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**CDC® MINI MODULE DRIVE**

**BZ5AX**

**BZ9AX**

**INSTALLATION AND CHECKOUT**

**MAINTENANCE**

**DIAGRAMS**

**WIRE LISTS**

**PARTS DATA**

## REVISION RECORD

| REVISION        | DESCRIPTION  |
|-----------------|--|
| 01<br>(09-1-78) | Preliminary Release  |
| A<br>(12-1-78)  | Original Release   |
| B<br>(2-16-79)  | Manual updated to include Engineering Change Orders 50436 and 50434. Technical and editorial change.   |
| C<br>(4-16-79)  | Manual updated to include Engineering Change Order 50490, 50491. Technical and Editorial changes.  |
| D<br>(6-14-79)  | Manual updated to include Engineering Change Orders 50440, 50535, 50534, 50476, 50462 and Field Change Order 50476. Technical and Editorial changes.   |
| E<br>(7-30-79)  | Manual updated to include Engineering Change Orders 50505, 50549, 50588, 50603, 50595. Incorporates Microprocessor, Technical, and Editorial changes.  |
| F<br>(10-15-79) | Manual updated to include Engineering Change Orders 50574, 50661. Technical and Editorial Changes.   |
| G<br>(1-3-80)   | Manual revised to incorporate Engineering Change Orders 50553, 50591, 50593, 50602, 50609, 50617, 50630, 50632, 50645, 50648A, 50657A, 50659, 50660, 50670, 50681A, 50685, 50697, 50705, 50715, 50719, 50720, 50727, 50729, 56283, 56549 and Field Change Order 50659. This edition obsoletes all previous editions. |

REVISION LETTERS I, O, Q  
AND X ARE NOT USED.

Address comments concerning this  
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Technical Publications Dept.  
7801 Computer Avenue  
Minneapolis, Mn 55435  
or use Comment Sheet in the back  
of this manual.

## REVISION RECORD (Contd)

| REVISION   | DESCRIPTION   |
|--|---|
| <p style="text-align: center;">H<br/>(3-18-80)</p> | <p>Manual revised to incorporate Series Code 17 changes, which includes ECOs 42238A, 49168, 50672, 50691A, 50721, 50734, 50743A, 50757, 50771, 50795, 50800, 50807, 50808A, 50809, 50814, 50824, 50835, 50838, 50843, 50848, 50853, 50860, 56604A, 58205.</p>             |
| <p style="text-align: center;">J<br/>(5-15-80)</p> | <p>Manual revised to incorporate Series Code 18 changes, which includes ECO's 50855, 50870, 50904, 50900, 50911, 50778A, and also technical and editorial changes.</p>  |
| <p style="text-align: center;">K<br/>(7-10-80)</p> | <p>Manual revised to incorporate Series Code 19 changes, which includes ECO's 50844, 50879, 50896A, 50920, 50916A, 50937, 50951A, 50935, 50977, 50976, and also technical and editorial changes.</p>  |
| <p style="text-align: center;">L<br/>(9-12-80)</p> | <p>Manual revised to incorporate Series Code 20 changes: ECO's 50897B, 50928, 50967A, 50973A, technical changes, and editorial changes.</p>   |
| <p style="text-align: center;">M<br/>(11-4-80)</p> | <p>Manual revised to incorporate Series Code 21 changes: ECO's 62003, 62004, 62014, 62029, 62028, 62043, 62044, 62071, technical changes, and editorial changes.</p>  |
| <p style="text-align: center;">N<br/>(2-12-81)</p> | <p>Manual revised to incorporate Series Code 22 changes: ECO's 62072, 62084, 62112, 62070, FCO's 62072, 62112, 62070, technical changes, and editorial changes. Also incorporated Series Code 23 change: ECO/FCO 62127. This edition obsoletes all previous editions.</p> |
| <p style="text-align: center;">P<br/>(3-10-81)</p> | <p>Manual revised to incorporate Series Code 23 changes: ECO's 62073, 62142, 49195, 49196, FCO's 62142, 62212, 62213, technical and editorial changes.</p>  |
| <p style="text-align: center;">R<br/>(5-1-81)</p>  | <p>Manual revised to incorporate the following Series Code 24 changes: ECO's 62140, 62182, 62199, 62224, 62225, technical changes, and editorial changes.</p>   |

## REVISION RECORD (Contd)

| REVISION       | DESCRIPTION  |
|----------------|--|
| S<br>(7-23-81) | Manual revised to incorporate the following Series Code 25 changes: ECO's 62226, 62253, 62266, 62309, technical changes, and editorial changes. Also incorporated FCO 02015.       |
| T<br>(9-23-81) | Manual revised to incorporate the following Series Code 26 changes: ECO's 02028, 02042, FCO's 02028, 02042, technical changes, and editorial changes. Also incorporated FCO 02099. |
| U<br>(12-4-81) | Manual revised to incorporate the following Series Code 27 changes: ECO's 02085, 02044, technical changes, and editorial changes.  |
| V<br>(2-17-82) | Manual revised to incorporate Series Code 28 technical and editorial changes.  |



## MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

**EXPLANATION:** Locate the equipment type and series code number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series code number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

This correlation sheet also applies to the following related manuals:

Publication No. 83323160 Rev. K

Publication No. \_\_\_\_\_ Rev. \_\_\_\_\_

| EQUIPMENT<br>TYPE | SERIES<br>CODE | WITH<br>FCOS | COMMENTS                |   |
|-------------------|----------------|--------------|-------------------------|---|
| BZ5AX/BZ9AX       | 09             | None         |                         |   |
|                   | 10             | None         |                         |   |
|                   | 11             | None         |                         |   |
|                   | 12             | 50476        | 50534<br>50535<br>50505 | Incorporates new front panel.<br>Read Recovery.<br>Write Fault Volt Marg.<br>Incorporates microprocessor servo. |
|                   | 13             | 50603        | 50591                   | Incorporates twisted pair wires.<br>Random seek errors.   |
|                   | 14             | 50632        | 50659                   | Eliminates data errors on FNRN.<br>Corrects Servo Seek error.   |
|                   | 15             | None         |                         |   |
|                   | 16             | None         |                         |   |
|                   | 17             | None         |                         |   |
|                   | 18             | None         |                         |   |
|                   | 19             | 50967A       |                         | 50967A applies to BZ5A1V/W, BZ5AG/H only  |

## MANUAL TO EQUIPMENT LEVEL CORRELATION (Contd)

| EQUIPMENT<br>TYPE | SERIES<br>CODE | WITH<br>FCOs | COMMENTS  |
|-------------------|----------------|--------------|---|
| BZ5AX/BZ9AX       | 20             | 62072        | FCO 62072 applies to BZ9A1J/K only                            |
|                   | 21             | 62112        | FCO 62112 applies to 80 MB units only                         |
|                   |                | 62070        | FCO 62070 applies to BZ5A1V/W, BZ5A5G/H only.                 |
|                   |                | 62212        | FCO 62212 applies to 80 MB units only.                        |
|                   |                | 62213        | FCO 62213 applies to 160 MB units only.                       |
|                   | 22             | 62127        | FCO 62142 applies to 160 MB units only.                       |
|                   |                | 62142        |   |
|                   | 23             | 02015        | FCO 02015 applies to BZ5A1E/F/V/W/Z, BZ5A5G/H, BZ9A1C/W only. |
|                   |                | 02099        | FCO 02099 applies to BZ9A1J/K only.                           |
|                   | 24             | None         |   |
|                   | 25             | 02028        | FCO 02028 applies to BZ9A1J/K Series Codes 23/24 only.        |
|                   |                | 02042        | FCO 02042 applies to BZ5A1B only.                             |
|                   | 26             | None         |   |
| 27                | None           |              |   |
| 28                | None           |              |   |

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New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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| Blank       | -          | xxxiv       | N          |
| Title P     | -          | S-1 Div     | -          |
| ii          | V          | Blank       | -          |
| iii         | R          | 1-1         | N          |
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| v           | V          | 1-3         | N          |
| vi          | V          | 1-4         | N          |
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| viii        | T          | 1-6         | N          |
| ix          | V          | 1-7         | N          |
| x           | V          | 1-8         | R          |
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| xii         | V          | 1-10        | S          |
| xiii        | V          | 1-11        | N          |
| xiv         | T          | 1-12        | N          |
| xv          | N          | 1-13        | N          |
| xvi         | N          | 1-14        | N          |
| xvii        | N          | 1-15        | N          |
| xviii       | N          | 1-16        | V          |
| xix         | N          | 1-17        | T          |
| xx          | V          | 1-18        | R          |
| xxi         | N          | 1-19        | N          |
| xxii        | S          | 1-20        | N          |
| xxiii       | T          | 1-21        | N          |
| xxiv        | U          | 1-22        | N          |
| xxv         | V          | 1-23        | N          |
| xxvi        | V          | 1-24        | N          |
| xxvii       | V          | 1-25        | N          |
| Blank       | -          | 1-26        | N          |
| xxix        | N          | 1-27        | N          |
| xxx         | T          | 1-28        | N          |
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| 1-34        | T          | Blank       | -          |
| 1-35        | N          | 2-21        | N          |
| 1-36        | N          | 2-22        | N          |
| 1-37        | N          | 2-23        | T          |
| 1-38        | N          | 2-24        | N          |
| 1-39        | N          | 2-25        | N          |
| 1-40        | N          | 2-26        | N          |
| 1-41        | N          | 2-27        | N          |
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| 1-43        | T          | 2-29        | N          |
| 1-44        | N          | 2-30        | N          |
| 1-45        | N          | 2-31        | N          |
| Blank       | -          | 2-32        | N          |
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| Blank       | -          | 2-38        | N          |
| 2-3         | N          | 2-39        | N          |
| 2-4         | N          | 2-40        | N          |
| 2-5         | N          | 2-41        | N          |
| 2-6         | N          | 2-42        | N          |
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| 2-11        | N          | 2-47        | N          |
| 2-12        | T          | 2-48        | N          |
| S-2B Div    | -          | 2-49        | N          |
| Blank       | -          | 2-50        | N          |
| 2-13        | N          | 2-51        | N          |
| 2-14        | N          | 2-52        | N          |
| 2-15        | T          | 2-53        | N          |
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| 2-17        | N          | 2-55        | N          |
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| 2-18.1      | S          | 2-57        | N          |
| Blank       | -          | 2-58        | N          |

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| Blank       | -          | 3-1         | E          |
| 2-63        | N          | 3-2         | E          |
| 2-64        | N          | 3-3         | E          |
| 2-65        | N          | 3-4         | E          |
| 2-66        | N          | 3-5         | E          |
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| 2-68        | V          | 3-7         | E          |
| 2-69        | V          | 3-8         | N          |
| 2-70        | N          | 3-9         | E          |
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| 2-82        | N          | 3-21        | N          |
| 2-83        | R          | 3-22        | N          |
| 2-84        | N          | 3-23        | N          |
| 2-85        | N          | Blank       | -          |
| 2-86        | T          | 3-25        | N          |
| 2-87        | N          | 3-26        | N          |
| 2-88        | N          | 3-27        | N          |
| 2-89        | N          | 3-28        | N          |
| 2-90        | T          | 3-29        | N          |
| 2-91        | N          | 3-30        | N          |
| 2-92        | N          | 3-31        | N          |
| 2-93        | T          | 3-32        | N          |
| 2-94        | N          | 3-33        | N          |
| 2-95        | R          | 3-34        | N          |
| 2-96        | V          | 3-35        | N          |
| 2-97        | V          | 3-36        | N          |

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| 3-37        | N          | 3-72        | N          |
| Blank       | -          | 3-73        | N          |
| 3-39        | V          | 3-74        | N          |
| 3-40        | V          | 3-75        | N          |
| 3-41        | U          | 3-76        | N          |
| 3-42        | T          | 3-77        | P          |
| 3-43        | T          | Blank       | -          |
| 3-44        | T          | 3-89        | V          |
| 3-45        | S          | 3-90        | N          |
| 3-46        | S          | 3-91        | N          |
| 3-47        | S          | 3-92        | N          |
| 3-48        | S          | 3-93        | N          |
| 3-49        | S          | 3-94        | N          |
| Blank       | -          | 3-95        | N          |
| 3-51        | U          | 3-96        | N          |
| 3-52        | U          | 3-97        | V          |
| 3-53        | S          | Blank       | -          |
| 3-54        | S          | 3-111       | U          |
| 3-55        | S          | 3-112       | U          |
| 3-56        | S          | 3-113       | U          |
| 3-57        | U          | 3-114       | N          |
| 3-58        | U          | 3-115       | N          |
| 3-59        | N          | 3-116       | N          |
| 3-60        | N          | 3-117       | N          |
| 3-61        | P          | 3-118       | N          |
| 3-62        | N          | 3-119       | N          |
| 3-62.1      | U          | 3-120       | N          |
| 3-62.2      | U          | 3-121       | S          |
| 3-62.3      | R          | 3-122       | N          |
| 3-62.4      | R          | 3-123       | N          |
| 3-62.5      | U          | 3-124       | N          |
| 3-62.6      | R          | 3-125       | N          |
| 3-63        | V          | 3-126       | N          |
| 3-64        | N          | 3-126.1     | R          |
| 3-65        | N          | 3-126.2     | R          |
| 3-66        | N          | 3-126.3     | R          |
| 3-67        | N          | 3-126.4     | R          |
| 3-68        | V          | 3-126.5     | R          |
| 3-69        | N          | 3-126.6     | R          |
| Blank       | -          | 3-126.7     | U          |
| 3-71        | N          | 3-126.8     | U          |

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| 3-126.10    | U          | 3-159       | N          |
| 3-126.11    | U          | 3-160       | N          |
| 3-126.12    | U          | 3-161       | T          |
| 3-127       | U          | 3-162       | T          |
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| 3-130       | S          | 3-165       | N          |
| 3-131       | S          | Blank       | -          |
| 3-132       | S          | 3-167       | R          |
| 3-133       | S          | 3-168       | N          |
| Blank       | -          | 3-169       | R          |
| 3-135       | U          | 3-170       | N          |
| 3-136       | U          | 3-171       | R          |
| 3-137       | S          | 3-172       | N          |
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| 3-139       | S          | 3-174       | R          |
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| 3-140.1     | U          | 3-176       | N          |
| 3-140.2     | U          | 3-177       | N          |
| 3-140.3     | R          | 3-178       | N          |
| 3-140.4     | R          | 3-179       | N          |
| 3-140.5     | U          | 3-180       | N          |
| 3-140.6     | R          | 3-181       | N          |
| 3-141       | N          | 3-182       | N          |
| 3-142       | N          | 3-183       | N          |
| 3-143       | N          | 3-184       | N          |
| Blank       | -          | 3-185       | N          |
| 3-145       | N          | 3-186       | N          |
| 3-146       | N          | 3-187       | N          |
| 3-147       | N          | 3-188       | N          |
| 3-148       | N          | 3-189       | N          |
| 3-149       | N          | 3-190       | N          |
| 3-150       | N          | 3-191       | N          |
| 3-151       | U          | 3-192       | N          |
| 3-152       | N          | 3-193       | N          |
| 3-153       | U          | 3-194       | N          |
| 3-154       | N          | 3-195       | N          |
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| Blank       | -          | 5-25        | U          |
| 4-1         | N          | 5-26        | T          |
| 4-2         | N          | 5-27        | P          |
| 4-3         | N          | 5-28        | V          |
| 4-4         | N          | 5-29        | V          |
| 4-5         | N          | Blank       | -          |
| 4-6         | N          | 5-31        | V          |
| 4-7         | N          | 5-32        | U          |
| 4-8         | N          | 5-33        | V          |
| 4-9         | N          | 5-34        | V          |
| 4-10        | N          | 5-35        | V          |
| 4-11        | N          | Blank       | -          |
| Blank       | -          | 5-37        | V          |
| S-5 Div     | -          | 5-38        | V          |
| Blank       | -          | 5-39        | V          |
| 5-1         | P          | 5-40        | U          |
| Blank       | -          | S-5B Div    | -          |
| S-5A Div    | -          | Blank       | -          |
| Blank       | -          | 5-41        | M          |
| 5-3         | H          | 5-42        | M          |
| Blank       | -          | 5-43        | V          |
| 5-5         | J          | 5-44        | V          |
| 5-6         | V          | 5-45        | S          |
| 5-7         | U          | 5-46        | U          |
| Blank       | -          | 5-47        | V          |
| 5-9         | V          | 5-48        | V          |
| 5-10        | V          | 5-49        | V          |
| 5-11        | V          | 5-50        | V          |
| 5-12        | V          | 5-51        | V          |
| 5-13        | T          | 5-52        | V          |
| Blank       | -          | 5-53        | V          |
| 5-15        | V          | 5-54        | V          |
| 5-16        | V          | 5-55        | V          |
| 5-17        | V          | 5-56        | V          |
| 5-18        | V          | 5-57        | V          |
| 5-19        | V          | Blank       | -          |
| 5-20        | T          | Cmt Sht     | -          |
| 5-21        | V          | Rtn Env     | -          |
| 5-22        | T          | Blank       | -          |
| 5-23        | M          | Cover       | -          |



## PREFACE

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This manual contains maintenance information for the CONTROL DATA® BZ5AX/BZ9AX (refer to the Configuration Chart in the front matter of this manual for a complete listing of equipment numbers) Mini Module Drives (MMD). It is prepared for customer engineers and other technical personnel directly involved with maintaining the MMD.

The information in this manual is presented as follows:

- Section 1 - Installation and Checkout. Contains site requirements, unpackaging and inspection, installation, and checkout.
- Section 2 - Maintenance. Contains general maintenance information, tests and adjustments, trouble analysis, repair and replacement.
- Section 3 - Diagrams. Contains logic diagrams.
- Section 4 - Wire Lists. Contains wire lists.
- Section 5 - Parts Data. Contains illustrated parts breakdown and spare parts list.

The following manuals apply to the MMD and are available from Control Data Corporation, Literature Distribution Services, 308 North Dale Street, St. Paul, MN 55103:

| <u>Publication No.</u> | <u>Title</u>   |
|------------------------|--|
| 83323150               | BZ5AX/BZ9AX Hardware Maintenance Manual  |
| 83323160               | BZ5AX/BZ9AX Hardware Reference Manual  |
| 83323970               | Special Supplement (applies to BZ5A1J/K/R/S, BZ5A2C/D/G/H units only).                 |
| 83323850               | Special Supplement (applies to BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D/E/F units only). |
| 83324470               | Special Supplement (applies to BZ5A9L/M, BZ9A7A/B units only)                          |
| 83324530               | Special Supplement (applies to BZ5A9N/P units only)                                    |
| 83322440               | CDC Microcircuits, Volume 1 (provides functional descriptions for integrated circuits) |
| 83324440               | CDC Microcircuits, Volume 2 (provides functional descriptions for integrated circuits) |
| 83323790               | A Guide for the Disk Drive Operator  |

## WARNING

To ensure the integrity of safety features built into these drives, installation and maintenance must be performed only by qualified service personnel using designated CDC/MPI parts. Also, in case of fire or other emergency, isolate the drives from main power by disconnecting the drive power plugs from their site power receptacles. In situations where pulling the plugs is not possible or practical (such as in a rack mount installation), use the system main power disconnect to isolate the drives from main power.

## WARNUNG

Um das einwandfreie Funktionieren der eingebauten Schutzvorrichtungen zu gewährleisten, darf die Installation und Wartung nur von qualifiziertem Service-Personal unter Verwendung von Original CDC/MPI Teilen durchgeführt werden. Beim Ausbrechen von Feuer oder in anderen Notfällen ist die Verbindung zum Hauptstromnetz dadurch zu unterbrechen, dass die Stecker der Antriebe aus den Steckdosen gezogen werden. Sollte dies nicht möglich oder unpraktisch sein (z. B. dann, wenn die Stationen übereinander installiert sind), ist der Hauptstromunterbrecher des Systems zu bedienen, um die Antriebe vom Hauptstromnetz zu trennen.

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## CONFIGURATION CHART

| Equip No.<br>(BZ) | Part Number | Power<br>Volts/Hz/W | Data<br>Cap.<br>(MB) | Dual<br>Ch | Fxd<br>Hds | Long<br>Last<br>Sctr | Crg<br>Ofs | Part No. for<br>Painted Parts |                  |
|-------------------|-------------|---------------------|----------------------|------------|------------|----------------------|------------|-------------------------------|------------------|
|                   |             |                     |                      |            |            |                      |            | Color<br>Panel                | Control<br>Panel |
| 5A1A              | 73036702    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 5A1B              | 73036703    | 220/50/420          | 80                   | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 5A1C              | 73036726    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036419                      | 82395920         |
| 5A1D              | 73036727    | 220/50/420          | 80                   | No         | No         | No                   | No         | 73036419                      | 82395920         |
| 5A1E              | 73036747    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036412                      | 73043800         |
| 5A1F              | 73036728    | 240/50/420          | 80                   | No         | No         | No                   | No         | 73036417                      | 82395918         |
| 5A1G              | 73036761    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036412                      | 73062401         |
| 5A1H              | 73036729    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 5A1J*             | 73036730    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036424                      | 82395923         |
| 5A1K*             | 73036731    | 220/50/420          | 80                   | No         | No         | No                   | No         | 73036424                      | 82395923         |
| 5A1L              | 82397707    | 240/60/460          | 80                   | No         | No         | No                   | Mo         | 73036404                      | 82395902         |
| 5A1R*             | 73036748    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036424                      | 82395923         |
| 5A1S*             | 73036749    | 220/50/420          | 80                   | No         | No         | No                   | No         | 73036424                      | 82395923         |
| 5A1T              | 73036762    | 120/60/480          | 80                   | No         | No         | No                   | No         | 73036412                      | 73062401         |
| 5A1U              | 73036763    | 220/50/420          | 80                   | No         | No         | No                   | No         | 73036412                      | 73062401         |
| 5A1V              | 73036764    | 120/60/480          | 80                   | No         | No         | No                   | Yes        | 73036433                      | 82395933         |
| 5A1W              | 73036765    | 220/50/420          | 80                   | No         | No         | No                   | Yes        | 73036433                      | 82395933         |
| 5A1Z              | 73036777    | 220/50/420          | 80                   | No         | No         | No                   | No         | 73036415                      | 82395916         |
| 5A2A              | 73036708    | 120/60/480          | 80                   | Yes        | No         | No                   | No         | 73036412                      | 82395902         |
| 5A2B              | 73036709    | 220/50/420          | 80                   | Yes        | No         | No                   | No         | 73036412                      | 82395902         |
| 5A2C*             | 73036732    | 120/60/480          | 80                   | Yes        | No         | No                   | No         | 73036424                      | 82395923         |
| 5A2D*             | 73036733    | 220/50/420          | 80                   | Yes        | No         | No                   | No         | 73036424                      | 82395923         |
| 5A2E*             | 73036736    | 120/60/480          | 80                   | Yes        | No         | No                   | No         | 47365522                      | 82395001         |
| 5A2F*             | 73036737    | 220/50/420          | 80                   | Yes        | No         | No                   | No         | 47365522                      | 82395001         |
| 5A2G*             | 73036750    | 120/60/480          | 80                   | Yes        | No         | No                   | No         | 73036424                      | 82395923         |
| 5A2H*             | 73036751    | 220/50/420          | 80                   | Yes        | No         | No                   | No         | 73036424                      | 82395923         |
| 5A2J              | 73036787    | 120/60/480          | 80                   | Yes        | No         | No                   | No         | 73036412                      | 82395902         |
| 5A3A              | 73036704    | 120/60/480          | 80                   | No         | 48         | No                   | No         | 73036412                      | 82395902         |
| 5A3B              | 73036705    | 220/50/420          | 80                   | No         | 48         | No                   | No         | 73036412                      | 82395902         |
| 5A4A              | 73036710    | 120/60/480          | 80                   | Yes        | 48         | No                   | No         | 73036412                      | 82395902         |
| 5A4B              | 73036711    | 220/50/420          | 80                   | Yes        | 48         | No                   | No         | 73036412                      | 82395902         |

\* Special Supplement manual used in conjunction with this manual.  
Refer to Preface for publication number.

## CONFIGURATION CHART (Contd)

| Equip No. (BZ) | Part Number | Power Volts/Hz/W | Data Cap (MB) | Dual Ch | Fxd Hds | Long Last Sctr | Crg Ofs | Part No. for Painted Parts |               |
|----------------|-------------|------------------|---------------|---------|---------|----------------|---------|----------------------------|---------------|
|                |             |                  |               |         |         |                |         | Color Panel                | Control Panel |
| 5A5A           | 73036706    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036412                   | 82395902      |
| 5A5B           | 73036707    | 220/50/420       | 80            | No      | 96      | No             | No      | 73036412                   | 82395902      |
| 5A5D           | 73036794    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036404                   | 82395933      |
| 5A5F           | 73036795    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036407                   | 82395907      |
| 5A5G           | 73036775    | 120/60/480       | 80            | No      | 96      | No             | Yes     | 73036433                   | 82395933      |
| 5A5H           | 73036776    | 220/50/420       | 80            | No      | 96      | No             | Yes     | 73036433                   | 82395933      |
| 5A5J           | 73036788    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036404                   | 82395933      |
| 5A5K           | 73036796    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036404                   | 82395933      |
| 5A5L           | 73036797    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036407                   | 82395907      |
| 5A6A           | 73036712    | 120/60/480       | 80            | Yes     | 96      | No             | No      | 73036412                   | 82395902      |
| 5A6B           | 73036713    | 220/50/420       | 80            | Yes     | 96      | No             | No      | 73036412                   | 82395902      |
| 5A6C*          | 73036734    | 120/60/480       | 80            | Yes     | 96      | No             | No      | 47365522                   | 82395001      |
| 5A6D*          | 73036735    | 220/50/420       | 80            | Yes     | 96      | No             | No      | 47365522                   | 82395001      |
| 5A9B           | 73036778    | 220/50/420       | 80            | No      | No      | No             | No      | 73036436                   | 82395935      |
| 5A9C           | 73036781    | 120/60/480       | 80            | No      | No      | No             | No      | 73036411                   | 82395944      |
| 5A9D           | 73036782    | 220/50/420       | 80            | No      | No      | No             | No      | 73036411                   | 82395944      |
| 5A9E           | 73036779    | 120/60/480       | 80            | No      | 96      | No             | No      | 73036412                   | 82395902      |
| 5A9F           | 73036780    | 220/50/480       | 80            | No      | 96      | No             | No      | 73036412                   | 82395902      |
| 5A9G           | 73036783    | 120/60/480       | 80            | No      | No      | No             | No      | 73036439                   | 82395919      |
| 5A9H           | 73036784    | 220/50/420       | 80            | No      | No      | No             | No      | 73036439                   | 82395919      |
| 5A9J           | 73036785    | 120/60/480       | 80            | No      | No      | No             | No      | 73036412                   | 82395902      |
| 5A9K           | 73036786    | 220/50/420       | 80            | No      | No      | No             | No      | 73036412                   | 82395902      |
| 5A9L*          | 73036789    | 120/60/480       | 80            | No      | No      | No             | No      | Not used                   | 73083700      |
| 5A9M*          | 73036790    | 220/50/420       | 80            | No      | No      | No             | No      | Not used                   | 73083700      |
| 5A9N*          | 73036798    | 120/60/480       | 80            | No      | No      | No             | No      | 73036412                   | 82395902      |
| 5A9P*          | 73036799    | 220/50/420       | 80            | No      | No      | No             | No      | 73036412                   | 82395902      |
| 5A9R           | 82399702    | 120/60/480       | 80            | No      | No      | No             | No      | 73036404                   | 82395902      |
| 9A1A           | 73036802    | 120/60/480       | 160           | No      | No      | No             | No      | 73036412                   | 82395902      |
| 9A1B           | 73036803    | 220/50/420       | 160           | No      | No      | No             | No      | 73036412                   | 82395902      |
| 9A1C           | 73036845    | 120/60/480       | 160           | No      | No      | No             | No      | 73036412                   | 82395902      |
| 9A1E           | 73036853    | 120/60/480       | 160           | No      | No      | No             | No      | 73036412                   | 82395902      |
| 9A1F           | 73036854    | 220/50/420       | 160           | No      | No      | No             | No      | 73036412                   | 82395902      |
| 9A1G           | 73036855    | 120/60/480       | 160           | No      | No      | No             | No      | 73036446                   | 82395945      |
| 9A1H           | 73036856    | 220/50/420       | 160           | No      | No      | No             | No      | 73036446                   | 82395945      |
| 9A1J           | 73036867    | 120/60/480       | 160           | No      | No      | Yes            | No      | 73036437                   | 82395949      |
| 9A1K           | 73036868    | 220/50/420       | 160           | No      | No      | Yes            | No      | 73036437                   | 82395949      |
| 9A1L           | 73036869    | 120/60/480       | 160           | No      | 48      | Yes            | No      | 73036437                   | 82395949      |

\* Special Supplement manual used in conjunction with this manual. Refer to Preface for publication number.

## CONFIGURATION CHART (Contd)

| Equip No.<br>(BZ) | Part Number | Power<br>Volts/Hz/W | Data<br>Cap<br>(MB) | Dual<br>Ch | Fxd<br>Hds | Long<br>Last<br>Sctr | Crg<br>Ofs | Part No. for<br>Painted Parts |                  |
|-------------------|-------------|---------------------|---------------------|------------|------------|----------------------|------------|-------------------------------|------------------|
|                   |             |                     |                     |            |            |                      |            | Color<br>Panel                | Control<br>Panel |
| 9A1M              | 73036870    | 220/50/420          | 160                 | No         | 48         | Yes                  | No         | 73036437                      | 82395949         |
| 9A1N              | 73036873    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A1P              | 73036874    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036411                      | 82395944         |
| 9A1R              | 73036875    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036411                      | 82395944         |
| 9A1S              | 73036876    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036443                      | 82395942         |
| 9A1T              | 73036877    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036443                      | 82395942         |
| 9A1U              | 73036878    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036446                      | 82395945         |
| 9A1V              | 73036879    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036446                      | 82395945         |
| 9A1W              | 73036886    | 240/50/420          | 160                 | No         | No         | No                   | No         |                               | 82395918         |
| 9A1Y              | 73036893    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A1Z              | 73036887    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A2A              | 73036808    | 120/60/480          | 160                 | Yes        | No         | No                   | No         | 47365522                      | 82395902         |
| 9A2B              | 73036809    | 220/50/420          | 160                 | Yes        | No         | No                   | No         | 47365522                      | 82395902         |
| 9A2C*             | 73036882    | 120/60/480          | 160                 | Yes        | No         | No                   | No         | 73036422                      | 82395001         |
| 9A2D*             | 73036883    | 220/50/420          | 160                 | Yes        | No         | No                   | No         | 73036422                      | 82395001         |
| 9A3A              | 73036804    | 120/60/480          | 160                 | No         | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A3B              | 73036805    | 220/50/420          | 160                 | No         | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A4A              | 73036810    | 120/60/480          | 160                 | Yes        | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A4B              | 73036811    | 220/50/420          | 160                 | Yes        | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A5A              | 73036806    | 120/60/480          | 160                 | No         | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A5B              | 73036807    | 220/50/420          | 160                 | No         | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A5C              | 73036865    | 120/60/480          | 160                 | No         | 96         | No                   | No         | 73036446                      | 82395945         |
| 9A5D              | 73036866    | 220/50/420          | 160                 | No         | 96         | No                   | No         | 73036446                      | 82395945         |
| 9A5E              | 73036871    | 120/60/480          | 160                 | No         | 96         | Yes                  | No         | 73036437                      | 82395949         |
| 9A5F              | 73036872    | 220/50/420          | 160                 | No         | 96         | Yes                  | No         | 73036437                      | 82395949         |
| 9A5G              | 73036880    | 120/60/480          | 160                 | No         | 96         | No                   | No         | 73036441                      | 82395940         |
| 9A5H              | 73036881    | 220/50/420          | 160                 | No         | 96         | No                   | No         | 73036441                      | 82395940         |
| 9A6A              | 73036812    | 120/60/480          | 160                 | Yes        | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A6B              | 73036813    | 220/50/420          | 160                 | Yes        | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A6C*             | 73036884    | 120/60/480          | 160                 | Yes        | 96         | No                   | No         | 47365522                      | 82395001         |
| 9A6D*             | 73036885    | 220/50/420          | 160                 | Yes        | 96         | No                   | No         | 47365522                      | 82395001         |
| 9A6E*             | 82399808    | 120/60/480          | 160                 | Yes        | 96         | No                   | No         | 73036422                      | 82395910         |
| 9A6F*             | 82399809    | 220/50/420          | 160                 | Yes        | 96         | No                   | No         | 73036422                      | 82395910         |
| 9A7A*             | 73036888    | 120/60/480          | 160                 | No         | No         | No                   | No         | Not used                      | 73083700         |
| 9A7B*             | 73036889    | 220/50/420          | 160                 | No         | No         | No                   | No         | Not used                      | 73083700         |
| 9A7C              | 73036894    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036439                      | 82395919         |
| 9A7D              | 73036895    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036439                      | 82395919         |
| 9A7E              | 73036896    | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036402                      | 82395904         |
| 9A7F              | 73036897    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036402                      | 82395904         |
| 9A7G              | 73036898    | 240/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A7L              | 82399806    | 240/60/460          | 160                 | No         | No         | No                   | No         | 73036404                      | 82395902         |
| 9A7M              | 82399807    | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036436                      | 82395935         |

\* Special Supplement manual used in conjunction with this manual.  
Refer to Preface for publication number.



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## ABBREVIATIONS

---

|      |   |       |  |
|------|---|-------|--|
| A    | Ampere                                  | BLU   | Blue                                       |
| ABR  | Absolute Reserve                        | BLW   | Below                                      |
| ABV  | Above                                   | BOB   | Bus Out Bit                                |
| ac   | Alternating Current                     | BRN   | Brown                                      |
| ADD  | Address                                 | BTN   | Button                                     |
| ADDR | Address                                 | C     | Celsius                                    |
| ADJ  | Adjustment                              | CAP   | Capacitor, Capacity                        |
| ADRS | Address                                 | CAR   | Cylinder Address Register                  |
| AGC  | Automatic Gain Control                  | CB    | Circuit Breaker                            |
| AM   | Address Mark                            | CDC   | Control Data Corporation                   |
| AMP  | Amplifier, Ampere                       | CH    | Channel                                    |
| AMPL | Amplifier                               | CHAN  | Channel                                    |
| ANAL | Analog                                  | CLK   | Clock                                      |
| APA  | Track Average<br>Base-To-Peak Amplitude | CLR   | Clear                                      |
| APPA | Track Average<br>Peak-To-Peak Amplitude | cm    | Centimeter                                 |
| ASSY | Assembly                                | CMOS  | Complementary Metal<br>Oxide Semiconductor |
| BH   | Behind Home                             | CNTGL | Centrifugal                                |
| BIB  | Bus In Bit                              | CNTR  | Counter                                    |
| BIN  | Binary                                  | COM   | Common                                     |
| BLK  | Black                                   | COMP  | Component, Compare                         |

## ABBREVIATIONS (Contd)

|        |                                      |       |                    |
|--------|--------------------------------------|-------|--------------------|
| CONFIG | Configuration                        | EN    | Enable             |
| CONTD  | Continued                            | EOT   | End of Track       |
| CRC    | Cyclic Redundancy Check              | EQUIP | Equipment          |
| CRG    | Carriage                             | EXT   | External           |
| CS     | Chip Select                          | F     | Fahrenheit, Fuse   |
| CT     | Center Tap                           | FCO   | Field Change Order |
| CTR    | Counter                              | FF    | Flip Flop          |
| CYL    | Cylinder                             | FH    | Fixed Head         |
| D/A    | Digital to Analog Converter          | FIG   | Figure             |
| dc     | Direct Current                       | FLT   | Fault              |
| DCDR   | Decoder                              | FREQ  | Frequency          |
| DEMOD  | Demodulator                          | ft    | Foot               |
| DIFF   | Difference                           | FTU   | Field Test Unit    |
| DIG    | Digital                              | FWD   | Forward            |
| DIS    | Disable                              | FXD   | Fixed              |
| DLT    | Decision Logic Table                 | GB    | Guard Band         |
| DRVR   | Driver                               | GEN   | Generator          |
| ECL    | Emitter Coupled Logic, Enabled Clock | GND   | Ground             |
| ECO    | Engineering Change Order             | GP    | Group              |
| EMER   | Emergency                            | GRN   | Green              |
| EMG    | Emergency                            | GRY   | Grey               |
|        |                                      | HD    | Head               |
|        |                                      | HDA   | Head Disk Assembly |

## ABBREVIATIONS (Contd)

|            |                             |       |                               |
|------------|-----------------------------|-------|-------------------------------|
| HEX        | Hexagon                     | LSD   | Least Significant Digit       |
| Hg         | Mercury                     | LSI   | Large Scale Integration       |
| Hz         | Hertz                       | LZ    | Landing Zone                  |
| IC         | Integrated Circuit          | m     | Meter                         |
| ID         | Identification              | MACH  | Machine                       |
| IDENT      | Identification              | MAG   | Magnitude                     |
| IDX        | Index                       | MAINT | Maintenance                   |
| in         | Inch                        | MAX   | Maximum                       |
| INT        | Internal                    | MB    | Megabyte                      |
| INTEG      | Integrator                  | MC    | Master Clear                  |
| I/O        | Input/Output                | MET   | Metal                         |
| IPB        | Illustrated Parts Breakdown | MFM   | Modified Frequency Modulation |
| IRQ        | Interrupt Request           | MH    | Moveable Head                 |
| kg         | Kilogram                    | MHz   | Megahertz                     |
| kHz        | Kilohertz                   | MIN   | Minimum                       |
| kPa        | Kilopascal                  | MK    | Mark                          |
| kW         | Kilowatt                    | mm    | Millimeter                    |
| k $\Omega$ | Kilohm                      | MMD   | Mini Module Drive             |
| lb         | Pound                       | MOD   | Module                        |
| lbf        | Pound-Force                 | MOV   | Movable                       |
| LD         | Level Detect                | MPI   | Magnetic Peripherals, Inc.    |
| LED        | Light Emitting Diode        |       |                               |
| LOC        | Local, Location             |       |                               |

## ABBREVIATIONS (Contd)

|      |                                   |        |                              |
|------|-----------------------------------|--------|------------------------------|
| MPU  | Microprocessor Unit               | PC     | Printed Circuit              |
| ms   | Millisecond                       | PHH    | Phillips Head                |
| MSD  | Most Significant Digit            | PIA    | Peripheral Interface Adapter |
| MTR  | Motor                             | PLO    | Phase Lock Oscillator        |
| MULT | Multiple                          | PN     | Part Number                  |
| MUX  | Multiplexer                       | PNH    | Pan Head                     |
| N    | Newton                            | POS    | Positive                     |
| NC   | No Connection,<br>Normally Closed | POSN   | Position                     |
| NEG  | Negative                          | PP     | Peak-To-Peak                 |
| NFR  | Not Field Replaceable             | PREAMP | Preamplifier                 |
| NMI  | Non Maskable Interrupt            | PTM    | Programmable Timing Module   |
| NO   | Number, Normally Open             | PVA    | Peak Variation               |
| NOM  | Nominal                           | PWR    | Power                        |
| NORM | Normal                            | RAM    | Random Access Memory         |
| NRM  | Normal                            | RCVR   | Receiver                     |
| NRZ  | Non Return To Zero                | RD     | Read                         |
| ns   | Nanosecond                        | RDY    | Ready                        |
| Nsec | Nanosecond                        | RECAL  | Recalibrate                  |
| OFS  | Offset                            | RECT   | Rectified                    |
| OGB  | Outer Guard Band                  | REF    | Reference                    |
| ORN  | Orange                            | REG    | Regulator, Regulated         |
| OS   | One Shot                          | REM    | Remote                       |
| OSC  | Oscillator                        |        |                              |

## ABBREVIATIONS (Contd)

|       |                              |        |                               |
|-------|------------------------------|--------|-------------------------------|
| RES   | Reserved, Resolution         | SLFTPG | Self Tapping                  |
| RET   | Retract                      | SW     | Switch                        |
| REV   | Reverse, Revision            | TERM   | Terminator                    |
| RFI   | Radio Frequency Interference | TF     | Thread Forming                |
| RGTR  | Register                     | TLA    | Top Level Assembly            |
| RH    | Relative Humidity            | TP     | Test Point                    |
| r/min | Revolutions Per Minute       | TRANS  | Transition                    |
| ROM   | Read Only Memory             | TRK    | Track                         |
| RPM   | Revolutions Per Minute       | TTL    | Transistor-Transistor Logic   |
| RPS   | Rotational Position Sensing  | V      | Volts, Voltage                |
| RTM   | Reserve Timeout              | V ac   | Volts Alternating Current     |
| RTZ   | Return to Zero               | VCO    | Voltage Controlled Oscillator |
| R/W   | Read/Write                   | VEL    | Velocity                      |
| s     | Second, Single               | VFL    | Velocity Follow Latch         |
| S/C   | Series Code                  | VIO    | Violet                        |
| SCH   | Socket Head                  | VMA    | Valid Memory Address          |
| SCTR  | Sector                       | VOM    | Voltohmeter                   |
| SEC   | Second                       | W      | Watts, Write                  |
| SEL   | Select                       | W/     | With                          |
| SEQ   | Sequence                     | WHT    | White                         |
| SH    | Sheet                        | W/O    | Without                       |
| SHLDR | Shoulder                     | W PROT | Write Protect                 |

## ABBREVIATIONS (Contd)

|        |                     |
|--------|---------------------|
| W+R    | Write or Read       |
| W•R    | Write and Read      |
| WRT    | Write               |
| W/W    | Wirewrap            |
| XDUCER | Transducer          |
| XMTR   | Transmitter         |
| XTAL   | Crystal             |
| YEL    | Yellow              |
| μ      | Micro               |
| μF     | Microfarad          |
| μH     | Microhenry          |
| μP     | Microprocessor      |
| μS     | Microsecond         |
| ±XXXX  | Hexadecimal Number  |
| \$XXXX | Hexadecimal Address |



**SECTION 1**

**INSTALLATION AND CHECKOUT**



---

## INTRODUCTION

The information contained in this section describes installation and initial checkout of the MMD.

## SITE REQUIREMENTS

### GENERAL

The site requirements considered are environment, space, power, grounding, and interface.

### ENVIRONMENTAL REQUIREMENTS

There are no special environmental requirements for the MMD beyond those listed in the reference manual.

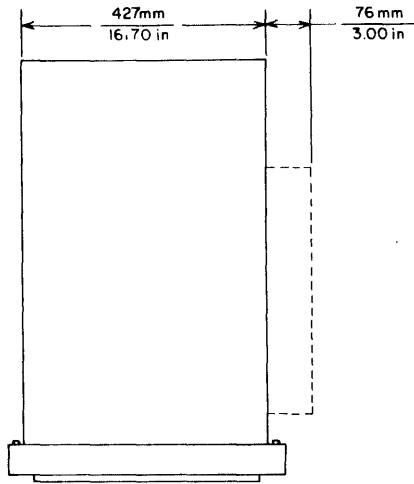
### SPACE REQUIREMENTS

The MMD slide mounts into a 483 mm (19 in) standard rack. The slide action allows a complete outward extension of the unit for ease of maintenance. The space requirements are shown in figure 1-1.

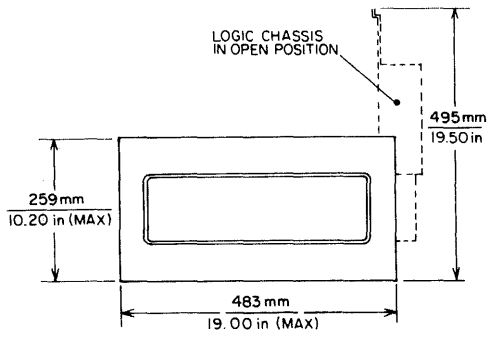
The mass of the drive is 45.4 kg (100 lbs). In the extended position, the drive center of gravity is approximately 300 mm (12 in) from the rack front.

### POWER REQUIREMENTS

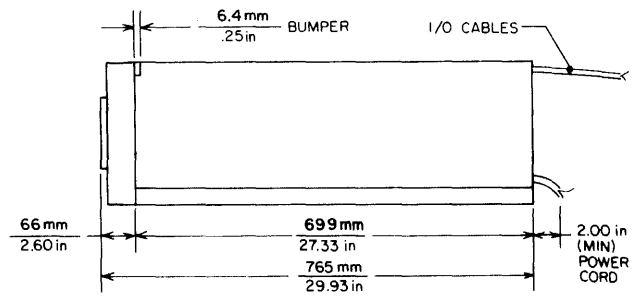
Drive ac power requirements are listed in table 1-1. Conversion to the different line voltages is explained in the Transformer Wiring paragraphs. Drive current versus start-up time is shown in figure 1-2 for 120, 220, and 240 volt connections.



TOP VIEW



FRONT VIEW



SIDE VIEW

9P215C

Figure 1-1. MMD Space Requirements

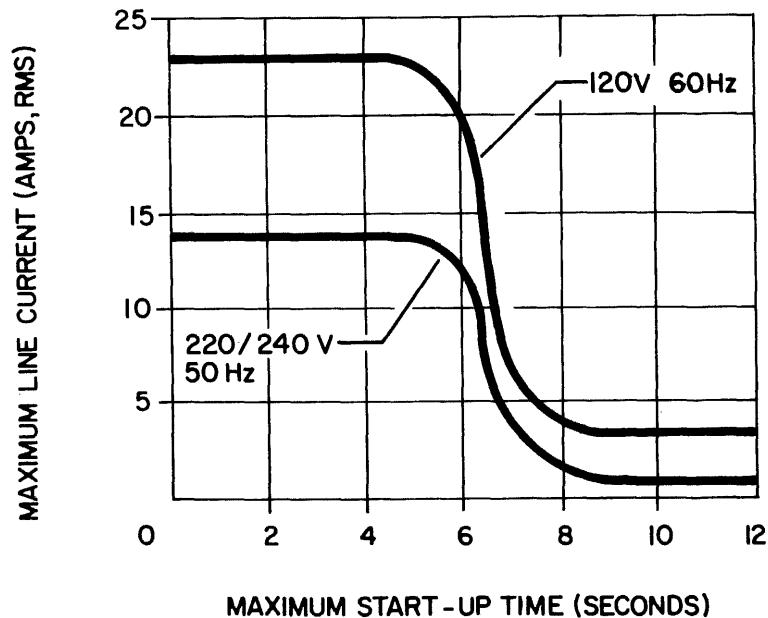
TABLE 1-1. POWER REQUIREMENTS

| Specifications                               | Value                |                         |                          |                     |
|--|----------------------|-------------------------|--------------------------|---------------------|
| AC Power Input Options                       | <u>Voltage</u>       |                         | <u>Frequency</u>         | <u>Phase</u>        |
|  | 120 (+8, -18) V      |                         | 60 (+.6, -1) Hz          | 1                   |
|  | 220 (+15, -25) V     |                         | 50 (+.5, -1) Hz          | 1                   |
| 240 (+17, -27) V                             |                      | 50 (+.5, -1) Hz         | 1                        |                     |
| Power Used with Disks and Carriage in Motion | <u>Power Input</u>   | <u>Max Line Current</u> | <u>Power Consumption</u> | <u>Power Factor</u> |
|  | 120 V, 60 Hz         | 5.2 A                   | 0.52 kW                  | 0.83                |
|  | 220 V, 50 Hz         | 2.7 A                   | 0.49 kW                  | 0.75                |
|  | 240 V, 50 Hz         | 2.7 A                   | 0.49 kW                  | 0.75                |
| Power used with Disks and Carriage at Rest   | <u>Power Input</u>   | <u>Max Line Current</u> | <u>Power Consumption</u> | <u>Power Factor</u> |
|  | 120 V, 60 Hz         | 1.41 A                  | 0.15 kW                  | 0.9                 |
|  | 220 V, 50 Hz         | 0.67 A                  | 0.18 kW                  | 0.9                 |
|  | 240 V, 50 Hz         | 0.67 A                  | 0.18 kW                  | 0.9                 |
| Start Up Current                             | Refer to figure 1-2. |                         |                          |                     |

**GROUNDING REQUIREMENTS**

**General**

Safety grounding, connecting the drive power cord to a grounded outlet, and system grounding, connecting the controller and drives to earth ground, are discussed in the following paragraphs.



9T254

Figure 1-2. Line Current Versus Start-Up Time

### Safety Grounding

A safety ground must be provided by the site ac power system. The green (or green and yellow striped) wire in the drive's power cord provides the safety ground connection between the drive and the power system. In turn, the site ac power system must tie this connection (safety ground) to earth ground. All site ac power connection points, including convenience outlets for test equipment, must be maintained at the same safety ground potential.

### System Grounding

In addition to safety grounding, a system ground connection is also required. The following paragraphs describe various grounding configurations and suggest the correct choice for a particular site. The Installation Procedures in this section have separate grounding instructions for each configuration. Detailed schematic diagrams of the grounding configurations are provided with these procedures. It is necessary to select the best configuration before beginning to ground the system.

The following discussion relates to site features and site planning. The three grounding choices are presented in the order of effectiveness.

If the site has a floor grid, it should be used. A typical floor grid is shown in figure 1-3. It consists of a mechanical structure which supports a false floor. The elements of the grid are connected electrically to ensure that the entire grid is at ground potential. The controller and MMDs are grounded to the floor grid, and the floor grid must be connected to earth ground. If the floor grid is not grounded, connect the controller to both the grid and earth ground.

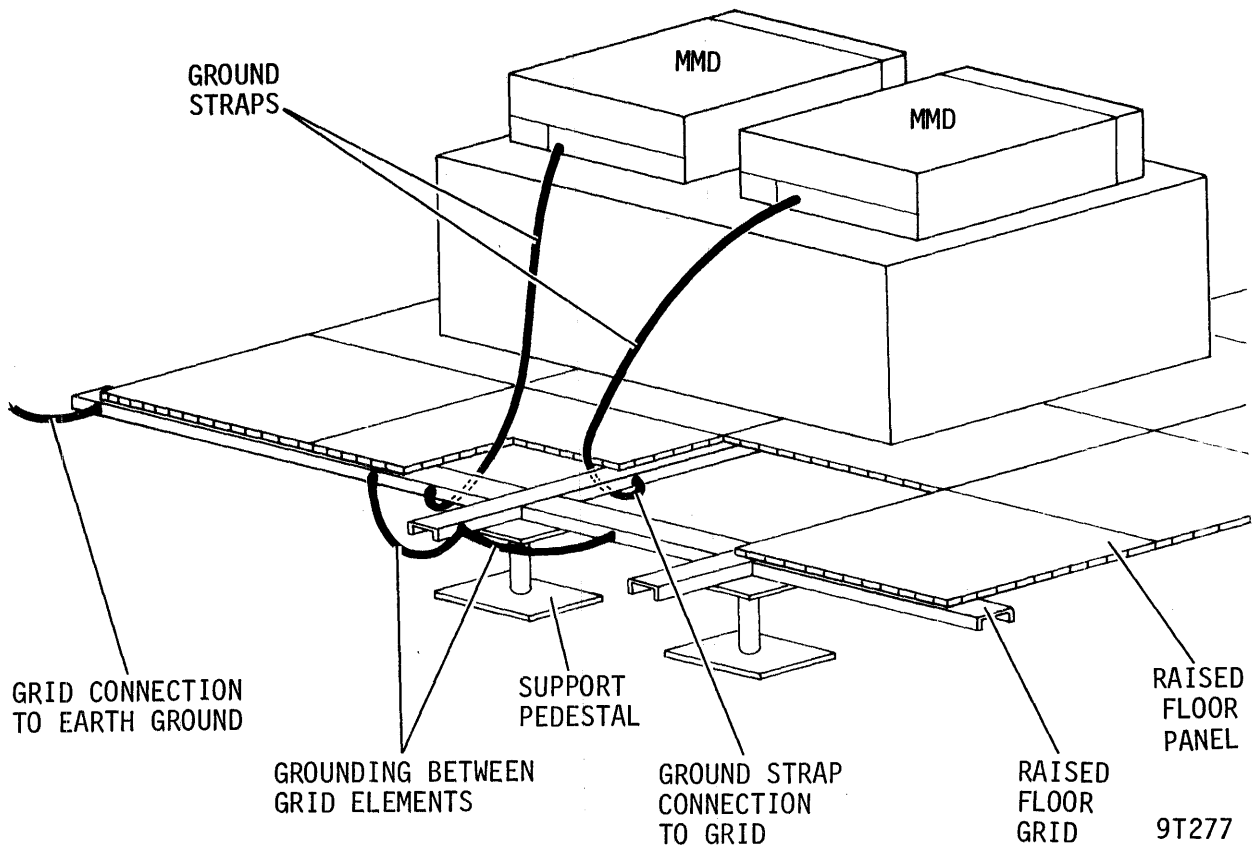


Figure 1-3. Typical Floor Grid

If the site has no floor grid, the controller and MMDs must be grounded with a system of heavy ground straps. This can be a star or a daisy chain system, but star connecting the units is preferable. A star system has ground straps fanning out from the controller to each drive; a daisy chain system has ground straps going from drive to drive and then to the controller. In both systems the controller must be connected to earth ground.

When drives are added to an existing system, the grounding must be consistent within the system. For instance, do not star connect a new drive when the other units are daisy chained together.

## INTERFACE REQUIREMENTS

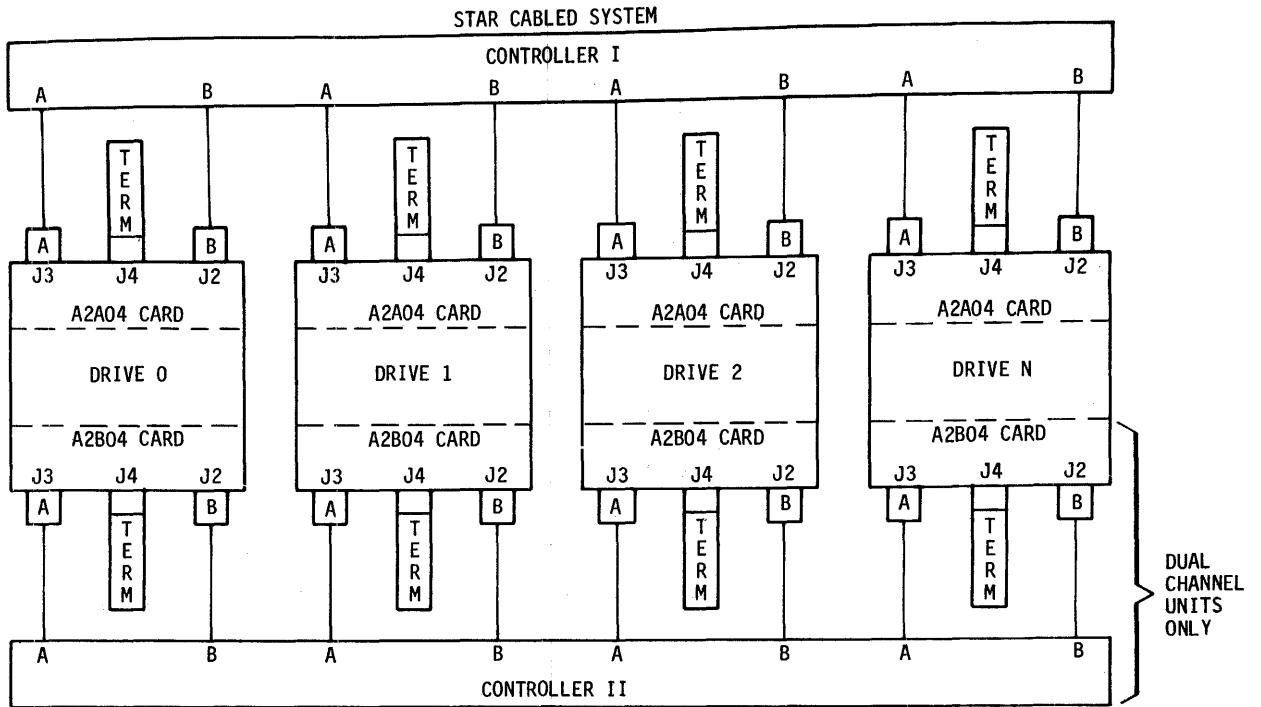
An important part of site preparation is planning the layout and routing of I/O cables. The I/O cables are designated as A and B cables. The I/O A cables may be connected in either a star or daisy chain configuration as shown in figure 1-4. Each configuration calls for the use of terminators; these too are shown in figure 1-4.

The following discussion of the I/O configurations applies to single channel installations where a set of drives are interfaced to one controller. Extending the discussion to dual channel installations (involving two controllers) requires doubling the quantities of cables and terminators because the two channels have independent cabling.

The star configuration has individual A and B cables going from the controller to each drive, and each drive has a terminator installed on it. The daisy chain configuration has individual B cables going from the controller to each drive. However, a single A cable connects the controller to the first drive. Other A cables go from drive to drive, and the last drive in the string has a terminator installed on it.

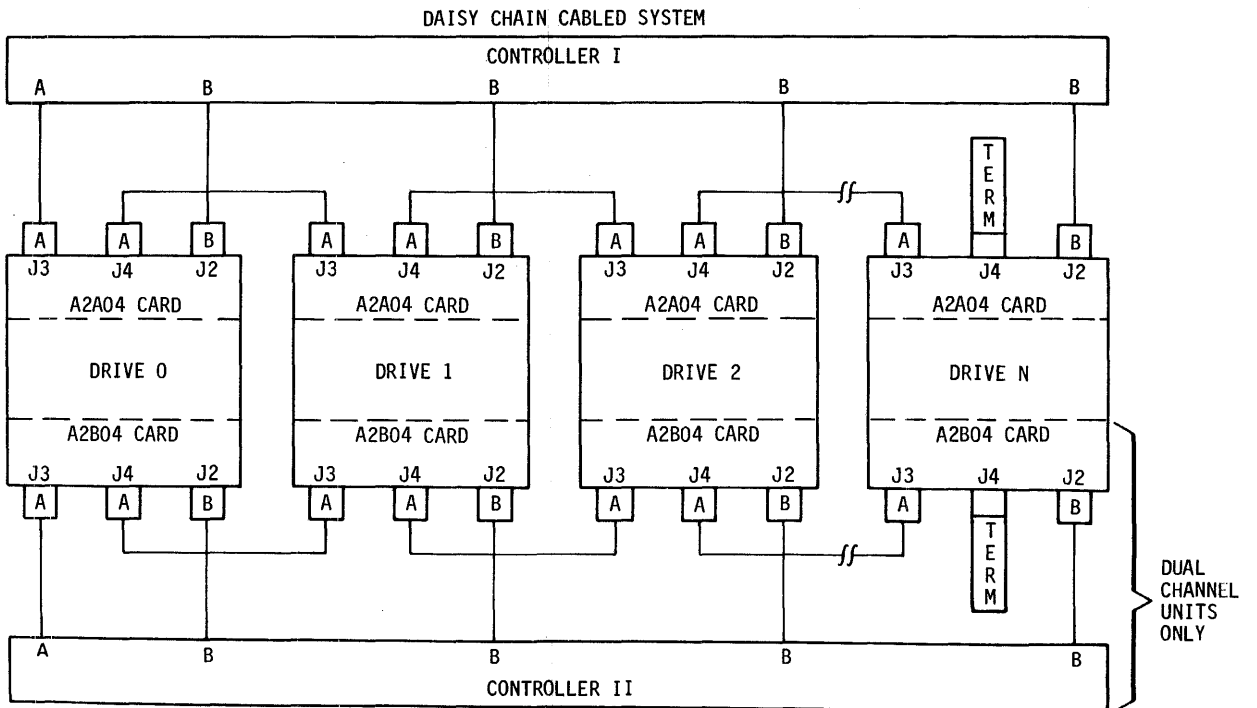
In estimating the I/O cables needed for an installation, decide which configuration will be used and allow sufficient length to permit extension of rack-mounted drives. Limitations on I/O cable lengths may influence system layout. The maximum length for each B cable is 15.3 m (50 ft). Each star system A cable or the cumulative A cabling in a daisy chain system cannot exceed 30.6 m (100 ft) in length. Table 1-2 lists the part numbers for the terminator and for the available lengths of I/O cables.





**NOTES:**

1. MAXIMUM INDIVIDUAL A CABLE LENGTHS = 100 FEET
2. MAXIMUM INDIVIDUAL B CABLE LENGTHS = 50 FEET



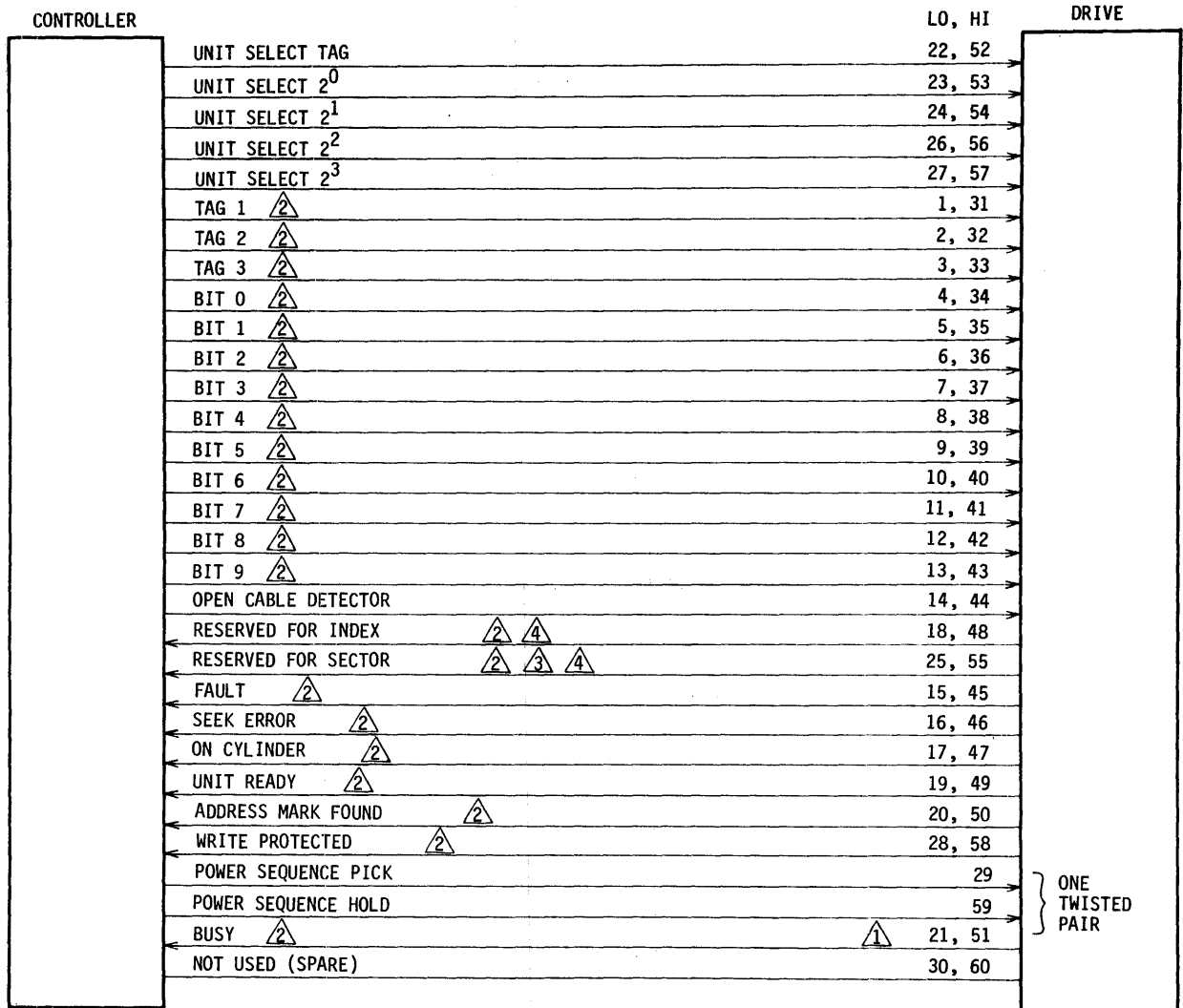
9T278

**Figure 1-4. System Cabling**





TABLE 1-2. I/O CABLES AND ACCESSORIES

| Length                               |          | Part Numbers |          |
|--------------------------------------|----------|--------------|----------|
| (Feet)                               | (Metres) | A Cable      | B Cable  |
| 5                                    | 1.5      | 77564200     | 77564300 |
| 6                                    | 1.8      | 77564201     | 77564301 |
| 8                                    | 2.4      | 77564202     | 77564302 |
| 10                                   | 3.0      | 77564203     | 77564303 |
| 15                                   | 4.5      | 77564204     | 77564304 |
| 20                                   | 6.1      | 77564205     | 77564305 |
| 25                                   | 7.6      | 77564206     | 77564306 |
| 30                                   | 9.1      | 77564207     | 77564307 |
| 40                                   | 12.2     | 77564208     | 77564308 |
| 50                                   | 15.3     | 77564209     | 77564309 |
| I/O Terminator Part Number: 75841300 |          |              |          |

Figure 1-5 shows the pin assignments and signal names for the A cable. Figure 1-6 shows the pin assignments and signal names for the B cable. Detailed information about interface lines is given in section 3 of the hardware reference manual.



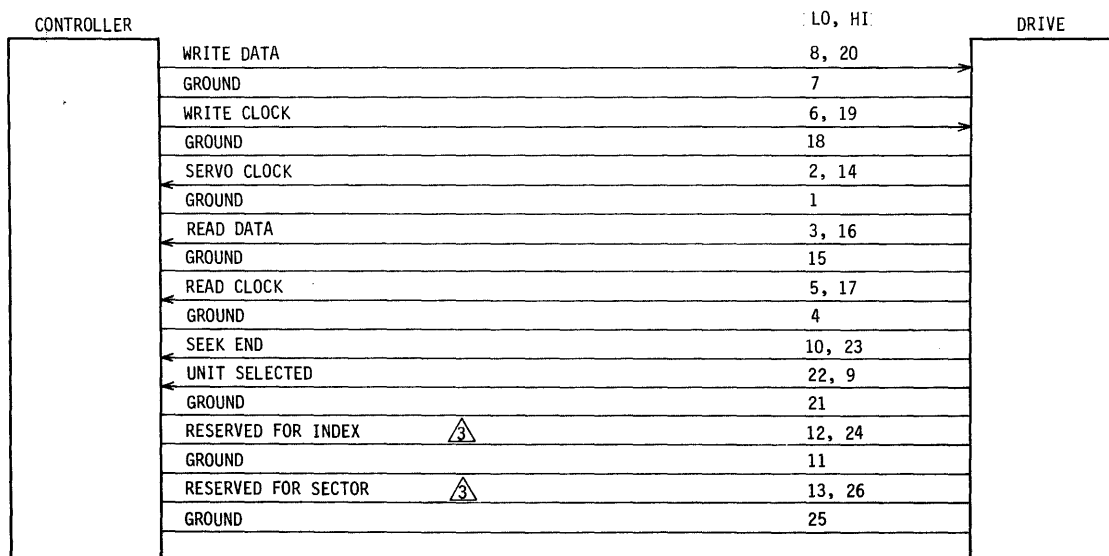
NOTES:

-  DUAL CHANNEL UNITS ONLY
-  GATED BY UNIT SELECT
-  CALLED SECTOR MOD ON BZ9A1J/K/L/M AND BZ9A5E/F
-  INDEX AND SECTOR MAY BE IN "A" CABLE AND/OR "B" CABLE.

9T2928

Figure 1-5. A Cable

"B" CABLE



NOTES:

- 1 26 CONDUCTORS FLAT CABLE. MAXIMUM LENGTH - 50 FT.
- 2 NO SIGNALS GATED BY UNIT SELECTED.
- INDEX AND SECTOR MAY BE IN "A" CABLE AND/OR "B" CABLE.

9T308A

Figure 1-6. B Cable

## FINAL UNPACKAGING AND INSPECTION

### GENERAL

After removing packaging material according to the unpackaging instructions provided with the drive, inspection for shipping damage should be carried out and several final unpackaging procedures performed. Most packaging materials can be reused if it is necessary to ship the drive at some future date. To obtain packaging instructions, contact:

Packaging Engineer, Material Services Dept.  
 Normandale Division, MPI  
 7801 Computer Ave  
 Minneapolis, MN 55435

When ordering packaging instructions, specify the exact equipment number and series code of the drive as shown on the equipment identification label.

## UNPACKAGING

1. Open package (save all packaging materials).
2. If MMD has a slide mount option, remove packages containing two slide mounts.
3. Remove two I/O flat cables packaged around MMD.
4. Remove plastic dust cover from around MMD.
5. Check all items against shipping bill for required equipment and hardware to complete installation. Discrepancies, missing items, damaged equipment, etc., should be reported to the CDC account sales representative responsible for the equipment.

## INSPECTION

Inspect all components of the drive for possible shipping damage. All claims for shipping damage should be filed with the carrier involved.

## INSTALLATION PROCEDURES

### GENERAL

The following text provides the procedures necessary to install the drive. It is assumed that the requirements for site preparation have been completed prior to performing the installation procedures.

The following procedures should be considered in the order presented, but the order may be altered for a specific installation:

- Mounting In Rack
- System Grounding
- Transformer Wiring
- System Cabling
- Setting Logic Card Switches.

## MOUNTING IN RACK

The MMD can be slide mounted onto a standard 483 mm (19 in) rack. Figure 1-7 shows an exploded view of the mounting hardware for the MMD.

1. Loosely attach screws, lockwashers, and nut plates to rack. Leave this hardware loose enough so that the slotted recess brackets at the ends of the slide assembly can be inserted between nut plate and rack.
2. Loosen adjusting screws on front and rear recess brackets such that slide assemblies can be positioned in rack.
3. Position slide assemblies in rack and tighten hardware securing slide assemblies to rack.
4. Tighten adjusting screws on recess brackets .
5. Ensure that slide assemblies are aligned horizontally and vertically, and that assemblies are parallel.
6. Install latch keeper bracket on left side of rack so it will mate with front panel latch in a manner that will not interfere with slide assembly motion.
7. Pull both slide assemblies to their fully extended position, making certain that full extension lock on each slide moves into locked position.
8. Loosen and lower J bracket catch (at front of each slide assembly).

### NOTE

The following step may require two people.

9. Place MMD (with J brackets attached) onto slide assemblies, making certain that J bracket slips under the J bracket catch at the rear of each outer slide. Figure 1-8 shows the sequence of steps required to mount the drive on the slides. Ensure that mounting stop on underside of each J bracket fits into mounting notch on each outer slide.

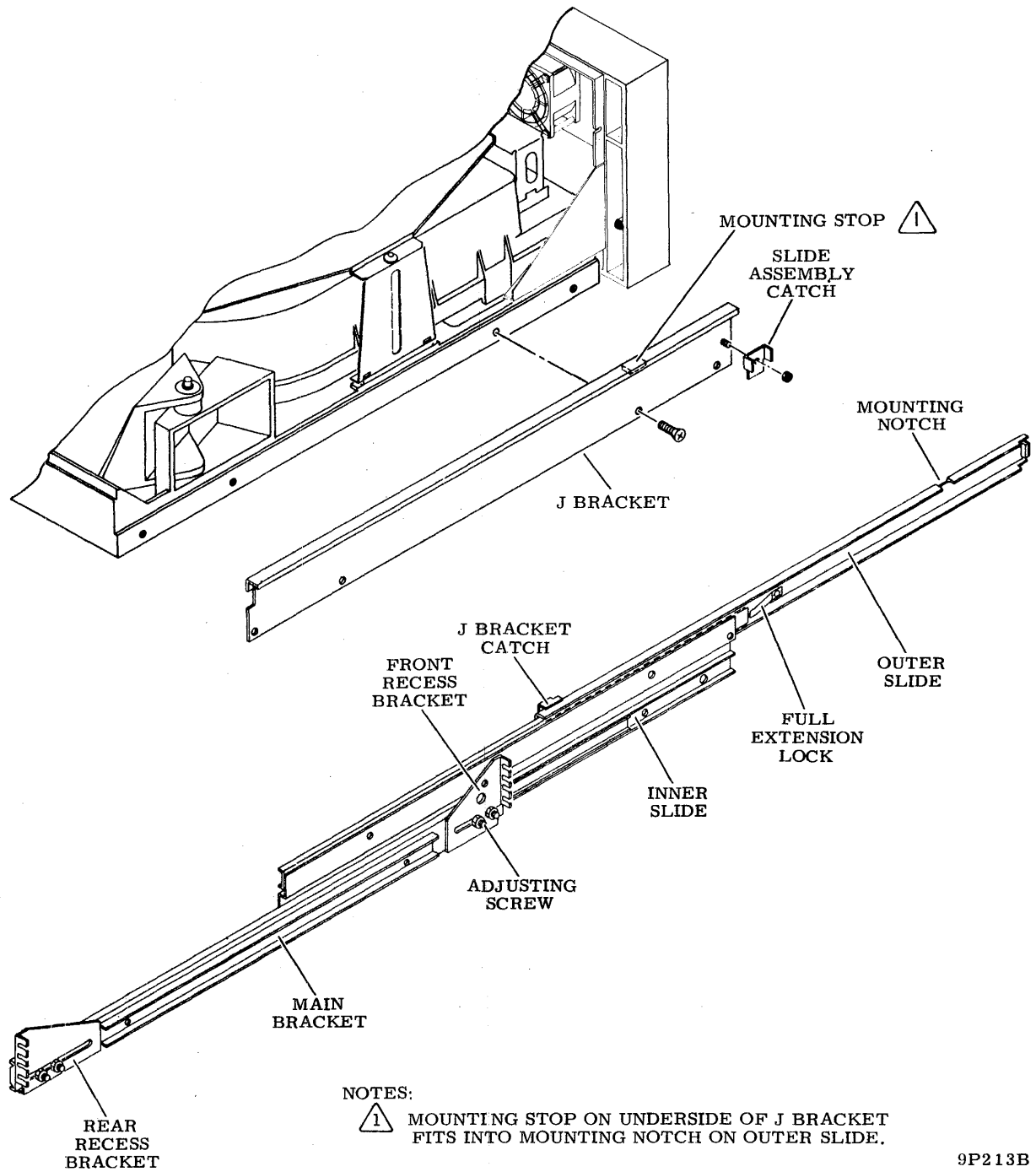
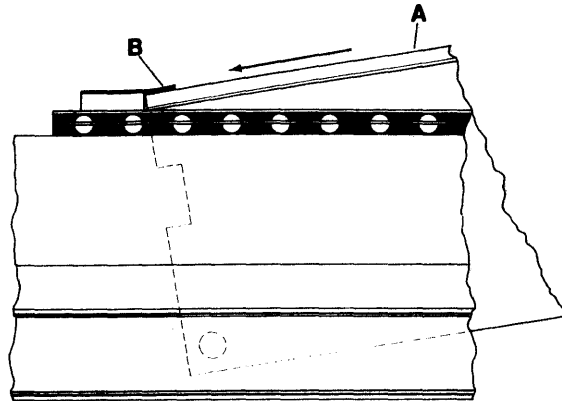
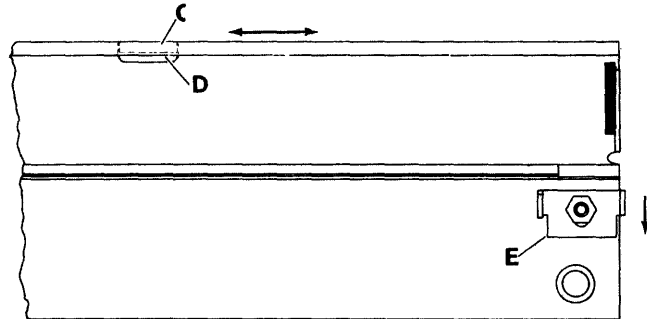


Figure 1-7. MMD Installation

- ① SLIDE J BRACKET (A)  
UNDER J BRACKET  
CATCH (B).



- ② LOCATE MOUNTING  
STOP (C) IN  
MOUNTING NOTCH (D)  
WITH SLIDE ASSY  
CATCH (E) DOWN.



- ③ SECURE SLIDE ASSY  
CATCH (E) AGAINST  
OUTER SLIDE (F)  
TIGHTEN NUT (G).

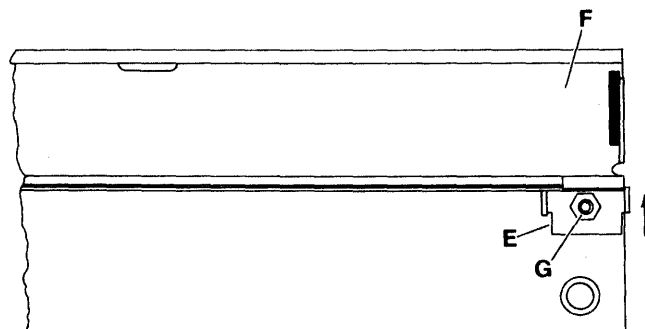


Figure 1-8. Slide Mounting Sequence

9T262

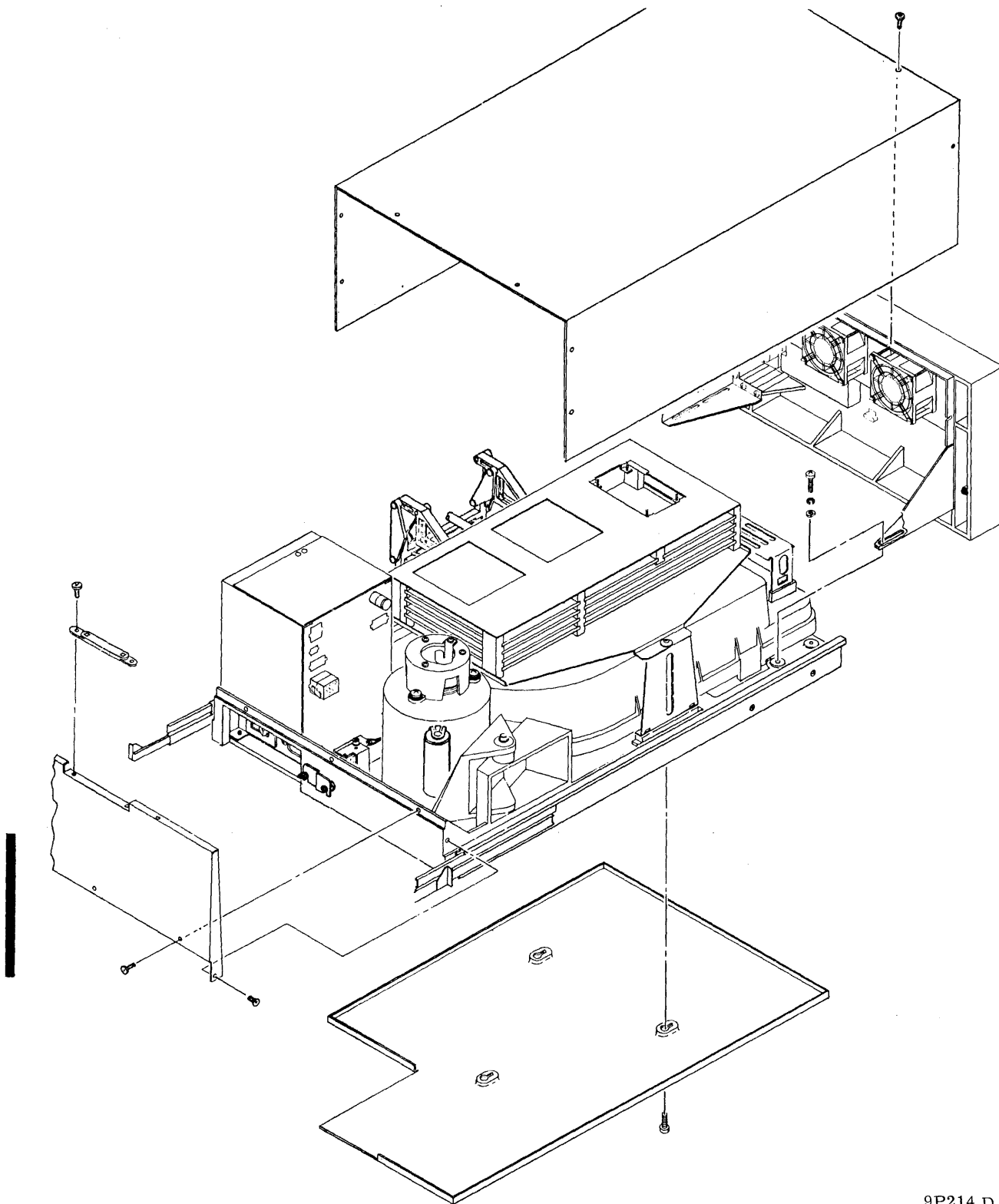


10. Position 90-degree tabs of each slide assembly catch firmly against each outer slide and tighten their adjustment nuts. This secures MMD on the slide assemblies.
11. At top of drive, take out allen head screws and remove top cover.
12. At bottom of drive, loosen screws securing bottom cover. Slide cover such that the screw heads can pass through cover slots. Remove bottom cover by dropping straight down as in figure 1-9.

#### NOTE

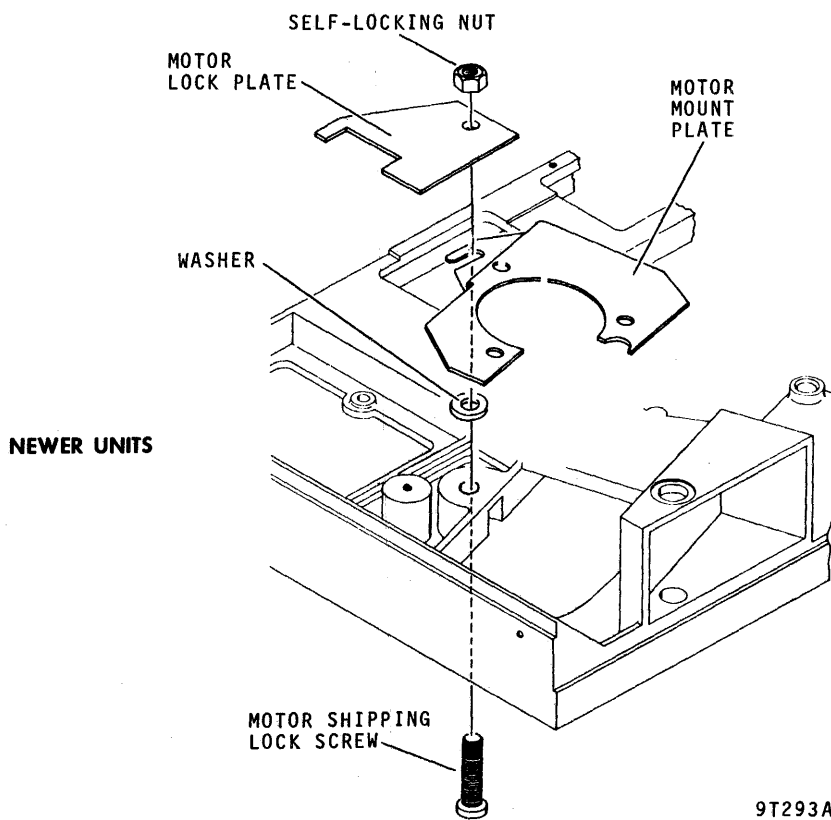
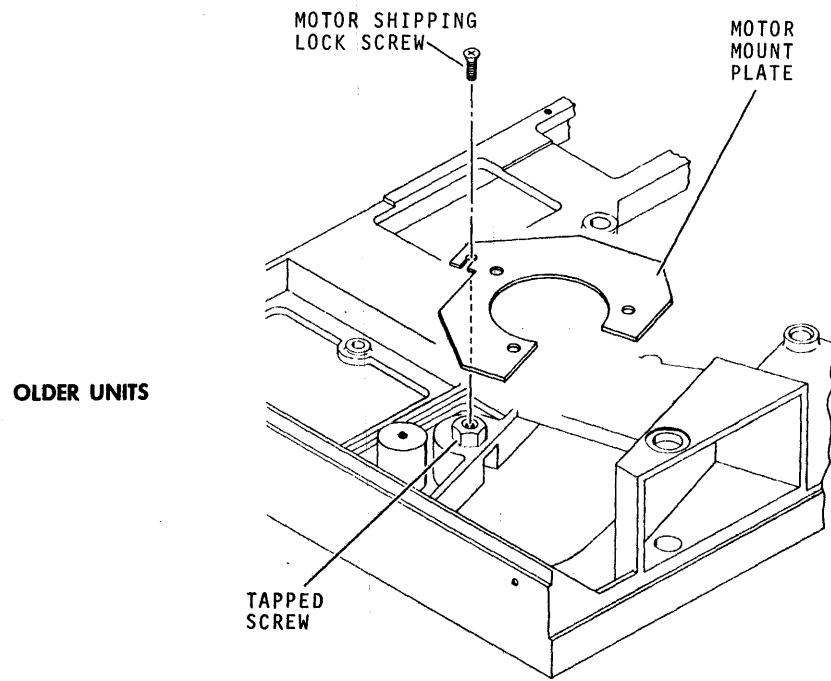
Two different methods of locking the drive motor are shown in figure 1-10. For newer drives (having a motor lock plate), perform step 13 and proceed to step 16. For older drives, proceed to step 14.

13. Unlock drive motor on newer units by turning motor shipping lock screw fully counterclockwise with a 5/32 in allen wrench. This raises motor lock plate until it contacts the self-locking nut.
14. Unlock drive motor on older units by loosening motor shipping lock screw (see figure 1-10), rotating motor so that motor mount plate clears screw, and tightening motor shipping lock screw until it and the tapped screw seat against base frame. Then allow motor to return to its original position.
15. Perform Drive Belt Replacement procedure given in the Repair and Replacement section.
16. Unlock actuator by rotating actuator shipping lock to unlocked position (see figure 1-11).
17. Position spindle lock and ground spring so that its contact is centered on spindle shaft. Tighten screws (see figure 1-12).



9P214 D

Figure 1-9. Cover Removal



9T293A

Figure 1-10. Drive Motor Lock Screw

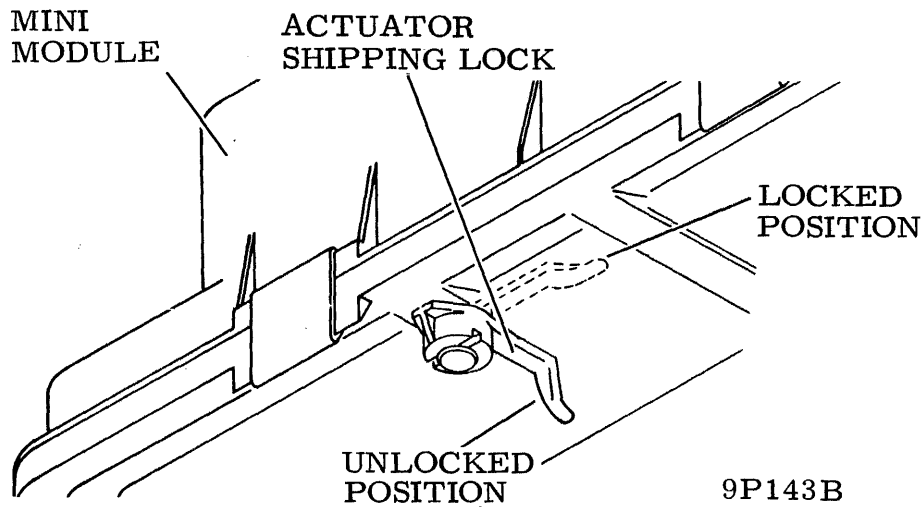


Figure 1-11. Actuator Shipping Lock

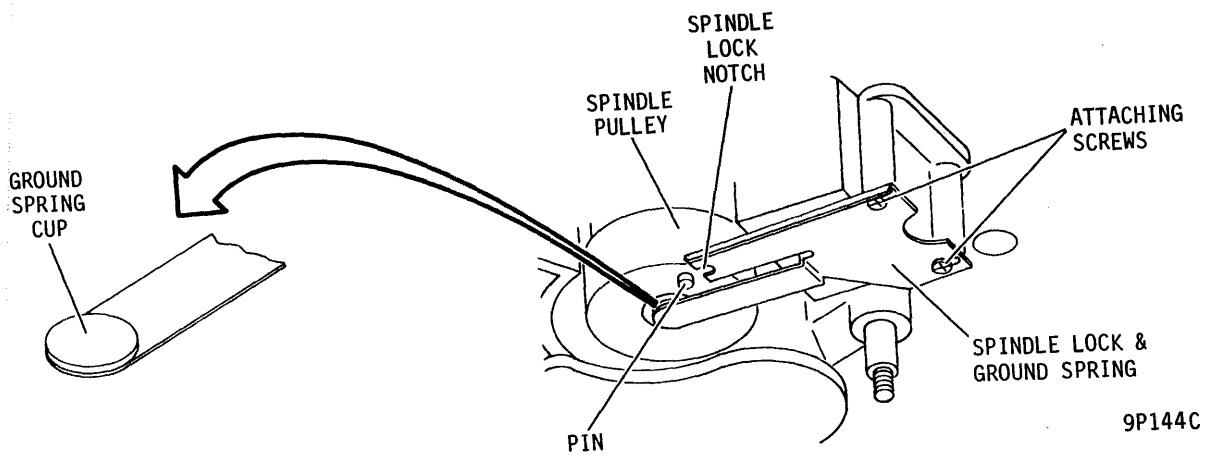


Figure 1-12. Spindle Lock and Ground Spring

## SYSTEM GROUNDING

### General

This section contains instructions on making the system grounding connections. It is assumed that the site has been prepared in accordance with the site requirements information provided earlier in this section. Refer to that discussion if there is any doubt about which grounding scheme to use. System grounding procedures are presented in the following sections:

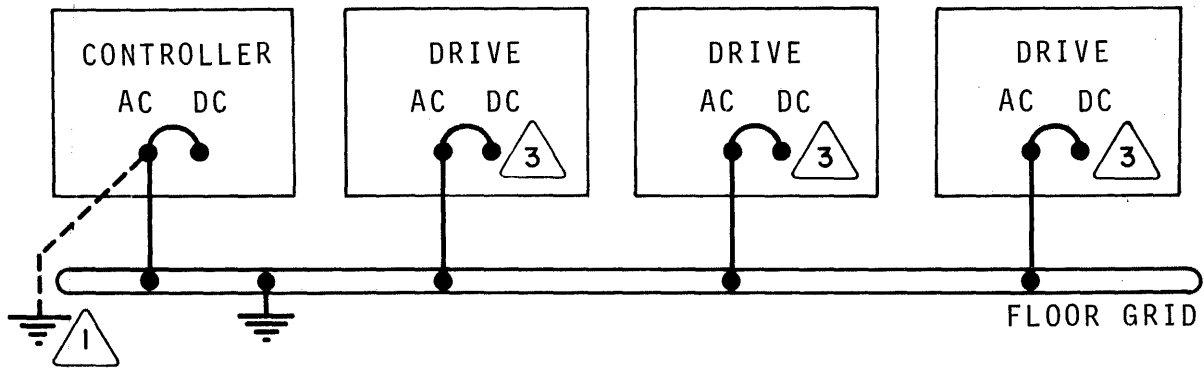
- Floor Grid Grounding Procedure
- Star Grounding Procedure
- Daisy Chain Grounding Procedure
- Isolated Grounds

### Floor Grid Grounding Procedure

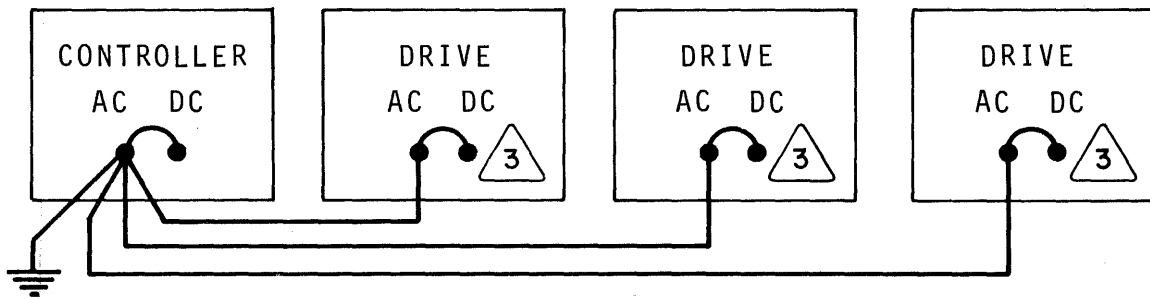
This procedure describes how to ground the system to a floor grid as shown in figure 1-13. In this configuration, ground straps connect the controller and drives to the floor grid. In addition, if the floor grid is isolated from earth ground, the controller is connected to earth ground.

1. Prepare ground straps as follows (see table 1-3):
  - a. Allowing sufficient length for drive extension, cut ground straps to length needed for the following connections:
    - Controller to floor grid
    - Controller to earth ground (if necessary)
    - Each drive to floor grid
  - b. Crimp and solder terminal lugs to both ends of each ground strap.
2. Connect ground strap between controller ground terminal and floor grid (see step 5 for floor grid connection). If necessary, connect another ground strap between controller ground and earth ground.

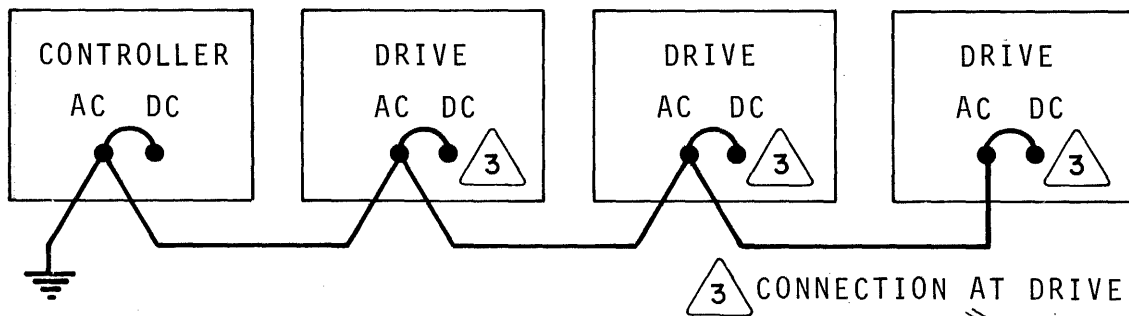
FLOOR GRID AVAILABLE



FLOOR GRID UNAVAILABLE - STAR CONFIGURATION



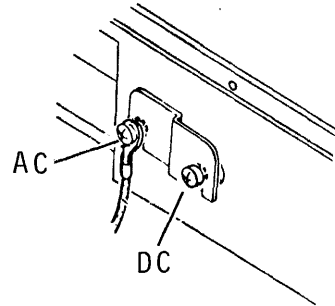
FLOOR GRID UNAVAILABLE - DAISY CHAIN CONFIGURATION



NOTES:

1 REQUIRED IF FLOOR GRID IS NOT GROUNDED

2 COMMON GROUND STRAP  
GROUND BAR ON DRIVE  
EARTH GROUND



9T272

Figure 1-13. System Grounding Schemes (Not Isolated)

TABLE 1-3. GROUNDING ACCESSORIES

| <u>Part</u>                           | <u>Part Number</u>       |
|---------------------------------------|--------------------------|
| Flat Braided Shielding                | 93267009<br>15 m (50 ft) |
| Terminal Lug                          | 40125601                 |
| Lockwasher, external tooth, #10       | 10126403                 |
| Screw, thread rolling,<br>10-32 x 1/2 | 17901524                 |

NOTE

For newer drives having ac and dc ground screws and a ground bar, perform step 3. For older drives having only one ground screw, perform step 4.

3. Referring to figure 1-14, attach ground strap to ac ground at each drive as follows:
  - a. Loosen both ac and dc ground screws.
  - b. Remove ground bar and set it aside.
  - c. Remove ac ground screw and lock washers.
  - d. Insert ac ground screw through terminal lug of ground strap and then through two lock washers.
  - e. Attach ac ground screw loosely to base frame.
  - f. Replace ground bar so that it is inserted between the pair of lock washers on each screw.
  - g. Tighten both ac and dc ground screws.

4. Attach ground strap to ac ground at each drive as follows:
  - a. Remove ground screw and lock washers at rear of drive.
  - b. Place ground strap terminal lug between lock washers and attach it with ground screw to base frame.
5. Connect each ground strap to floor grid as follows:
  - a. Route free end of ground strap through floor cutout.
  - b. Drill a 0.9 mm (11/32 in) hole in floor grid.
  - c. Secure terminal lug to floor grid using screw and lock washer. Lock washer goes between terminal lug and floor grid.

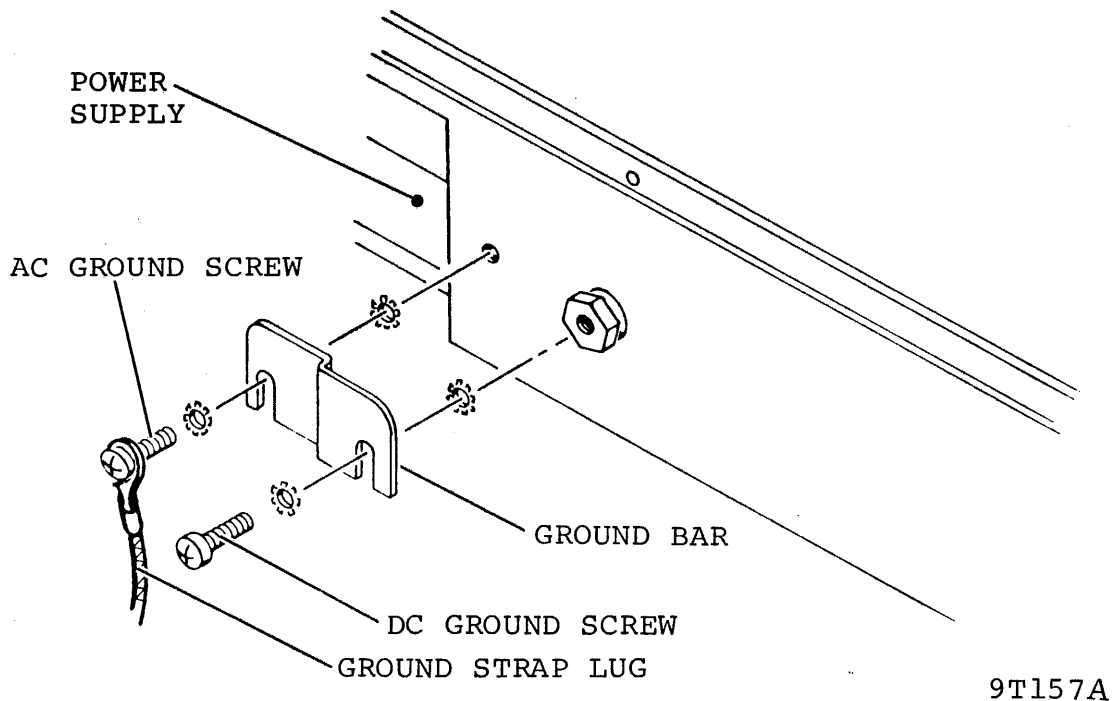


Figure 1-14. Drive Grounding Terminals



## Star Grounding Procedure

This procedure describes how to ground the system in a star configuration as shown in figure 1-13. In this configuration, ground straps connect the controller to earth ground and to each drive in the system.

1. Prepare ground straps as follows (see table 1-3):
  - a. Allowing sufficient length for drive extension, cut ground straps to length needed for the following connections:
    - Controller to earth ground
    - Controller to each drive
  - b. Crimp and solder terminal lugs to both ends of each ground strap.
2. Connect one end of all ground straps to controller ground terminal. Connect one strap to earth ground and route other straps to each drive in system.

### NOTE

For newer drives having ac and dc ground screws and a ground bar, perform step 3. For older drives having only one ground screw, perform step 4.

3. Referring to figure 1-14, attach ground strap to ac ground at each drive as follows:
  - a. Loosen both ac and dc ground screws.
  - b. Remove ground bar and set it aside.
  - c. Remove ac ground screw and lock washers.
  - d. Insert ac ground screw through terminal lug of ground strap and then through two lock washers.
  - e. Attach ac ground screw loosely to base frame.
  - f. Replace ground bar so that it is inserted between the pair of lock washers on each screw.
  - g. Tighten both ac and dc ground screws.

4. Attach ground strap to ac ground at each drive as follows:
  - a. Remove ground screw and lock washers at rear of drive.
  - b. Place ground strap terminal lug between lock washers and attach it with ground screw to base frame.

#### **Daisy Chain Grounding Procedure**

This procedure describes how to ground the system in a daisy chain configuration as shown in figure 1-13. In this configuration, ground straps connect the controller to earth ground and to the first drive in the daisy chain. The remainder of the drives are connected by ground straps going from the first drive to the second, the second to the third, and so on.

1. Prepare ground straps as follows (see table 1-3):
  - a. Allowing sufficient length for drive extension, cut ground straps to length needed for the following connections:
    - Controller to earth ground
    - Controller to nearest drive
    - Each drive to next drive in daisy chain.
  - b. Crimp and solder terminal lugs to both ends of each ground strap.
2. Connect two straps to controller ground terminal. Connect one strap to earth ground and route other strap to first drive in daisy chain.

#### **NOTE**

For newer drives having ac and dc ground screws and a ground bar, perform step 3. For older drives having only one ground screw, perform step 4.

3. Route ground straps between drives, and referring to figure 1-14, attach ground straps to ac ground at each drive as follows:
  - a. Loosen both ac and dc ground screws.
  - b. Remove ground bar and set it aside.

- c. Remove ac ground screw and lock washers.
  - d. Insert ac ground screw through terminal lug of ground strap and then through two lock washers.
  - e. Attach ac ground screw loosely to base frame.
  - f. Replace ground bar so that it is inserted between the pair of lock washers on each screw.
  - g. Tighten both ac and dc ground screws.
4. Route ground straps between drives and attach ground straps to ac ground at each drive as follows:
    - a. Remove ground screw and lock washers at rear of drive.
    - b. Insert ground screw through terminal lugs of both ground straps with lock washers on either side of each terminal lug.
    - c. Attach ground screw to base frame.

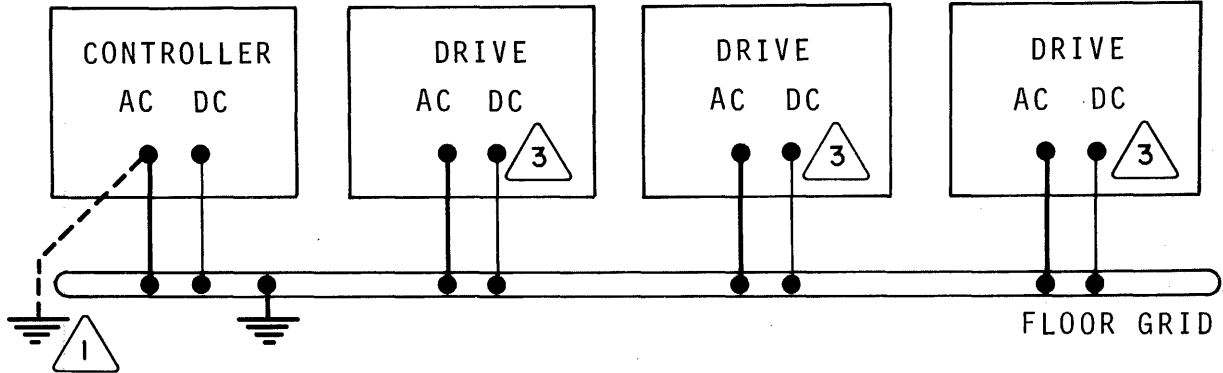
### **Isolated Grounds**

Isolated grounding consists of parallel systems that accomplish ac (frame) and dc (logic) grounding separately. In some cases, system performance is improved with isolated grounds. However, the common grounding approach already presented is generally superior and should be used if it results in satisfactory operation.

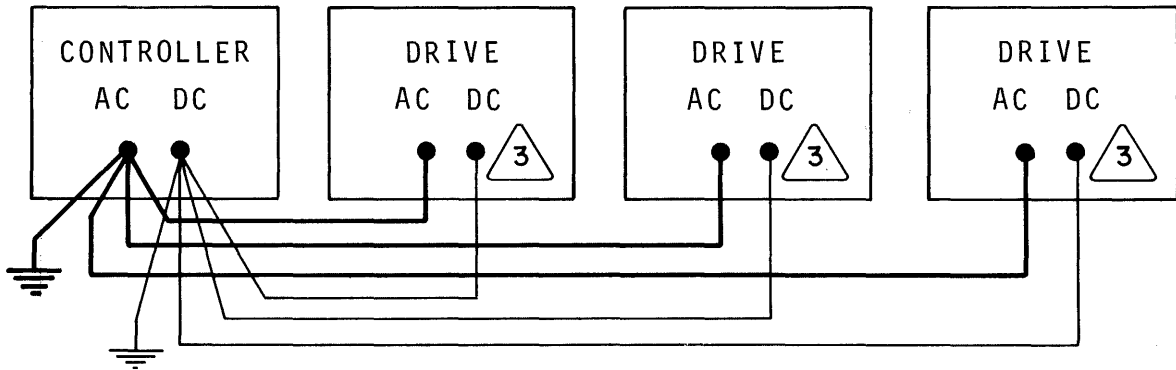
Isolated grounding is possible only with the newer drives having ac and dc ground screws and a ground bar. In the older drives having one ground screw, ac and dc grounds are tied together inside the drive.

The three isolated grounding configurations are shown schematically in figure 1-15. A comparison of figure 1-15 with figure 1-13 reveals that for each configuration, the ac grounding system is parallel to the dc grounding system. Furthermore, the ground bar is secured vertically by the ac ground screw so that the two ground screws are not shorted together at the drive.

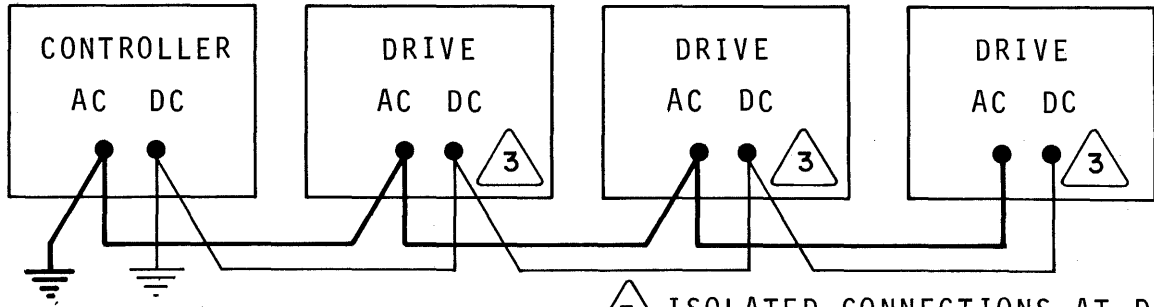
FLOOR GRID AVAILABLE



FLOOR GRID UNAVAILABLE - STAR CONFIGURATION



FLOOR GRID UNAVAILABLE - DAISY CHAIN CONFIGURATION



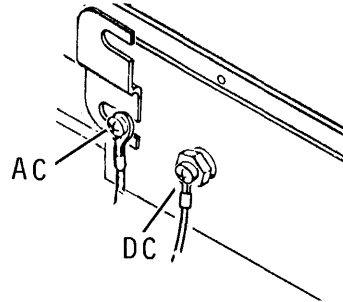
NOTES:

1 REQUIRED IF FLOOR GRID IS NOT GROUNDED

2 AC GROUND STRAP  
DC GROUND STRAP  
EARTH GROUND



3 ISOLATED CONNECTIONS AT DRIVE



9T273

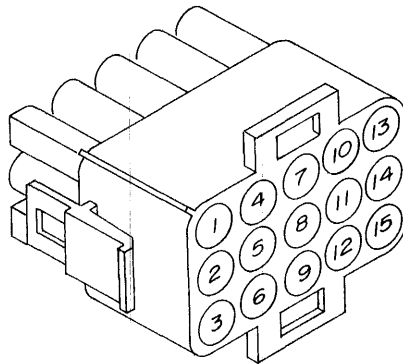
Figure 1-15. System Grounding Schemes (Isolated)

## TRANSFORMER WIRING

The power supply transformer is designed to accept various ac input voltages. The input voltage is applied to the proper transformer primary windings by jumper wires on the power selector plug P07, located on the power supply. A drive is shipped ready to accept the input voltage and frequency listed in the configuration chart that appears in the front matter of this manual.

To convert the drive to another voltage input, remove plug P07 (shown in figure 1-16) and refer to the logic diagrams section in this manual for jumper wiring information. After rewiring the plug, revise its power label, and reinstall it on the power supply.

To convert the drive from 60 to 50 Hz, from 50 to 60 Hz, or to 100 V - 50 Hz requires extensive changes. For further information contact the CDC Account Sales Representative.



NOTE: CROSS REF 011 OF LOGIC DIAGRAMS  
SPECIFIES JUMPER WIRING FOR  
EACH INPUT VOLTAGE.

9P167A

Figure 1-16. Power Selector Plug

## SYSTEM CABLING

This procedure describes how to connect the drive power cord, I/O cables, and terminators. It is assumed that the site has been prepared in accordance with the site preparation information provided earlier in this section. Refer to that discussion for cable routing and power outlet information.

Figure 1-17 shows where the I/O cables are connected at the logic chassis and provides an exploded view of the mounting hardware for the I/O cables. The power cords supplied with 60 and 50 Hz drives are shown in figure 1-18.

1. Connect power cord to power connector AlJ01 at rear of drive and to site ac power source.
2. Connect B cable from channel I controller to drive connector J2 on card A2A04. For dual channel drives, connect a second B cable from channel II controller to drive connector J2 on card A2B04.

### NOTE

Steps 3, 4, and 5 apply only to drives using star I/O cabling configuration.

3. Connect A cable from channel I controller to drive connector J3 on card A2A04.
4. Install terminator on drive connector J4 and make terminator ground connection. Both connections are made on card A2A04 (see figure 1-19).
5. For dual channel drives, repeat steps 3 and 4 to connect channel II A cable and terminator to card A2B04.

### NOTE

Steps 6 through 9 apply only to drives using daisy chain I/O cabling configuration. In these steps, upstream and downstream define drives adjacent to a particular drive in daisy chain with upstream drive closer to controller.

6. Connect A cable to drive connector J3 on card A2A04 either from channel I controller or from connector J4 on card A2A04 of upstream drive.

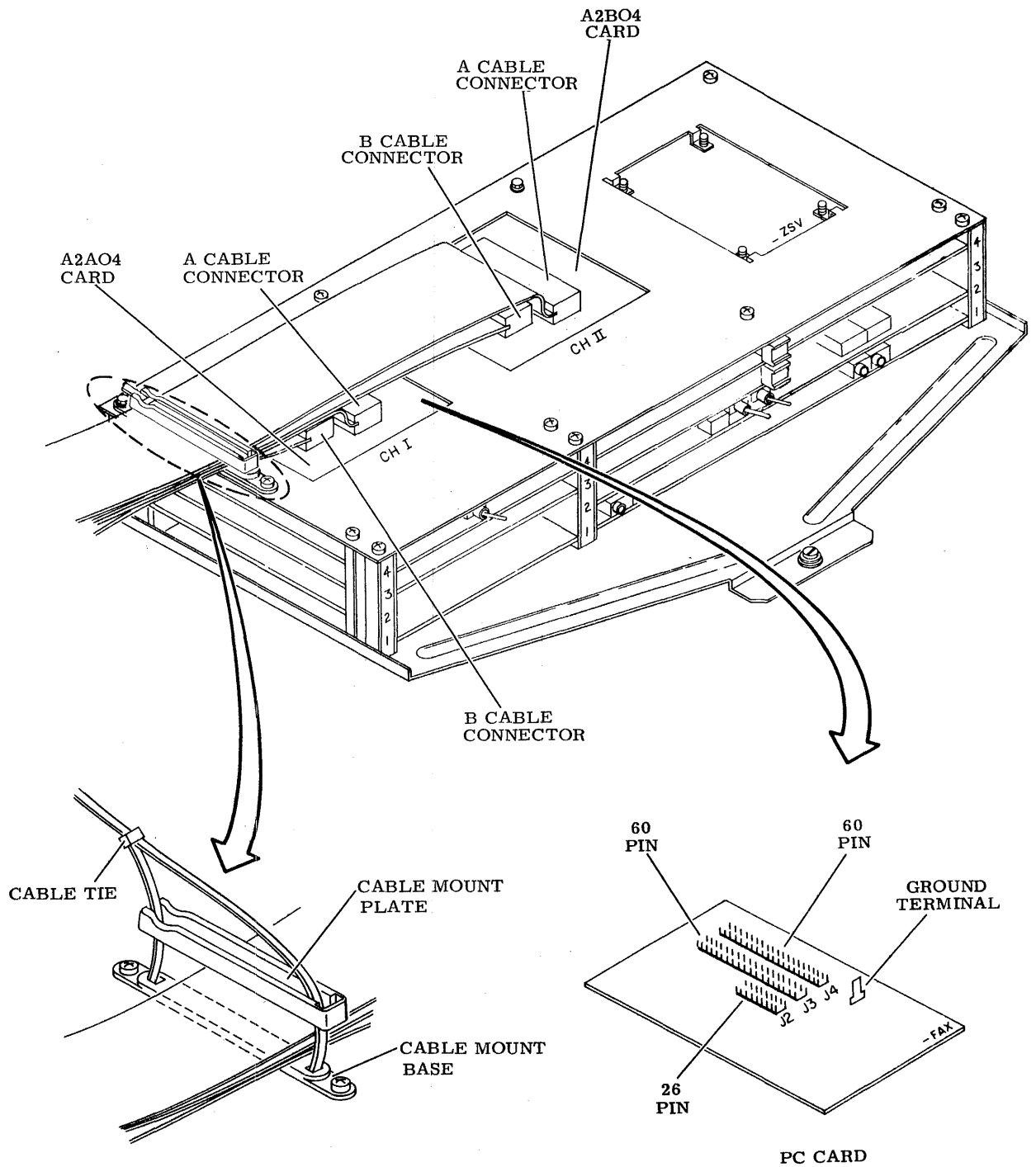
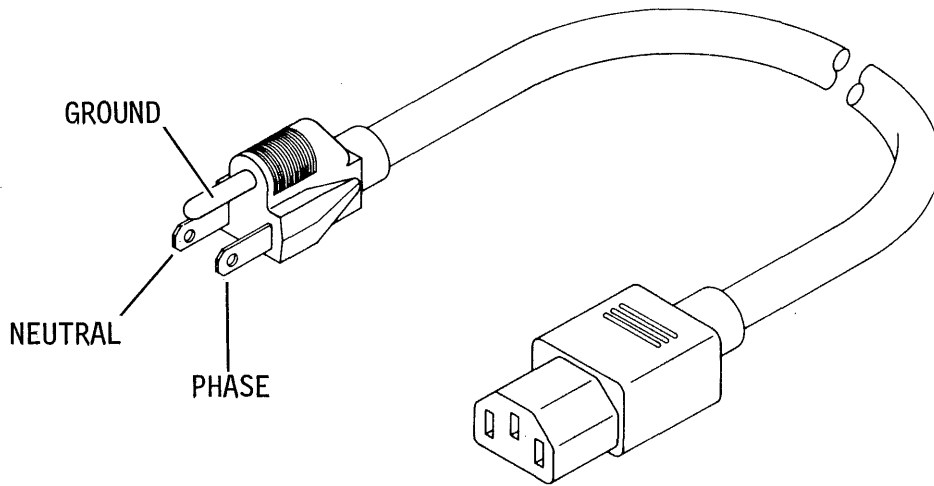
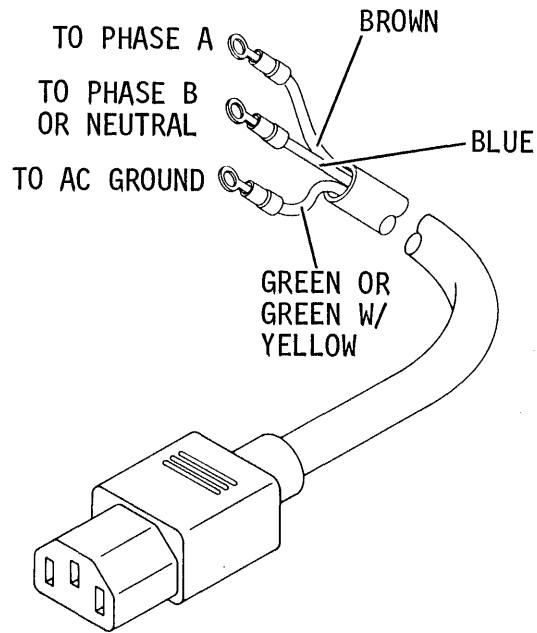


Figure 1-17. I/O Cable Attachment

9P206C



60 Hz POWER CORD



50 Hz POWER CORD

9T279

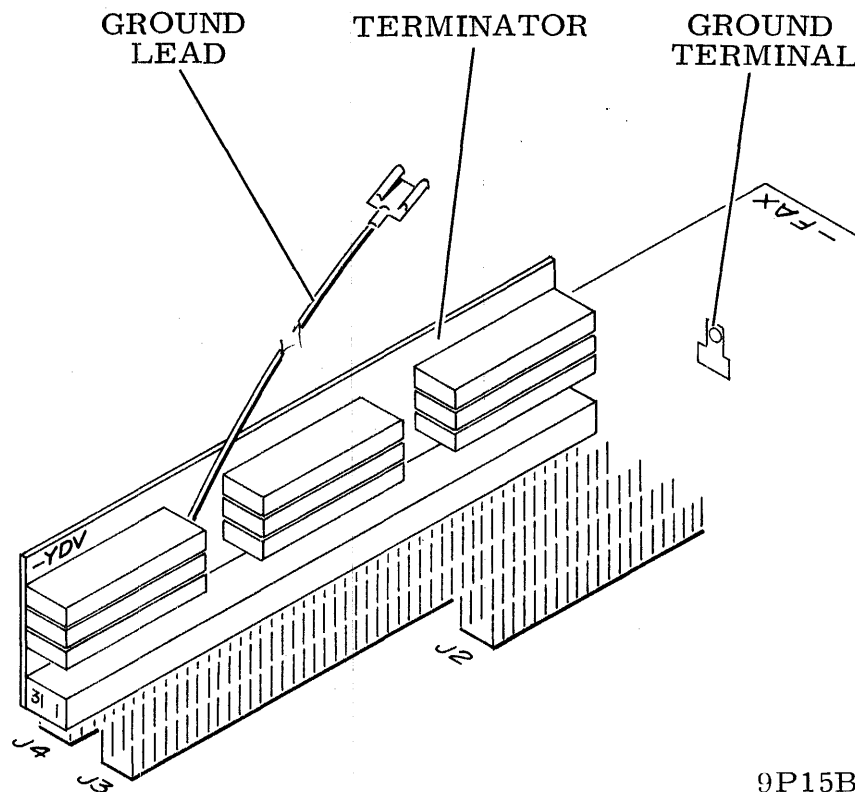
Figure 1-18. AC Power Cables



NOTE

If drive is not last in daisy chain, perform step 7. If drive is last in daisy chain, perform step 8.

7. Connect another A cable from drive connector J4 on card A2A04 to downstream drive's connector J3 on card A2A04.
8. Install terminator on drive connector J4 and make ground connection. Both connections are made on card A2A04 (see figure 1-19).
9. For dual channel drives, repeat steps 6 through 8 to connect channel II A cables, or A cable and terminator, to card A2B04.



9P15B

Figure 1-19. Terminator Assembly

10. Secure I/O cables to drive logic chassis and rear panel as follows:

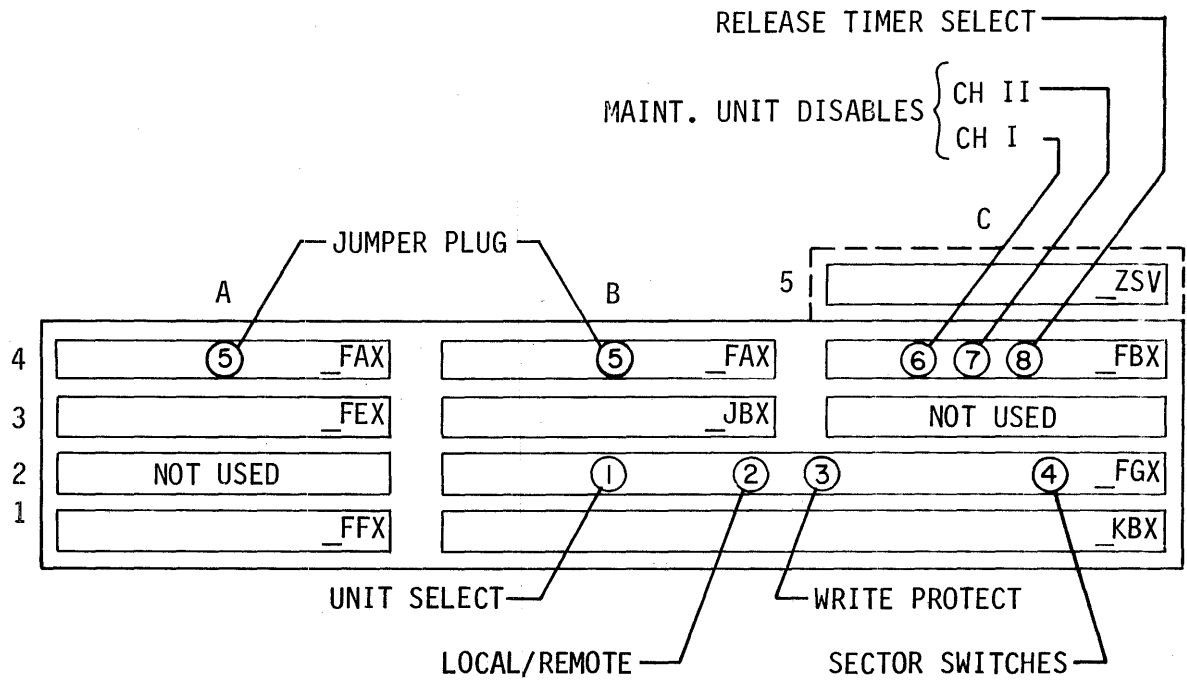
- a. Arrange cables so they lie flat on both cable mount bases (see figure 1-17).
- b. Remove cable mount plates and cable ties from accessories packaged with MMD.
- c. Thread a cable tie through channel in each cable mount base and through hole in each cable mount plate.
- d. Tighten cable ties so that cables are secured between base and plate of each cable mount.

This completes the process of system cable attachment. If the I/O cables must be detached for maintenance purposes, remove the screws securing cable mounts to the logic chassis and rear panel to avoid cutting cable ties.

## **SETTING LOGIC CARD SWITCHES**

### **General**

The PC cards in the logic chassis contain a number of switches that must be set correctly for normal operation of the drive. Sheet 1 of figure 1-20 identifies these switches and gives their locations on the logic cards. Sheet 2 of figure 1-20 lists the switches as indexed on sheet 1 and gives the correct settings for normal drive operation for all switches except the sector select switches. Setting the sector select switches is discussed separately in this section.



NOTE:

- (5) ON MFAX CARD ONLY
- (6) THROUGH (8) ON DUAL CHANNEL UNITS ONLY

9T274-1B

Figure 1-20. Setting Logic Card Switches (Sheet 1 of 2)

1 UNIT SELECT

|                            |                            | UNIT ADDRESSED <sup>1</sup> |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |   |
|----------------------------|----------------------------|-----------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|---|
|                            |                            | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |   |
| S<br>W<br>I<br>T<br>C<br>H | N<br>U<br>M<br>B<br>E<br>R | 0                           | C | 0 | C | 0 | C | 0 | C | 0 | C | 0  | C  | 0  | C  | 0  | C  | 0 |
|                            | 1                          | C                           | C | 0 | 0 | C | C | 0 | 0 | C | C | 0  | 0  | C  | C  | 0  | 0  |   |
|                            | 2                          | C                           | C | C | C | 0 | 0 | 0 | 0 | C | C | C  | C  | 0  | 0  | 0  | 0  |   |
|                            | 3                          | C                           | C | C | C | C | C | C | C | 0 | 0 | 0  | 0  | 0  | 0  | 0  | 0  |   |

2 LOCAL/REMOTE    LOC: DRIVE POWER UP INDEPENDENT OF CONTROLLER  
 REM: DRIVE POWER UP DEPENDENT ON CONTROLLER

3 WRITE PROTECT        NORM

4 SECTOR SWITCHES      REFER TO DISCUSSION ON SETTING SECTOR SELECT SWITCHES

5 INDEX/SECTOR JUMPER PLUG    ON MFAX CARD ONLY,  
 PLACE JUMPER PLUG BETWEEN "A" AND "COMMON" FOR INDEX AND SECTOR SIGNALS IN A CABLE, OR BETWEEN "A+B" AND "COMMON" FOR INDEX AND SECTOR SIGNALS IN A AND B CABLES.

NOTE:  
 THE FOLLOWING SWITCHES ARE FOUND ONLY IN DUAL CHANNEL DRIVES:

6 CH I MAINT. UNIT DISABLE        NORM

7 CH II MAINT. UNIT DISABLE        NORM

8 RELEASE TIMER SELECT            ABR: ALLOWS EITHER CONTROLLER TO HOLD DRIVE IN ABSOLUTE RESERVE CONDITION UNTIL RELEASING IT.

RTM: ALLOWS EITHER CONTROLLER TO HOLD DRIVE IN RESERVED CONDITION UNTIL RESERVE TIMEOUT HAS ELAPSED.

<sup>1</sup> IN TABLES, C = CLOSED OR ON SETTING, X = DON'T CARE, AND  
 O = OPEN OR OFF SETTING.

9T274-2B

Figure 1-20. Setting Logic Card Switches (Sheet 2)

Figure 1-21 shows the four types of miniature rocker and slide switches used on the logic cards. Refer to the switch illustrations in this figure when verifying that these switches are set as prescribed in figure 1-20.

### Setting Sector Select Switches

Figure 1-20 shows the location of the Sector Select switch assembly. The Sector Select switch assembly has twelve independent switches used for selecting sectors. The number of sectors per revolution generated by the drive logic must be matched to that required by the controller. Therefore, sector select switches are provided in the drive logic to allow selection of different sector counts. These switches are located on logic card FGX and appear as in figure 1-21.

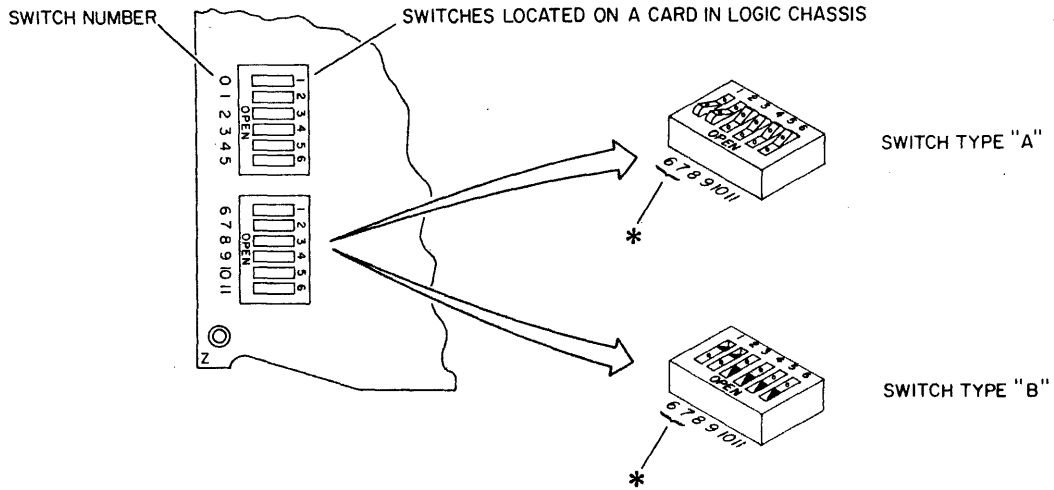
Refer to the subsystem reference manual to determine the number of sectors required by the controller; then locate that number in table 1-4. Across from the number of sectors listed in the table is a row of Cs and Os. C represents the Closed or On position of the sector switch. O represents the Open or Off position of the sector switch. Set the switches to the positions designated in the table while referring to figure 1-21 for an illustration of the switch positions.

The switch settings listed in table 1-4 have been determined from a formula. Use of this formula is demonstrated below to provide the user with an additional tool for determining sector switch settings.

Each sector will contain a certain number of clock pulses (received from the servo tracks). The number of clock pulses in each sector is the result of the number of sectors required by the controller. Thus:

$$\text{Total Sector Clock Pulses} = \frac{13\ 440}{\text{Number of Sectors}} - 1$$

## ROCKER-TYPE SWITCHES

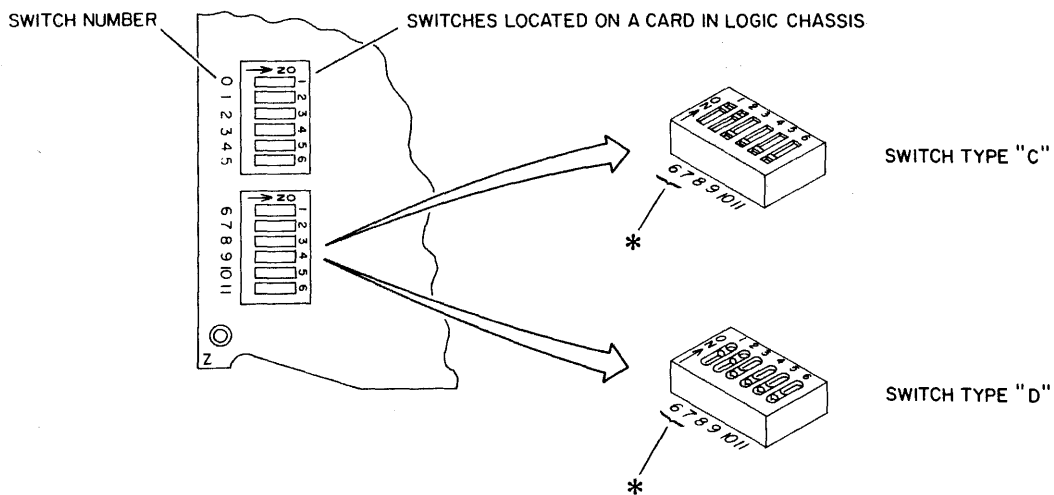


### ROCKER-TYPE SWITCHES:

TO ACTUATE A SWITCH TO ITS CLOSED POSITION,  
PRESS ON END OF SWITCH FARTHEST FROM "OPEN" LETTERING.

\* SWITCHES 6 AND 7 SHOWN IN CLOSED POSITION.

## SLIDE-TYPE SWITCHES



### SLIDE-TYPE SWITCHES:

TO ACTUATE A SWITCH TO ITS ON POSITION,  
SLIDE SWITCH IN DIRECTION OF ARROW SHOWN ON SWITCH.

\* SWITCHES 6 AND 7 SHOWN IN ON POSITION.

9H10B

Figure 1-21. Miniature Switches

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS

| Number of Sectors | Switch Number |   |   |   |   |   |   |   |   |   |    |    |
|-------------------|---------------|---|---|---|---|---|---|---|---|---|----|----|
|                   | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 4                 | C             | C | C | C | C | O | O | O | C | O | C  | C  |
| 5                 | C             | C | C | C | C | C | C | O | O | C | O  | C  |
| 6                 | C             | C | C | C | C | C | O | C | O | O | O  | C  |
| 7                 | C             | C | C | C | C | C | C | O | C | C | C  | O  |
| 8                 | C             | C | C | C | O | O | O | C | O | C | C  | O  |
| 9                 | O             | O | C | O | C | O | C | C | C | O | C  | O  |
| 10                | C             | C | C | C | C | C | O | O | C | O | C  | O  |
| 11                | O             | O | C | O | O | O | C | C | O | O | C  | O  |
| 12                | C             | C | C | C | C | O | C | O | O | O | C  | O  |
| 13                | O             | O | O | C | O | O | O | O | O | O | C  | O  |
| 14                | C             | C | C | C | C | C | O | C | C | C | O  | O  |
| 15                | C             | C | C | C | C | C | C | O | C | C | O  | O  |
| 16                | C             | C | C | O | O | O | C | O | C | C | O  | O  |
| 17                | C             | O | C | O | C | O | O | O | C | C | O  | O  |
| 18                | C             | O | O | C | O | C | C | C | O | C | O  | O  |
| 19                | O             | C | O | O | O | O | C | C | O | C | O  | O  |
| 20                | C             | C | C | C | C | O | O | C | O | C | O  | O  |
| 21                | C             | C | C | C | C | C | C | O | O | C | O  | O  |
| 22                | C             | O | O | O | O | C | C | O | O | C | O  | O  |
| 23                | C             | C | C | O | O | O | C | O | O | C | O  | O  |
| 24                | C             | C | C | C | O | C | O | O | O | C | O  | O  |
| 25                | O             | O | O | C | C | O | O | O | O | C | O  | O  |
| 26                | C             | C | O | O | O | O | O | O | O | C | O  | O  |
| 27                | O             | O | O | O | C | C | C | C | C | O | O  | O  |

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

| Number of Sectors | Switch Number |   |   |   |   |   |   |   |   |   |    |    |
|-------------------|---------------|---|---|---|---|---|---|---|---|---|----|----|
|                   | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 28                | C             | C | C | C | C | O | C | C | C | O | O  | O  |
| 29                | O             | C | C | C | O | O | C | C | C | O | O  | O  |
| 30                | C             | C | C | C | C | C | O | C | C | O | O  | O  |
| 31                | O             | O | O | O | C | C | O | C | C | O | O  | O  |
| 32                | C             | C | O | O | O | C | O | C | C | O | O  | O  |
| 33                | O             | C | C | O | C | O | O | C | C | O | O  | O  |
| 34                | O             | C | O | C | O | O | O | C | C | O | O  | O  |
| 35                | C             | C | C | C | C | C | C | O | C | O | O  | O  |
| 36                | O             | O | C | O | C | C | C | O | C | O | O  | O  |
| 37                | O             | C | O | C | O | C | C | O | C | O | O  | O  |
| 38                | O             | O | O | O | O | C | C | O | C | O | O  | O  |
| 39                | C             | C | C | O | C | O | C | O | C | O | O  | O  |
| 40                | C             | C | C | C | O | O | C | O | C | O | O  | O  |
| 41                | O             | C | C | O | O | O | C | O | C | O | O  | O  |
| 42                | C             | C | C | C | C | C | O | O | C | O | O  | O  |
| 43                | C             | C | C | O | C | C | O | O | C | O | O  | O  |
| 44                | O             | O | O | O | C | C | O | O | C | O | O  | O  |
| 45                | C             | O | O | C | O | C | O | O | C | O | O  | O  |
| 46                | C             | C | O | O | O | C | O | O | C | O | O  | O  |
| 47                | O             | O | C | C | C | O | O | O | C | O | O  | O  |
| 48                | C             | C | C | O | C | O | O | O | C | O | O  | O  |
| 49                | C             | O | O | O | C | O | O | O | C | O | O  | O  |
| 50                | C             | C | O | C | O | O | O | O | C | O | O  | O  |
| 51                | O             | C | C | O | O | O | O | O | C | O | O  | O  |

Table Continued on Next Page



TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

| Number of Sectors | Switch Number |   |   |   |   |   |   |   |   |   |    |    |
|-------------------|---------------|---|---|---|---|---|---|---|---|---|----|----|
|                   | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 52                | C             | O | O | O | O | O | O | O | C | O | O  | O  |
| 53                | O             | O | C | C | C | C | C | C | O | O | O  | O  |
| 54                | C             | C | C | O | C | C | C | C | O | O | O  | O  |
| 55                | C             | C | O | O | C | C | C | C | O | O | O  | O  |
| 56                | C             | C | C | C | O | C | C | C | O | O | O  | O  |
| 57                | O             | C | O | C | O | C | C | C | O | O | O  | O  |
| 58                | O             | C | C | O | O | C | C | C | O | O | O  | O  |
| 59                | O             | C | O | O | O | C | C | C | O | O | O  | O  |
| 60                | C             | C | C | C | C | O | C | C | O | O | O  | O  |
| 61                | C             | C | O | C | C | O | C | C | O | O | O  | O  |
| 62                | C             | C | C | O | C | O | C | C | O | O | O  | O  |
| 63                | O             | O | C | O | C | O | C | C | O | O | O  | O  |
| 64                | C             | O | O | O | C | O | C | C | O | O | O  | O  |
| 65                | C             | O | C | C | O | O | C | C | O | O | O  | O  |
| 66                | O             | C | O | C | O | O | C | C | O | O | O  | O  |
| 67                | C             | C | C | O | O | O | C | C | O | O | O  | O  |
| 68                | O             | O | C | O | O | O | C | C | O | O | O  | O  |
| 69                | C             | O | O | O | O | O | C | C | O | O | O  | O  |
| 70                | C             | C | C | C | C | C | O | C | O | O | O  | O  |
| 71                | O             | O | C | C | C | C | O | C | O | O | O  | O  |
| 72                | C             | O | O | C | C | C | O | C | O | O | O  | O  |
| 73                | C             | C | C | O | C | C | O | C | O | O | O  | O  |
| 74                | O             | O | C | O | C | C | O | C | O | O | O  | O  |
| 75                | O             | C | O | O | C | C | O | C | O | O | O  | O  |

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

| Number of Sectors | Switch Number |   |   |   |   |   |   |   |   |   |    |    |
|-------------------|---------------|---|---|---|---|---|---|---|---|---|----|----|
|                   | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 76                | C             | C | C | C | O | C | O | C | O | O | O  | O  |
| 77                | C             | O | C | C | O | C | O | C | O | O | O  | O  |
| 78                | C             | C | O | C | O | C | O | C | O | O | O  | O  |
| 79                | C             | O | O | C | O | C | O | C | O | O | O  | O  |
| 80                | C             | C | C | O | O | C | O | C | O | O | O  | O  |
| 81                | O             | O | C | O | O | C | O | C | O | O | O  | O  |
| 82                | O             | C | O | O | O | C | O | C | O | O | O  | O  |
| 83                | O             | O | O | O | O | C | O | C | O | O | O  | O  |
| 84                | C             | C | C | C | C | O | O | C | O | O | O  | O  |
| 85                | C             | O | C | C | C | O | O | C | O | O | O  | O  |
| 86                | C             | C | O | C | C | O | O | C | O | O | O  | O  |
| 87                | C             | O | O | C | C | O | O | C | O | O | O  | O  |
| 88                | C             | C | C | O | C | O | O | C | O | O | O  | O  |
| 89                | O             | C | C | O | C | O | O | C | O | O | O  | O  |
| 90                | O             | O | C | O | C | O | O | C | O | O | O  | O  |
| 91                | O             | C | O | O | C | O | O | C | O | O | O  | O  |
| 92                | C             | O | O | O | C | O | O | C | O | O | O  | O  |
| 93                | C             | C | C | C | O | O | O | C | O | O | O  | O  |
| 94                | C             | O | C | C | O | O | O | C | O | O | O  | O  |
| 95                | O             | O | C | C | O | O | O | C | O | O | O  | O  |
| 96                | C             | C | O | C | O | O | O | C | O | O | O  | O  |
| 97                | C             | O | O | C | O | O | O | C | O | O | O  | O  |
| 98                | O             | O | O | C | O | O | O | C | O | O | O  | O  |
| 99                | O             | C | C | O | O | O | O | C | O | O | O  | O  |

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

| Number of Sectors | Switch Number |   |   |   |   |   |   |   |   |   |    |    |
|-------------------|---------------|---|---|---|---|---|---|---|---|---|----|----|
|                   | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 100               | C             | O | C | O | O | O | O | C | O | O | O  | O  |
| 101               | O             | O | C | O | O | O | O | C | O | O | O  | O  |
| 102               | O             | C | O | O | O | O | O | C | O | O | O  | O  |
| 103               | C             | O | O | O | O | O | O | C | O | O | O  | O  |
| 104               | O             | O | O | O | O | O | O | C | O | O | O  | O  |
| 105               | C             | C | C | C | C | C | C | O | O | O | O  | O  |
| 106               | C             | O | C | C | C | C | C | O | O | O | O  | O  |
| 107               | O             | O | C | C | C | C | C | O | O | O | O  | O  |
| 108               | C             | C | O | C | C | C | C | O | O | O | O  | O  |
| 109               | O             | C | O | C | C | C | C | O | O | O | O  | O  |
| 110               | C             | O | O | C | C | C | C | O | O | O | O  | O  |
| 111               | O             | O | O | C | C | C | C | O | O | O | O  | O  |
| 112               | C             | C | C | O | C | C | C | O | O | O | O  | O  |
| 113               | C             | O | C | O | C | C | C | O | O | O | O  | O  |
| 114               | O             | O | C | O | C | C | C | O | O | O | O  | O  |
| 115               | C             | C | O | O | C | C | C | O | O | O | O  | O  |
| 116               | O             | C | O | O | C | C | C | O | O | O | O  | O  |
| 117               | C             | O | O | O | C | C | C | O | O | O | O  | O  |
| 118               | O             | O | O | O | C | C | C | O | O | O | O  | O  |
| 119               | C             | C | C | C | O | C | C | O | O | O | O  | O  |
| 120               | C             | C | C | C | O | C | C | O | O | O | O  | O  |
| 121               | O             | C | C | C | O | C | C | O | O | O | O  | O  |
| 122               | C             | O | C | C | O | C | C | O | O | O | O  | O  |
| 123               | O             | O | C | C | O | C | C | O | O | O | O  | O  |

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

| Number of Sectors | Switch Number |   |   |   |   |   |   |   |   |   |    |    |
|-------------------|---------------|---|---|---|---|---|---|---|---|---|----|----|
|                   | 0             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 124               | C             | C | O | C | O | C | C | O | O | O | O  | O  |
| 125               | O             | C | O | C | O | C | C | O | O | O | O  | O  |
| 126               | C             | O | O | C | O | C | C | O | O | O | O  | O  |
| 127               | O             | O | O | C | O | C | C | O | O | O | O  | O  |
| 128               | O             | O | O | C | O | C | C | O | O | O | O  | O  |

Note: C = Closed or On position; O = Open or Off position.

NOTE

Ignore any remainder in the calculation. In most drives the existence of a remainder adds a "short" sector before index. However, in the BZ5A1V/W, BZ9A5E/F, and BZ9A1J/K/L/M, the final sector is extended to include the "short" sector.

Each sector switch represents a binary and decimal value of clock pulses (as counted in the logic). The values related to each switch are as follows:

| <u>Switch No.</u> | <u>Binary Value</u> | <u>Decimal Value</u> |
|-------------------|---------------------|----------------------|
| 0                 | 2 <sup>0</sup>      | 1                    |
| 1                 | 2 <sup>1</sup>      | 2                    |
| 2                 | 2 <sup>2</sup>      | 4                    |
| 3                 | 2 <sup>3</sup>      | 8                    |
| 4                 | 2 <sup>4</sup>      | 16                   |
| 5                 | 2 <sup>5</sup>      | 32                   |
| 6                 | 2 <sup>6</sup>      | 64                   |
| 7                 | 2 <sup>7</sup>      | 128                  |
| 8                 | 2 <sup>8</sup>      | 256                  |
| 9                 | 2 <sup>9</sup>      | 512                  |
| 10                | 2 <sup>10</sup>     | 1024                 |
| 11                | 2 <sup>11</sup>     | 2048                 |

Here is an example of determining the switch settings for selecting 63 sectors:

$$\text{Total Sector Clock Pulses} = \frac{13\,440}{63} - 1 = 212$$

**NOTE**

Remainder is ignored.

Determine which switches to place in the Closed or On position as follows:

|                                   |     |
|-----------------------------------|-----|
| Total clock pulses per sector     | 212 |
| Clock pulses selected by switch 7 | 128 |
| (Difference)                      | 84  |
| Clock pulses selected by switch 6 | 64  |
| (Difference)                      | 20  |
| Clock pulses selected by switch 4 | 16  |
| (Difference)                      | 4   |
| Clock pulses selected by switch 2 | 4   |
| (Difference)                      | 0   |

Thus, placing switches 2, 4, 6, and 7 in the Closed or On position selects 63 sectors of 212 clock pulses per sector. Since a remainder existed in the calculation formula, an additional "short" sector of 21 Sector Clock Pulses (806 kHz) will be present just before index. In the BZ5A1V/W, BZ9A5E/F, and BZ9A1-J/K/L/M, the final sector is extended to include the 21 remaining Sector Clock Pulses.

## **CHECKOUT**

### **GENERAL**

After installation of the drive, perform visual inspection and verification and initial startup.

### **VISUAL INSPECTION AND VERIFICATION**

Perform the following inspection after installing drive.

1. Verify that all logic cards are firmly seated in logic chassis, mini module, and power supply.
2. Verify that all connectors are firmly seated.
3. Verify that all cabling is intact and that there are no broken or damaged wires.

4. Inspect entire drive for the presence of foreign material which could cause an electrical short.
5. Verify that actuator is unlocked as in figure 1-11.
6. Verify that spindle is unlocked and that the ground spring portion of assembly is properly installed in the center of the shaft as in figure 1-12.
7. Confirm that drive belt is installed.

NOTE

For single channel operation, the single channel adapter plug must be installed and the dual channel steering card must be removed. Failure to remove card assembly disables the drive.

8. Verify, for single channel operation, that the single channel selector plug is installed on the wire wrap back-panel at location C04 between pins 15 and 36. Figure 1-22 shows the wiring configuration for the single channel adapter plug.

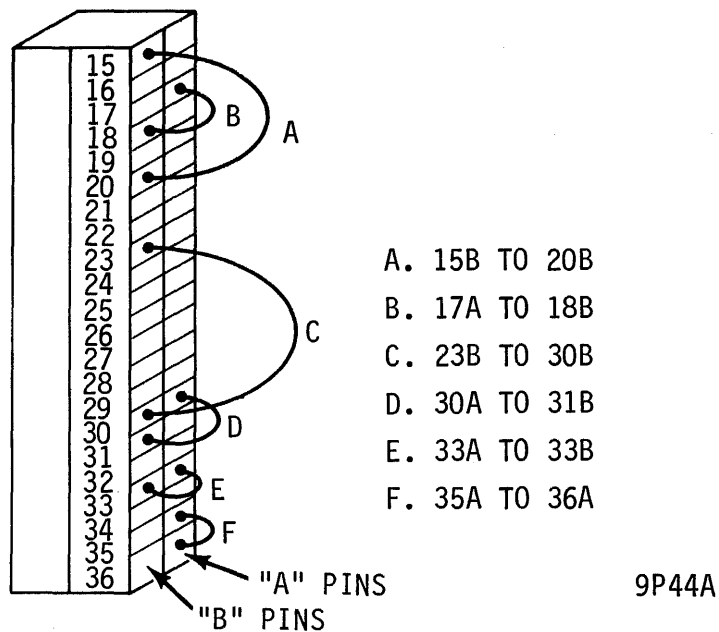


Figure 1-22. Single Channel Adapter Plug

9. Confirm that dual channel steering card assembly \_FBX is removed from location C04.

NOTE

For dual channel operation, install dual channel steering card assembly and remove single channel adapter plug. Failure to remove adapter plug disables drive.

10. Verify, for dual channel operation, that dual channel steering card assembly \_FBX is installed at location C04.
11. Confirm that single channel adapter plug is removed from wire wrap backpanel at location C04 between pins 15 and 36.

INITIAL STARTUP

After installation and visual inspection is completed, follow the sequence outlined below for initial startup. Refer to section 2 of the hardware reference manual for information about operation of the drive.

1. Set LOC/REM switch (on card assembly at B02/C02) to LOC position.
2. Set circuit breaker CBI at rear of drive in ON position and observe that the following events occur:
  - o The three fans on the front panel operate.
  - o The drive motor starts.
  - o The READY indicator lights within 30 seconds of start-up. This indicates that the drive motor is up to speed and that the heads are at track 0.

If any of these events do not occur, a problem exists in the drive. Then refer to the Decision Logic Tables in section 2C for troubleshooting information.

3. Power down drive.
4. Set LOC/REM switch to REM position if remote operation is desired.
5. Replace top and bottom covers.
6. Drive is now ready for online operation.





**SECTION 2**

**MAINTENANCE**



---

## INTRODUCTION

This section provides the information necessary to maintain all configurations of the drive. The maintenance discussed in this section is limited to that which can be performed in the field. Unless otherwise specified, the information presented here applies to all equipments listed in the front of this manual.

The maintenance procedures defined here should be performed only by qualified maintenance personnel.

Information is divided into the following major areas:

- General Maintenance Information - Provides information on safety precautions, maintenance tools and materials, special maintenance practices, accessing drive for maintenance, and test points. Before performing any maintenance, be thoroughly familiar with the information in this section.
- Tests and Adjustments - Provides procedures for all the major drive tests and adjustments which can be performed in the field.
- Trouble Analysis Information - Provides procedures and information to assist in isolating drive malfunctions.
- Repair and Replacement - Provides procedures and information on the replacement and adjustment of drive assemblies. This section assumes that the assembly was previously identified as malfunctioning.



**SECTION 2A**

**GENERAL MAINTENANCE INFORMATION**



---

**GENERAL**

This section contains general information relating to maintenance of the drive. A person performing maintenance on the drive should be familiar with this information in addition to the operating principles and procedures described in the hardware reference manual.

The information in this section is divided into the following areas:

- Safety Precautions - Lists safety precautions that must be observed when working on the drive.
- Maintenance Tools and Materials - Lists the tools and materials required to perform maintenance on the drive.
- Special Maintenance Practices - Presents important practices to be observed during field service.
- Physical Locations - Lists major assemblies of the drive with references to diagrams and parts data sections of the manual.
- Test Points - Identifies and describes the test points which are provided for maintenance purposes.
- Accessing Drive for Maintenance - Identifies the various parts of the drive and provides procedures which describe the opening and closing of the various parts of the machine in order to gain access for maintenance purposes.

**SAFETY PRECAUTIONS**

Observe the following safety precautions at all times. Failure to do so may cause equipment damage and/or personal injury.

- Use care while working with the ac power distribution and dc power supply because line voltages are present.
- Do not attempt to disassemble the mini module. It is not field repairable. Replace the entire mini module assembly if it is found defective.
- Do not operate the drive over an extended period of time without the top cover installed.

## MAINTENANCE TOOLS AND MATERIALS

### GENERAL

The maintenance procedures described in this manual require the use of certain special tools, test equipment, and materials. These are listed in table 2-1 along with the appropriate CDC part number. Note that the list only includes special tools. It is assumed that the service person has normal maintenance tools.

TABLE 2-1. MAINTENANCE TOOLS AND MATERIALS

| Description                        | CDC Part Number                 |
|------------------------------------|---------------------------------|
| Card Extender (Full Size)          | CDC 82318700                    |
| Card Extender (1/2 Size)           | CDC 82318800                    |
| Chip Extender (Chip Clip)          | CDC 12212196                    |
| Field Test Unit (TB216A)           | CDC 75144000                    |
| Filter Coat                        | CDC 12210958                    |
| Non-Metallic Feeler Gage, 0.001 in | CDC 12205637                    |
| Non-Metallic Feeler Gage, 0.005 in | CDC 12205633                    |
| Oscilloscope, Dual Trace           | Tektronix 475A<br>or equivalent |
| Pin Straightener                   | CDC 87369400                    |
| Scope Probe Tip (Hatchet type)     | CDC 12212885                    |
| Torque Wrench, 1/4 Inch            | CDC 12263205                    |

Table Continued on Next Page



TABLE 2-1. MAINTENANCE TOOLS AND MATERIALS (Contd)

| Description                        | CDC Part Number   |
|------------------------------------|---|
| Volt/ohmmeter                      | Ballantine 345<br>or equivalent<br>digital volt-<br>meter |
| Wire Wrap Removal Tool, 20-30 Gage | CDC 92020500  |
| Wire Wrap Bit, 30 Gage             | CDC 12218402  |
| Wire Wrap Gun, Electric            | CDC 12259111  |

Most of the items listed in the table require no explanation. The items listed in the table are called out in the specific procedures in which they are required. However, some of the items included in the list require further explanation. The field test unit is discussed under Special Maintenance Practices. The following paragraphs discuss the card extender and chip extender.

#### CARD EXTENDER

Two types of card extenders are required for maintaining the drive, one to accommodate the full size cards and the other for the half size cards. The extenders permit access to all components and test points on all cards except the NSN card. Since the NSN card cannot be extended, its components must be accessed from the foil side with the card in place.

When extending a card, always remove power from the drive before removing or installing the card.

Two considerations apply when extending the NRN and NQN cards located in front of the mini module. First, drive operation may be marginal when either card is extended. Second, to access these cards it is necessary to loosen the four screws securing the front panel brackets to the base frame and slide the front panel forward. The card retainer for these cards must be removed and set aside.

## CHIP EXTENDER :

The chip extender clamps over the IC package, and the extended pins at the back of the clip serve as the desired test points.

## SPECIAL MAINTENANCE PRACTICES

### GENERAL

Normal drive maintenance is performed by using standard field service practices. Some important practices are presented below for emphasis.

### TESTING THE DRIVE

#### General

Electrical testing of the drive requires that the drive be exercised. The drive may be exercised (commanded to perform various seeks or to read or write test data) by either a field test unit or by system software. Each method is discussed separately.

#### Field Test Unit

The field test unit (FTU) makes it possible to exercise and evaluate a drive independent of the rest of the system. The drive operates offline because the FTU I/O cables are connected to the drive in place of the system I/O cables.

The FTU recommended for the MMD is the TB216A. The FTU manual contains specific instructions for interconnecting the FTU and the drive. The FTU manual also contains procedures for preliminary setup and operation of the tester.

Before disconnecting the system I/O cables from the drive, disable the controller and place drive circuit breaker CBI in the OFF position. In a daisy chain system, power off all the drives. Remove all the system I/O cables from the drive to be tested. In a daisy chain system, make the necessary connections to ensure that other drives remain under system control, and restore power to the other drives.

Connect the FTU A cable to drive connector J3 and the FTU B cable to drive connector J2. Connect a terminator on drive connector J4 and make its ground connection. The terminator is shown in figure 1-19, and its part number is given in table 1-2. Drive connections are made on the A2A04 card for single

channel drives. Dual channel drives may be tested through the channel I or the channel II interface by making the three connections at the A2A04 card (channel I) or the A2B04 card (channel II).

At the completion of testing, restore the drive to online operation by reversing the process outlined above.

### **System Software**

The drive may also be tested by use of microdiagnostic test routines (system software). This requires use of the controller and the appropriate software. In this type of testing, the drive communicates with the controller as in normal online operations, and no special I/O connections are necessary.

Refer to manuals or other documentation applicable to the specific system or subsystem for information concerning the system software routines.

### **HANDLING ELECTROSTATIC SENSITIVE DEVICES**

The MMD uses logic cards having metal-oxide semiconductor integrated circuits. These circuits require special handling procedures to prevent damage from static electricity. Logic cards having metal-oxide semiconductor circuits are identified by orange card ejectors. Listed below are some precautions that service personnel must observe when handling these cards.

- Never use an ohmmeter on the \_JBX microprocessor card assembly.
- Always remove the microprocessor card from the drive before using an ohmmeter on the drive.
- Turn off power before removing and installing any logic cards.
- Discharge to ground anything that will come in contact with the card. This includes tools, the body, clothing, containers, etc.
- Touch the logic chassis to bleed off any accumulated static charge before removing and installing the card, and continue to touch the chassis while removing and installing the card.
- Handle the card only by a non-circuit portion. Connector pins and circuit connection points must not be touched.

- Make sure that the special protective container for the card is in contact with the logic chassis ground before and during the time that the card is inserted into or removed from the container. The protective container must have affixed to it a CDC Warning Label, Form AA5642.
- Keep logic card in the approved container whenever it is not installed in the logic chassis or at a properly prepared work station.

## PHYSICAL LOCATIONS

Figure 2-1 shows all the major assemblies in the drive and indicates the physical location code assigned to each. This is supplemented by the key to logic in the diagrams section which shows the location of all logic cards in the drive. Also, the illustrated parts breakdown in the parts data section is useful for locating parts inside the drive.

## TEST POINTS

Test points are provided at the printed circuit card edges to aid service persons in carrying out maintenance of the system. The test points are of three types: plated holes, wire wrap posts, and turret terminals as shown in figure 2-2.

The plated hole test points are located at the card edge and are numbered left to right consecutively starting with test point 1 and continuing through test point 34 for the full size printed circuit card assembly. The half size card assembly usually has test points that are numbered 1 through 17, but this can vary for each type of card.

Wire wrap and turret test points may be located anywhere on the card assembly. These test points are assigned a four digit numerical X and Y coordinate location as XXYY and are so designated on the logic diagrams.

## ACCESSING THE DRIVE FOR MAINTENANCE

### GENERAL

The following instructions describe how to extend a rack-mounted drive on its slides and how to raise and lower the logic chassis. Instructions for removing the top, bottom, and rear covers, as well as the field-replaceable parts, are given in the repair and replacement section of this manual.

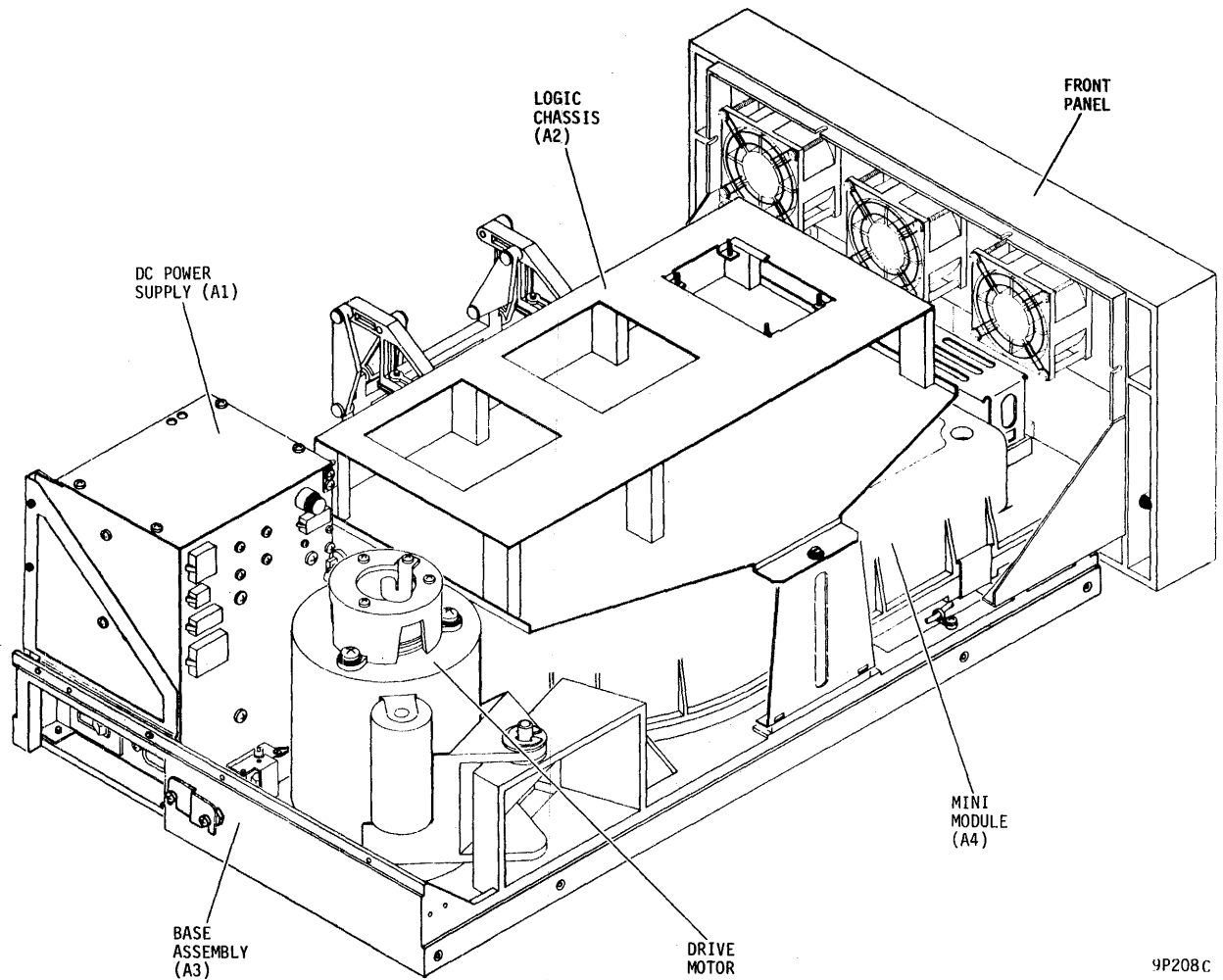


Figure 2-1. Assembly Location

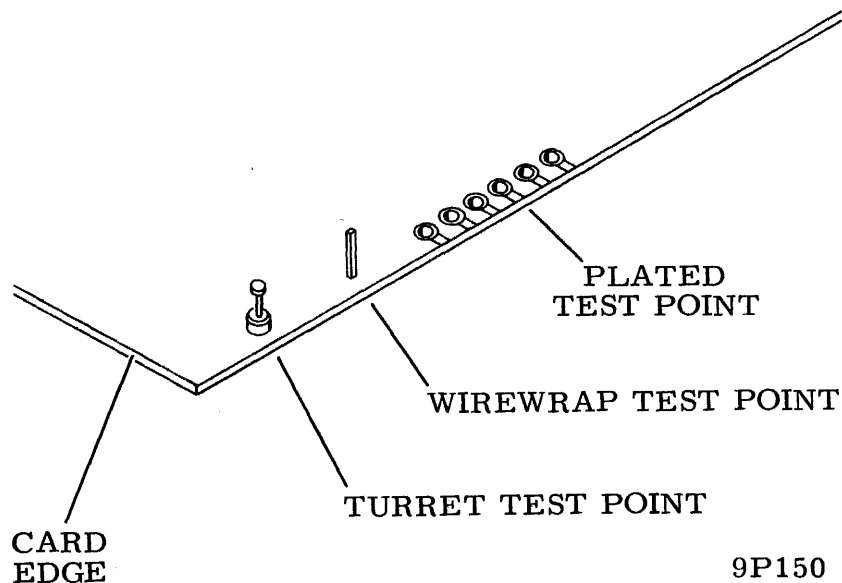


Figure 2-2. Types of Test Points

#### DRIVE EXTENSION

This procedure contains instructions for extending a rack-mounted drive for maintenance purposes. When extending a drive, exercise caution to ensure that the equipment rack remains stable. Also, take care that the system cabling is not damaged when sliding the drive in and out of the rack.

1. Remove front panel cover by pressing at top of cover until it snaps free.
2. Disengage latch on right side of front panel by inserting a 1/8 in allen wrench into hex screw on latch and turning wrench counterclockwise. Some drives also have a latch on left side of front panel; if so, disengage this latch in the same manner.
3. Pull out drive until full extension locks on slide assemblies are latched.
4. Perform desired maintenance.

5. Release full extension locks on slide assemblies and push drive into latched position in mounting rack.
6. Replace front panel cover by inserting top of cover first and then pushing bottom into place.

#### **RAISING AND LOWERING THE LOGIC CHASSIS :**

The two positions for the logic chassis are defined as follows:

- Normal operating - logic chassis is secured flat against mini module
- Maintenance - logic chassis is pivoted up 90° to expose top of mini module.

As shown in figure 2-3, the logic chassis is secured to the frame support by a 1/4-turn fastener on older drives and by a locking screw on newer drives. The following procedure describes raising the logic chassis to the maintenance position. Returning the logic chassis to the normal operating position is performed in the reverse order. This procedure assumes that power is removed from the drive.

1. Remove top cover of drive as defined in the removal procedure in this section of manual.
2. Remove I/O cable mount on rear cover.
3. On older drives, release 1/4-turn fastener securing logic chassis to frame support. On newer drives, remove and set aside the locking screw securing logic chassis to frame support.
4. Raise logic chassis to maintenance position.

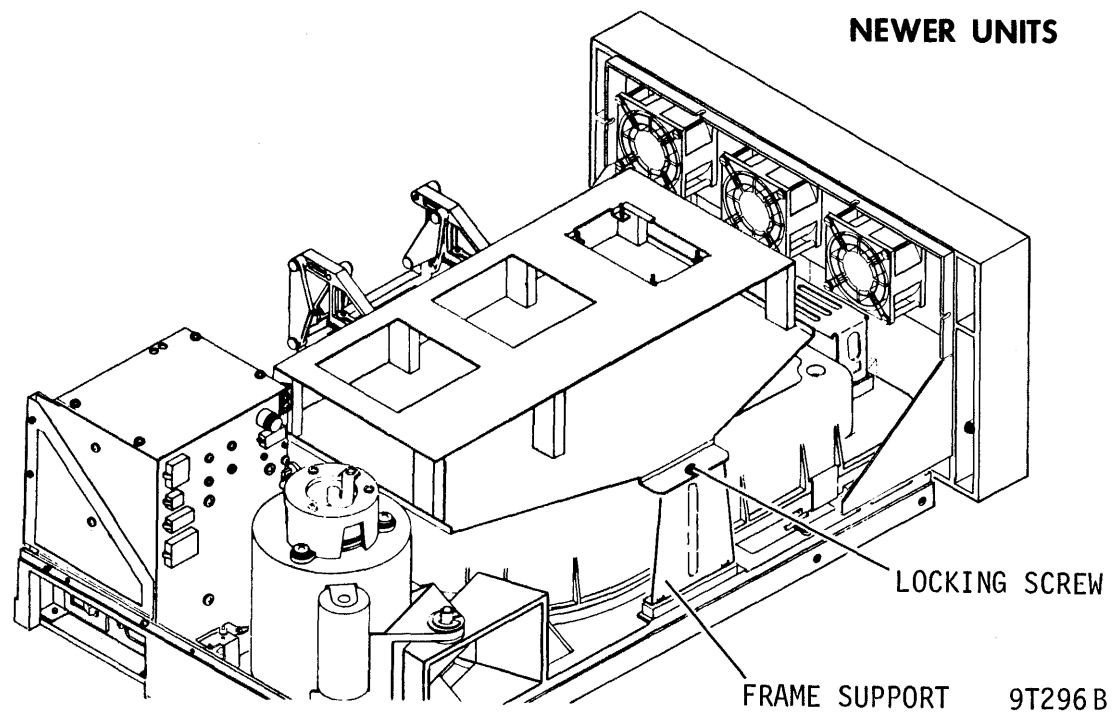
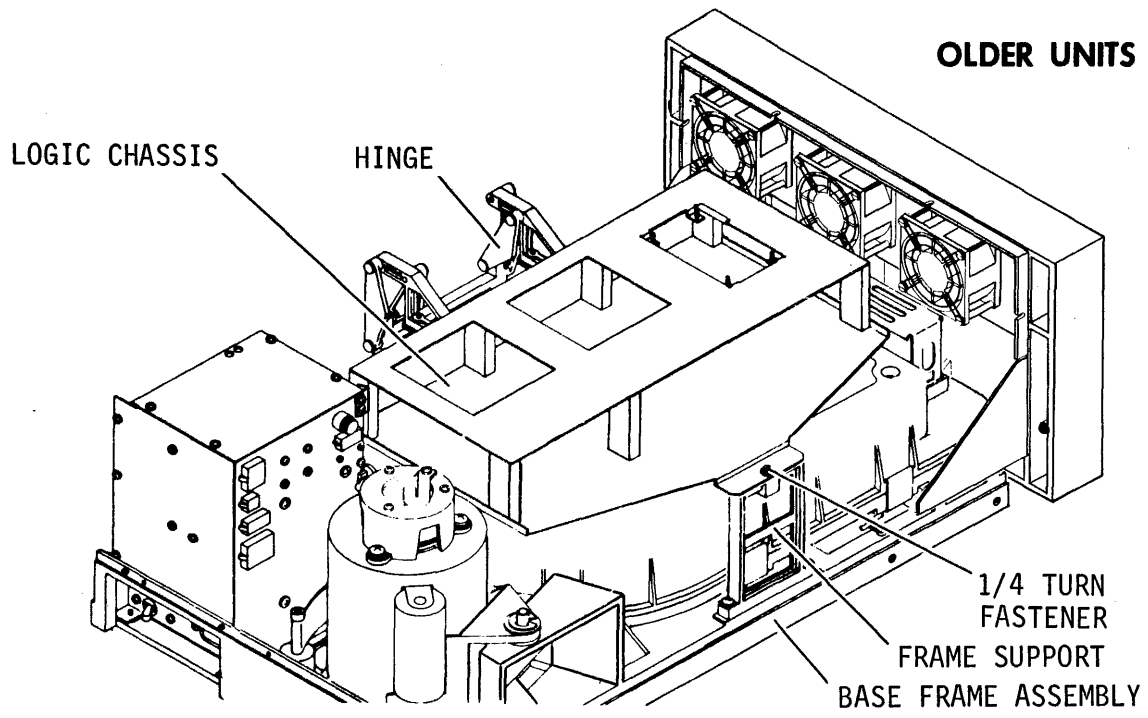


Figure 2-3. Logic Chassis



**SECTION 2B**

**TESTS AND ADJUSTMENTS**



---

## GENERAL

This section provides information on the tests and adjustments which can be performed in the field. The adjustments given here are limited to those performed at the drive level. These tests should only be performed as required elsewhere in this manual, or when there is suspicion that the drive is not functioning properly.

Other tests, normally associated with analyzing a malfunction, are included in the Trouble Analysis section. A person performing these tests and adjustments should already be familiar with the information contained in the General Maintenance Information section. Refer to that section for information on safety precautions, maintenance tools and materials, and test point locations.

These procedures assume that an FTU is connected to the drive (or that suitable software is available), a mini module is installed, and the drive is powered on. All the following tests are written to provide a check procedure and then the adjustment. If the drive meets the criteria of the check, there is no need for the adjustment.

The following procedures are contained in this section, in the order specified:

- Plus and Minus 5 Volt Adjustment
- Servo Gain Adjustment
- Velocity Overshoot Adjustment
- Position Null Adjustment

## PLUS AND MINUS 5 VOLT ADJUSTMENT

This procedure checks the output of the plus and minus 5 volt power supplies while the drive is doing repeat seeks. Power supply outputs are checked at the logic chassis backpanel. Therefore, the supplies are being checked to account for both line loss and loading.

1. Extend drive fully to the maintenance position.

2. Remove top cover. Refer to Top Cover Removal and Replacement procedure.
3. Connect digital voltohmmeter between GND and +5 V fastons on logic chassis wire wrap panel.
4. Command continuous seeks between cylinders 0 and 33 for 160 MB drives. For 80 MB drives, command continuous seeks between cylinders 0 and 66.

NOTE

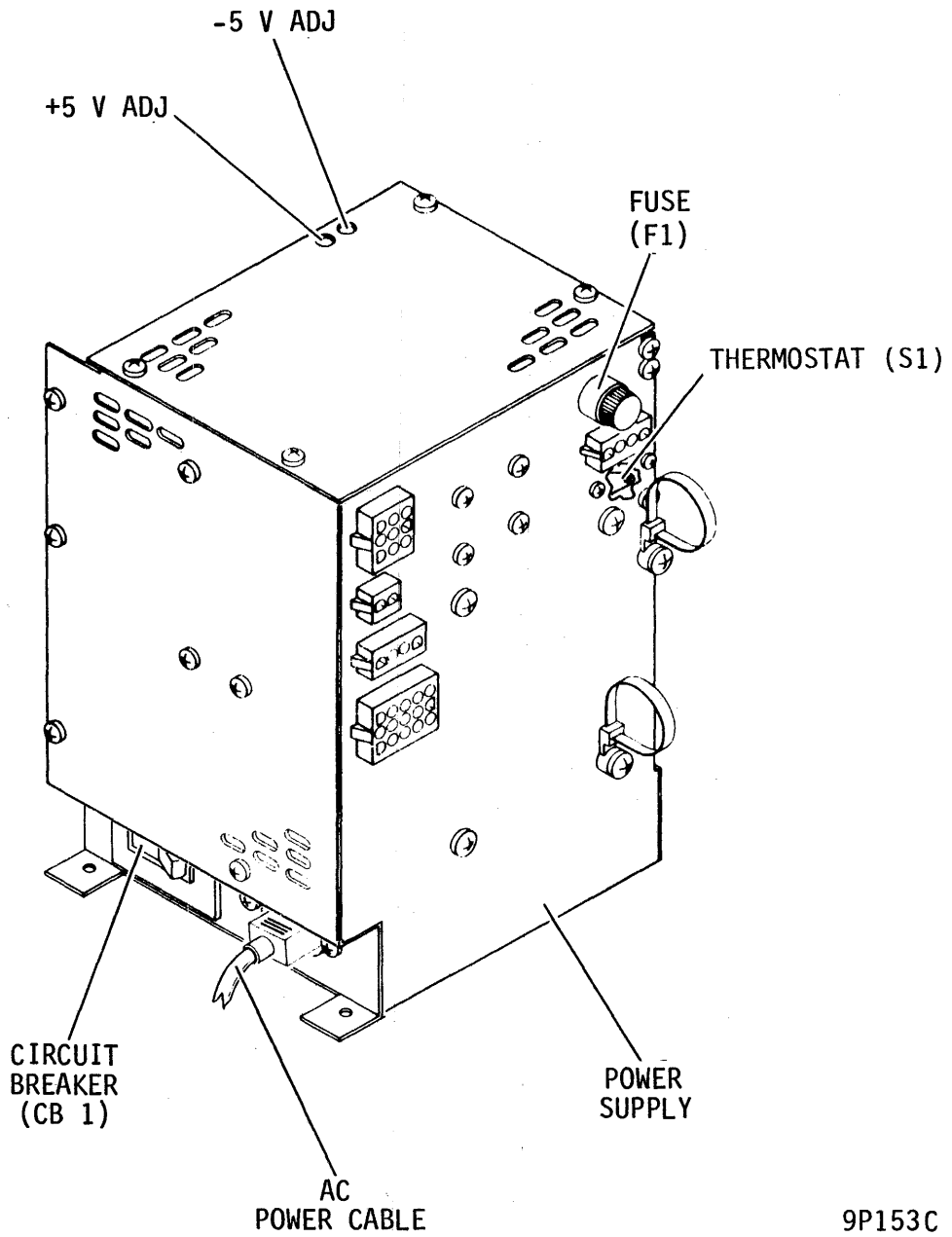
If +5 volt output is adjusted to exceed +5.7 volts, an overvoltage protection circuit reduces the output and holds it at about +1 volt. If this happens, remove power by turning off circuit breaker CBl, adjust +5 V potentiometer fully counterclockwise, and restore power with CBl before reattempting step 5.

5. Verify that +5 volt output is  $+5.10 \pm 0.05$  volts. If not, adjust +5 V potentiometer on card assembly ZYV until output is within specification. Access is provided to the potentiometer through a hole in the top cover of the power supply as in figure 2-4.
6. Move voltohmmeter lead to -5 V faston on wire wrap panel.

NOTE

If -5 volt output is adjusted to exceed -5.7 volts, an overvoltage protection circuit reduces the output and holds it at about -1 volt. If this happens, remove power by turning off circuit breaker CBl, adjust -5 V potentiometer fully counterclockwise, and restore power with CBl before reattempting step 7.

7. Verify that -5 volt output is  $-5.10 \pm 0.05$  volts. If not, adjust -5 V potentiometer on card assembly ZYV until output is within specification.
8. Restore drive to normal operation when both power supply outputs are within specifications.



9P153C

Figure 2-4. Power Supply

## SERVO GAIN ADJUSTMENT

If the analog card assembly KBX or the mini module fails in the field, the following steps must be initiated to make certain that 8 volts peak to peak is available on the servo position signal as in figure 2-5.

1. Before installing replacement card in drive, using a voltohmmeter (VOM), adjust potentiometer SERVO GAIN ADJ (shown in figure 2-6) for the smallest resistance possible. Turn potentiometer counterclockwise.
2. Install KBX card assembly into drive.
3. Apply power to drive.
4. Place LOC/REM switch to LOC position enabling disks to spin and unit to load heads.
5. Using the FTU, command 33 track continuous seeks for 160 MB drives or 66 track continuous seeks for 80 MB drives.
6. Connect oscilloscope as shown in figure 2-5.
7. Observe the -Position signal and adjust potentiometer SERVO GAIN ADJ shown in figure 2-6 for a position signal amplitude of  $8.0 \pm 0.10$  volts peak to peak.

## OVERSHOOT ADJUSTMENT

This procedure contains instructions for minimizing access times by adjusting for optimum overshoot.

### NOTE

Different criteria apply when adjusting different KBX Analog Servo cards. Throughout this procedure, refer to Sheet 1 of figure 2-7 for the LKBX card or to sheet 2 of figure 2-7 for other KBX cards.

1. Connect oscilloscope as shown in figure 2-7.
2. Apply power to drive.
3. Command random seeks.
4. Observe +Position signal at TP17 on B01/C01 card assembly as shown in figure 2-7. Scope display shows traces for in and out direction seeks superimposed.

### OSCILLOSCOPE SETUP

INPUT:  
 CHANNEL VOLTS/DIV CONNECTION SIGNAL NAME  
 CH 1 2.0 V/CM B01-TP17 +POSITION

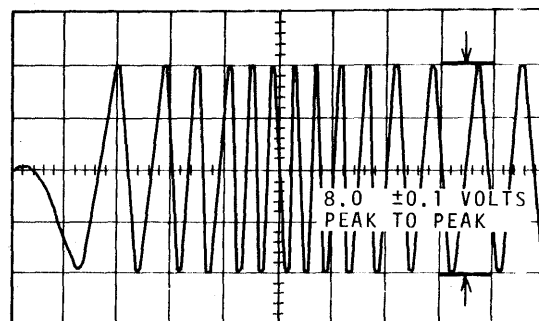
CH 2

TRIGGERING:  
 SLOPE/SOURCE CONNECTION SIGNAL NAME  
 +EXT B03-18B + IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.  
 USE XIO PROBES UNLESS OTHERWISE NOTED.

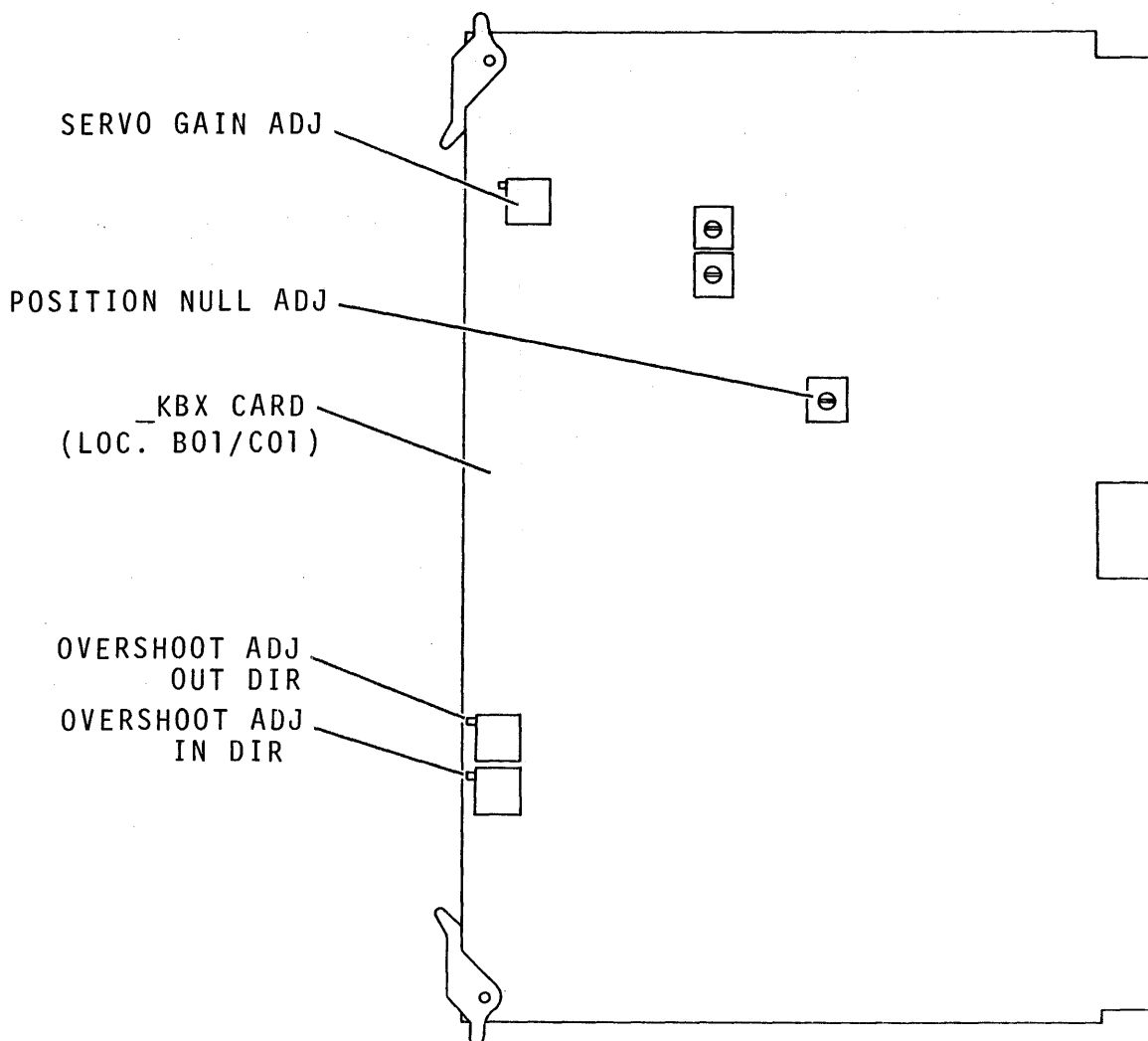
TIME/DIV: 1.0 ms/CM MODE: CH1

NOTES:



9P203F

Figure 2-5. Position Signal Gain



9T258

Figure 2-6. Servo Adjustment Potentiometer Locations

## OSCILLOSCOPE SETUP

**INPUT:**

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2 V/CM    | B01-TP17   | +POSITION   |
|         |           |            |             |
| CH 2    |           |            |             |

**TRIGGERING:**

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME  |
|--------------|------------|--------------|
| -EXT         | B03-18A    | +INTEG SHORT |

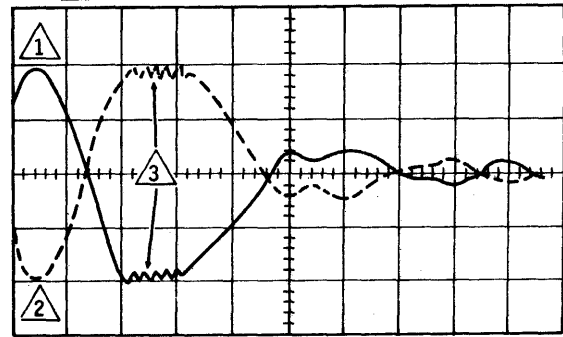
SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 1 MS/CM                      MODE: CH.1

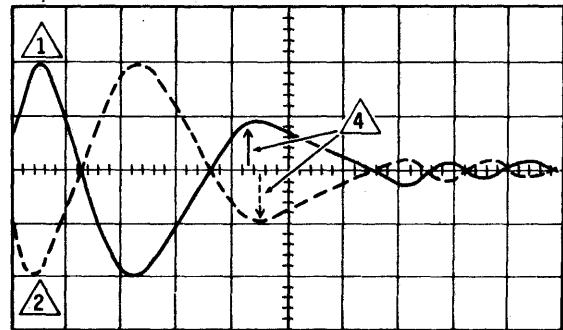
**NOTES:**

- ① SOLID-LINE TRACE PRODUCED BY IN DIRECTION SEEK
- ② DOTTED-LINE TRACE PRODUCED BY OUT DIRECTION SEEK
- ③ RIPPLES ON THESE PEAKS INDICATE THAT OVERSHOOT IS INSUFFICIENT
- ④ MAXIMUM ALLOWABLE OVERSHOOT IS 2.0 V-PEAK
- ⑤ OVERSHOOT EXCEEDS MAXIMUM ALLOWABLE VALUE

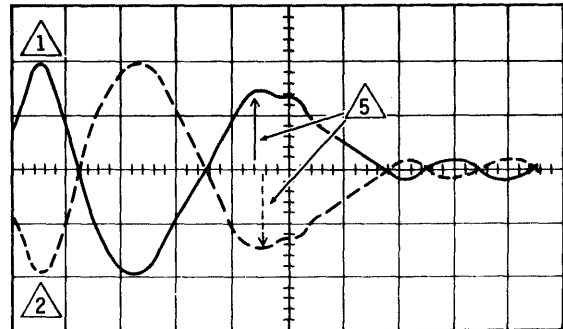
**BOTH TRACES SHOW INSUFFICIENT OVERSHOOT:**



**BOTH TRACES ARE WITHIN TOLERANCE:**



**BOTH TRACES SHOW EXCESSIVE OVERSHOOT:**



10K43

Figure 2-7. Overshoot (Sheet 1 of 2)



## OSCILLOSCOPE SETUP

**INPUT:**

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2 V/CM    | B01-TP17   | +POSITION   |
| CH 2    |           |            |             |

**TRIGGERING:**

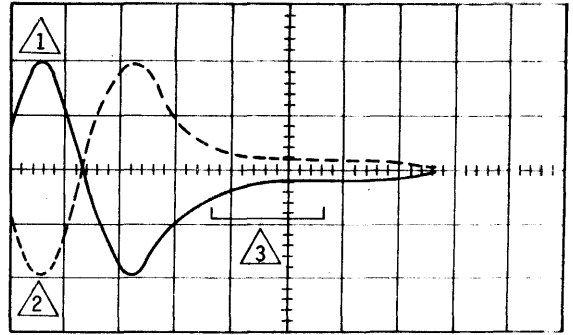
| SLOPE/SOURCE | CONNECTION | SIGNAL NAME  |
|--------------|------------|--------------|
| -EXT         | B03-18A    | +INTEG SHORT |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

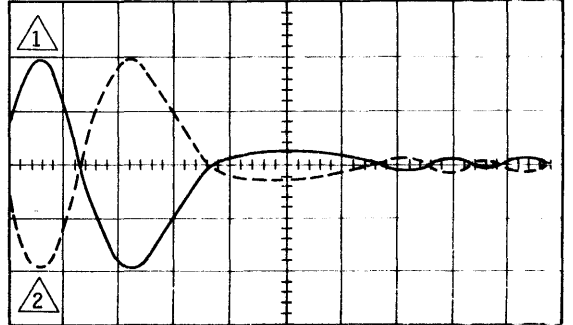
TIME/DIV: 1 MS/CM                      MODE: CH.1  
NOTES:

- △1 SOLID-LINE TRACE PRODUCED BY IN DIRECTION SEEK
- △2 DOTTED-LINE TRACE PRODUCED BY OUT DIRECTION SEEK
- △3 UNDERSHOOT IS INDICATED BY NO OSCILLATION IN THIS INTERVAL

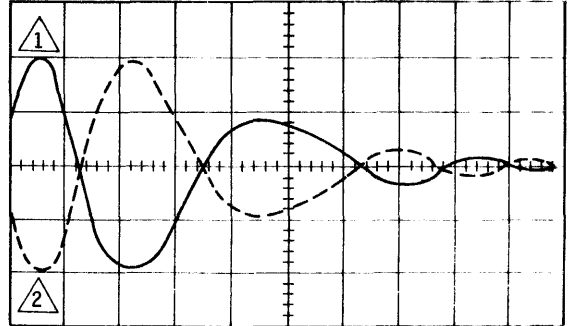
**BOTH TRACES SHOW UNDERSHOOT:**



**BOTH TRACES ARE PROPERLY ADJUSTED:**



**BOTH TRACES SHOW EXCESSIVE OVERSHOOT:**



10K42

Figure 2-7. Overshoot (Sheet 2)



#### NOTE

Card locations of potentiometers specified in steps 5 and 6 are shown in figure 2-6.

5. Adjust OVERSHOOT ADJ IN DIR potentiometer to optimize trace for in direction seeks (see figure 2-7).
6. Adjust OVERSHOOT ADJ OUT DIR potentiometer to optimize trace for out direction seeks (see figure 2-7).

#### POSITION NULL ADJUSTMENT

This procedure contains instructions for minimizing the offset error of the position signal when forward and reverse seeks are compared.

1. Connect oscilloscope as shown in figure 2-9.
2. Command 33 track continuous seeks for 160 MB drives or 66 track continuous seeks for 80 MB drives.
3. Observe the negative peaks of the +Position signal at B01-TP17 between forward and reverse seeks. Negative peaks should be within 0.4 volts of each other as shown in figure 2-9. If this requirement is not met, proceed with step 4. If it is met, skip to step 8.
4. Remove power from drive.
5. Place card B01/C01 on full size card extender.
6. Apply power to drive.
7. Adjust POSITION NULL potentiometer shown in figure 2-6 until above requirement is met.
8. Return drive to online operation.

### OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2.0 V/CM  | B01-TP17   | +POSITION   |

CH 2

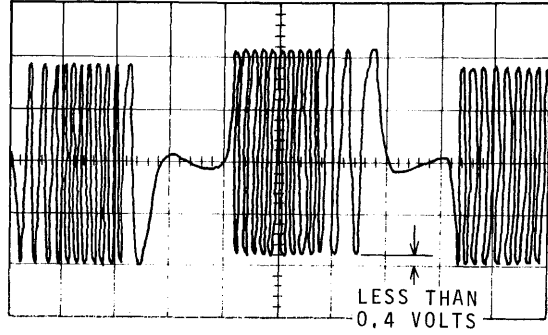
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME   |
|--------------|------------|---------------|
| +EXT         | B03-18B    | +IN DIRECTION |

SCOPE GND TO GND ON LOGIC CARD  
USE XIO PROBES UNLESS OTHERWISE NOTED

TIME/DIV: 5ms/CM                      MODE: CH1

NOTES:

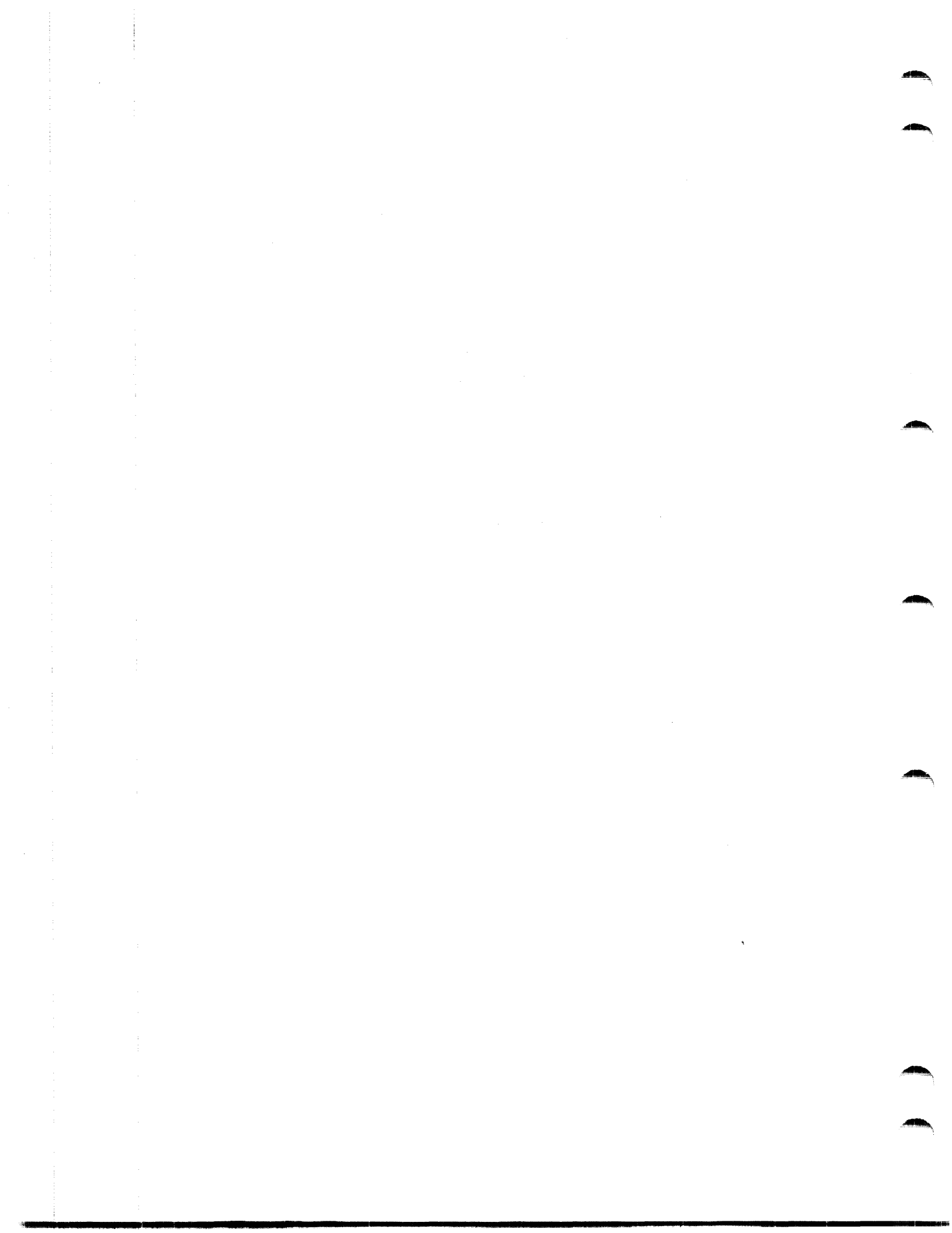


9P198B

Figure 2-9. Position Signal

**SECTION 2C**

**TROUBLE ANALYSIS INFORMATION**



---

## GENERAL

This section contains information on analyzing problems in the drive. The section is divided into three parts and they appear in the following order:

- Electrical Checks
- Troubleshooting Procedures
- Decision Logic Tables

The first part contains instructions on checking specific circuits or components. The last two parts describe procedures for localizing and correcting problems in the drive when their cause is not known.

The person performing these procedures should be thoroughly familiar with drive operation and with all information in the General Maintenance section of this manual.

## ELECTRICAL CHECKS

### GENERAL

The purpose of these procedures is to assist maintenance personnel in isolating problems causing improper drive operation. However, if the drive appears to be operating properly, failure to meet a specification given in these procedures does not in itself indicate improper drive operation.

The procedures are divided into the following major areas:

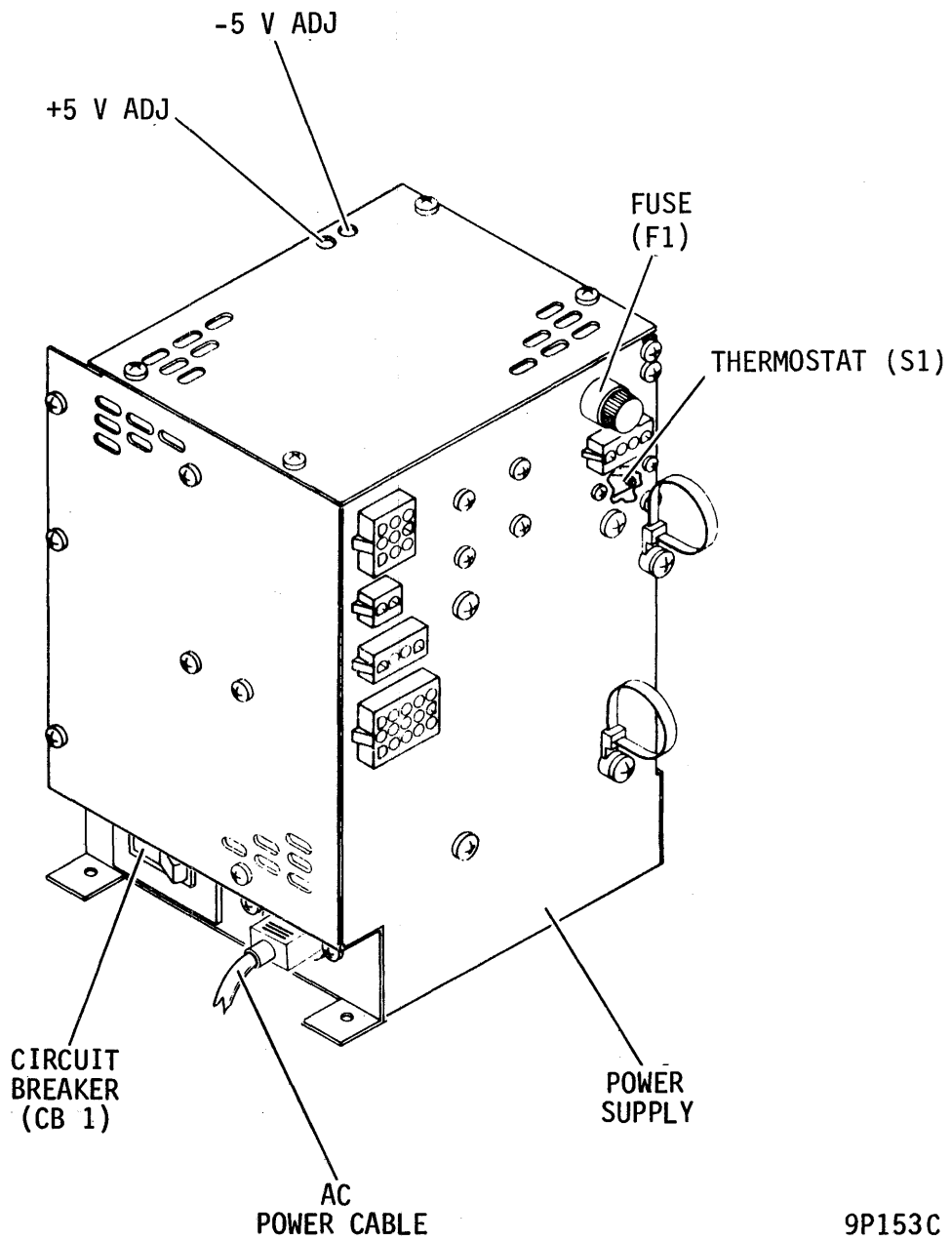
- Power System Checks
- Servo System Checks
- Read/Write System Checks
- Miscellaneous Checks

## POWER SYSTEM CHECKS

This procedure checks the ac and dc voltages. This includes all voltages except +5 volts and -5 volts which are checked in the Plus and Minus 5 Volt Adjustment procedure.

1. If drive fails to provide proper distribution of ac power, check circuit breaker (CBI) for ON position. Reset if necessary. Refer to figure 2-10 for circuit breaker location.
2. For further ac power distribution failures within drive, check fuse (F1) on the side of dc power supply. If blown, replace fuse with a fuse of the same specifications.
3. If an ac power failure continues to exist, check thermostat in power supply as shown in figure 2-10. Normally, the voltage drop across the thermostat is 0 V ac.
4. If drive motor fails to start, check thermo overload breaker on drive motor. Reset if necessary.
5. Prepare drive for use with test software or FTU.
6. Command continuous seeks between cylinders 0 and 128.
7. Connect voltmeter ground lead to ground terminal on wire-wrap panel.
8. Measure the following voltages at the test points on the logic chassis.
  - +24.0  $\pm$  2.4 volts at wire wrap panel +24 volt terminal.
  - -24.0  $\pm$  2.4 volts at wire wrap panel -24 volt terminal.
  - -8.2  $\pm$  0.4 volts at wire wrap panel B01-03A or B01-03B.
  - +15.0  $\pm$  0.75 volts at TP 3 on \_KBX card assembly.
  - -15.0  $\pm$  0.75 volts at TP 2 on \_KBX card assembly.
9. Referring to the Card Extender discussion in Section 2A, extend the \_NRN card assembly.
10. Measure +18.0  $\pm$  1.08 volts at B3-43A or B3-43B on \_NRN card assembly.





9P153C

Figure 2-10. AC Power

11. Replace the \_NRN card assembly and extend the \_NQN card assembly.
12. Measure the following voltages referenced to ground:
  - $-18.0 \pm 1.08$  volts at A2-03A or A2-03B on \_NQN card assembly.
  - $+6.0 \pm 0.3$  volts at B2-16A or B2-16B on \_NQN card assembly.
  - $-4.00 \pm 0.25$  volts at A2-33A or A2-33B on \_NQN card assembly.
13. Return drive to online operation.

## SERVO SYSTEM CHECKS

### General

The servo system checks consist of procedures that test various points in the drives servo logic. It becomes very important to identify the area of failure between the mini module and the servo logic circuits, since a mini module should be replaced only upon failure.

These logic-controlled checks use the FTU or test software to command the actuator movement required for testing the servo system.

### Position Gain Check

This procedure checks that the proper amplitude is available on the  $\pm$ Position signals. If necessary, perform the Servo Gain Adjustment in Section 2B before proceeding here.

1. Connect oscilloscope as shown in figure 2-11.
2. Command continuous seeks between cylinders 0 and 822.
3. Observe  $\pm$ Position signal at B01-TP17 over a complete seek. Its peak to peak amplitude must remain between 7.8 and 8.4 volts.
4. Connect oscilloscope as shown in figure 2-12.

### OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2.0 V/CM  | B01-TP17   | +POSITION   |
| CH 2    |           |            |             |

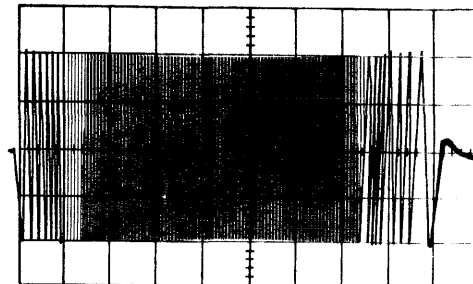
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME   |
|--------------|------------|---------------|
| +EXT         | B03-18B    | +IN DIRECTION |

SCOPE GND TO GND ON LOGIC CARD.  
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 5 ms/CM                      MODE: CH 1

NOTES:



9T257

Figure 2-11. Plus Position Gain

### OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2.0 V/CM  | B01-TP16   | -POSITION   |
| CH 2    |           |            |             |

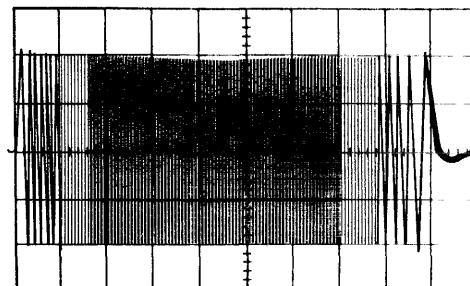
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME   |
|--------------|------------|---------------|
| +EXT         | B03-18B    | +IN DIRECTION |

SCOPE GND TO GND ON LOGIC CARD.  
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 5 ms/CM                      MODE: CH.1

NOTES:



9T231

Figure 2-12. Minus Position Gain

5. Observe -Position signal at B01-TP16 over a complete seek. Its peak to peak amplitude must remain between 7.8 and 8.4 volts.
6. Return drive to online operation.

### Position Demodulator Gating Check

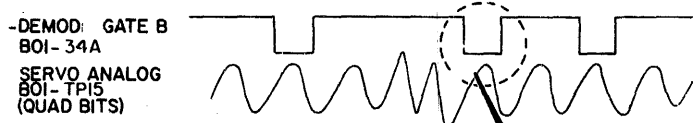
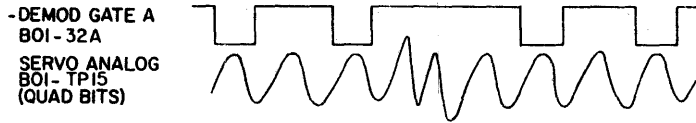
This procedure checks that the servo analog quadbits are centered within the demodulator gates.

1. Connect oscilloscope as follows:
  - TRIGGER: EXT+ at B02-TP27 (Index).
  - VOLTS/DIV: CH I 2.0 v/cm  
CH II 0.5 v/cm
2. Command positioner to cylinder 0.
3. Connect CH I of oscilloscope to B01-32A (-Demod Gate A signal).
4. Connect CH II of oscilloscope to B01-TP15 (Servo Analog signal).
5. With oscilloscope in X10 magnified sweep, adjust horizontal position to display -Demod Gate A on CRT.
6. Measure quad bit gate timing as shown in figure 2-13.
7. Connect CH I of oscilloscope to B01-34A (-Demod Gate B signal).
8. With oscilloscope in X10 magnified sweep, adjust horizontal position to display -Demod Gate B on CRT.
9. Measure quad bit gate timing as shown in figure 2-13.
10. Return drive to online operation.

### Settled On Track Delay Check

This procedure checks the on track delay to make certain the heads stay on track.

1. Connect oscilloscope as follows:



### OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME   |
|---------|-----------|------------|---------------|
| CH 1    | 2.0 V/CM  | B01-32A    | -DEMOD GATE A |
| CH 2    | 0.5 V/CM  | B01-TP15   | SERVO ANALOG  |

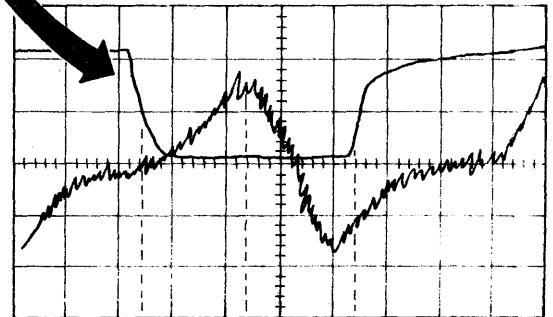
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| +EXT         | B02-TP27   | INDEX       |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 1  $\mu$ s/CM      MODE: ALT

NOTES: PUT HORIZONTAL DISPLAY IN X10  
DEMOM GATE SHALL BE CENTERED OVER  
QUADBITS, WITHIN 100ns. (X=Y WITHIN 100ns)



← X →    ← Y →  
← 400 ns (REF) →

9P204C

Figure 2-13. Demodulator Gating

- TRIGGER: EXT+ on C01-42A (+On Cylinder Sense)
  - VOLTS/DIV: 2.0 V/cm
  - TIME/DIV: 0.5 ms/cm
2. Command one cylinder continuous seeks for 160 MB drives or two cylinder continuous seeks for 80 MB drives.
  3. Connect CH I of oscilloscope to B03-21B (+On Cylinder).
  4. Observe that time interval between the start of the sweep and +On Cylinder condition is  $2.5 \pm 0.25$  ms.
  5. Connect oscilloscope as follows:
    - TRIGGER: INT(CH I)
    - VOLTS/DIV: 2.0 V/cm
    - TIME/DIV: 20.0  $\mu$ s/cm
  6. Command continuous zero cylinder seeks.
  7. Observe that negative pulse period is 150 microseconds maximum.
  8. Return drive to online operation.

### Cylinder Pulse Check

This procedure checks the delay on the one shots to make certain that a cylinder crossing pulse of sufficient width is generated.

1. Connect oscilloscope as shown in figure 2-14.
2. Command 14 cylinder continuous seeks.

#### NOTE

Verify that a jumper is installed between backpanel pins C01 - 30A and C01 - 30B for 80 MB drives.

3. Observe that +Position signal at B01-TP17 and Cylinder Pulse signal at C01-38A resemble those shown in figure 2-14.
4. Connect oscilloscope as follows:
  - TRIGGER: INT+ (NORM)

### OSCILLOSCOPE SETUP

**INPUT:**

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME    |
|---------|-----------|------------|----------------|
| CH 1    | 2.0 V/CM  | B01-TP17   | +POSITION      |
| CH 2    | 2.0 V/CM  | C01-38A    | CYLINDER PULSE |

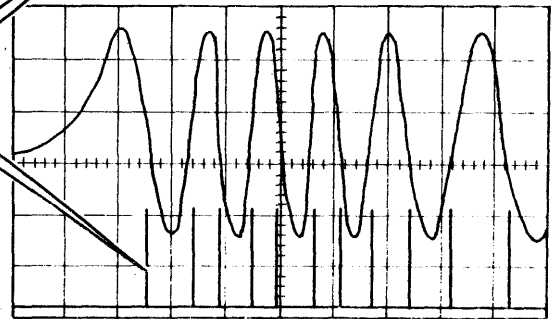
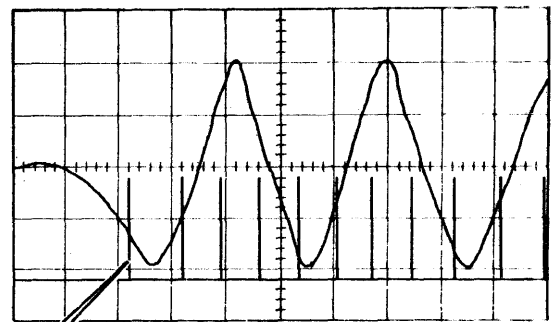
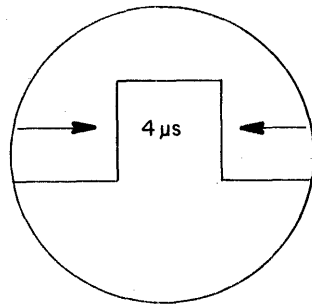
**TRIGGERING:**

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME   |
|--------------|------------|---------------|
| +EXT         | B03-18B    | +IN DIRECTION |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5ms/CM      MODE: CHOPPED

**NOTES:**



9P188-1C

Figure 2-14. Cylinder Pulses

● TIME/DIV: 2  $\mu$ s/cm

● MODE: CH II

5. Verify cylinder pulses are  $4 \pm 1$  microseconds as in figure 2-14.

6. Return drive to online operation.

### On Track Level Detector Check

This procedure checks the level detectors for the on track condition for both the plus and minus signals.

1. Connect oscilloscope as shown in figure 2-15.
2. Command three cylinder continuous seeks for 160 MB drives or six cylinder continuous seeks for 80 MB drives.

### OSCILLOSCOPE SETUP

| INPUT: | CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME                            |
|--------|---------|-----------|------------|--|
|        | CH 1    | 0.2 V/CM  | B01-TP19   | $\pm$ POSITION 0.85V<br>LEVEL DETECTOR |

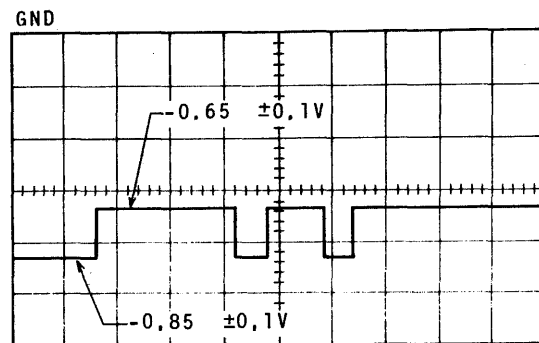
CH 2

| TRIGGERING: | SLOPE/SOURCE | CONNECTION | SIGNAL NAME   |
|-------------|--------------|------------|---------------|
|             | +EXT         | B03-18B    | +IN DIRECTION |

SCOPE GND TO GND ON LOGIC CARD.  
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5 ms/CM      MODE: CH1

NOTES:



9P199B

Figure 2-15. Plus and Minus Level Detector Signal



3. Verify that switching levels for on track level detector are as shown in figure 2-15.
4. Return drive to online operation.

### Linear Region Level Detector Check

This procedure checks the level detectors for the linear portion of the position signals.

1. Connect oscilloscope as shown in figure 2-16.
2. Command three cylinder continuous seeks for 160 MB drives or six cylinder continuous seeks for 80 MB drives.
3. Measure switching levels for linear region level detector as shown in figure 2-16.
4. Return drive to online operation.

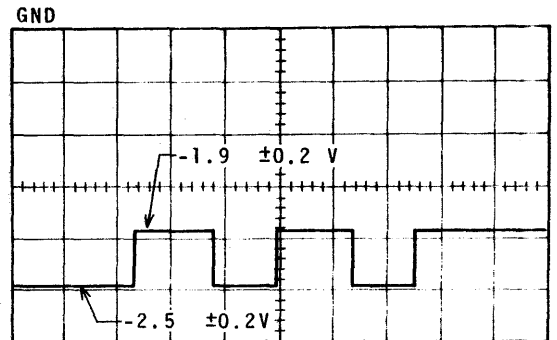
**OSCILLOSCOPE SETUP**

|                    |           |            |                                   |
|--------------------|-----------|------------|-----------------------------------|
| <b>INPUT:</b>      |           |            |                                   |
| CHANNEL            | VOLTS/DIV | CONNECTION | SIGNAL NAME                       |
| CH 1               | 0.5 V/CM  | B01-TP20   | ±POSITION 2.4 V<br>LEVEL DETECTOR |
| CH 2               |           |            |                                   |
| <b>TRIGGERING:</b> |           |            |                                   |
| SLOPE/SOURCE       |           | CONNECTION | SIGNAL NAME                       |
| +EXT               |           | B03-18B    | +IN DIRECTION                     |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5 ms/CM      MODE: CH1

NOTES:



9P200B

Figure 2-16. Plus and Minus Detector Signal

## Track Crossing Level Detector Check

This procedure checks the track crossing level detector to make certain that the detector turns on at the proper level to set the track crossing latch.

1. Connect oscilloscope as shown in figure 2-17.
2. Command three cylinder continuous seeks for 160 MB drives or six cylinder continuous seeks for 80 MB drives.
3. Measure switching levels for track crossing level detector as shown in figure 2-17.
4. Return drive to online operation.

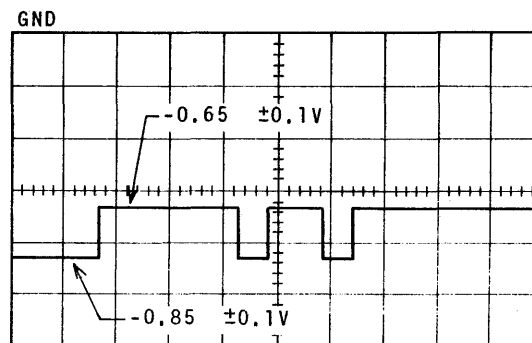
## Current Sense Check

This procedure checks the current magnitude to make certain that the seek is completed in optimum time.

1. Connect oscilloscope as shown in figure 2-18.

**OSCILLOSCOPE SETUP**

|   |           |            |                                   |
|---|-----------|------------|-----------------------------------|
| <b>INPUT:</b>   |           |            |                                   |
| CHANNEL   | VOLTS/DIV | CONNECTION | SIGNAL NAME                       |
| CH 1  | 0.2 V/CM  | B01-TP27   | ±POSITION 0.85V<br>LEVEL DETECTOR |
| CH 2  |           |            |                                   |
| <b>TRIGGERING:</b>  |           |            |                                   |
| SLOPE/SOURCE  |           | CONNECTION | SIGNAL NAME                       |
| +EXT  |           | B03-18B    | +IN DIRECTION                     |
| SCOPE GND TO GND ON LOGIC CARD.<br>USE X10 PROBES UNLESS OTHERWISE NOTED. |           |            |                                   |
| TIME/DIV:   | 0.5 ms/CM | MODE:      | CH1                               |
| NOTES:  |           |            |                                   |



9P201B

Figure 2-17. Plus Track Crossing Waveform

### OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME   |
|---------|-----------|------------|---------------|
| CH 1    | 1.0 V/CM  | B01-TP18   | CURRENT SENSE |
| CH 2    |           |            |               |

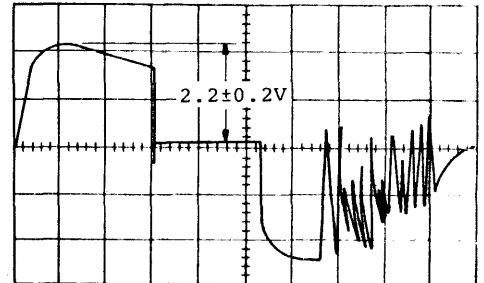
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME     |
|--------------|------------|-----------------|
| +EXT         | B02-TP2    | NOT ON CYLINDER |

SCOPE GND TO GND ON LOGIC CARD.  
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 5 ms/CM                      MODE: CH 1

NOTES:



9T232

Figure 2-18. Current Sense Waveform

2. Command 822 cylinder continuous seeks starting at cylinder 0.
3. Connect oscilloscope to B01-TP18 (Current Sense) and measure peak positive amplitude of the current sense signal. It should be  $2.2 \pm 0.2$  volts.
4. Return drive to online operation.

#### Return To Zero Seek Timing Check

The performance of this procedure checks the time to perform the return to zero seek.

1. Connect oscilloscope as in figure 2-19.
2. Command several return to zero seeks and verify timing as shown in figure 2-19.
3. Return drive to online operation.

### OSCILLOSCOPE SETUP

INPUT:

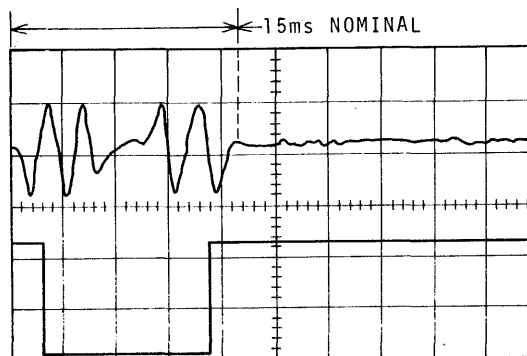
| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 5.0 V/CM  | B01-TP17   | +POSITION   |
| CH 2    | 2.0 V/CM  | B02-29A    | -GUARDBAND  |

TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| +EXT         | B02-TP4    |             |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 2.0 ms/CM      MODE: CHOPPED  
NOTES:



9P202B

Figure 2-19. Return to Zero Seek Timing

### Speed Sensor Output Check

This checks the speed sensor output at full speed of 3600 revolutions per minute.

1. Connect oscilloscope as shown in figure 2-20.
2. Ensure that READY indicator is lit.
3. Observe that negative speed pulses have period of 16.67 (+0.4, -0.2) ms.
4. Return drive to online operation.

### READ/WRITE SYSTEM CHECKS

#### Write Timing Check

This procedure checks the timing relationship between Write Clock and Write Data. Write Gate is used to trigger the oscilloscope. It is necessary to use a delayed sweep to observe the

## OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME  |
|---------|-----------|------------|--------------|
| CH 1    | 2.0 V/CM  | C01-12A    | -SPEED PULSE |
| CH 2    |           |            |              |

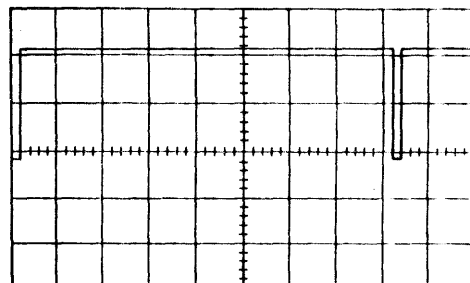
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| -INT         |            |             |

SCOPE GND TO GND ON LOGIC CARD.  
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 2 ms/CM                      MODE: CH1

NOTES:



9T233

**Figure 2-20. Speed Sensor Output**

Write Data signal because address and sync fields appear between the transition of Write Gate and the start of the data pattern. Perform steps 1 through 4 to set up the oscilloscope and steps 5 through 8 to verify the timing of Write Data.

1. Command drive to write an alternate 1 and 0 pattern using cylinder 0, record 0, and head 0.
2. Connect oscilloscope as shown in figure 2-21.

### NOTE

In "A Intensified" horizontal mode, the brightened marker highlights the segment of the sweep that is displayed later in "B Delayed" horizontal mode.

3. Adjust DELAY TIME MULTIPLIER on oscilloscope to move intensified marker into data pattern (refer to figure 2-21).
4. Referring to figure 2-22, position oscilloscope HORIZ DISPLAY switch to B DELAYED.
5. Observe that timing relationship between Write Data and Write Clock agrees with figure 2-22.
6. Connect oscilloscope as shown in figure 3-23.

### OSCILLOSCOPE SETUP

**INPUT:**

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME  |
|---------|-----------|------------|--------------|
| CH 1    | 1.0 V/CM  | A01-08B    | +WRITE DATA  |
| CH 2    | 1.0 V/CM  | A01-11B    | +WRITE CLOCK |

**TRIGGERING:**

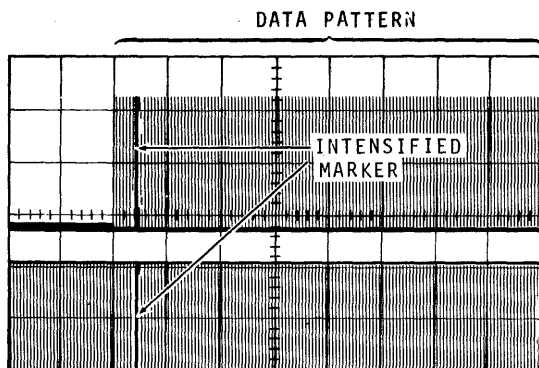
| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| -EXT         | A01-20B    | -WRITE GATE |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED

A TIME/DIV: 5  $\mu$ s/CM      MODE: ALT

B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO "A INTENSIFIED."  
ADJUST DELAY TIME MULTIPLIER TO MOVE MARKER  
INTO DATA PATTERN



9T234A

Figure 2-21. Scope Setup for Write Check

### OSCILLOSCOPE SETUP

**INPUT:**

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME  |
|---------|-----------|------------|--------------|
| CH 1    | 1.0 V/CM  | A01-08B    | +WRITE DATA  |
| CH 2    | 1.0 V/CM  | A01-11B    | +WRITE CLOCK |

**TRIGGERING:**

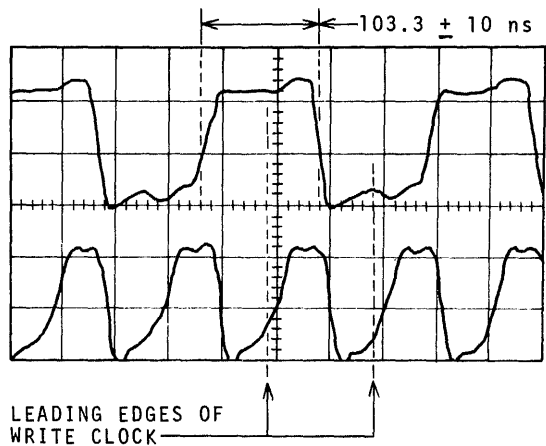
| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| -EXT         | A01-20B    | -WRITE GATE |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 5  $\mu$ s/CM      MODE: ALT

B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO B(DELAYED).  
ADJUST DELAY TIME MULTIPLIER AS  
REQUIRED.



9P160A

Figure 2-22. Write Data Timing

7. Observe that +Compensated MFM Data pulses have pulse width indicated in figure 3-23.
8. Return drive to online operation.

### Read Timing Check

This procedure checks the timing relationship between Read Clock and Read Data. Read Gate is used to trigger the oscilloscope. It is necessary to use a delayed sweep to observe the Read Data signal because address and sync fields appear between the transition of Read Gate and the start of the data pattern. Perform steps 1 through 5 to set up the oscilloscope and steps 6 and 7 to verify the timing of Read Data.

1. Perform Write Timing Check (previous procedure).
2. Command drive to read alternate 1 and 0 data pattern written in Write Timing Check. Use cylinder 0, record 0, and head 0.
3. Connect oscilloscope as shown in figure 2-24.

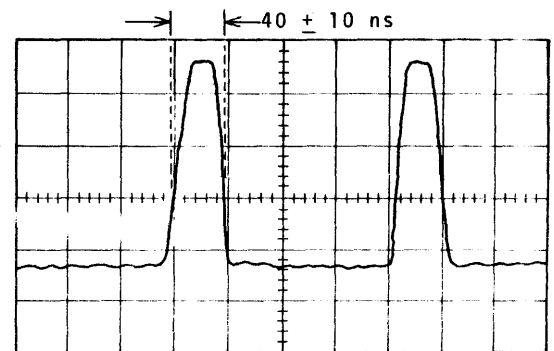
**OSCILLOSCOPE SETUP**

|                    |           |            |                          |
|--------------------|-----------|------------|--------------------------|
| <b>INPUT:</b>      |           |            |                          |
| CHANNEL            | VOLTS/DIV | CONNECTION | SIGNAL NAME              |
| CH 1               | 1.0 V/CM  | A01-35B    | +COMPENSATED<br>MFM DATA |
| CH 2               |           |            |                          |
| <b>TRIGGERING:</b> |           |            |                          |
| SLOPE/SOURCE       |           | CONNECTION | SIGNAL NAME              |
| - EXT              |           | A01-20B    | -WRITE GATE              |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 5  $\mu$ s/CM      MODE: CH1  
B TIME/DIV: 50 ns/CM  
DELAY TIME: 13.25  $\mu$ s

NOTES: SET HORIZONTAL DISPLAY TO B(DELAYED).  
ADJUST DELAY TIME MULTIPLIER AS  
REQUIRED.



9P161B

Figure 2-23. Compensated MFM Data Waveform

## OSCILLOSCOPE SETUP

**INPUT:**

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2.0 V/CM  | A03-27B    | +READ DATA  |
| CH 2    | 2.0 V/CM  | A03-28B    | -READ CLOCK |

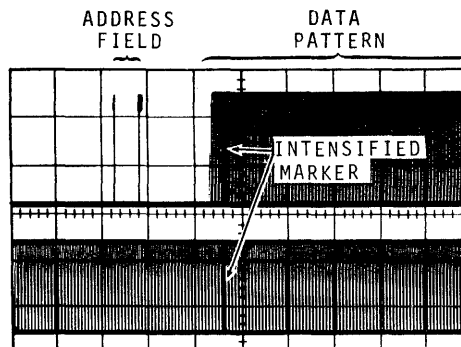
**TRIGGERING:**

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| -EXT         | A04-04B    | -READ GATE  |

SCOPE GND TO GND ON LOGIC CARD.  
USE X10 PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 10  $\mu$ s/CM      MODE: ALT  
B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO A INTENSIFIED.  
ADJUST DELAY TIME MULTIPLIER TO MOVE MARKER  
INTO DATA PATTERN.



9T235

**Figure 2-24. Scope Setup for Read Check**

**NOTE**

In "A Intensified" horizontal mode, the brightened marker highlights the segment of the sweep that is displayed later in "B Delayed" horizontal mode.

4. Adjust DELAY TIME MULTIPLIER on oscilloscope to move intensified marker into data pattern (refer to figure 2-24).
5. Referring to figure 2-25, position oscilloscope HORIZ DISPLAY switch to B DELAYED.
6. Observe that timing relationship between Read Data and Read Clock agrees with figure 2-25.
7. Return drive to online operation.



### OSCILLOSCOPE SETUP

INPUT:

| CHANNEL | VOLTS/DIV | CONNECTION | SIGNAL NAME |
|---------|-----------|------------|-------------|
| CH 1    | 2.0 V/CM  | A03-27B    | +READ DATA  |
| CH 2    | 2.0 V/CM  | A03-28B    | -READ CLOCK |

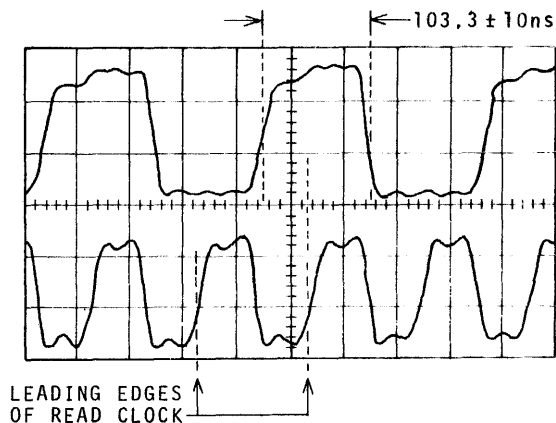
TRIGGERING:

| SLOPE/SOURCE | CONNECTION | SIGNAL NAME |
|--------------|------------|-------------|
| -EXT         | A04-04B    | -READ GATE  |

SCOPE GND TO GND ON LOGIC CARD.  
USE XIO PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 5  $\mu$ s/CM      MODE: ALT  
B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO B(Delayed).  
ADJUST DELAY TIME MULTIPLIER AS  
REQUIRED.



9P162A

Figure 2-25. Read Data Timing

### MISCELLANEOUS CHECKS

#### Power On Master Clear Check

This procedure checks the power on master clear circuit timing.

1. Connect oscilloscope as follows:

- TRIGGER: EXT+ at +5 Volts on terminal of wirewrap panel.
- VOLTS/DIV: 1.0 V/cm

2. Turn ac power off at rear of drive.

3. Connect oscilloscope to C02-31B (-DC Master Clear).

4. Turn on ac power at CBl and verify that C02-31B is low for  $4.0 \pm 1.5$  seconds.

5. Disconnect oscilloscope and return drive to online operation.

## Fault Code Display Check

This procedure checks that all segments of the LEDs in the fault code display are functional.

1. Turn on ac power at CBI at rear of drive.
2. Clear all fault counters by momentarily pressing the clear switch (S2) on the front of the unit.
3. Observe that display reads 000 with no defective LED segments.
4. Press status request switch (S1) and observe that display reads FFF with no defective LED segments.

## TROUBLESHOOTING PROCEDURES

### GENERAL

The following procedures specify how to pinpoint voltage faults in the logic chassis and read/write chassis and how to troubleshoot heat-generated problems in the drive. They are identified as Procedures A, B, and C and are referenced as such in the procedures entries in the heading blocks of the decision logic tables.

Figure 2-26, showing power and logic cabling, and table 2-2, identifying which dc voltages are used by each component, are included as general reference information.

Figure 2-26. Power and Logic Cabling Between Assemblies

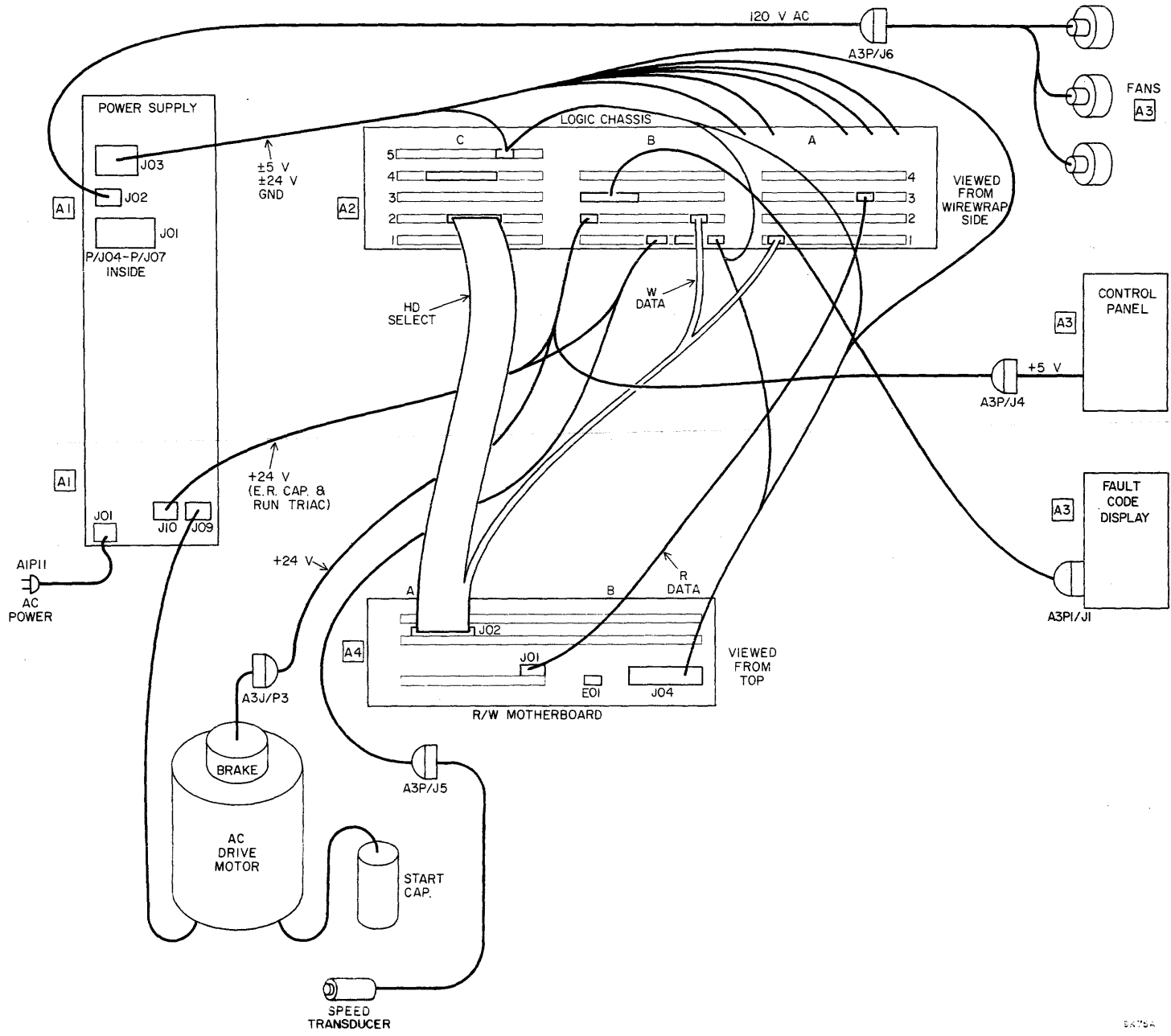


TABLE 2-2. DC VOLTAGES USED BY DRIVE COMPONENTS

| Location or Component        | -4 V | +5 V<br>(44A,B) | -5 V<br>(02A,B) | -8.2 V | +24 V<br>(45A,B) | -24 V<br>(01A,B) | Card Type  |
|------------------------------|------|-----------------|-----------------|--------|------------------|------------------|------------|
| A1 Pwr Supply                |      |                 |                 |        |                  |                  |            |
| Run Triac                    |      |                 |                 |        | x                |                  | (via PB03) |
| Retract Cap                  |      |                 |                 |        | x                |                  | (via PB01) |
| A2 Logic Chassis             |      |                 |                 |        |                  |                  |            |
| A01                          |      | x               | x               |        | x                |                  | _FFX       |
| A03                          |      | x               | x               |        |                  |                  | _FEX       |
| A04                          |      | x               | x               |        |                  |                  | _FAX       |
| B01/C01                      |      | x               | x               |        | x                | x                | _KBX       |
| B02/C02                      |      | x               |                 |        | x                |                  | _FGX       |
| B03                          |      | x               |                 |        |                  |                  | _JBX       |
| B04                          |      | x               | x               |        |                  |                  | _FAX       |
| C04                          |      | x               | x               |        |                  |                  | _FBX       |
| C05                          |      |                 |                 |        | x                | x                | _ZSV       |
| Table Continued on Next Page |      |                 |                 |        |                  |                  |            |

TABLE 2-2. DC VOLTAGES USED BY DRIVE COMPONENTS (Contd)

| Location or Component | -4 V | +5 V<br>(44A,B) | -5 V<br>(02A,B) | -8.2 V | +24 V<br>(45A,B) | -24 V<br>(01A,B) | Card Type  |
|-----------------------|------|-----------------|-----------------|--------|------------------|------------------|------------|
| A3 Base Assembly      |      |                 |                 |        |                  |                  |            |
| Brake                 |      |                 |                 |        | x                |                  | (via PB02) |
| Control Panel         |      | x               |                 |        |                  |                  | (via PB02) |
| A4 Mini Module (1)    |      |                 |                 |        |                  |                  |            |
| A1                    |      |                 | x               |        |                  | x                | _NSN       |
| A2/B2                 |      | x               | x               |        | x                |                  | _NQN       |
| A3/B3                 |      | x               | x               |        | x                |                  | _NRN       |
| A4 (mother-board)     |      | x               | x               |        | x                | x                | _WJN       |
| Servo Preamp          |      |                 |                 | x (2)  |                  |                  |            |
| Fixed Head Shoe       | x(3) | x               | x               |        |                  |                  | _YCN       |

- (1) All mini module voltages come from W/W pins at location B01 on logic chassis unless noted otherwise below.
- (2) -8.2 V is derived on KBX card in location A2B01/C01, and is available on pins 03A,B.
- (3) -4 V is derived on NQN card in location A4A2/B2, and is available on pins 20A,B and 33A,B.

## PROCEDURE A: VOLTAGE FAULTS IN THE LOGIC CHASSIS

This procedure locates  $\pm 5$  V and  $\pm 24$  V faults on cards in the logic chassis or in the logic chassis backpanel wiring.

The test procedures may be conducted in either of two ways. The first method is to check the  $\pm 15$  V and  $\pm 24$  V loads individually by entering Procedure A from the applicable DLT:

$\pm 5$  V -- Condition 1 of DLT 3

$\pm 24$  V -- Condition 1 of DLT 4

The second method is to check both loads at the same time. The test for load faults in each voltage is made by adding cards to the logic chassis one at a time, so it is more efficient to check all loads on a given card at one time. (Of course, some cards will not require both checks). The second method is the one described below:

### NOTE

It should be pointed out that, as shown in table A-1, only +5 V is used on every card. If there is no +5 V fault in the logic chassis (that is, when testing Condition 1 of DLT 3, F3 did not blow), only the cards using the faulted voltage(s) need to be removed.

1. Be certain to restrict the  $\pm 5$  V and  $\pm 24$  V distribution to the logic chassis, as described in both of the Conditions shown above.
2. Turn off the POWER circuit breaker.
3. Be certain that all four dc voltage wires, plus the two ground wires, are connected to the terminals on the logic chassis.
4. Remove all cards from the logic chassis. (See NOTE, above, for possible exception to this "all cards" rule).

5. Disconnect A2 PC/JC05 from amplifier card assembly \_ZSV.
6. Turn on the POWER circuit breaker to energize the logic chassis; then, after a second or two, turn it off again.
7. Load faults caused by wiring errors in (or damage to) the logic chassis backpanel will show up as a blown fuse. If a fuse blows, carefully check backpanel for shorts caused by bent pins or dangling wires. After clearing the fault, replace blown fuse or fuses.
8. You are now ready to start putting the cards back in the logic chassis one at a time and connecting cable A2 PC/JC05 to power amplifier card assembly, checking for faults after each one has been inserted or connected.
9. Before inserting a card, examine both sides for evidence of arcing across the foil. Often the carbon residue around an arc area can be removed with an alcohol swab and the card will not give any more trouble.
10. Insert the selected card properly.
11. Turn on the POWER circuit breaker, then turn it off.
12. Using table 2-3 to determine which voltages are present on the card, check the integrity of the applicable fuses.
13. If step 12 shows a blown fuse, replace the card just installed with a fresh one from the spare parts bin and try the test again.
14. If step 12 shows that the fuses are OK, select another card and repeat steps 9 through 14.
15. When all cards have been checked good, return to the applicable "load fault" DLT to continue the dc-load check-out on the additional assemblies.

#### **PROCEDURE B: VOLTAGE FAULTS IN THE R/W CHASSIS**

This procedure locates  $\pm 5$  V and  $\pm 24$  V faults in cards A1, A2/B2, and A3/B3 of the card chassis on Mini Module assembly A4 (defined in this appendix as the R/W chassis), or in the etched-circuit wiring of the R/W chassis motherboard, location A4A4.

The test procedure may be conducted in either of two ways. The first method is to check the  $\pm 5$  V and  $\pm 24$  V (including  $-8.2$  V input to the servo preamp) individually, by entering the procedure from the applicable DLT:

$\pm 5$  V -- Condition 1 of DLT 3 (Sheet 2)

$\pm 24$  V -- Condition 2 of DLT 4 (Sheet 2)

This second method is to check both loads at the same time. The test for load faults in each voltage is made by adding cards to the A4 motherboard one at a time, checking for faults after each insertion. For consistency with Procedure A, however, the second method is described.

#### NOTE

Before beginning the following procedure, be certain that prior Conditions of DLT 3 and DLT 4 have been tested. This ensures that the logic chassis, the Run triac, the brake, and the retract capacitor are free of voltage faults.

1. Turn off the POWER circuit breaker.
2. Be certain that all four dc voltage wires, plus the two ground wires, are connected to the terminals on the logic chassis.
3. Remove connecting cable A4P01 from the A1/B1 card. DO NOT remove connector P/J02 (flat cable) from A2/B2 card or connector P/J04 from the A4 motherboard.
4. Remove cards A1, A2/B2, and A3/B3 from the motherboard.
5. Ascertain that F5 ( $-24$  V), F3 ( $+5$  V), and F4 ( $-5$  V) are all good. (The R/W chassis does not use  $+24$  V).
6. Turn on the POWER circuit breaker to energize the motherboard; then, after a second or two, turn it off again.
7. Examine F3, F4, F5. If any fuses are blown, the fault is in the motherboard. This can only be cured by replacing the mini module, as described in section 2D. If the fuses are intact, go to step 8.
8. Select the A1 card removed in step 4. Before inserting it in the motherboard, examine both sides for evidence of arcing across the foil. Often the carbon residue around an arc area can be removed with an alcohol swab and the card will not give any more trouble.



9. Insert the selected card properly.
10. Turn on the POWER circuit breaker, then turn it off again.
11. Check the integrity of fuses F3, F4, and F5.
12. If step 11 shows a blown fuse, replace the card with a fresh one from the spare parts bin and try again.
13. If the fuses are intact, repeat steps 8 through 12 for the A2/B2 card.
14. If the fuses are intact, repeat steps 8 through 12 for the A3/B3 card.
15. When all three cards have checked out OK, replace cable A4P1 removed in step 3 and return to DLT 1.

### PROCEDURE C: TROUBLESHOOTING HEAT-GENERATED PROBLEMS

Heat-related problems are easy to diagnose. They occur only when the drive gets hot, and they disappear when the drive has had a chance to cool off. If you suspect a problem is heat-related, let the drive cool down, then note the failure (or more accurately, the absence of the failure) when the drive is started up again. Often the troubleshooting period can be shortened by applying artificial heat to the suspected area (a hair dryer is useful here). Once you have diagnosed the problem, correct it as you would any other malfunction.

Heat problems are of two types -- those originating in the power supplies and those developing in the various loads. Should a load fault take out a fuse, the course is clear: Simply refer to the applicable "load" DLT. If the load does not blow a fuse but merely brings up a FAULT light (on the operator panel), the table below should offer a starting point for correcting the problem. (If the +5 V supply goes, of course, the fault light will not work).

| <u>FAULT</u>          | <u>PROBLEM RELATED TO</u>        |
|-----------------------|----------------------------------|
| Voltage (except +5 V) | B02/C02, B01/C01                 |
| On Cyl · (W+R)        | B02/C02, B03, A01                |
| Write                 | B02/C02, A04 (B04),<br>A1, A2/B2 |
| W·R                   | B02/C02, A04 (B04)               |
| Hd Sel                | B02/C02, A2/B2                   |

## DECISION LOGIC TABLES

### GENERAL

This section contains decision logic tables (DLTs) designed to help the maintenance technician analyze problems occurring in the drive. For a given fault condition (or set of conditions), actions are recommended to locate and correct the fault. The corrective actions which are easier to perform (checking a fuse or changing a logic card, for example) are listed before the more difficult tasks such as replacing the drive motor.

This section consists of a discussion on using the DLTs and eight decision logic tables, described as follows:

- DLT 1 shows how to correct problems that occur while attempting to "power up" the drive, and defines any dc voltage problem as being either in the various "load" components or in the power supply itself.
- DLT 2 helps to correct problems within the power supply.
- DLTs 3 and 4 help to isolate voltage faults that appear in the  $\pm 5$  V and  $\pm 24$  V loads, respectively.
- DLT 5 helps to pinpoint the cause for the drive failing to go to a READY state during power-up.
- DLTs 6 through 8 are to be used in conjunction with the TB216 FTU to correct various seek and read/write errors.

## USING THE DLT

The DLT is divided into four quadrants. The upper-left quadrant, CONDITIONS, contains the various test conditions that can be answered "yes" or "no". The CONDITIONS quadrant is prefaced by any ASSUMPTIONS (that is, preconditions) that must be observed if the test results are to be valid. Sometimes, prerequisite actions other than the ASSUMPTIONS must be taken before the test for a given condition is made. Such steps are included in the CONDITIONS quadrant. The yes (Y) or no (N) answers to each condition are shown in numbered columns in the topright Situations quadrant.

To use the DLT, first determine whether the result of a condition tested is Y or N. If two or more conditions exist simultaneously, look for a situations column that combines the appropriate Y-N answers for those conditions. A dash (-) in the top-right Situations quadrant means that the related Condition is not a factor in determining what actions are to be taken for that situation.

Next determine what action should be taken for a given test result (i.e., situation) by following down the selected column to the row marked "1" in the lower-right Sequence quadrant. (If there is only one recommended action for a given situation, an "X" appears instead of the "1"). The recommended action is then located by moving across to the lower-left ACTIONS quadrant. A dash in a column of the Sequence quadrant indicates that the related Action is not applicable.

After taking the first recommended action, repeat the test that gave rise to the situation. If the test results have not changed (same situation), try recommended action 2, and so on, being sure to repeat the test after each such action.

Column 1 is generally reserved for an "everything OK" situation. If a DLT requires more than one sheet, this "no problem" column is repeated on each sheet. Similarly, the last ACTION on each sheet is a recommendation to "call field support". Do not brood over your inadequacy if you reach this last entry; not every situation can be covered in a DLT.

**Warning:** None  
**Enters from:** Assumptions  
**Procedures:** Power Supply, Drive Motor Assembly, Speed Transducer Replacement (Sect. 2D)  
**References:** Power and cabling diagrams 012, 022, 412.  
**Exits to:** Sheet 2

**Assumption:**  
 1. Sector switches set per customer's disk format.  
 2. Drive connected to ac power and set for LOCAL operation.

| CONDITIONS   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--|---|---|---|---|---|---|---|---|---|
| 1. Do fans start when circuit breaker CBl is turned on?  | Y | Y | Y | Y | Y | Y | Y |   |   |
| 2. Does drive motor start when CBl is turned on?   | Y | Y | Y | Y | N | N | N |   |   |
| 3. Does READY light come on a few seconds after power has been applied?                            | Y | N | N | N | - | - | - |   |   |
| 4. Does drive motor thermal breaker trip before drive gets up to speed?                            | - | Y | N | - | - | - | - |   |   |
| 5. Does drive motor stop after 15-second start timeout expires?                                    | - | - | Y | N | - | - | - |   |   |
| 6. Is -Ready signal (approx 0 V) present at B02-43A on logic chassis backpanel?                    | - | - | - | Y | - | - | - |   |   |
| 7. Is ac line voltage present between pins 3 and 1 of AlJ09 (power for drive motor start winding)? | - | - | - | - | Y | N | N |   |   |
| 8. Is ac line voltage present between pins 4 and 1 of AlJ09 (power for drive motor run winding)?   | - | - | - | - | Y | N | Y |   |   |
| 9. Are ±24 volts present at logic chassis terminals?   | - | - | - | - | Y | Y | Y |   |   |
| 10. Are ±5 volts present at logic chassis terminals?   | - | - | - | - | Y | Y | Y |   |   |

| ACTIONS   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Power Up completed satisfactorily. Go to DLT 6.                    | X | - | - | - | - | - | - |   |   |
| 2. Check brake coil continuity thru pins on A3J3.                     | - | 1 | - | - | - | - | - |   |   |
| 3. Replace _FGX card (Fault/Control) at A2B02/C02.                    | - | 2 | 2 | - | - | 1 | - |   |   |
| 4. Replace _JBX card (Microprocessor Control) at A2B03.               | - | 3 | - | - | - | 2 | - |   |   |
| 5. Replace drive motor assembly.                                      | - | 4 | - | - | 2 | - | - |   |   |
| 6. Replace motor start triac (AlK1) in power supply.                  | - | 5 | - | - | - | 4 | 1 |   |   |
| 7. Replace _KBX card (Analog Servo) at A2B01/C01.                     | - | - | 1 | - | - | - | - |   |   |
| 8. Check speed transducer alignment. Replace transducer if necessary. | - | - | 3 | - | - | - | - |   |   |
| 9. Troubleshoot READY indicator for bad indicator or open wiring.     | - | - | - | X | - | - | - |   |   |
| 10. Ensure that motor thermal breaker is closed (reset).              | - | - | - | - | 1 | - | - |   |   |
| 11. Replace motor run triac (AlK2) in power supply.                   | - | - | - | - | - | 3 | - |   |   |
| 12. Replace _ZYV card in power supply.                                | - | - | - | - | - | 5 | 2 |   |   |
| 13. Go to conditions on sheet 2.                                      | - | 6 | 4 | - | - | - | - |   |   |
| 14. Call Field Support.   | - | - | - | - | 3 | 6 | 3 |   |   |

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**Warning:** None  
**Enters from:** Sheet 2  
**Procedures:** Drive Motor Assembly Replacement (Sect. 2D)  
**References:** Power and cabling diagrams 012, 022, 412.  
**Exits to:** DLT 2

**Assumption:**  
 1. Sector switches set per customer's disk format.  
 2. Drive connected to ac power and set for LOCAL operation.

| <b>CONDITIONS</b>  | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1. Do fans start when circuit breaker CBl is turned on?  | N        | N        | N        | N        |          |          |          |          |          |
| 2. Does drive motor start when CBl is turned on?   | N        | N        | N        | Y        |          |          |          |          |          |
| 3. Has ac fuse F1 blown?   | N        | Y        | N        | N        |          |          |          |          |          |
| 4. Does circuit breaker CBl trip off?  | N        | N        | Y        | N        |          |          |          |          |          |
| <b>ACTIONS</b>   | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> |
| 1. Check for continuity of fans and cabling thru ALP/J02.  | -        | -        | -        | 1        |          |          |          |          |          |
| 2. Check for presence of ac at site power connection to drive.   | 1        | -        | -        | -        |          |          |          |          |          |
| 3. If power plug is customer provided, check phase and ground connections.   | 2        | -        | 1        | -        |          |          |          |          |          |
| 4. Check continuity from power plug thru circuit breaker and fuse to primary of T1. If no continuity, go to action 5. If continuity, fans should run. Check again before going to action 11. | 3        | -        | -        | -        |          |          |          |          |          |
| 5. Remove supply and individually check continuity thru line cord, circuit breaker, line filter, F1, S1, and cabling to T1 via ALP/J07.  | 4        | -        | -        | -        |          |          |          |          |          |
| 6. Check for shorts/grounds in fans or fan cabling.  | -        | 1        | -        | -        |          |          |          |          |          |
| 7. Problem must be in T1. Go to DLT 2.   | -        | 2        | -        | -        |          |          |          |          |          |
| 8. Check for shorts/grounds in motor run triac (AlK2).   | -        | -        | 2        | -        |          |          |          |          |          |
| 9. Check for shorts/grounds in motor start triac (AlK1).   | -        | -        | 3        | -        |          |          |          |          |          |
| 10. Replace drive motor assembly.  | -        | -        | 4        | -        |          |          |          |          |          |
| 11. Call Field Support.  | 5        | -        | 5        | 2        |          |          |          |          |          |

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**Warning:** None  
**Enters from:** DLT 1 or as required.  
**Procedures:** A; B; Plus and Minus 5 Volt Adjustment; Power Supply Repair.  
**References:** Logic Diagrams  
**Exits to:** DLT 3, Sheet 3

**Assumption:** Either F3 (+5 V) or F4 (-5 V) or both have blown, indicating a fault in the +5 V loads. Begin each Condition below by turning off circuit breaker CBL and ensuring that both F3 and F4 are good.

| CONDITIONS  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Restrict ±5 V load to the logic chassis (Assy A2).   |   |   |   |   |   |   |   |   |   |
| a. Remove connections from A2 backpanel carrying ±5 V to R/W chassis (A4). Remove A2PB02 from pins on A2 backpanel to remove +5 V from operator controls. Remove A2PB03 from pins on A2 backpanel to remove +5 V from fault code display. |   |   |   |   |   |   |   |   |   |
| b. Remove power supply wires from ±24 V connections on A2 backpanel.  |   |   |   |   |   |   |   |   |   |
| c. Turn on circuit breaker CBL. Did either F3 or F4 blow?   | Y | N | N | - | - | - |   |   |   |
| 2. Do ±5 voltages measure $5.10 \pm 0.05$ V?  | - | N | Y | - | - | - |   |   |   |
| 3. Add operator controls to +5 V load:  |   |   |   |   |   |   |   |   |   |
| a. Reinstall A2PB02 on A2 backpanel pins.   |   |   |   |   |   |   |   |   |   |
| b. Turn on circuit breaker CBL. Did F3 blow?  | - | - | - | Y | N | N |   |   |   |
| 4. Does +5 voltage still measure $5.10 \pm 0.05$ V?   | - | - | - | - | N | Y |   |   |   |
| ACTIONS   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1. Problem could be in the logic chassis. Go to Procedure A.  | 1 | - | - | - | - | - |   |   |   |
| 2. Adjust ±5 voltages (see Procedures). If voltages cannot be adjusted, a minor load problem (not a dead short) exists. Go to Procedure A (for situation 2) or troubleshoot operator controls (for situation 5).                          | - | 1 | - | - | 1 | - |   |   |   |
| 3. Go to condition 3.   | - | - | X | - | - | - |   |   |   |
| 4. Troubleshoot operator controls and replace defective switch or indicator.  | - | - | - | 1 | - | - |   |   |   |
| 5. Go to condition 1 on sheet 2.  | - | - | - | - | - | X |   |   |   |
| 6. Replace ZYV assy in power supply.  | 2 | - | - | - | - | - |   |   |   |
| 7. Call Field Support.  | 3 | 2 | - | 2 | 2 | - |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |





















**SECTION 2D**

**REPAIR AND REPLACEMENT**



---

## INTRODUCTION

This section provides all necessary information needed to perform the adjustment, removal, and replacement of field replaceable parts of the drive. If an adjustment procedure is included, and if there is some doubt as to the need for replacement, the adjustment procedure should be attempted before the final decision to replace the part is made.

Information included in this section assumes that the reader is thoroughly familiar with the General Maintenance section of this manual. In addition to the information presented in this section, the reader will find that the illustrations in the parts data section are very useful.

If the drive is slide mounted, most procedures can be performed with the drive extended from its normal operating position (in line with other drives or in an equipment rack). If the drive is mounted in a fixed position, it will be necessary to remove the drive to perform maintenance.

Repair is limited to the removal and replacement of the various assemblies and parts of the drive, and to the adjustment of those components. The illustrations show all the field replaceable parts of the drive, and their relationship to one another. The following procedures are included in the order stated:

- Entire Drive Removal and Replacement
- Slide Rails Removal and Replacement
- Top Cover Removal and Replacement
- Bottom Cover Removal and Replacement
- Rear Cover Removal and Replacement
- Front Panel Removal and Replacement
- Fan Removal and Replacement
- Primary Filter Removal and Replacement

- Drive Belt Removal and Replacement
- Motor Static Spring Removal and Replacement
- Spindle Ground Spring Removal and Replacement
- Logic Chassis Removal and Replacement
- Logic Chassis Hinge Removal and Replacement
- Mini Module Removal and Replacement
- Drive Motor Removal and Replacement
- Drive Motor Brake Removal and Replacement
- Speed Sensor Removal and Replacement
- Power Supply Removal and Replacement
- Power Supply Repair

All procedures in this section require that power to the drive be turned off and that assemblies be accessible.

After completing any of these procedures, perform the Checkout procedure given in section 1 of this manual.

## **ENTIRE DRIVE REMOVAL AND REPLACEMENT**

This procedure contains instructions for removing the drive from its rack for maintenance purposes and reinstalling it later. Two people are needed for lifting the drive off and onto the slide rails.

When removing a defective drive and replacing it with another drive from the factory, refer to section 1 of this manual for information about packaging, unpackaging and installation information.

### **REMOVAL**

1. Disconnect drive from ac power by unplugging power cord from ac source.
2. Extend drive fully to maintenance position.
3. Perform Top Cover Removal procedure.
4. Disconnect I/O cables from card assemblies of the logic chassis. Remove I/O cable mounts and detach I/O cables from drive.
5. Remove ground cable at rear of drive.

6. Perform Top Cover Replacement procedure.
7. Loosen and lower slide assembly catch on each J bracket (see figure 1-7).
8. Lift drive slightly and slide forward until J bracket clears J bracket catch at rear of each slide rail.

**NOTE**

Step 9 requires two people.

9. Lift drive straight up and remove.

**REPLACEMENT**

**NOTE**

Step 1 requires two people.

1. Lift replacement drive onto fully extended slide rails, making certain that J brackets slide beneath J bracket catches at rear of slide rails. Ensure that mounting stop on underside of each J bracket fits into mounting notch on each outer slide. Figure 1-8 shows slide mounting sequence.
2. Position 90-degree tabs of each slide assembly catch firmly against each outer slide and tighten their adjustment nuts. This secures MMD on the slide assemblies.
3. Perform Top Cover Removal procedure.
4. Install all I/O cables as described under System Cabling in section 1 of this manual.
5. Install ground cable at rear of drive as described under System Grounding in section 1 of this manual.
6. Install line terminators as required. Refer to System Cabling discussion in section 1 of this manual.
7. Return drive to operating position in mounting rack.
8. Plug drive into source ac power.
9. Return drive to online operation.

## SLIDE RAILS REMOVAL AND REPLACEMENT

This procedure is limited to replacement of a defective slide rail. Two people are needed for lifting the drive off and onto the slide rails. Information about initial installation of slide rails in a rack is given in section 1 of this manual.

### REMOVAL

1. Perform Entire Drive Removal procedure.
2. Loosen hardware attaching defective slide rail to rack.
3. Remove slide rail.

### REPLACEMENT

1. Remove J bracket from replacement slide rail and return with defective slide rail. See figure 1-7.
2. Loosen adjusting screws on front and rear recess brackets such that slide assembly can be positioned in rack.
3. Position slide assembly in rack and tighten hardware securing slide assembly to rack.
4. Tighten adjusting screws on recess brackets.
5. Ensure that slide rail assemblies are aligned horizontally and vertically, and that assemblies are parallel.
6. Perform Entire Drive Replacement procedure.

## TOP COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective top cover or to temporary removal of the top cover to access other components in the drive.

### REMOVAL

1. Extend drive fully to maintenance position.
2. Place circuit breaker CBl in OFF position and disconnect power cord at drive or ac source.
3. Remove screws securing top cover to drive.
4. Remove top cover.

## REPLACEMENT

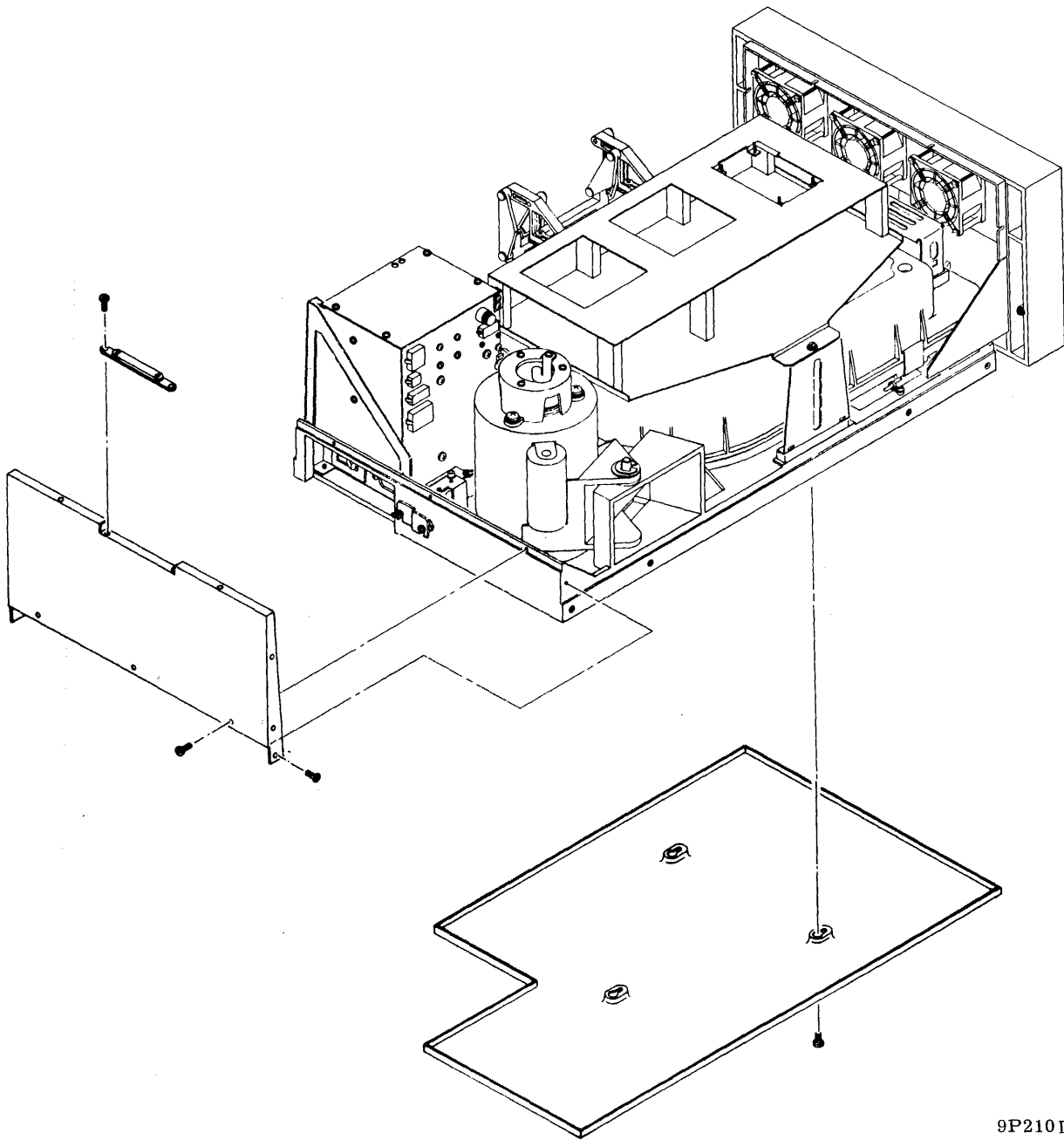
1. Place top cover over drive and align holes in cover with screw holes.
2. Replace screws to hold top cover to base frame.
3. Restore power to drive.
4. Return drive to operating position in mounting rack.
5. Return drive to online operation.

## BOTTOM COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective bottom cover or to temporary removal of the bottom cover to access other components in the drive.

### REMOVAL

1. Extend drive fully to maintenance position.
2. Place circuit breaker CBl in OFF position and disconnect power cord at drive or ac source.
3. Loosen screws securing bottom cover to base frame as shown in figure 2-27.
4. Slide cover toward front of drive until screws align with enlarged holes in cover. Lower cover until cover clears base of unit.
5. Remove bottom cover.



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Figure 2-27. Bottom Cover



## REPLACEMENT

1. Ensure that vinyl closures are installed on mini module studs to prevent bottom cover from contacting studs.
2. Align enlarged holes in bottom cover with screws in base frame. Raise cover allowing screws to pass through holes and then slide cover toward rear of drive.
3. Tighten screws securing bottom cover to base frame.
4. Restore power to drive.
5. Return drive to operating position in mounting rack.
6. Return drive to online operation.

## REAR COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective rear cover or to temporary removal of the rear cover to access other components in the drive.

It is difficult to remove the rear cover without removing the drive from the rack; therefore, two people are needed for lifting the drive off and onto the slide rails.

## REMOVAL

1. Perform Entire Drive Removal procedure.

### NOTE

On older drives, it may be necessary to remove J brackets to remove screws attaching rear cover to sides of drive.

2. Remove screws at base of rear cover.
3. Remove rear cover.

## REPLACEMENT

1. Install replacement rear cover into position on base frame.
2. Replace screws at base of rear cover. On each side of drive, use only the rear hole if more than one is available.
3. Perform Entire Drive Replacement procedure.

## FRONT PANEL ASSEMBLY REMOVAL AND REPLACEMENT

### REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect plug A3P6 (at left side of drive as viewed from the front).
3. Loosen screws attaching each front panel gusset to base frame (see figure 2-28) and slide front panel assembly as far as possible from base frame.
4. Disconnect plug A3P4 (at right side of drive as viewed from the front).
5. Remove ground strap connected to fan mounting plate or to fans from base frame (if present).
6. Remove front panel cover by pressing at top of cover until it snaps free.
7. Disconnect plug A3P1 from \_DZV display assembly.
8. Remove screws attaching each front panel gusset to base frame as shown in figure 2-28.
9. Remove front panel assembly.

### REPLACEMENT

1. Align front panel gussets with screw holes in base frame.
2. Loosely install screws with flat and lock washers through gussets securing front panel assembly to base frame.
3. Connect plug A3P4 (at right side of drive as viewed from the front).
4. Connect plug A3P6 (at left side of drive as viewed from the front).
5. Connect plug A3P1 to \_DZV display assembly.
6. Reattach ground strap (connected to fan mounting plate or fans in some drives) to base frame.
7. Slide front panel assembly as far as possible toward base frame.
8. Tighten screws through front panel gussets.
9. Perform Top Cover Replacement procedure.

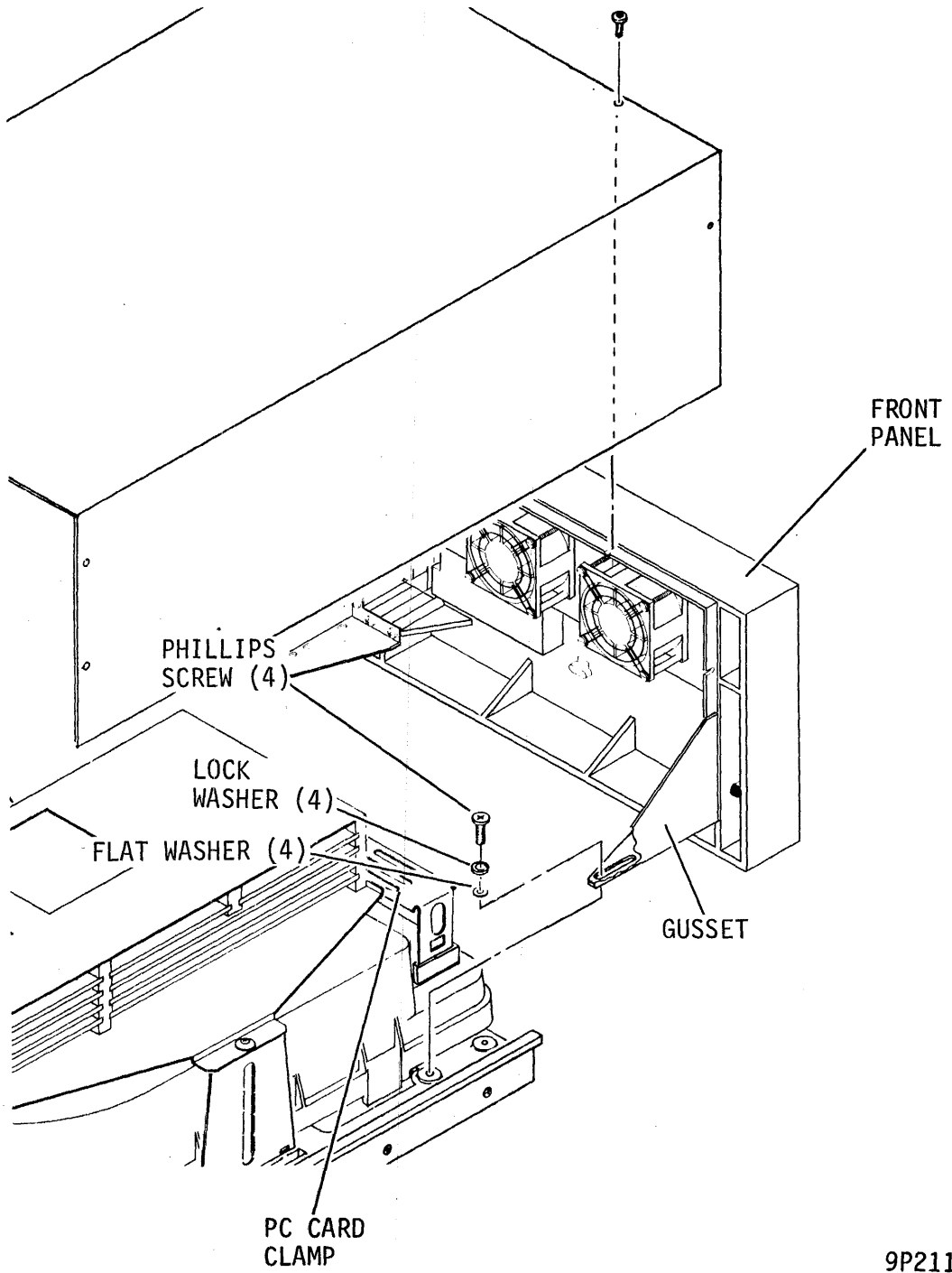


Figure 2-28. Front Panel Assembly Removal

10. Replace front panel cover by inserting top of cover first and then pushing bottom into place.
11. Return drive to online operation.

## FAN REMOVAL AND REPLACEMENT

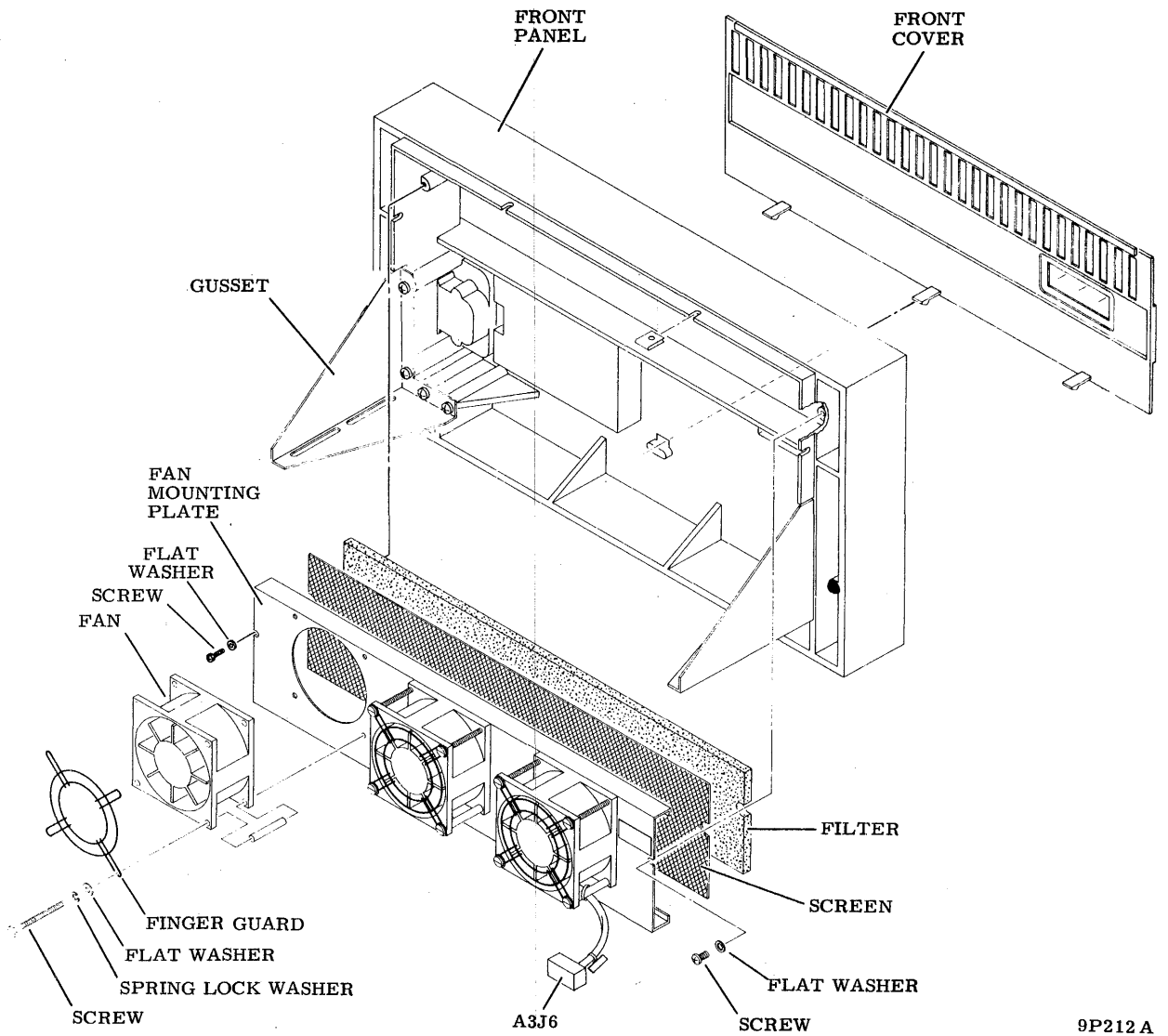
This procedure contains instructions for replacing a fan. Cable tie straps, spare connector pins, and a tool for removing connector pins are needed for fan replacement.

### REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect plugs A3P4 and A3P6 from front panel.
3. Loosen screws through gussets securing front panel to drive frame and move front panel assembly as far as possible from base frame (see figure 2-28).
4. Remove cable tie straps holding fan power and indicator leads together.
5. Remove connector pins attached to leads of defective fan from A3J6 as shown in figure 2-29.
6. Remove ground strap connected to fan mounting plate or to fans from base frame (if present).
7. Remove hardware attaching fan mounting plate to front panel.
8. Remove fan mounting plate with fans.
9. Remove hardware securing defective fan to fan mounting plate. Remove ground strap from that fan (if present).
10. Remove defective fan.

### REPLACEMENT

1. Align replacement fan with screw holes on fan mounting plate.
2. Secure fan to fan mounting plate with attaching hardware as shown in figure 2-29. Replace ground strap if fan was originally grounded.



9P212 A

Figure 2-29. Fan Removal and Replacement

3. Cut fan power leads to lengths required. Use lead lengths on removed fan as a correct measure for leads on replacement fan.
4. Strip ends of leads and crimp a connector pin on each lead.
5. Insert pinned leads into the same locations of A3J6 from which the removed leads were taken.
6. Replace cable tie straps in approximate locations from which straps were removed.
7. Align fan plate with screw holes on each side of front panel as shown in figure 2-29.
8. Secure fan mounting plate to front panel assembly with attaching hardware as shown in figure 2-29. Reconnect ground strap to base frame if necessary.
9. Connect plugs A3P6 and A3P4 to A3J6 and A3J4 respectively.
10. Slide front panel assembly as far as possible toward base frame and tighten screws through front panel gussets.
11. Perform Top Cover Replacement procedure.

## **PRIMARY FILTER REMOVAL AND REPLACEMENT**

This procedure contains instructions for either cleaning or replacing the primary filter.

### **REMOVAL**

1. Remove front panel cover by pressing at top of cover until it snaps free.
2. Pull primary filter from cavity in front panel.
3. Retain filter if not defective.
4. Wash filter with detergent, dry, and spray with filter coat.

### **REPLACEMENT**

1. Install cleaned or replacement filter back into cavity in front panel.
2. Replace front cover by inserting top of cover first and then pushing bottom into place.

## **DRIVE BELT REMOVAL AND REPLACEMENT**

This procedure applies either to replacement of the drive belt or to temporary removal of the drive belt to allow removal of other components. Two people are needed to install a drive belt, one to position the drive motor and the other to align the belt on the pulleys.

### **REMOVAL**

1. Perform Top Cover Removal procedure.
2. Perform Bottom Cover Removal procedure.

### **CAUTION**

Do not allow spindle to rotate during drive belt removal. Rotating the spindle in the wrong direction could damage the mini module.

3. Push drive motor forward until drive belt falls off as shown in figure 2-30.

### **REPLACEMENT**

#### **NOTE**

The following step may require two people.

1. Push drive motor forward until drive belt slips over pulleys on spindle and drive motor.

### **CAUTION**

In the following step, failure to rotate the spindle in the specified direction could damage the mini module.

2. Rotate spindle in direction shown in figure 2-30 until drive belt is centered on pulleys.
3. Perform Bottom Cover Replacement procedure.
4. Perform Top Cover Replacement procedure.

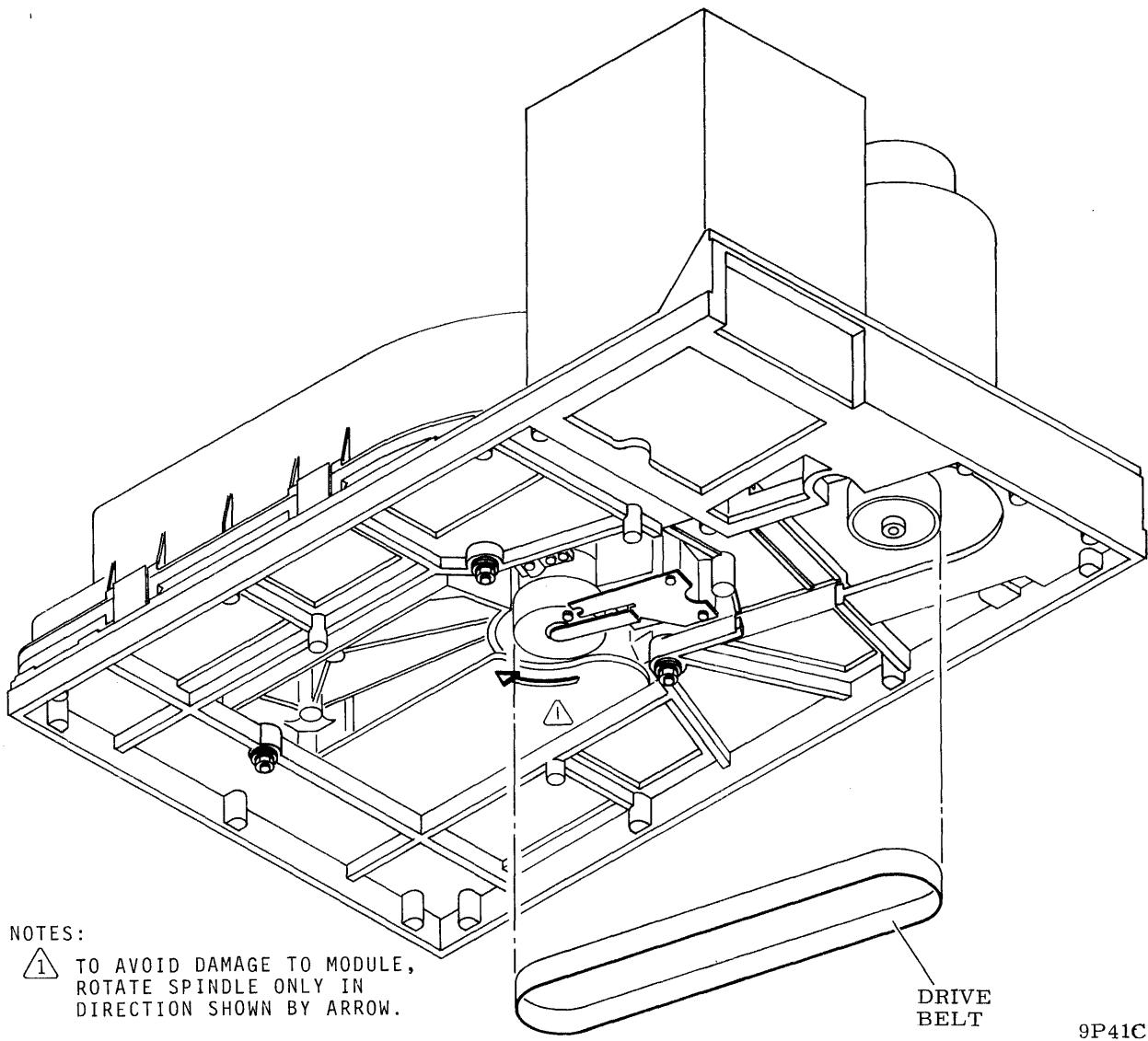


Figure 2-30. Drive Belt Removal and Replacement



## **MOTOR ANTISTATIC SPRING REMOVAL AND REPLACEMENT**

### **REMOVAL**

1. Perform Top Cover Removal procedure.
2. Remove motor antistatic spring by removing attaching hardware from base of spring as shown in figure 2-31.

### **REPLACEMENT**

1. Install replacement motor antistatic spring on brake housing with attaching hardware shown in figure 2-31.
2. Perform Top Cover Replacement procedure.

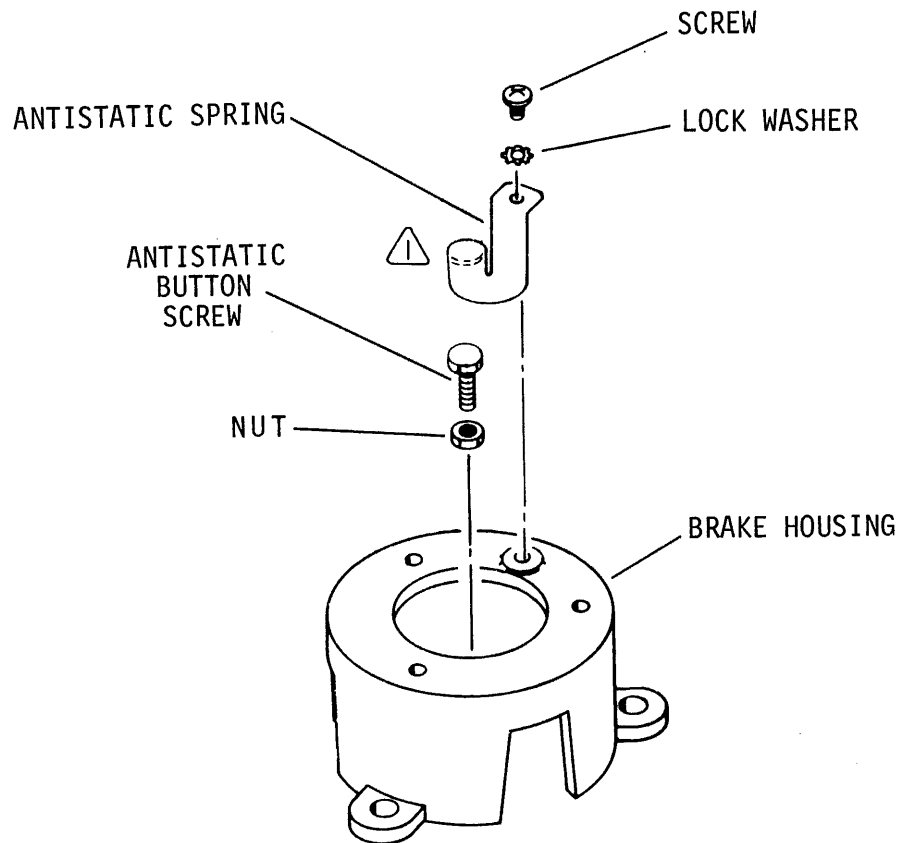
## **SPINDLE GROUND SPRING REMOVAL AND REPLACEMENT**

### **REMOVAL**

1. Perform Bottom Cover Removal procedure.
2. Remove spindle lock and ground spring by removing attaching hardware and ground strap (if used) as shown in figure 2-32.

### **REPLACEMENT**

1. Install replacement spindle lock and ground spring loosely with ground strap (if used) and attaching hardware as shown in figure 2-32.
2. Position spindle lock and ground spring so that spindle shaft is centered in ground spring cup.
3. Tighten screws to hold spindle lock and ground spring in operating position.
4. Perform Bottom Cover Replacement procedure.



NOTES:

1. UNDERSIDE OF ANTISTATIC SPRING HAS CUP THAT CONTACTS ANTISTATIC BUTTON SCREW.

9T263 A

Figure 2-31. Motor Antistatic Spring Removal and Replacement

## LOGIC CHASSIS REMOVAL AND REPLACEMENT

### REMOVAL

1. Perform Mini Module Removal procedure.
2. Lower logic chassis to normal operating position.
3. Disconnect I/O cables from I/O cards in logic chassis.
4. Disconnect all power leads and ground straps on logic chassis wire wrap backpanel.

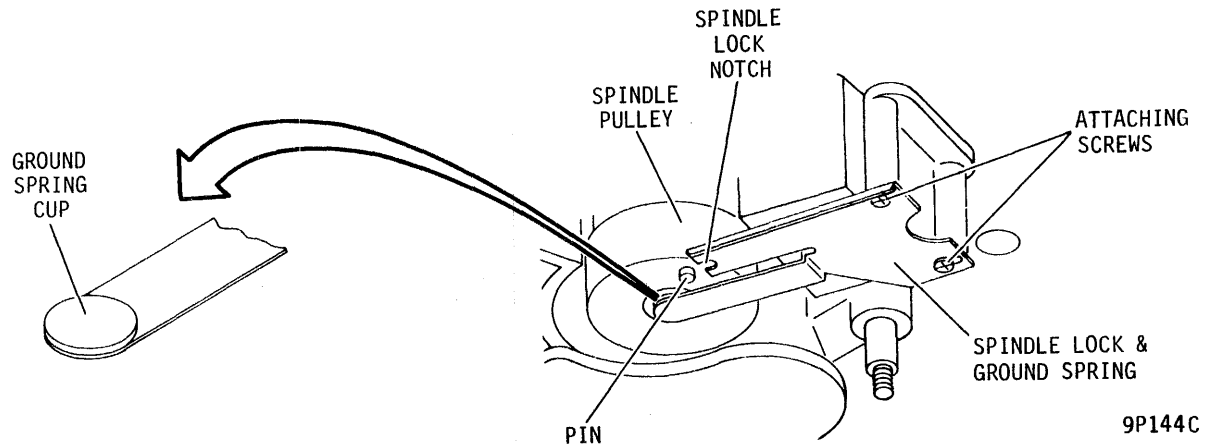


Figure 2-32. Spindle Lock and Ground Spring

**NOTE**

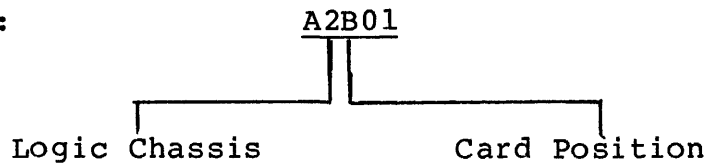
All cables in main harness have a plastic identification tag indicating the destination on logic chassis. All connectors on the end of each cable have a pin strip showing backpanel pins to which connectors attach. When connector is properly attached, the pin strip is visible (up).

5. Disconnect all logic cables from logic chassis wire wrap backpanel.
6. Support logic chassis while removing screws securing base of logic chassis to hinge. The best approach is to insert a long screwdriver up through cutouts in base frame.
7. Lift logic chassis straight up and remove.

## REPLACEMENT

1. Place logic chassis hinge in normal operating position.
2. Support replacement logic chassis in normal operating position and install screws securing chassis to hinge.
3. Transfer logic cards from old logic chassis to replacement logic chassis.
4. Connect all cables to logic chassis wire wrap backpanel locations indicated on cable identification tags and connector pin strips.

Example:



The pin strips indicate wire wrap pins on which connectors are inserted.

5. Connect all power and ground leads to terminals on wire wrap backpanel.
6. Connect I/O cables to I/O cards on logic chassis.
7. Raise logic chassis to maintenance position.
8. Perform Mini Module Replacement procedure.

## LOGIC CHASSIS HINGE REMOVAL AND REPLACEMENT

This procedure contains instructions for replacing the logic chassis hinge. New cable tie straps are needed for hinge replacement.

### REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect I/O cables from I/O cards in logic chassis.
3. Perform Mini Module Removal procedure.

4. Cut cable tie straps holding main harness to logic chassis hinge.
5. Remove screws securing hinge to logic chassis. The best approach is to insert a long screwdriver up through cut-outs in base frame.

### **CAUTION**

During the remainder of this procedure, avoid straining cables and wires attached to logic chassis backpanel.

6. Rotate logic chassis to maintenance position and support it there while removing screws securing base of hinge to base frame.
7. Remove defective hinge and rest logic chassis in normal position.

### **REPLACEMENT**

1. Rotate logic chassis to maintenance position and support it while installing screws securing base of hinge to base frame.
2. Lower logic chassis to normal position and support it there while installing screws securing hinge to logic chassis.
3. Replace cable tie straps securing main cable harness to hinge assembly.
4. Connect I/O cables to I/O cards in logic chassis.
5. Perform Mini Module Replacement procedure.
6. Perform Top Cover Replacement procedure.

### **MINI MODULE REMOVAL AND REPLACEMENT**

The mini module is not field repairable and must not be disassembled. The only mini module components replaceable in the field are the read/write cards, the spindle lock and ground spring, and the speed transducer. For any other mini module problems, perform the following procedures to remove and replace the mini module:

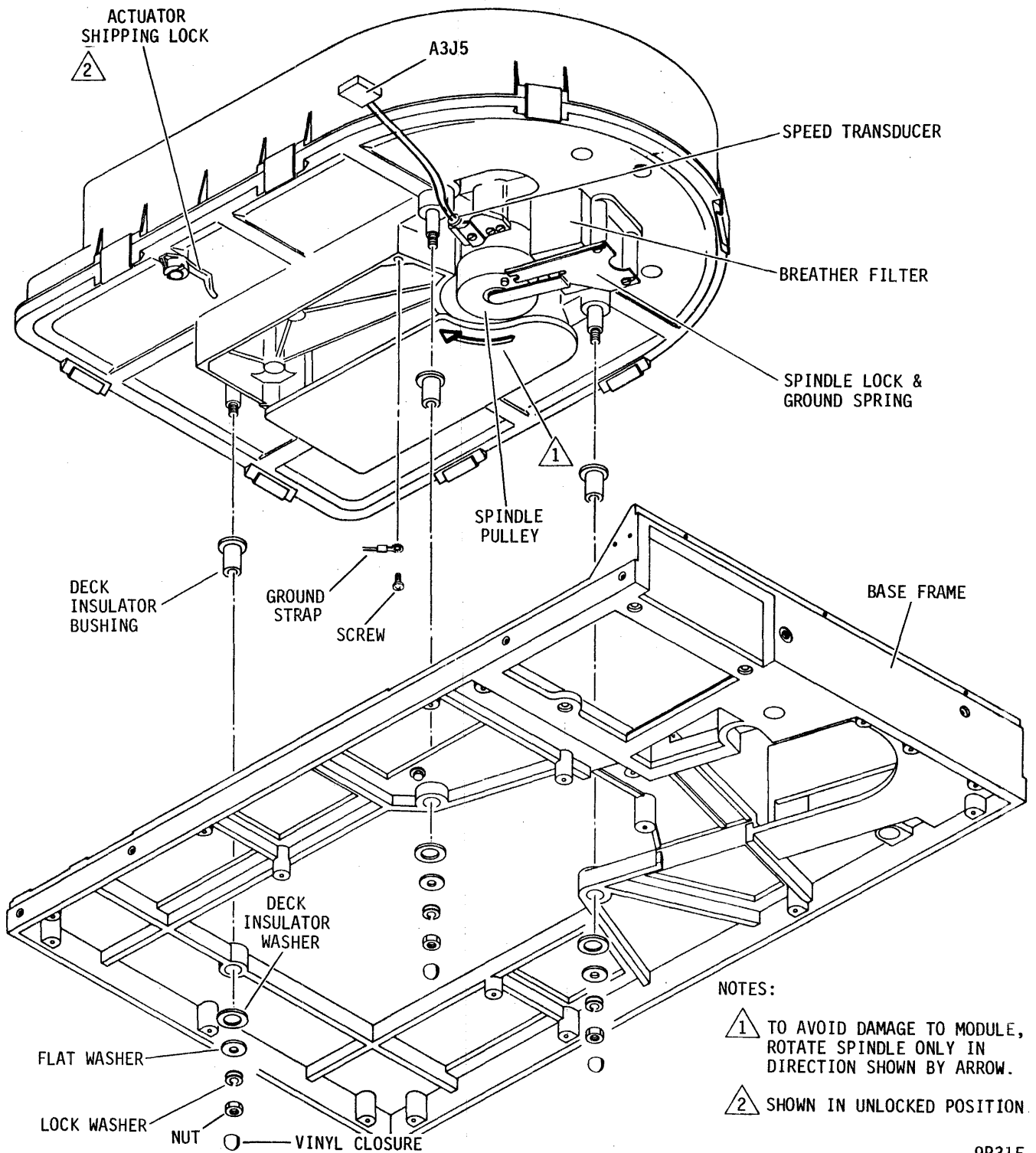
## REMOVAL

1. Perform Top Cover Removal procedure.
2. Perform Bottom Cover Removal procedure.
3. Perform Drive Belt Removal procedure.
4. Lock actuator by rotating actuator shipping lock counter-clockwise to locked position (see figure 1-11).
5. Loosen screws on underside of module securing spindle lock and ground spring to module chassis. Rotate spindle in direction of arrow and position spindle lock and ground spring forward so that pin on spindle pulley is engaged in notched portion of spindle lock and ground spring. Tighten screws. See figure 2-33.
6. Disconnect speed transducer at connector A3J5.
7. Disconnect base frame ground strap from mini module (see figure 2-33).
8. Loosen screws at side of base frame as shown in figure 2-28 and slide front panel assembly as far as possible from base frame.
9. Remove PC card clamp by pressing in on each side of clamp and lifting it straight up.
10. Remove screws securing I/O cable mounts to logic chassis and rear panel of drive.
11. Raise logic chassis to maintenance position.
12. Disconnect plug A4P01 from PC assembly \_NSN.
13. Disconnect plug A4P02 from PC assembly \_NQN.
14. Disconnect plug A4P04 from PC assembly \_WJN.
15. Disconnect ground lead from quick connect on PC assembly \_WJN.

### NOTE

Install PC assemblies removed in next step into the replacement mini module.

16. Remove PC assemblies \_NSN, \_NQN, and \_NRN.



9P31F

Figure 2-33. Mini Module Removal and Replacement

17. Remove hardware attaching module to base frame as shown in figure 2-33.
18. Remove mini module by lifting it straight up until module clears drive.
19. Remove deck insulator bushings from removed module and install them back in base frame.

## REPLACEMENT

1. Position replacement mini module so that three mounting studs are inserted through deck insulator bushings in holes provided in base frame (see figure 2-33).
2. Lower logic chassis to normal operating position and tighten fastener or screw at front of logic chassis to hold chassis in position.
3. Connect ground lead to quick connect on PC assembly \_WJN.
4. Connect plug A4P04 to PC assembly \_WJN.
5. Install PC assemblies \_NSN, \_NQN, and \_NRN.
6. Connect plug A4P02 to PC assembly \_NQN.
7. Connect plug A4P01 to PC assembly \_NSN.
8. Install PC card clamp by pressing on each side of clamp and lowering into position over read/write cards.
9. Slide front panel assembly as far as possible toward base frame.
10. Tighten screws through front panel gussets.

## CAUTION

In the next step, tighten hardware to a torque from 0.7 to 1.2 N·m (6 to 11 lbf·in).

11. At bottom of drive, replace hardware attaching module to base frame (see figure 2-33). Ensure that vinyl closures are installed on mini module studs.
12. Connect ground strap from base frame to mini module.



13. Plug in speed transducer at A3J5 connector.
14. Position spindle lock and ground spring so that its contact is centered on spindle shaft. Tighten screws (see figure 2-32).
15. Perform Drive Belt Replacement procedure.
16. Attach I/O cables to logic chassis and rear panel of drive by reinstalling cable mounts.
17. Unlock actuator by rotating actuator shipping lock clockwise to unlocked position (see figure 1-11).
18. Perform Bottom Cover Replacement procedure.
19. Perform Top Cover Replacement procedure.

## **DRIVE MOTOR ASSEMBLY REMOVAL AND REPLACEMENT**

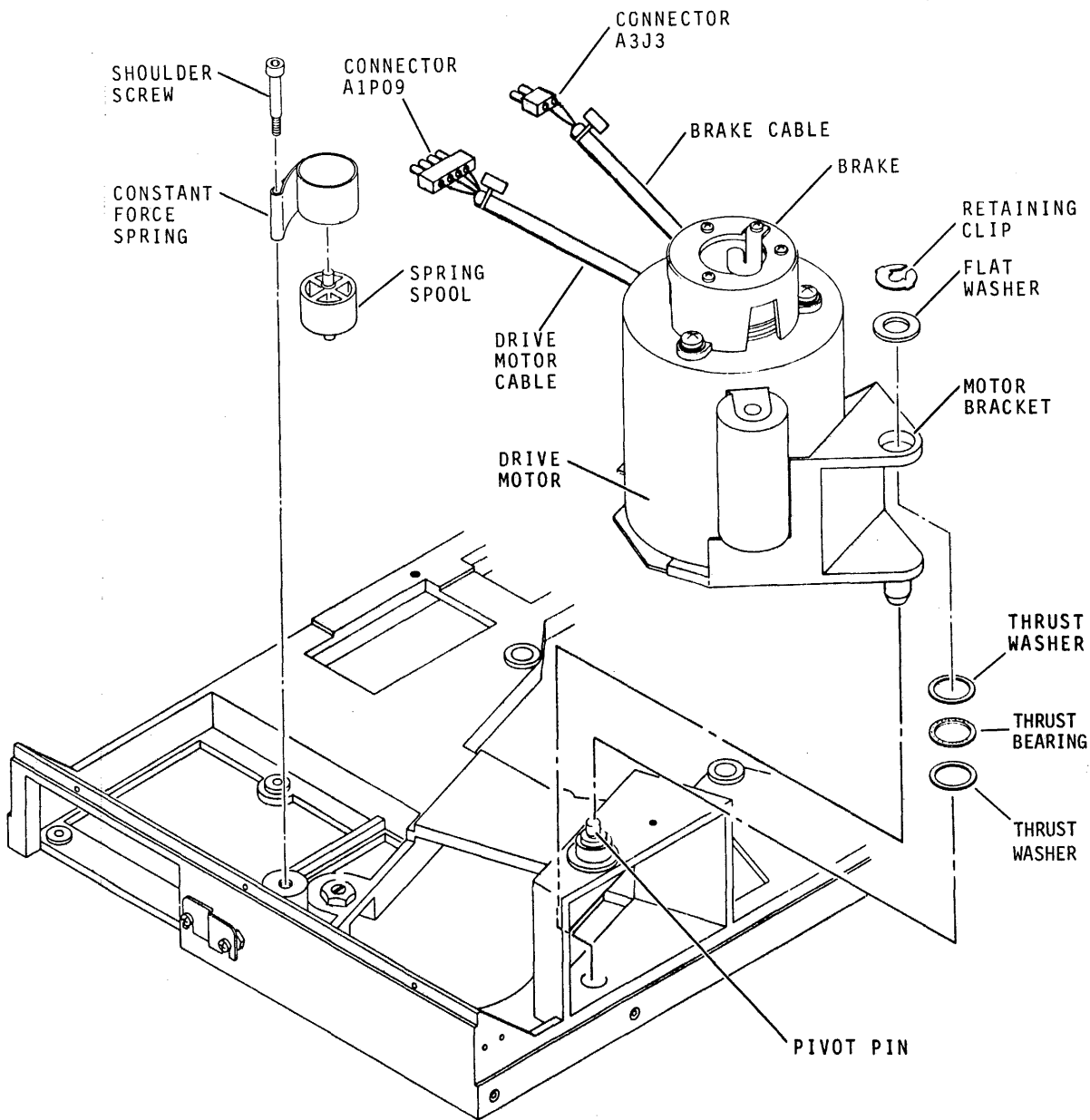
Removal and replacement of the drive motor assembly is described in two procedures, one for Series Code 20 and below, and the other for Series Code 21 and above. Drives built in Series Code 20 and below (figure 2-34) and drives built in Series Code 21 and above (figure 2-36) have different spring mechanisms attached to the drive motor.

Replacing only the drive motor is not recommended. The procedure for older drives requires two people for lifting the drive off and onto the slide rails.

### **REMOVAL AND REPLACEMENT (S/C 20 & BLW)**

#### **Removal (S/C 20 & Blw)**

1. Extend drive fully to maintenance position.
2. Perform Bottom Cover Removal procedure.
3. Perform Drive Belt Removal procedure.
4. Perform Rear Cover Removal procedure.
5. Disconnect drive motor cable at connector AlJ09 as shown in figure 2-34.
6. Disconnect cable at connector A3J3 going to motor brake assembly.



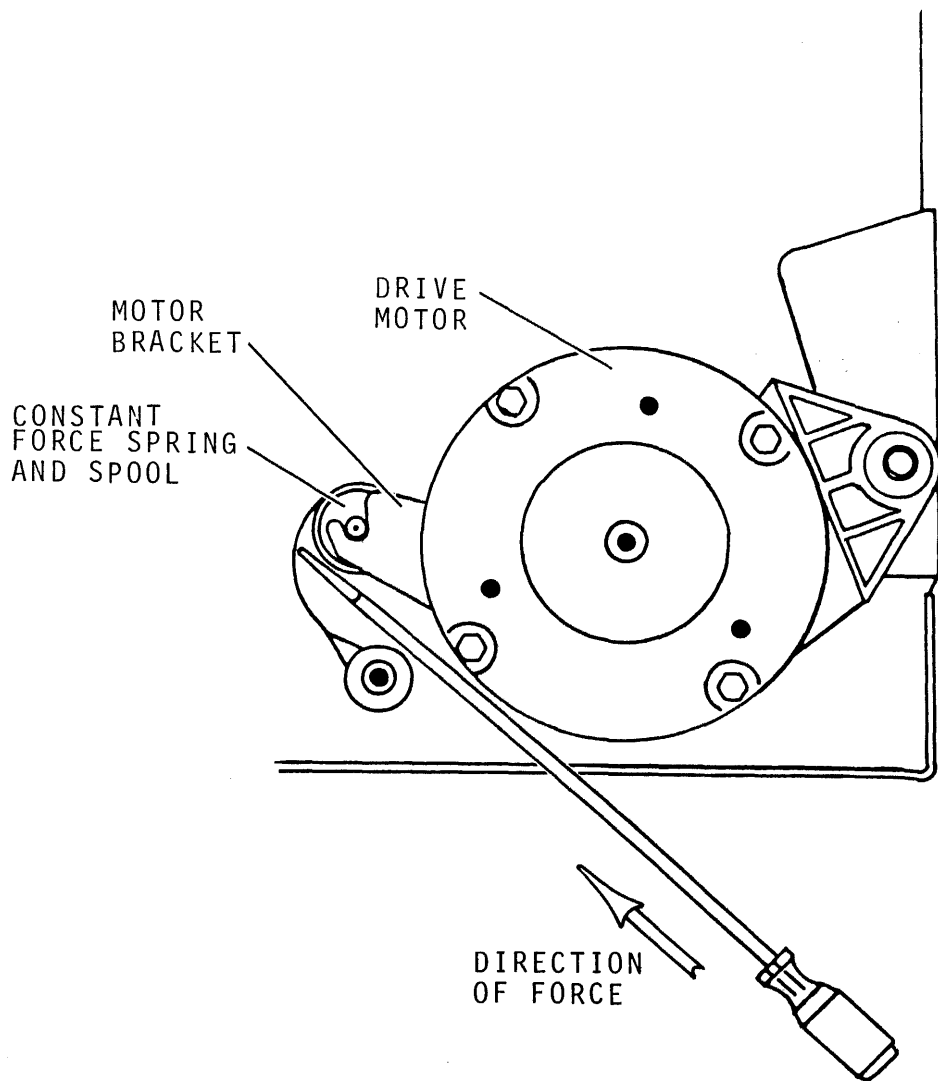
9T266A

Figure 2-34. Drive Motor Assembly (S/C 20 & BLW)

7. Remove constant force spring (see figure 2-35) by placing screw driver blade along spring and pushing forward to release spring spool from notch in motor mount plate. Slowly remove screw driver allowing spring to coil up.
8. Remove shoulder screw and set aside spring spool and constant force spring.
9. Remove retaining clip by pressing down on each side of clip and sliding clip from around pivot pin.
10. Remove flat washer from pivot pin.
11. Rotate motor bracket forward and lift motor mount to clear pivot pin and bearing hole (in base frame). Remove drive motor assembly.

#### **Replacement (S/C 20 & Blw)**

1. Position drive motor assembly so that pivot of motor bracket slides into associated hole in base frame and hole in motor bracket slides onto pivot pin. Lower drive motor assembly into position.
2. Replace flat washer on pivot pin.
3. Insert retaining clip by pressing down on both sides of clip while sliding it into notch on pivot pin.
4. Attach constant force spring as follows:
  - a. Attach constant force spring to base frame with shoulder screw.
  - b. Place screw driver blade along spring and push forward until spring uncoils allowing spring spool to slip into notch in motor bracket.
5. Reconnect drive motor and brake cables at connectors A1J09 and A3J3.
6. Perform Rear Cover Replacement procedure.
7. Perform Drive Belt Replacement procedure.
8. Perform Bottom Cover Replacement procedure.
9. Perform Top Cover Replacement procedure.



9T267

Figure 2-35. Removing Constant Force Spring (S/C 20 & BLW)

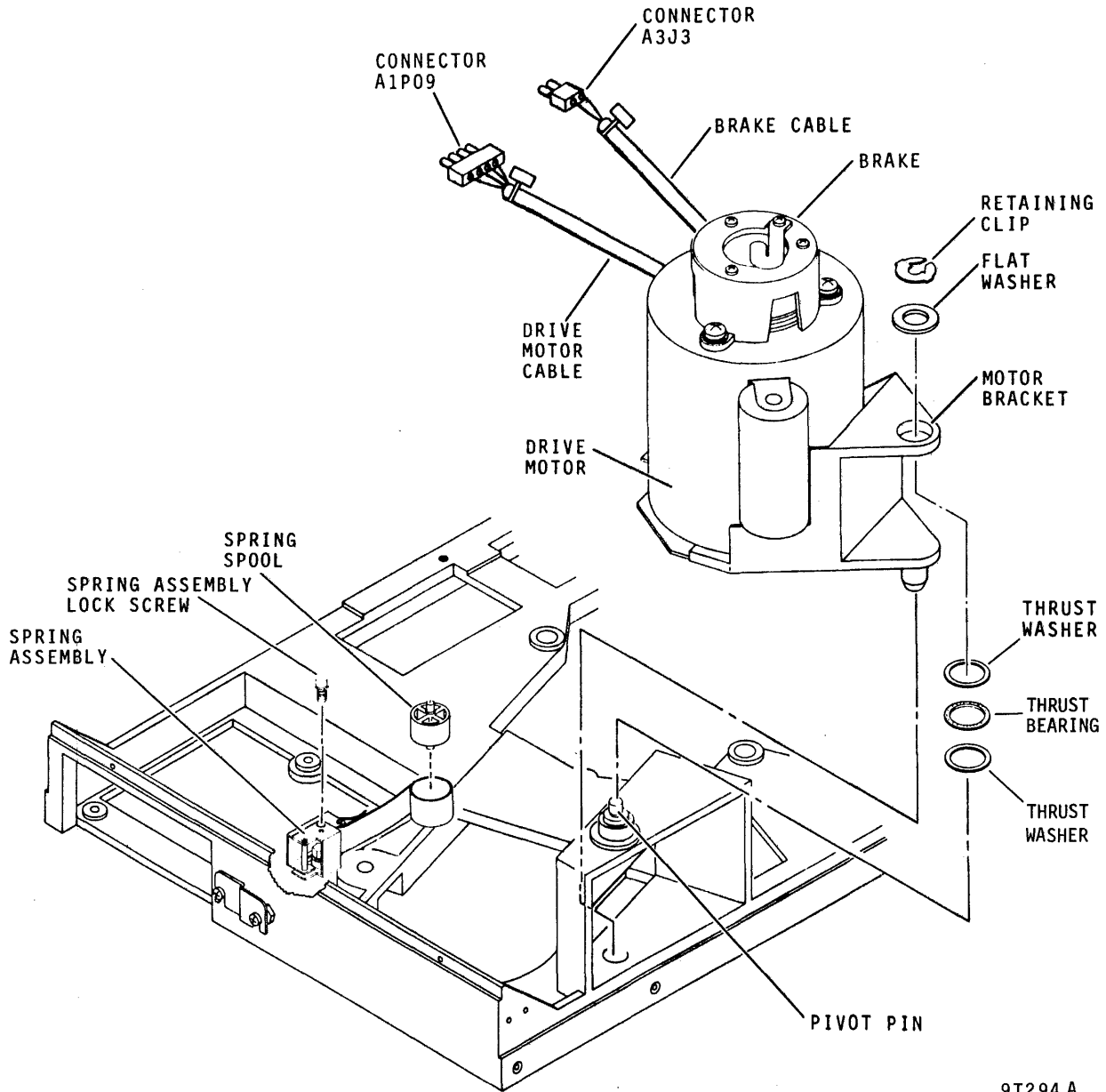
## REMOVAL AND REPLACEMENT (S/C 21 & ABV)

### Removal (S/C 21 & Abv)

1. Extend drive fully to maintenance position.
2. Perform Bottom Cover Removal procedure.
3. Perform Drive Belt Removal procedure.
4. Disconnect drive motor cable at connector AlJ09 as shown in figure 2-36.
5. Disconnect cable at connector A3J3 going to motor brake assembly.
6. Release constant force spring as follows:
  - a. Remove spring assembly lock screw with 5/32 in allen wrench (see figure 2-36). Set lock screw aside.
  - b. Insert 5/32 in allen wrench in hex hole in spring assembly (see figure 2-37).
  - c. Rotate allen wrench clockwise to extend spring assembly and loosen constant force spring (see figure 2-37).
  - d. Release spring spool from notch in motor bracket.
7. Remove retaining clip by pressing down on each side of clip and sliding clip from around pivot pin.
8. Remove flat washer from pivot pin.
9. Rotate motor bracket forward and lift motor mount to clear pivot pin and bearing hole (in base frame). Remove drive motor assembly.

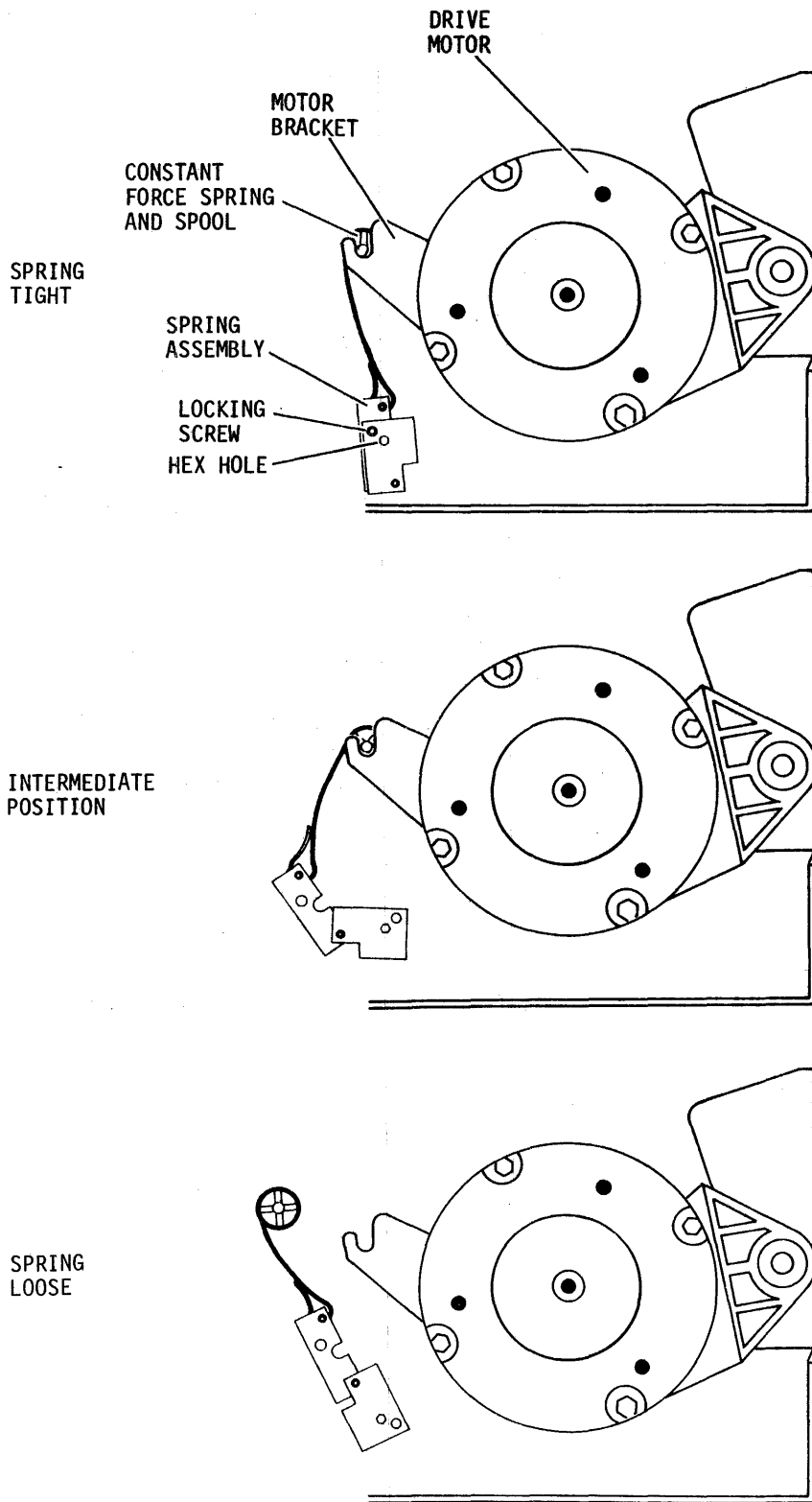
### Replacement (S/C 21 & Abv)

1. Position drive motor assembly so that pivot of motor bracket slides into associated hole in base frame and hole in motor bracket slides onto pivot pin. Lower drive motor assembly into position.
2. Replace flat washer on pivot pin.
3. Insert retaining clip by pressing down on both sides of clip while sliding it into notch on pivot pin.



9T294 A

Figure 2-36. Drive Motor Assembly (S/C 21 & ABV)



9T295

Figure 2-37. Removing Constant Force Spring (S/C 21 & ABV)

4. Attach constant force spring as follows:
  - a. Slip spring spool into notch in motor bracket (see figure 2-37).
  - b. Insert 5/32 in allen wrench in hex hole in spring assembly.
  - c. Rotate allen wrench fully counterclockwise to retract spring assembly and tighten constant force spring.
  - d. Replace spring assembly lock screw with 5/32 in allen wrench (see figure 2-36).
5. Reconnect drive motor and brake cables at connectors AlJ09 and A3J3.
6. Perform Drive Belt Replacement procedure.
7. Perform Bottom Cover Replacement procedure.
8. Perform Top Cover Replacement procedure.

## **DRIVE MOTOR BRAKE REMOVAL AND REPLACEMENT**

### **REMOVAL**

1. Perform Top Cover Removal procedure.
2. Disconnect cable to brake assembly at A3J3 connector.
3. Remove hardware securing brake housing to drive motor as shown in figure 2-38.
4. Lift brake housing and brake from shaft of drive motor.
5. Remove hardware securing brake to brake housing and remove defective brake.

### **NOTE**

It is necessary to replace the coupling on the motor shaft if the coupling looks defective or if it does not match the coupling supplied in the replacement brake kit. If so, perform steps 6 and 7.

6. Loosen hex screws securing coupling to drive motor shaft.
7. Lift and remove coupling from motor shaft as in figure 2-38.



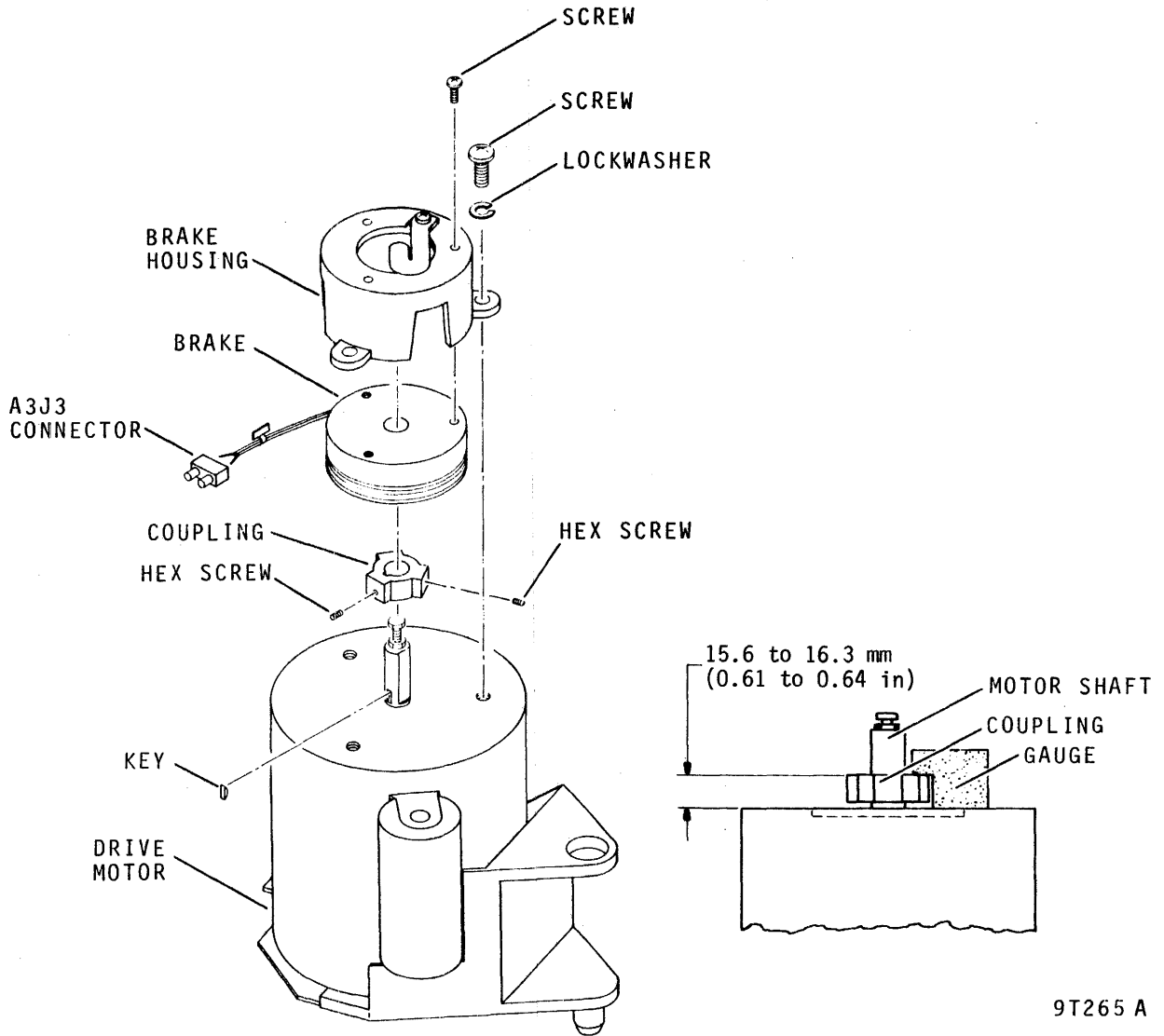


Figure 2-38. Brake Removal and Replacement

## REPLACEMENT

### NOTE

Steps 1 thru 3 apply if coupling was removed from motor shaft or is in need of adjustment. If not, proceed to step 4 for brake replacement.

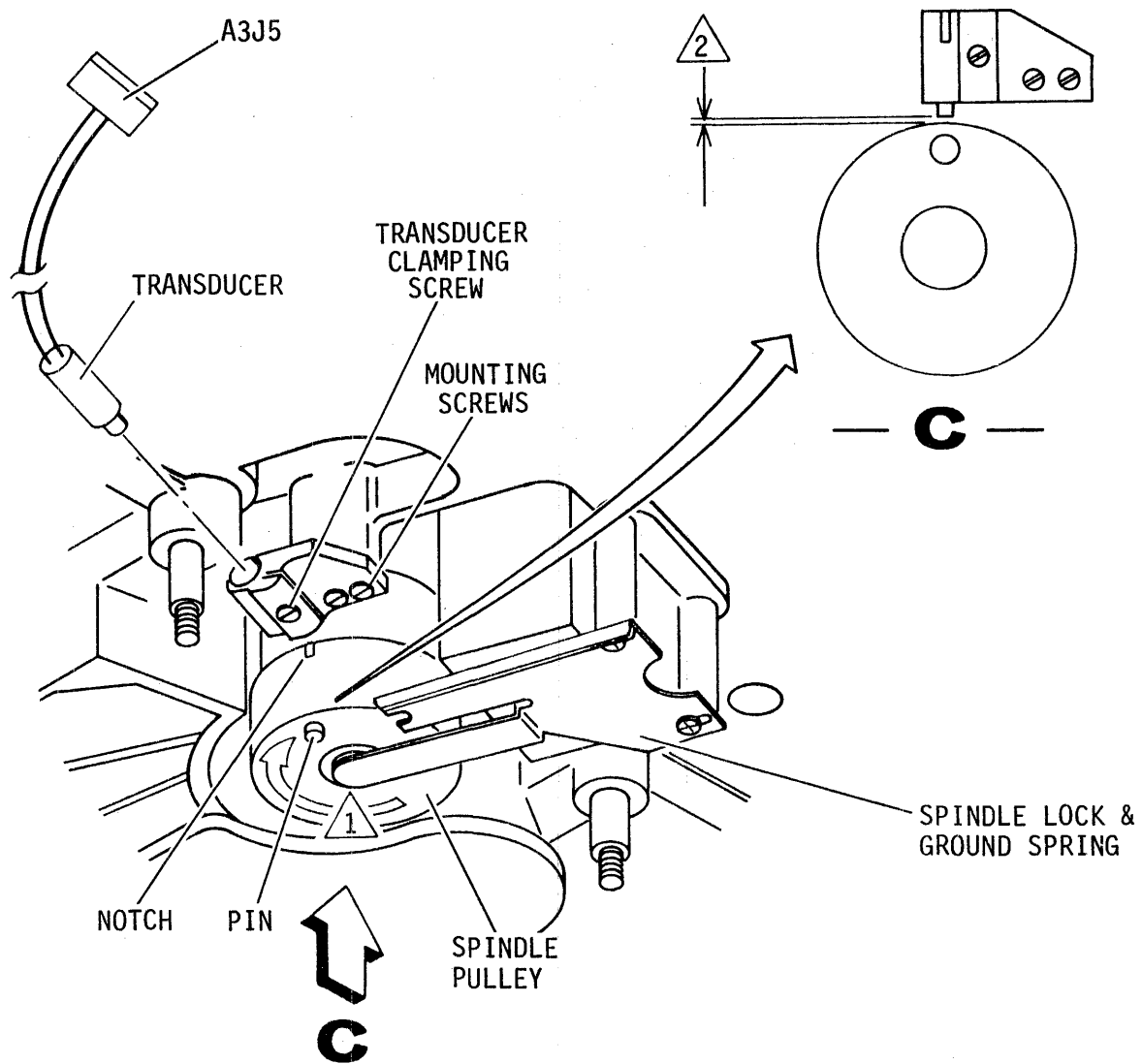
1. Align key slot in coupling with key on motor shaft.
2. Set gauge supplied with brake kit on raised surface of drive motor as shown in figure 2-38 and bring top surface of coupling into contact with gauge.
3. Tighten hex screws securing coupling to motor shaft.
4. Insert replacement brake into brake housing.
5. Secure brake to brake housing with attaching hardware shown in figure 2-38.
6. Replace brake assembly over drive motor shaft and coupling.
7. Secure brake housing to drive motor with hardware shown in figure 2-38.
8. Connect cable to brake assembly at A3J3 connector.
9. Perform Top Cover Replacement procedure.

## SPEED TRANSDUCER REMOVAL AND REPLACEMENT

This procedure contains instructions for replacing or adjusting the speed transducer. Feeler gauges are needed to set the distance between the speed transducer and the spindle pulley.

### REMOVAL

1. Perform Bottom Cover Removal procedure.
2. Disconnect cable to transducer at connector A3J5 as shown in figure 2-39.
3. Loosen transducer clamping screw.
4. Remove transducer from clamp.



NOTES:

1 TO AVOID DAMAGE TO MODULE  
 ROTATE SPINDLE ONLY IN DIRECTION  
 SHOWN BY ARROW

2 ADJUST SPACING TO  $0.15 \pm 0.005\text{mm}$   
 ( $0.006 \pm 0.002 \text{ in}$ ) WHEN TRANSDUCER  
 AND NOTCH ARE ALIGNED

9P29G

Figure 2-39. Speed Transducer Removal and Replacement

## REPLACEMENT

1. Rotate spindle pulley in direction of arrow.
2. Insert replacement transducer into clamp and adjust distance between transducer and spindle pulley as specified in figure 2-39.
3. Tighten transducer clamping screw.
4. Recheck distance between transducer and spindle pulley, and correct it if necessary.
5. Rotate spindle pulley in direction shown by arrow to verify that speed transducer does not contact spindle pulley.
6. Connect cable to transducer at connector A3J5.
7. Perform Bottom Cover Replacement procedure.

## POWER SUPPLY REMOVAL AND REPLACEMENT

### REMOVAL

1. Disconnect power cord from ac source and from power supply.
2. Perform Top Cover Removal procedure.
3. Disconnect plugs AlP03, AlP02, AlP09, and AlP10 from power supply.
4. Disconnect all ground straps from power supply and make a note of their location.

### NOTE

When removing cable tie straps, hold mounting hardware to prevent it from falling into power supply.

5. Remove cable tie straps holding cables to power supply.

#### NOTE

On units series code 23 through 26, the screws attaching one of the power supply support brackets to the base frame may be inaccessible with the rear cover in place. On these units only, step 6 must be performed.

6. Perform Rear Cover Removal procedure (if necessary).
7. Remove hardware securing power supply to base frame.
8. Lift power supply straight up and remove.

#### REPLACEMENT

1. Remove power selector plug (P07) from defective power supply and install on replacement power supply.

#### NOTE

Plug P05/P06 should be installed in J05 for 50 Hz units, or in J06 for 60 Hz units.

2. Check location of plug P05/P06 on replacement power supply. Change location if necessary.
3. Position replacement power supply in alignment with three holes in base frame.

#### NOTE

Units series code 22 and below do not have holes in the base frame to attach one of the support brackets on the new replacement power supplies. If the holes are not available, the support bracket may be either removed or left as is on the power supply. It is not required for drive operation.

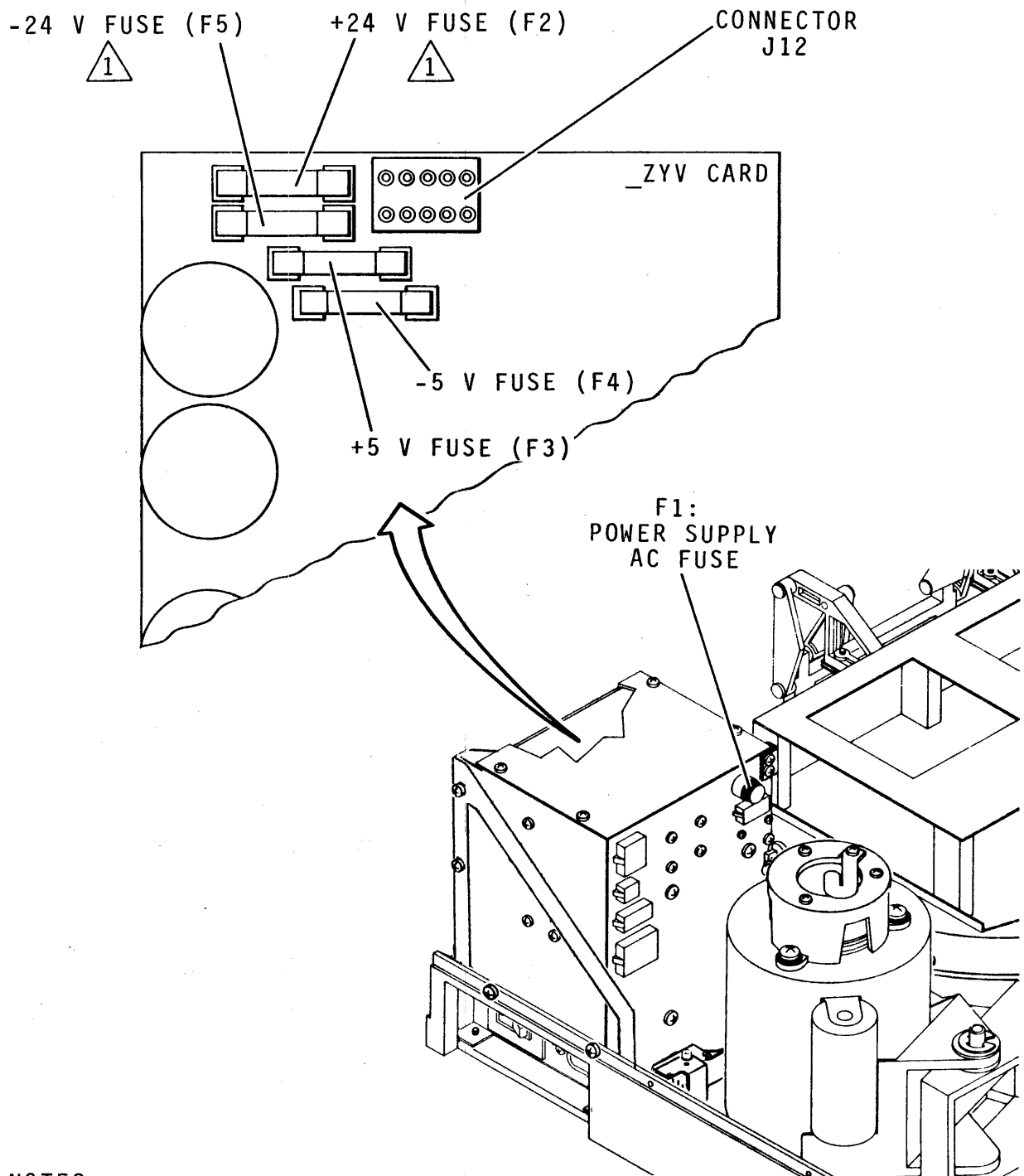
4. Secure power supply to base frame with attaching hardware.
5. Perform Rear Cover Replacement procedure (if necessary).
6. Connect all ground straps on replacement power supply in their original locations.
7. Replace cable tie straps securing cables to power supply.

8. Connect plugs AlP03, AlP02, AlP09, and AlP10 to power supply.
9. Perform Top Cover Replacement procedure.
10. Connect power cord to ac source and to power supply.

## POWER SUPPLY REPAIR

Repair of the ZYV regulator card in the power supply is limited to fuse replacement. If one of the dc voltages is missing at its logic backpanel testpoint, perform the following steps:

1. Perform Top Cover Removal procedure.
2. Determine which dc voltage is missing.
3. Set circuit breaker CBl in OFF position and disconnect drive from ac power.
4. Remove hardware securing cover to power supply and set cover aside.
5. Locate and replace suspected fuse. Figure 2-40 shows fuse locations. Fuse ratings are found in the logic diagram set. Removing plug Pl2 from regulator card makes lower fuses more accessible.
6. Apply power to drive and check dc voltages on logic backpanel. Procedures for checks and adjustments of these voltages are given in sections 2B and 2C.
7. Remove power from drive.
8. Replace cover on power supply with attaching hardware.
9. Perform Top Cover Replacement procedure.



NOTES:

△ ON SOME OLDER UNITS, F2 AND F5 ARE INTERCHANGED. IF IN DOUBT, MEASURE VOLTAGE ON FUSE TERMINALS TO DETERMINE CONFIGURATION.

9T268B

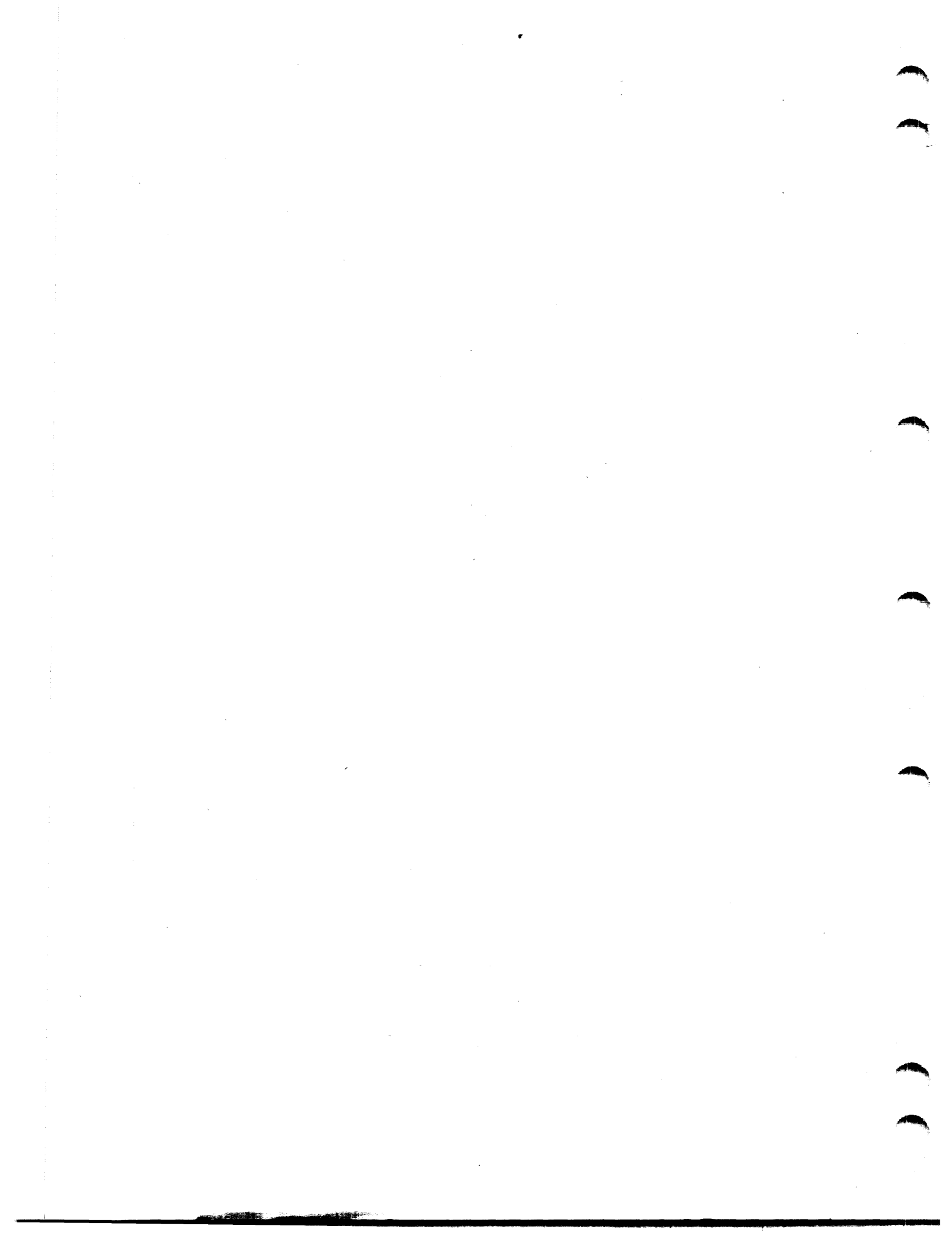
Figure 2-40. Power Supply Fuse Locations





**SECTION 3**

**DIAGRAMS**



---

## INTRODUCTION

This section includes the logic diagrams and the diagram conventions. The diagram conventions, along with the microcircuits manual, provides the necessary information to understand and use the diagrams.

## DIAGRAM CONVENTIONS

The diagram conventions used in the logic diagrams are:

- Symbology
- Abbreviations
- Logic Levels
- Signal Names
- Logic Arrangement
- Intersheet References
- Diagram Cover Sheets

An explanation of each of the above is included in the following paragraphs.

## SYMBOLGY

The diagrams contain standard schematic symbology and logic symbology. Logic symbology as identified in his manual refers to integrated circuits. Typically, all logic symbols contain three lines of information (see figure 3-1). All logic symbols have a qualifying symbol, an element identifier, and a physical location coordinate.

### Qualifying Symbol

Refer to the microcircuits manual for a detailed list and an explanation of the qualifying symbols used in the diagrams.

## Element Identifier

The second line of any logic symbol contains the element identifier. The element identifier defines the type of circuit involved. Integrated circuits are identified by a series of numbers (example: 175). This series of numbers may have a letter or series of letters following it (example: 175 H). A detailed description of all integrated circuits used can be found in the microcircuits manual.

## Coordinate Designator

The third line pertains to components on the card assemblies and contains the physical location coordinates of the components. The coordinate is a four character designation XXYY. The X coordinate runs along the exposed edge of the card assembly when installed into the logic chassis. The Y coordinate runs along the side of the card assembly giving the XY plane grid pattern. Refer to figure 3-1 and 3-2.

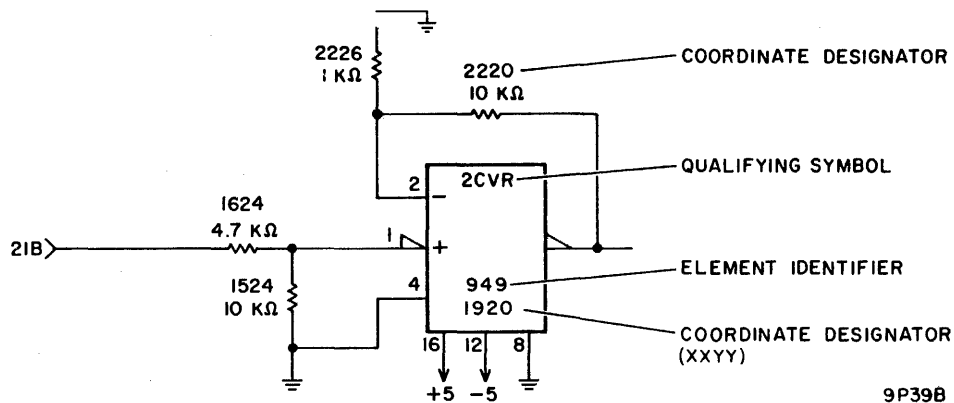


Figure 3-1. Component Location Designations

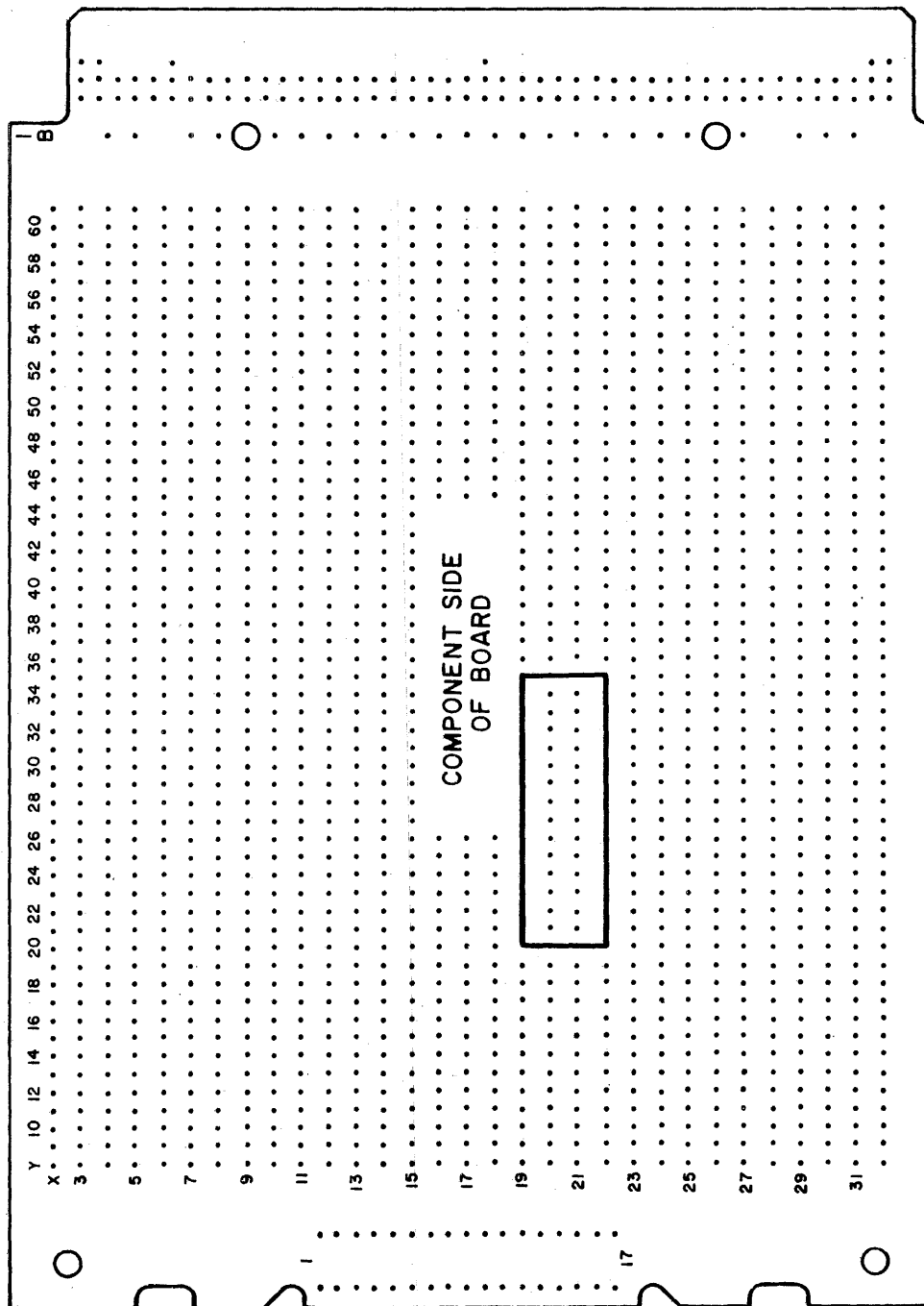


Figure 3-2. Card Assembly Coordinates

## ABBREVIATIONS

Abbreviations are used in the logic diagrams whenever it is impractical or impossible to use complete nomenclature. Standard abbreviations from ANSI Y1.1 were used when possible. Refer to the list of abbreviations included in the front matter for a definition of all abbreviations used in the manual.

## LOGIC LEVELS

Three types of logic are used in the drives covered by this manual: TTL logic, ECL logic, and CMOS logic. Logic Levels for the three types are given in table 3-1. Different circuit configurations and temperatures may result in legitimate readings that fall outside of the typical range. Such readings, however, should be suspect only in the event of trouble.

TABLE 3-1. LOGIC VOLTAGE LEVEL

| Logical State        | Nominal Voltage  | Typical Range                            |
|----------------------|------------------|--|
| TTL "1"<br>TTL "0"   | +3 V<br>0 V      | +2.5 V to +4.0 V*<br>0 V to +0.9 V       |
| ECL "1"<br>ECL "0"   | -0.9 V<br>-1.8 V | -0.61 V to -0.97 V<br>-1.52 V to -2.38 V |
| CMOS "1"<br>CMOS "0" | +5 V<br>0 V      | +3.5 V to +5.0 V<br>0 V to +1.5 V        |

\* Measuring a TTL open collector voltage may result in a reading that is close to the actual power supply voltage.

## **SIGNAL NAMES**

All input or output signals are labelled to reflect their particular function. If an output signal has no connection, and therefore no function, it is labelled "NC" to indicate no connection. The polarity (logical state) of a signal is identified by a plus or minus sign before the signal name. A plus sign before a signal name indicates that the signal is active when the logic level is high or in a logical 1 state. A minus sign before a signal name indicates that the signal is active when the logic level is low or in a logical 0 state. Refer to the discussion on logic levels.

## **LOGIC ARRANGEMENT**

Logic diagrams for the drive consist of several independent logic and schematic diagrams (see Chassis Map). With the drive in its normal operating position the A2A01 would be at the lower left in the logic chassis as viewed from the card edges. The logic card A2C04 would be in the upper right hand corner of the logic chassis.

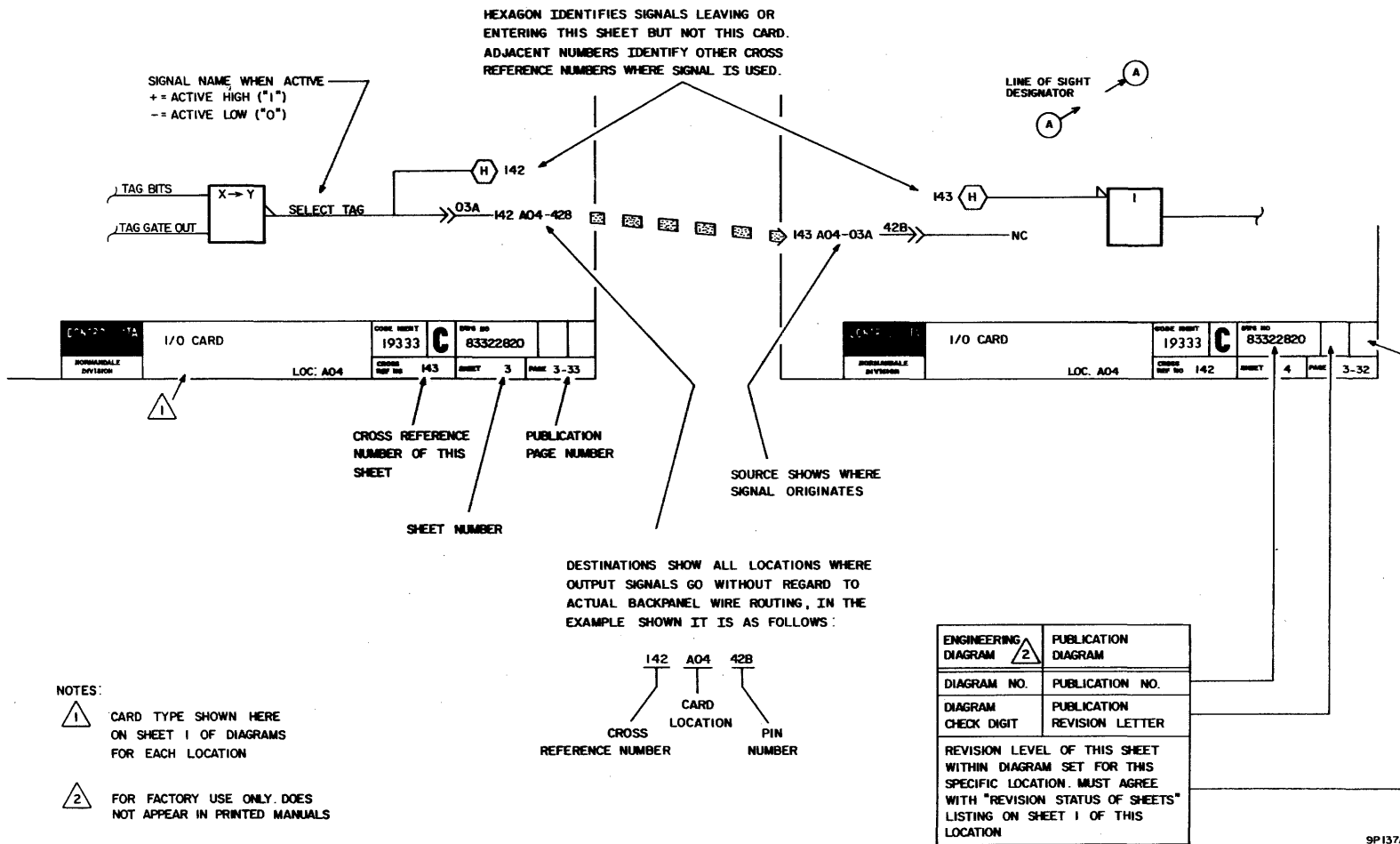
The read/write pc cards have an independent physical arrangement from front to back on the mini module, with logic card A3A1 at the front and logic card A3A3 at the back.

## **INTERSHEET REFERENCES**

The key to understanding the independent logic diagrams and schematics is to become familiar with the scheme used to identify the relationship between the various card logics. This scheme uses cross reference numbers, physical location codes and pin numbers (see figure 3-3).

The cross reference number is a three digit number. The first two digits indicate the independent logic diagrams referenced. The third digit indicates a particular sheet of the independent logic diagrams. For example, in reference number 131, the first two digits indicate independent logic 13 and the third digit indicates page 1. Since the logic diagrams are used with more than one drive configuration, it is possible to have identical cross reference numbers on two or more similar independent logic diagrams. In cases where a reference number is used on more than one independent logic diagram, the cover sheet of each applicable logic diagram will be labelled with the appropriate drive configuration. Cross reference numbers are also used within the logics, so that the logics can be traced from one logic diagram to another. A cross reference

Figure 3-3. Intersheet Referencing





number on the output of a logic signal indicates a continued logical sequence to another (or more) logic diagram. A cross reference on the input signal indicates the origin of the signal. Where a logic signal does not leave the logic diagram, but is continued on some other sheet of the same diagram, the cross reference number of the destination sheet is shown. In such cases, the cross reference number is preceded by a hexagon. The hexagon is identified with a letter to indicate a specific location on the destination sheet. Where a logical sequence cannot be shown in series, yet it does not leave the logic sheet, "line of sight" arrows are used to indicate the origin and destination of the sequence. The end of a logical sequence is shown with a line of sight arrow pointing away from a small circle identified with a letter. A second circle identified with the same letter, will have a line-of-sight arrow pointing in the same direction as the first. The second arrow indicates where the logical sequence continues.

The physical location code is an alpha-numerical code, such as A2A04, that identifies the relationship between the logics and their physical location on the drive. All physical location codes are represented in the logic. Refer to table 3-2 for physical location codes. The major physical location codes are as follows:

- A1 power supply distribution and associated power distribution cabling.
- A2 logic chassis and all the logics associated with the chassis.
- A3 base frame assembly including cable harnesses, front panel assembly and drive motor assembly.
- A4 mini module including connectors and card assemblies.

Pin numbers used in the logic are for identifying logic signals at their respective input output locations. Pin numbers are identified by a three character number, such as 14A (see figure 3-4). The tag information on all input output signals should reflect a reference number, a physical location code, and a pin number respectively.

Logic diagrams 41X contains the cabling information for all interchassis logic signals on logic diagrams 01X thru 55X. Interassembly connections are shown by an interassembly designator which is a small square with a location code inside, such as (A3). An interassembly designator used at the output of a logic signal indicates that the signal goes to the assembly indicated by the designator.

TABLE 3-2. CONTENTS OF DIAGRAMS

| Cross Reference No | Card Location | Title                                      |
|--------------------|---------------|--|
| None               | None          | Key To Logic                               |
| 011                | A1            | MMD Power Supply (AC)                      |
| 012                | A1            | MMD Power Supply Schematic and Wiring      |
| 021                | A1A1          | DC Voltage Reg Board                       |
| 022                | A1A1          | DC Volt Reg Part 1                         |
| 023                | A1A1          | DC Volt Reg Part 2                         |
| 024                | A1A1          | DC Volt Reg Part 3                         |
| 111                | A2A01         | Write PLO                                  |
| 112                | A2A01         | Servo Clock                                |
| 113                | A2A01         | Phase Lock Oscillator                      |
| 114                | A2A01         | NRZ to MFM Data                            |
| 115                | A2A01         | Write Precompensation                      |
| 131                | A2A03         | Read PLO                                   |
| 132                | A2A03         | Read PLO                                   |
| 133                | A2A03         | Read PLO Input/Output                      |
| 134                | A2A03         | Address Mark Detector                      |
| 141                | A2A04         | Channel I I/O                              |
| 142                | A2A04         | CH I Receivers and Unit Select             |
| 143                | A2A04         | CH I Receivers                             |
| 144                | A2A04         | CH I Receivers and Seq Power               |
| 145                | A2A04         | CH I Transmitters                          |
| 146                | A2A04         | CH I Transmitters                          |
| 211                | A2B01/C01     | Analog Servo                               |
| 212                | A2B01/C01     | Servo Demodulator                          |
| 213                | A2B01/C01     | Double CYL Pulse Gen and Position Circuits |
| 214                | A2B01/C01     | Level Detectors                            |
| 215                | A2B01/C01     | Power Amp Drive and Voltage Fault          |
| 216                | A2B01/C01     | Fine Servo and Retract                     |
| 217                | A2B01/C01     | Target Velocity                            |
| 221                | A2B02/C02     | Fault/Control                              |
| 222                | A2B02/C02     | Fault Latches                              |

Table Continued on Next Page

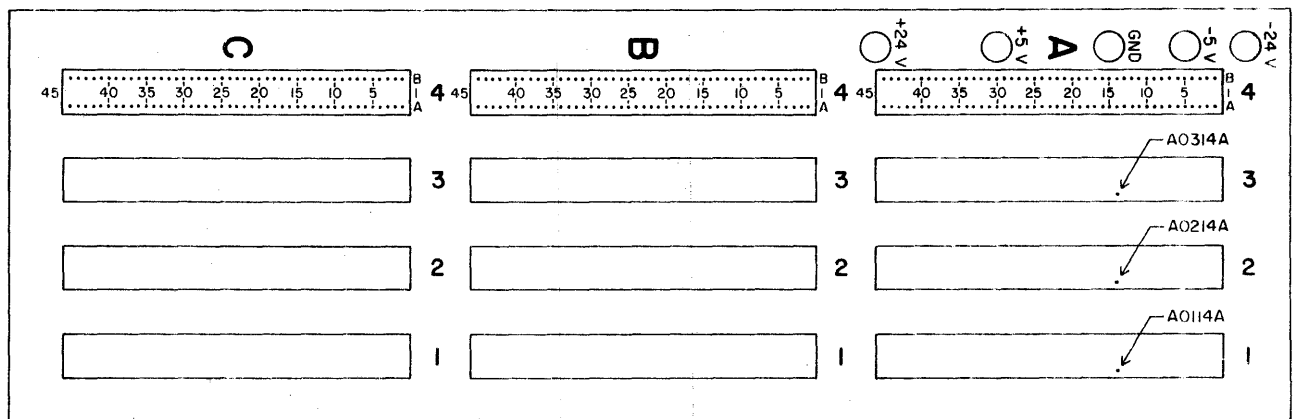
TABLE 3-2. CONTENTS OF DIAGRAMS (Contd)

| Cross Reference No | Card Location | Title                                 |
|--------------------|---------------|---------------------------------------|
| 223                | A2B02/C02     | On Cylinder Blanking                  |
| 224                | A2B02/C02     | Power On Control and Speed OK         |
| 225                | A2B02/C02     | Guard Bands/Unit Select               |
| 226                | A2B02/C02     | Sector Counter                        |
| 227                | A2B02/C02     | Demodulator Gates and Write Protected |
| 228                | A2B02/C02     | Sequence Power and Seek Error         |
| 229                | A2B02/C02     | Fixed and Movable HD                  |
| 231                | A2B03         | Microprocessor Control                |
| 232                | A2B03         | Cylinder Address Register             |
| 233                | A2B03         | Microprocessor                        |
| 234                | A2B03         | Memory                                |
| 235                | A2B03         | Cylinder Pulse Control                |
| 236                | A2B03         | Control and Status                    |
| 241                | A2B04         | Channel II I/O                        |
| 242                | A2B04         | CH II Receivers and Unit Select       |
| 243                | A2B04         | CH II Receivers                       |
| 244                | A2B04         | CH II Receivers and Seq Power         |
| 245                | A2B04         | CH II Transmitters                    |
| 246                | A2B04         | CH II Transmitters                    |
| 341                | A2C04         | Dual Channel Steering                 |
| 342                | A2C04         | Channel Selected Reserved and Busy    |
| 343                | A2C04         | Channel Enabled/Disable               |
| 344                | A2C04         | Disable, Interrupt, and Seek End      |
| 351                | A2C05         | Power Amp                             |
| 352                | A2C05         | Power Amp                             |
| 411                | A3            | MMD Cabling                           |
| 412                | A3            | MMD Cabling Part 1                    |
| 413                | A3            | MMD Cabling Part 2                    |
| 414                | A3            | MMD Cabling Part 3                    |
| 421                | A3            | Fault Code Display                    |
| 422                | A3            | Fault Code Display                    |
| 511                | A4A1          | Digital Read                          |
| 512                | A4A1          | Digital Read Part 1                   |

Table Continued on Next Page

TABLE 3-2. CONTENTS OF DIAGRAMS (Contd)

| Cross Reference No | Card Location | Title                         |
|--------------------|---------------|-------------------------------|
| 513                | A4A1          | Digital Read Part 2           |
| 514                | A4A1          | Digital Read Part 3           |
| 521                | A4A2/B2       | Writer and Select             |
| 522                | A4A2/B2       | Writer Part 1                 |
| 523                | A4A2/B2       | Writer Part 2                 |
| 524                | A4A2/B2       | Movable Head Select           |
| 525                | A4A2/B2       | Fixed Head Select             |
| 531                | A4A3/B3       | Read Analog                   |
| 532                | A4A3/B3       | Read Analog Part 1            |
| 533                | A4A3/B3       | Read Analog Part 2            |
| 534                | A4A3/B3       | Read Analog Part 3            |
| 541                | A4A4          | Read/Write Motherboard        |
| 542                | A4A4          | Read/Write Motherboard Part 1 |
| 543                | A4A4          | Read/Write Motherboard Part 2 |
| 544                | A4A4          | Read/Write Motherboard Part 3 |
| 551                | A4            | Fixed Head Shoe (Outer)       |
| 552                | A4            | Fixed Head Shoe (Outer)       |
| 553                | A4            | Fixed Head Select (Outer)     |
| 554                | A4            | Fixed Head Select (Outer)     |
| 555                | A4            | Fixed Head Select (Outer)     |
| 556                | A4            | Fixed Head Select (Outer)     |
| 557                | A4            | Fixed Head Data (Outer)       |
| 558                | A4            | Fixed Head Data (Outer)       |
| 559                | A4            | Fixed Head Data (Outer)       |
| 560                | A4            | Fixed Head Data (Outer)       |
| 561                | A4            | Fixed Head Shoe (Inner)       |
| 562                | A4            | Fixed Head Select (Inner)     |
| 563                | A4            | Fixed Head Select (Inner)     |
| 564                | A4            | Fixed Head Select (Inner)     |
| 565                | A4            | Fixed Head Select (Inner)     |
| 566                | A4            | Fixed Head Data (Inner)       |
| 567                | A4            | Fixed Head Data (Inner)       |
| 568                | A4            | Fixed Head Data (Inner)       |
| 569                | A4            | Fixed Head Data (Inner)       |
| 570                | A4            | Fixed Head Data (Inner)       |



9P11A

Figure 3-4. Logic Chassis Backpanel

All logic chassis backpanel wiring is shown in the wire list. Figure 3-4 gives the physical arrangement of the backpanel from the wire wrap side.

### DIAGRAM COVER SHEETS

The diagram cover sheet is the first sheet of each logic set. Power and ground connections, revision status, card type information, and a list of unused circuit elements are found on the cover sheet. Power enters the drive from the driver power plug (P1), is rectified, and then distributed to the wire wrap panel quick connects. The wire wrap panel then distributes power to the logic cards. The cover sheets show which pins receive that power. All power connections show the point of origin for the power source except those that are most common. The most common power connections are:

- -24 V quick connect, which feeds pins 1A and 1B on all cards.
- +24 V quick connect, which feeds pins 45A and 45B on all cards.

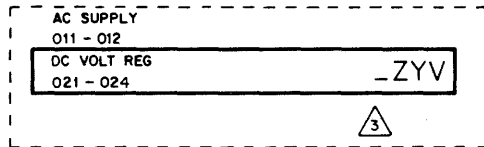
- -5 V quick connect, which feeds pins 2A and 2B on all cards.
- +5 V quick connect, which feeds pins 44A and 44B on all cards.
- GND quick connect, which feeds pins 6A, 6B, 23A, 23B, 39A and 39B on all cards.

The revision of each logic sheet within the logic set is shown in the upper left-hand corner of the cover sheet. The upper right-hand corner of the sheet contains a record of the changes made to the logic set. The latest revision letter shown in the revision record should always match the letter of the cover sheet.

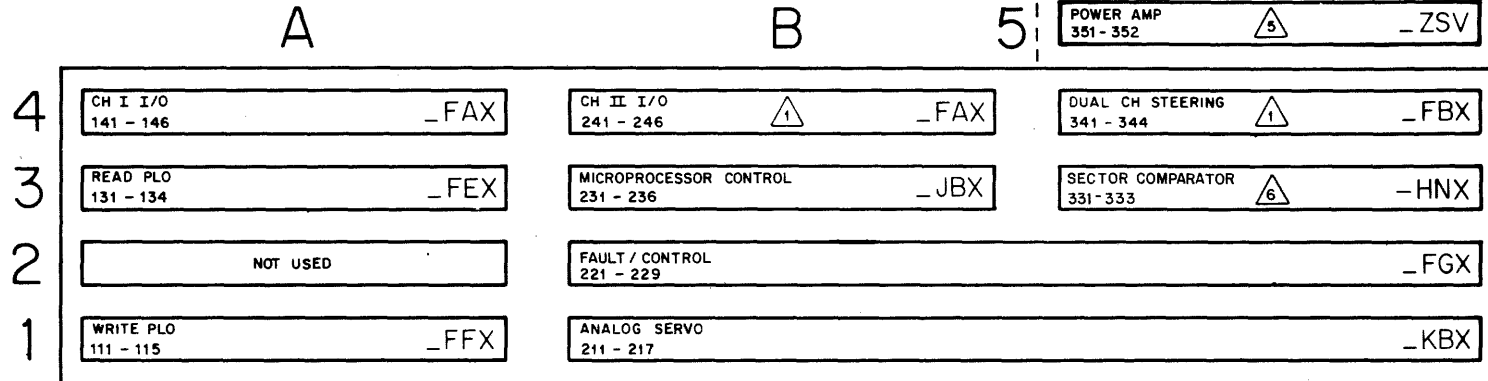
The cover sheet also shows the card type which appears in the title block below the card name. Refer to figure 3-3 for an explanation of all pertinent information shown in the title block.



POWER SUPPLY - [A1] 011 - 024



LOGIC CHASSIS - [A2] 111 - 352



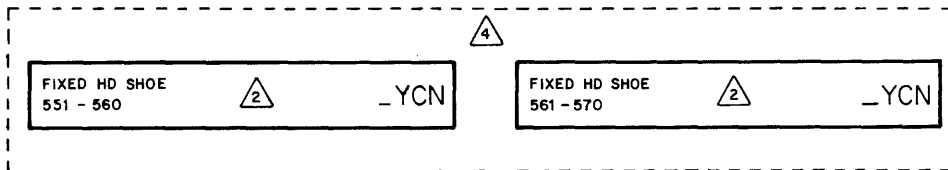
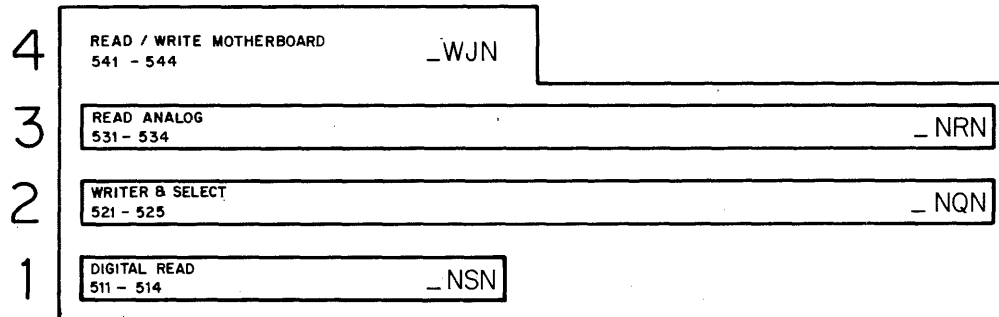
DECK ASSEMBLY - [A3] 411 - 422

CABLING DIAGRAMS  
411 - 414

FAULT CODE DISPLAY  
421 - 422

-DZV

MODULE - [A4] 511 - 570



KEY

|                                 |                           |
|---------------------------------|---------------------------|
| FUNCTIONAL NAME<br>CROSS REF NO | MODULE TYPE<br>IDENTIFIER |
|---------------------------------|---------------------------|

NOTES:

- 1 DUAL CHANNEL UNITS ONLY.
- 2 APPLICABLE ONLY TO UNITS WITH FIXED HD SHOE OPTIONS.
- 3 LOCATED INSIDE POWER SUPPLY [A1]
- 4 LOCATED INSIDE MODULE [A4]
- 5 LOCATED ON THE TOP OF LOGIC CHASSIS [A2]
- 6 USED ONLY IN UNITS WITH LONG LAST SECTOR

CONTROL DATA

NORMANDALE  
DIVISION

CHASSIS MAP

CODE IDENT  
19333

C

83323150

N

B

CROSS  
REF NO

SHEET 2

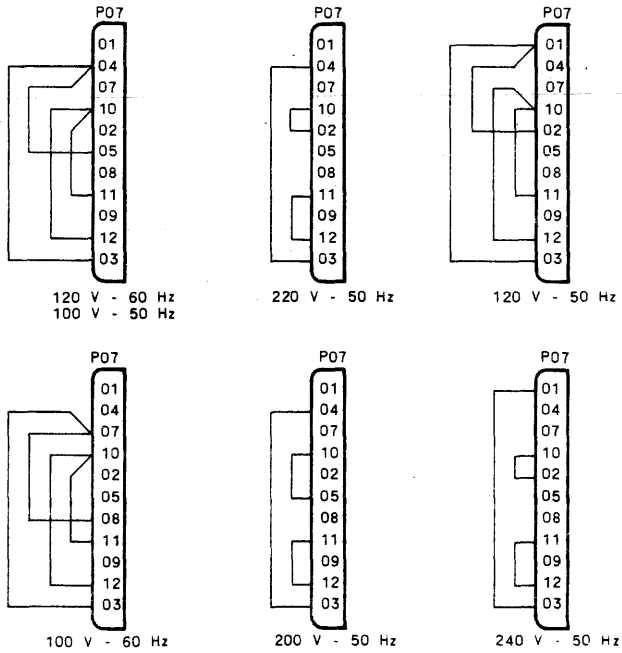
PAGE 3-14



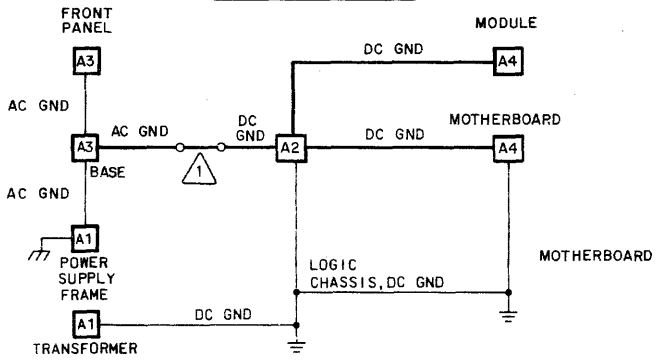
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|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| 1                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| A                         | A |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B                         | B |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

| REVISION |         |              |      |          |       |
|----------|---------|--------------|------|----------|-------|
| NO.      | ECN     | DESCRIPTION  | DRFT | DATE     | CHK'D |
| A        | PE23000 | RELEASED     |      |          |       |
| B        | PE50617 | BZYV TO CZYV | T.H. | 12-26-79 |       |

VOLTAGE PROGRAMING PLUGS



MMD GROUNDING DIAGRAM



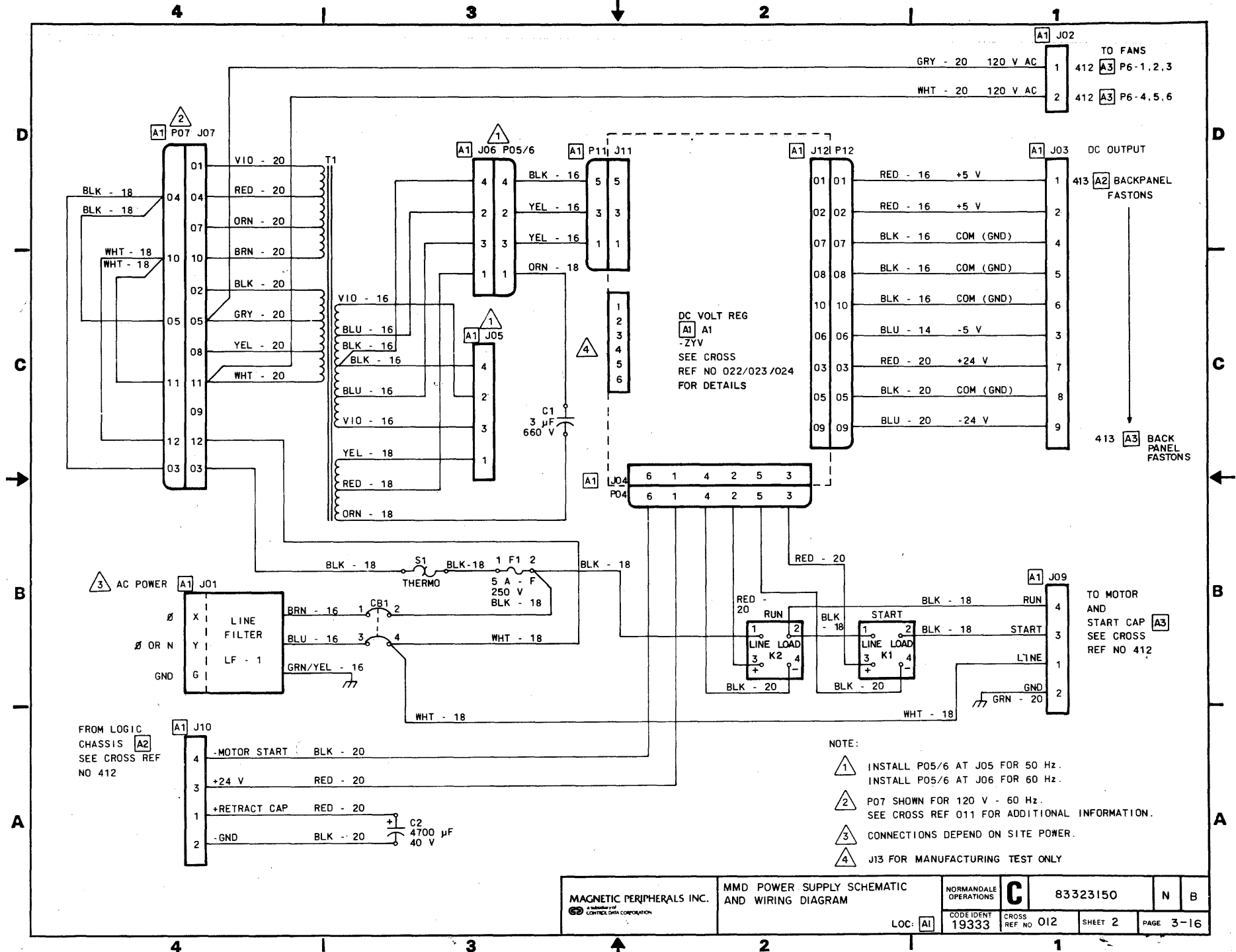
NOTE:  
 AC/DC GND SHORTING BAR.

|          |                |        |
|----------|----------------|--------|
| DRAWN    | <i>M. G...</i> | 4-9-79 |
| CHECKED  |                |        |
| ENGINEER |                |        |
| APPROVED |                |        |

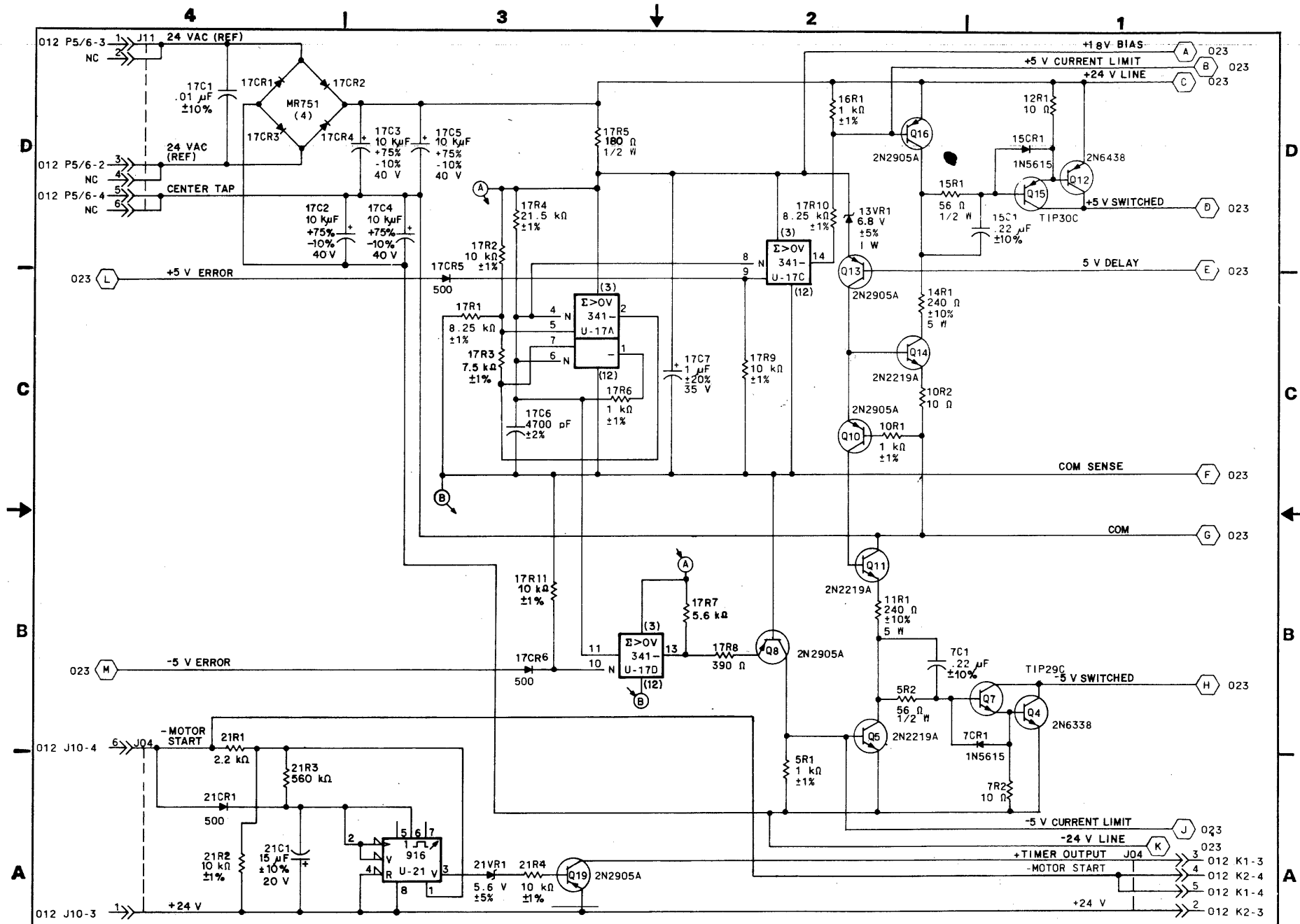
MAGNETIC PERIPHERALS INC.  
 A DIVISION OF  
 CONTROL DATA CORPORATION

MMD POWER SUPPLY (AC) DIAGRAM

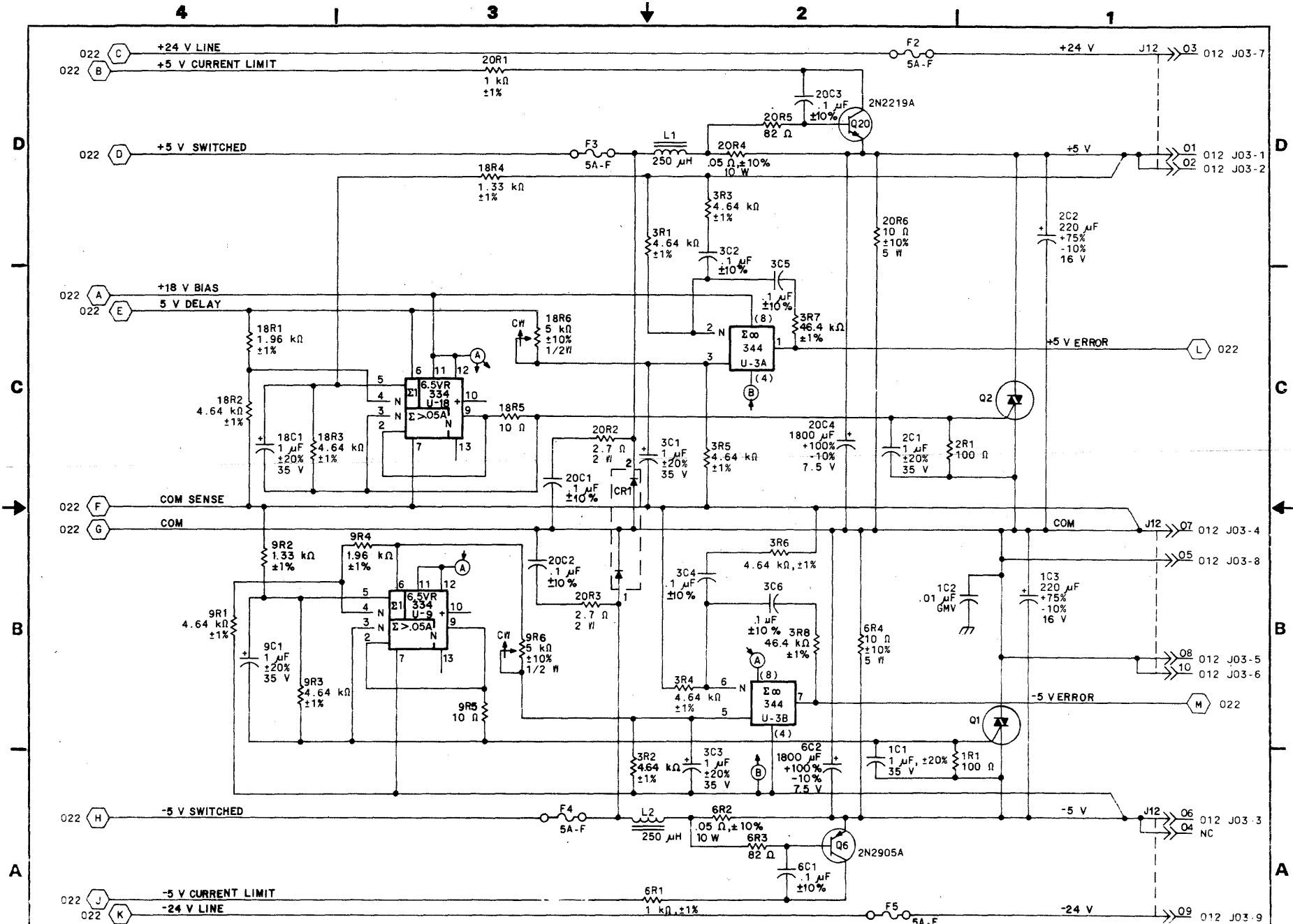
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|------|----|--------------|-----|-------|--------|------|------|
| LOC: | AI | CLASS REF NO | 011 | SHEET | 1 of 2 | PAGE | 3-15 |
|------|----|--------------|-----|-------|--------|------|------|





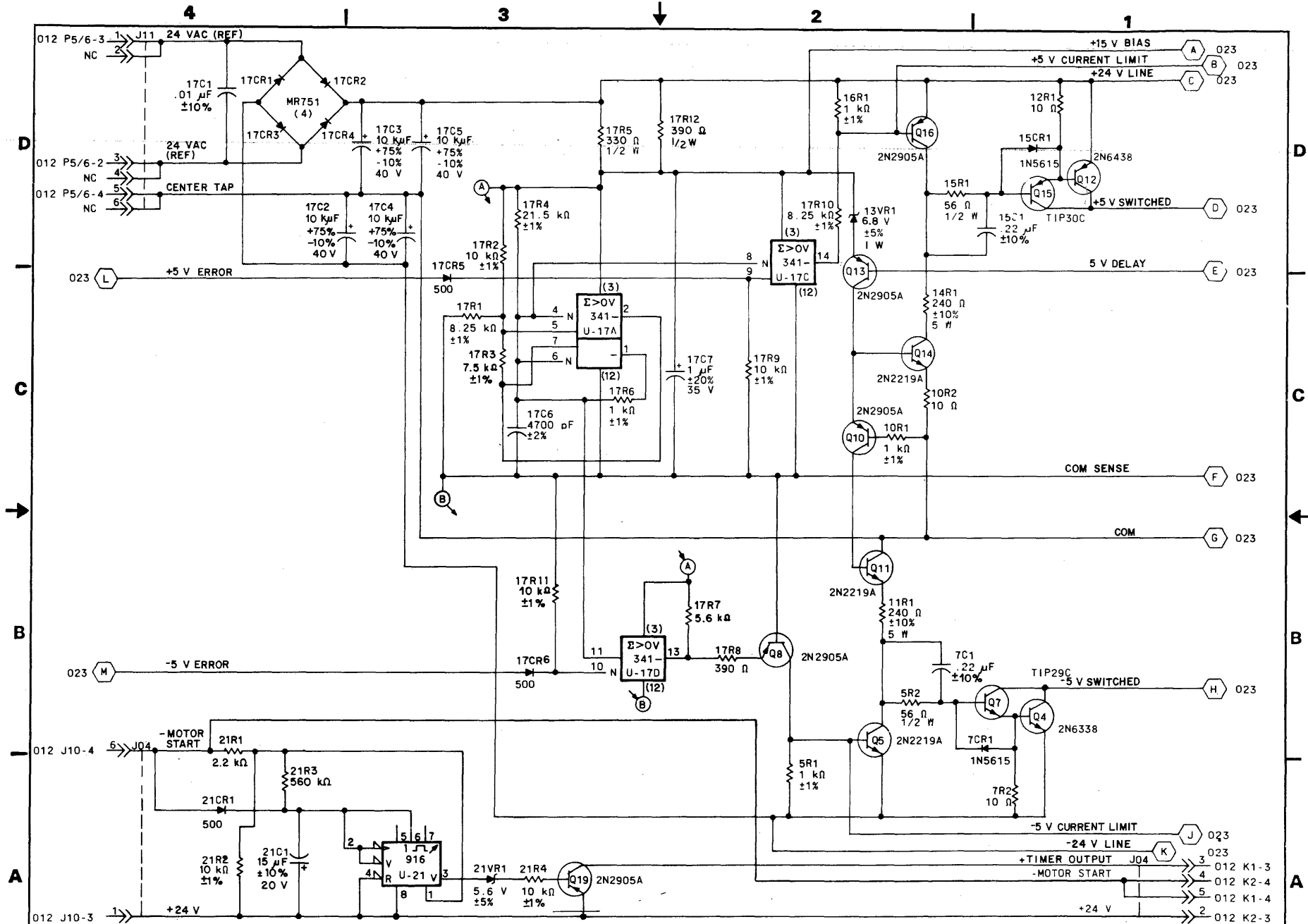


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| MAGNETIC PERIPHERALS INC.<br>A DIVISION OF<br>CONTROL DATA CORPORATION |  | DC VOLT REG PART I |  | NORMAN DALE OPERATIONS |  | C 833 23150 |  | N A       |  |
| LOC: AI AI   |  | CODE IDENT 19333   |  | CROSS REF NO 022       |  | SHEET 2     |  | PAGE 3-18 |  |

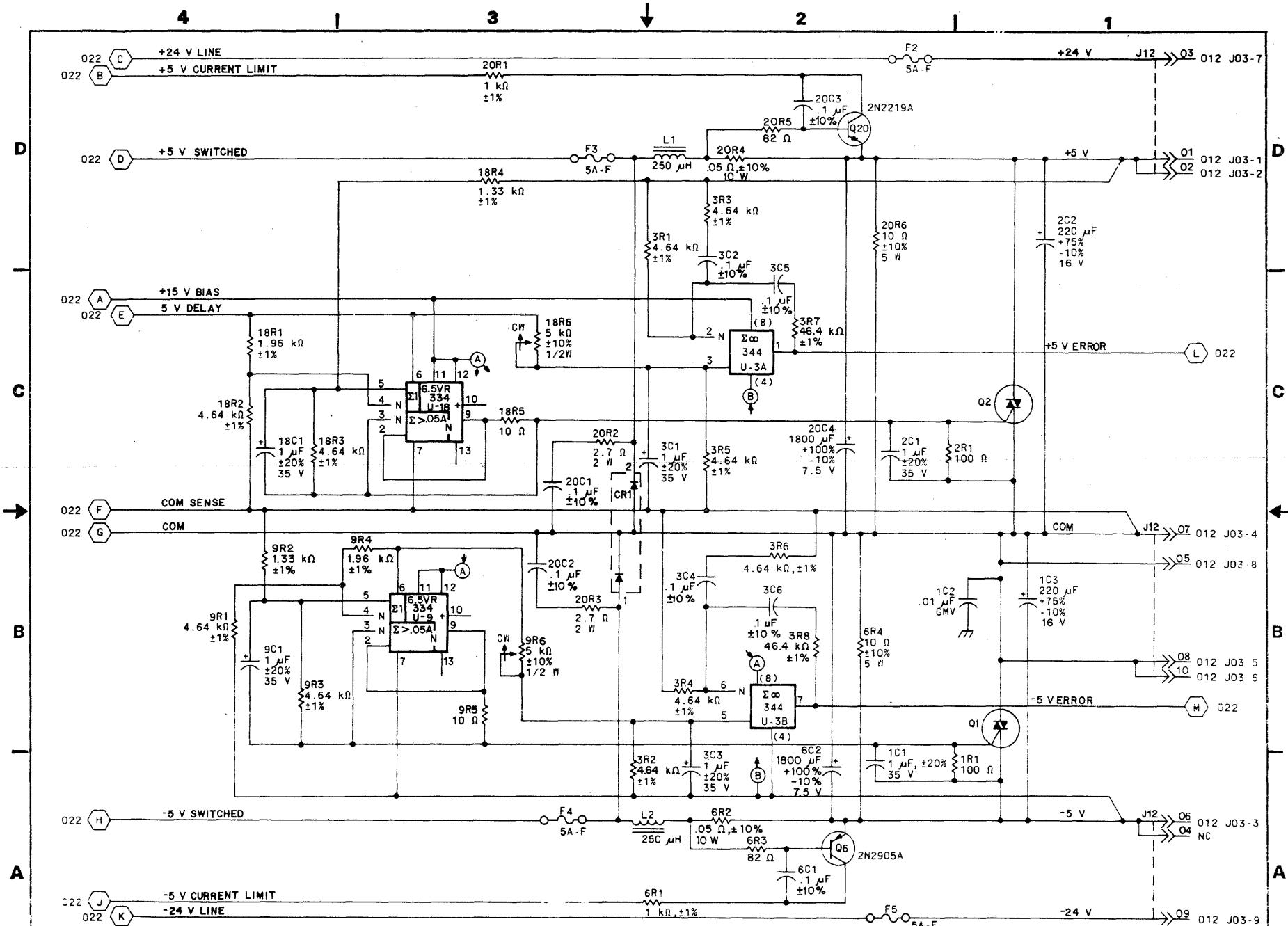








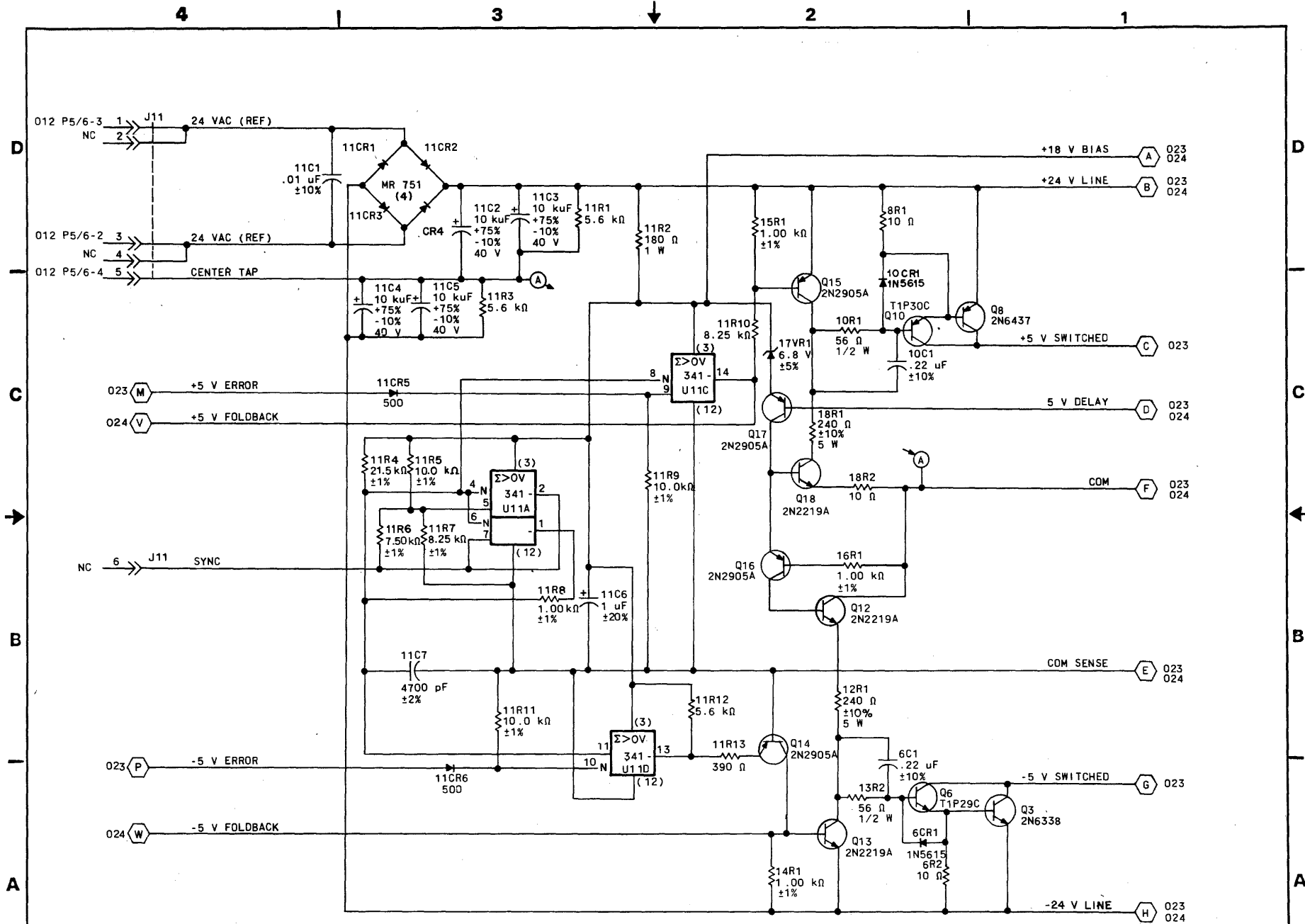




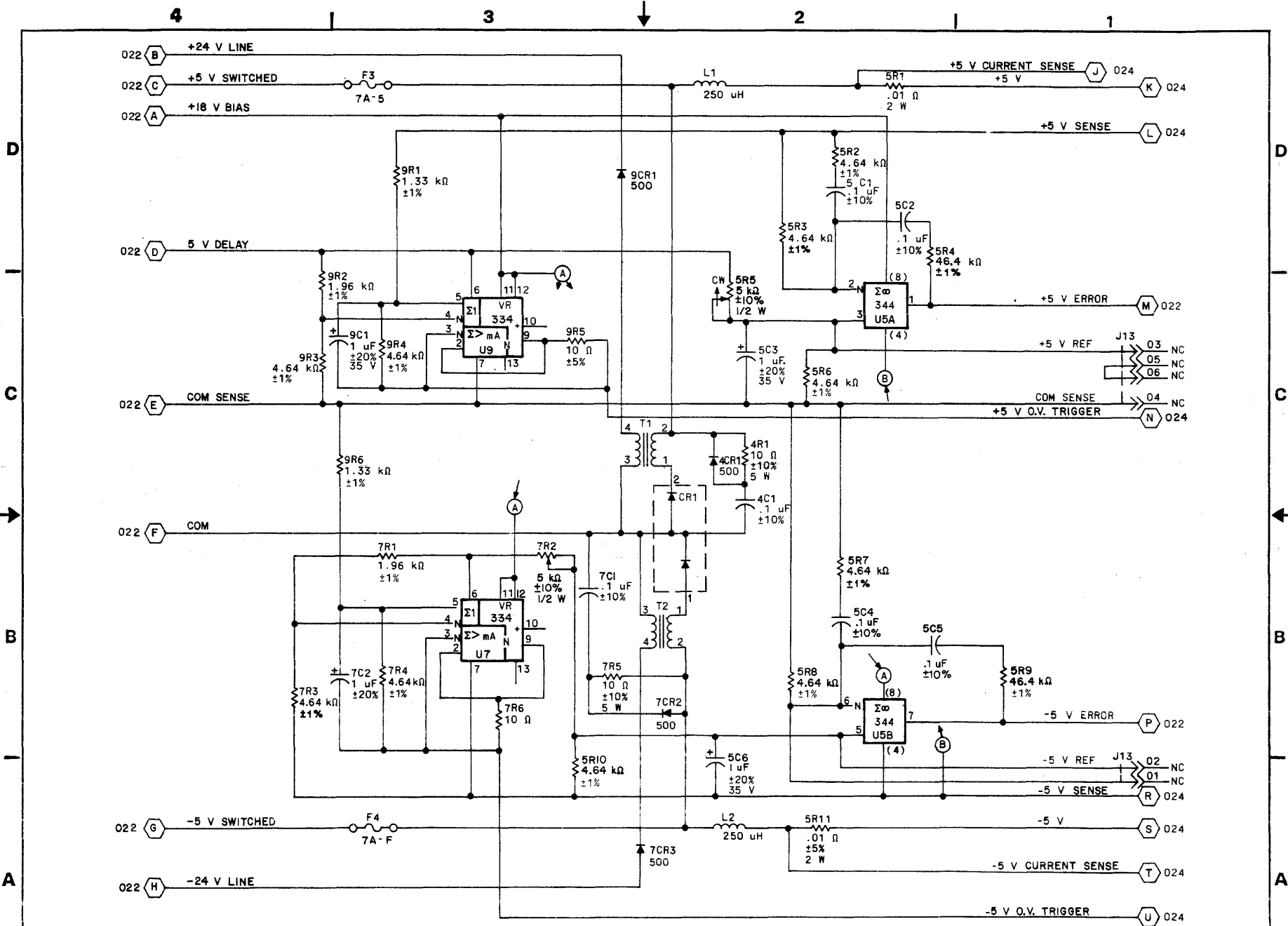
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| MAGNETIC PERIPHERALS INC.            |  | DC VOLT REG PART 2 |  | NORMANDALE OPERATIONS |  | C            |  | 83323150 |  | N    |  | 9       |  |
| A member of CONTROL DATA CORPORATION |  |                    |  | CODE IDENT            |  | CROSS REF NO |  | SHEET    |  | PAGE |  | 3-23/24 |  |
| LOC A1 A1                            |  |                    |  | 19333                 |  | 023          |  | 5        |  |      |  |         |  |

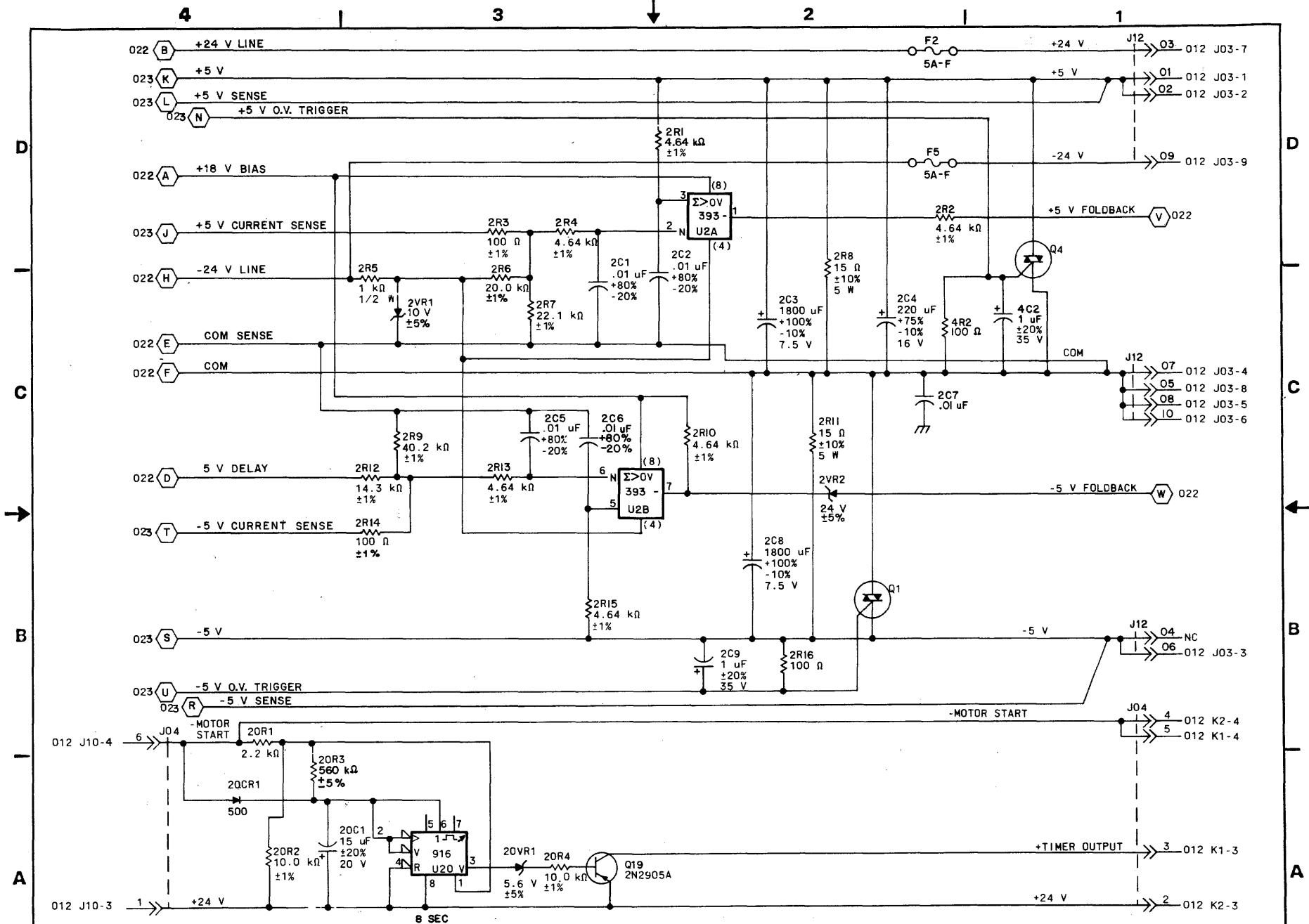




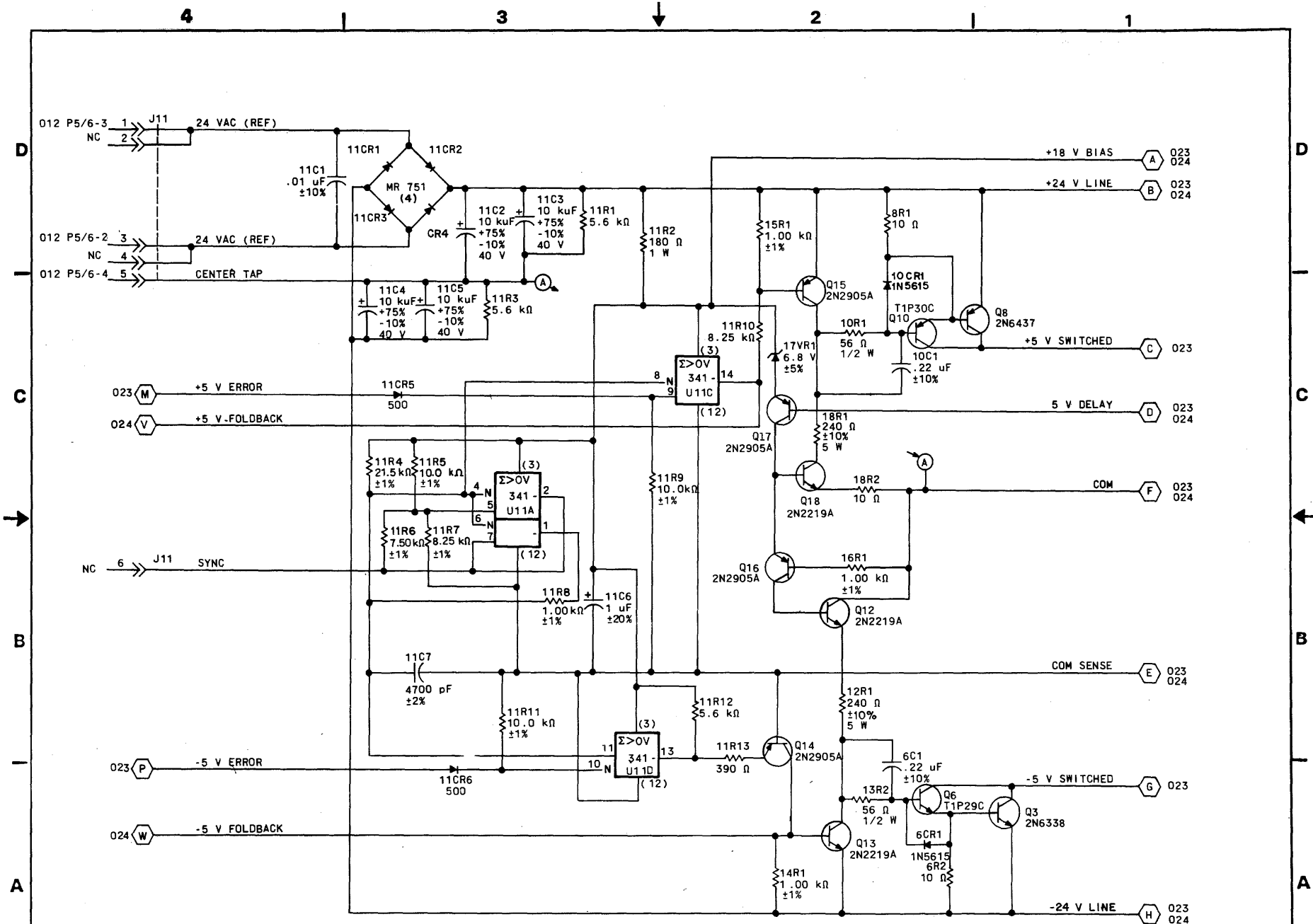


|   |                   |                  |                        |          |           |   |   |
|---|-------------------|------------------|------------------------|----------|-----------|---|---|
| MAGNETIC PERIPHERALS INC.<br><small>A subsidiary of<br/>         CONTROL DATA CORPORATION</small> | SCHEMATIC DIAGRAM |                  | NORMANDEALE OPERATIONS | <b>C</b> | 8332 3150 | N | B |
|   | LOC: A1 A1        | CODE IDENT 19333 | CROSS REF NO 022       | SHEET 2  | PAGE 3-26 |   |   |



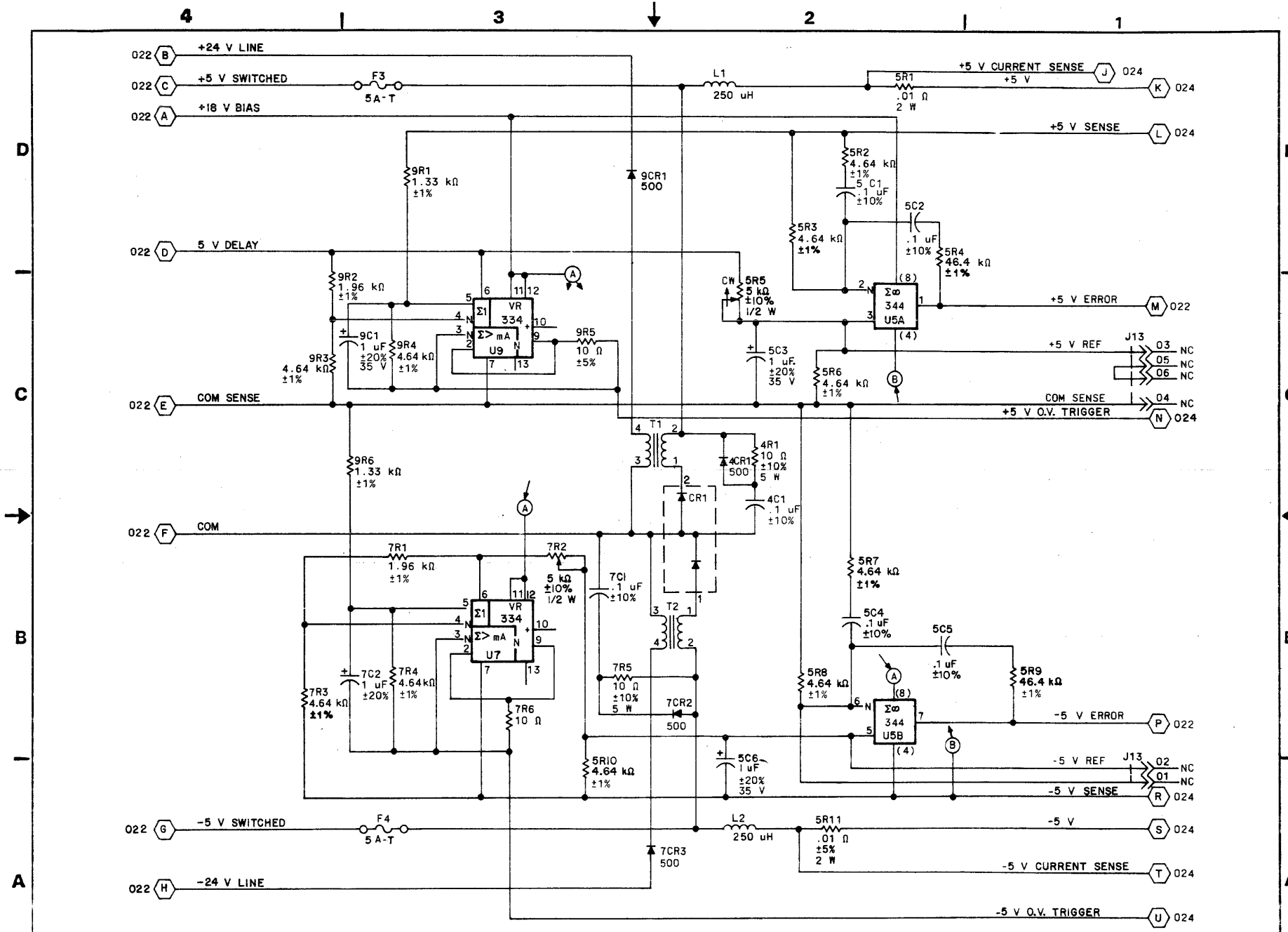




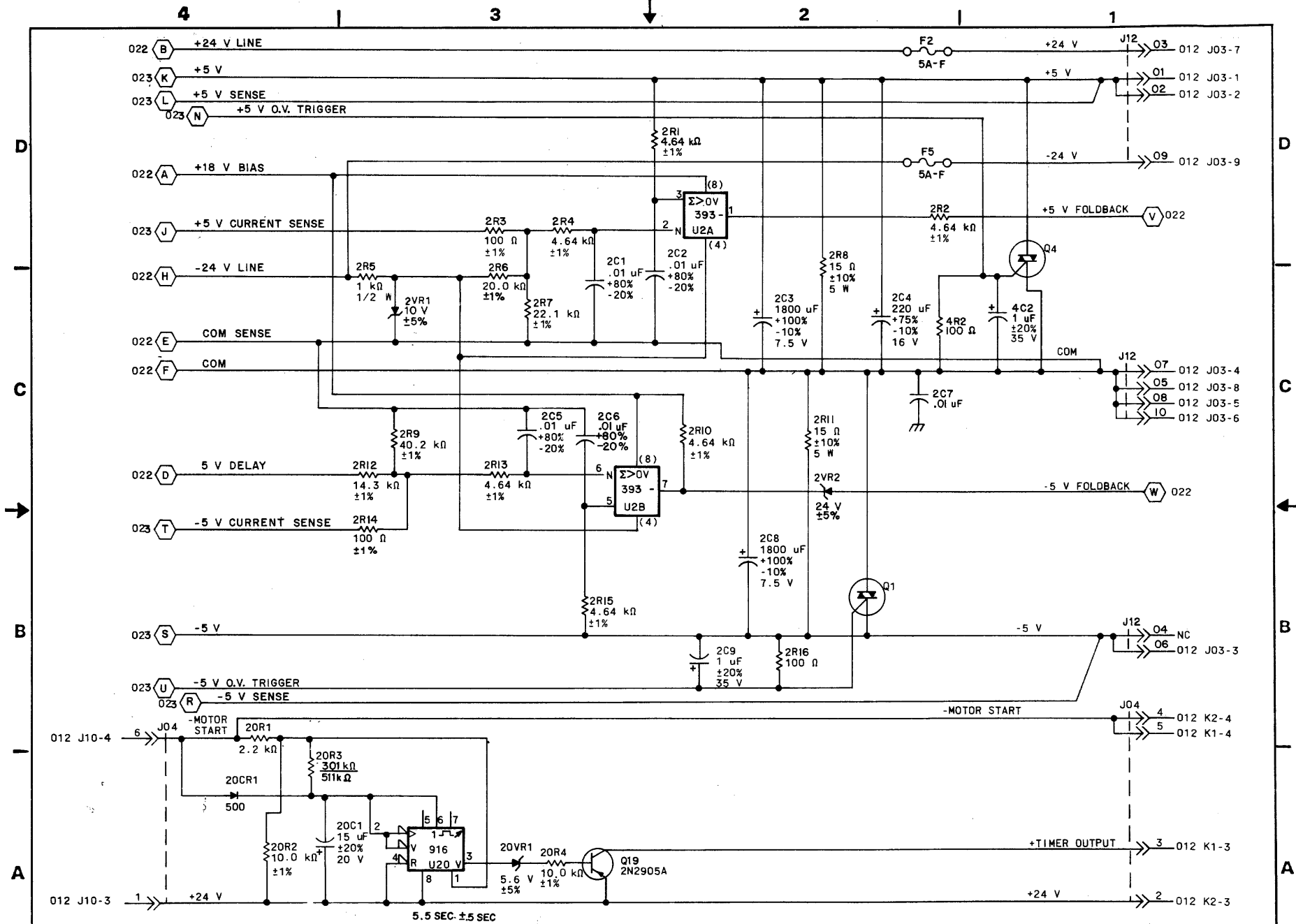


LOC: AI AI



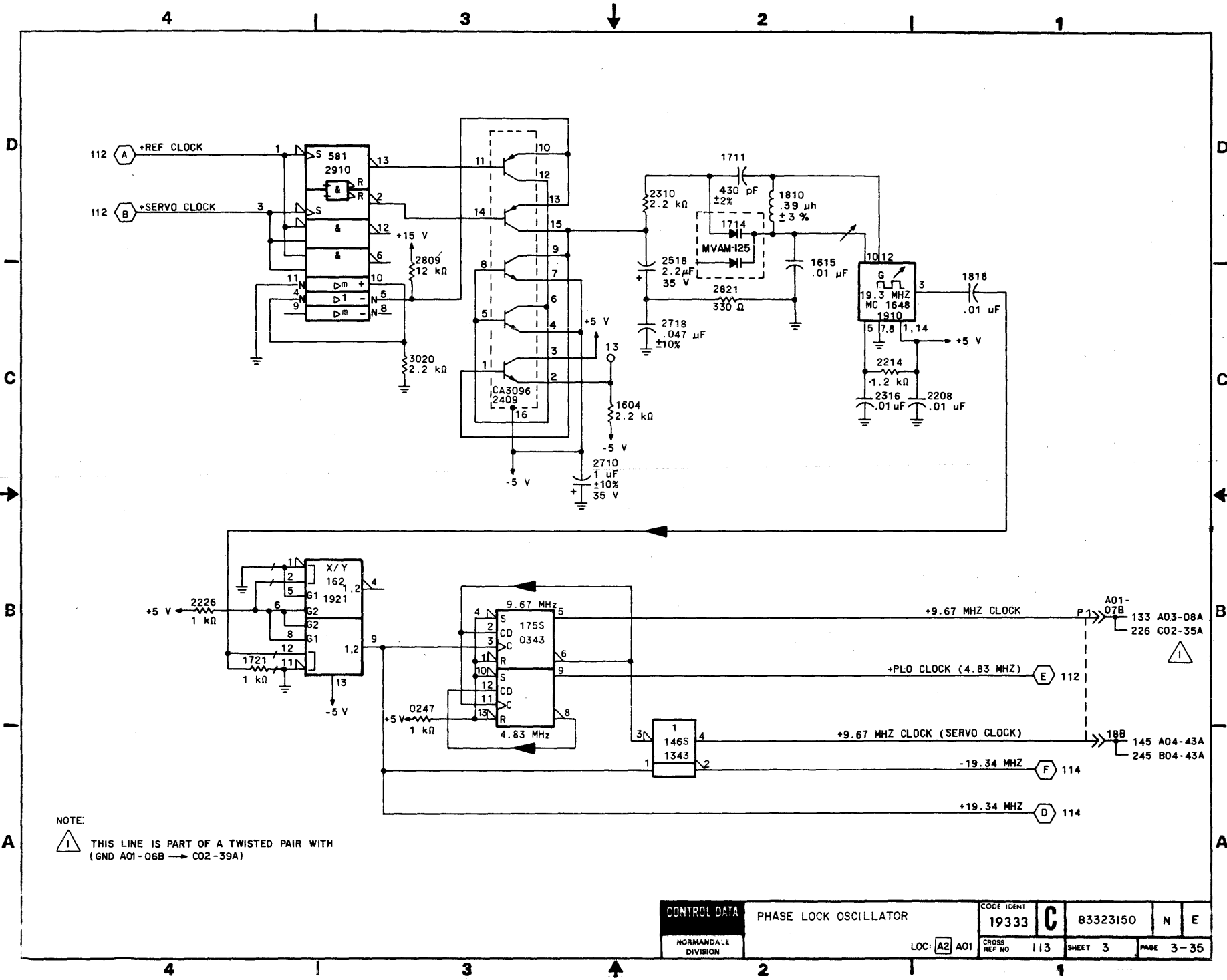


LOC: A1 A1

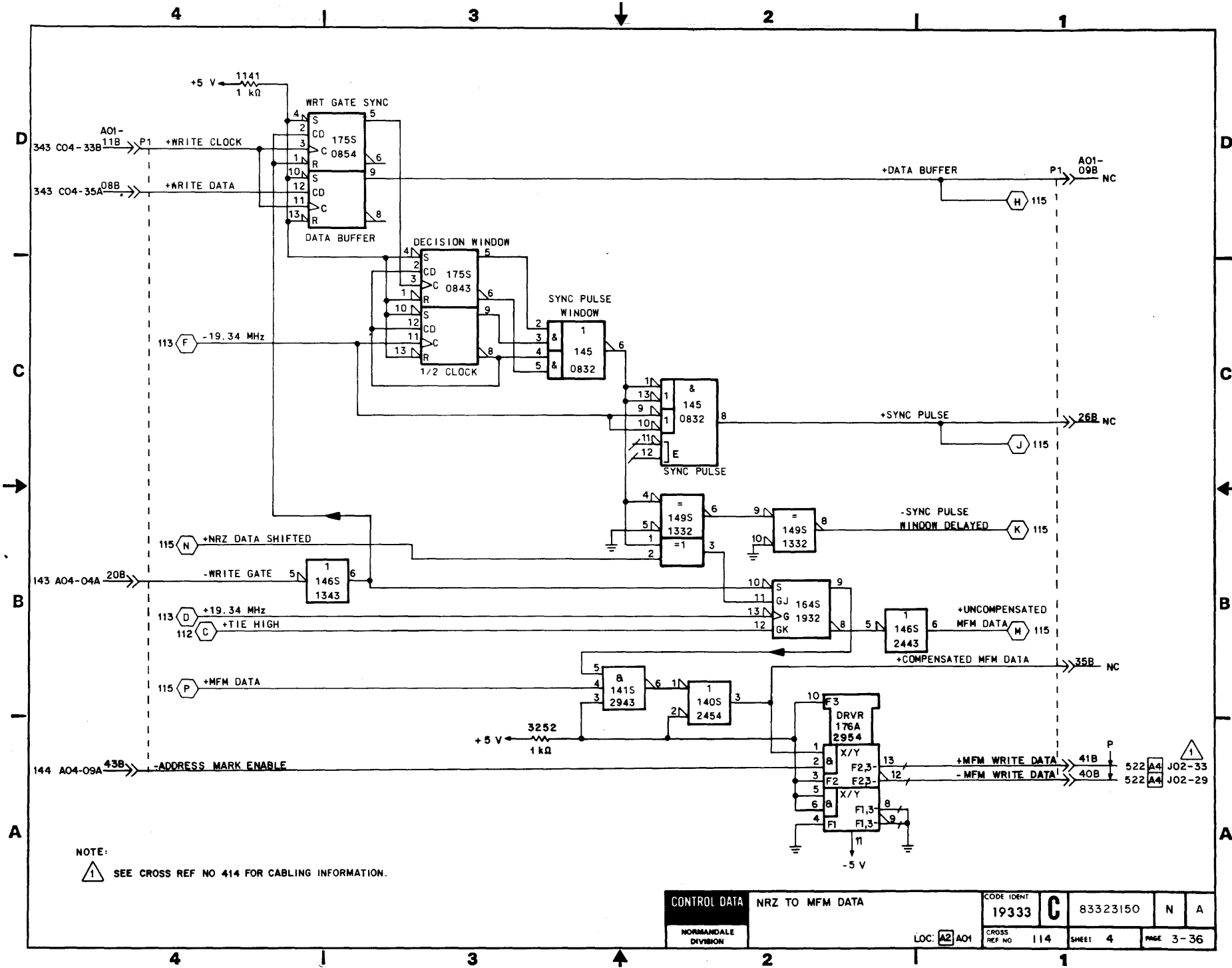






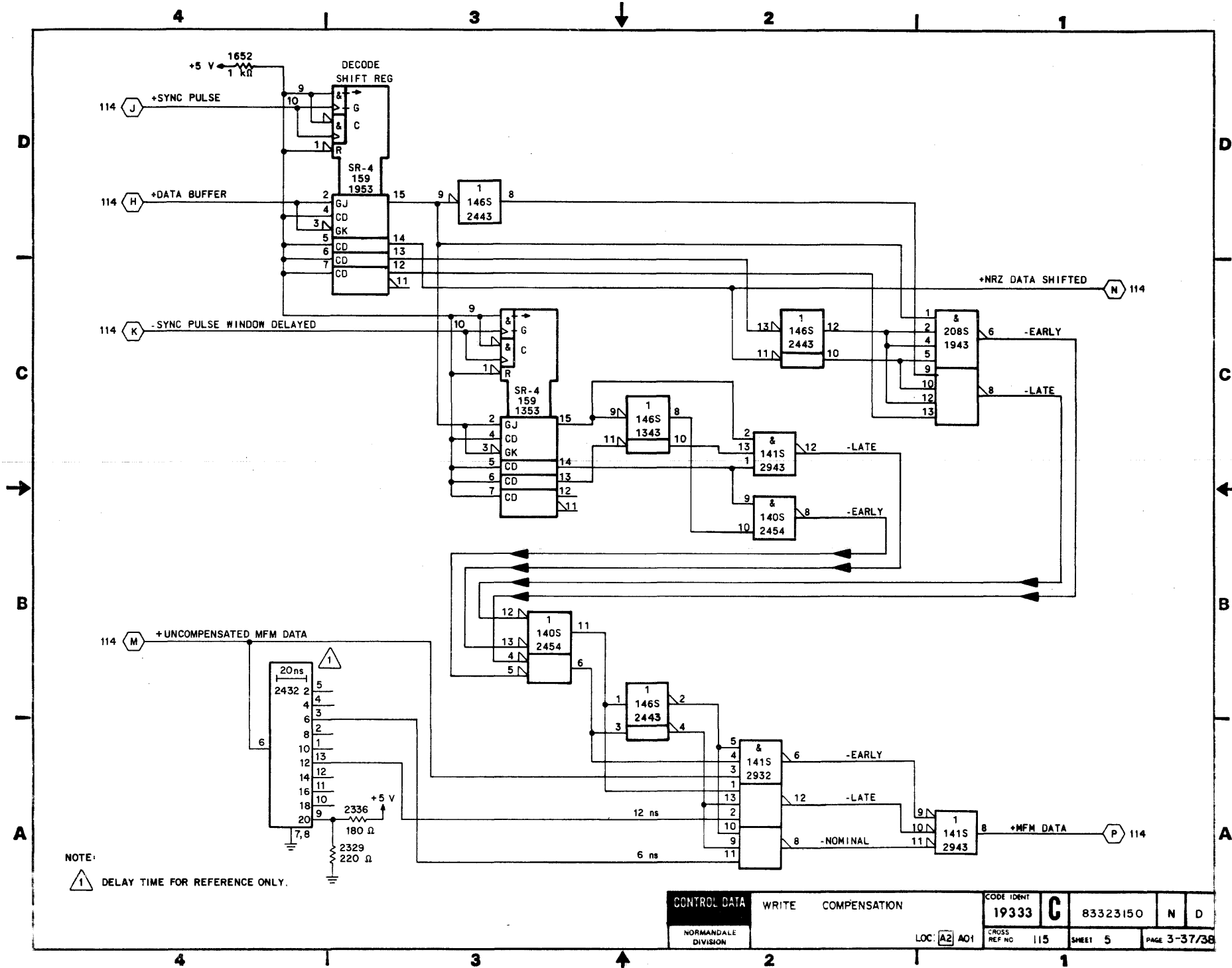


NOTE:  
 THIS LINE IS PART OF A TWISTED PAIR WITH  
 (GND A01-06B → C02-39A)



NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

|                     |  |                 |  |              |       |       |          |           |   |
|---------------------|--|-----------------|--|--------------|-------|-------|----------|-----------|---|
| CONTROL DATA        |  | NRZ TO MFM DATA |  | CODE IDENT   | 19333 | C     | 83323150 | N         | A |
| NORMANDALE DIVISION |  | LOC: A2 A01     |  | CROSS REF NO | 114   | SHEET | 4        | PAGE 3-36 |   |



NOTE:  
 1 DELAY TIME FOR REFERENCE ONLY.

|                      |             |              |              |     |          |   |              |
|----------------------|-------------|--------------|--------------|-----|----------|---|--------------|
| CONTROL DATA         | WRITE       | COMPENSATION | CODE IDENT   | C   | 83323150 | N | D            |
|                      |             |              | 19333        |     |          |   |              |
| NORMANDEALE DIVISION | LOC: A2 A01 |              | CROSS REF NO | 115 | SHEET    | 5 | PAGE 3-37/38 |





| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | A | B | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | C | C | C |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D                         | C | C | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E                         | C | E | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| F                         | C | F | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| G                         | C | F | G |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| H                         | C | H | G |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| J                         | J | H | G |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |          |                               |       |          |       |
|-----------|----------|-------------------------------|-------|----------|-------|
| REV.      | ECO.     | DESCRIPTION                   | DRFT. | DATE     | CHK'D |
| A         | PE23000  | RELEASED                      |       |          |       |
| B         | PE50705  | CORRECTIONS                   | TH    | 12-26-79 |       |
| C         | PE50743A | REPLACE BFEX WITH EFEX        | CB    | 3-2-80   |       |
| D         | PE62290  | CHANGE RESISTOR VALUE         | MF    | 6-1-81   |       |
| E         | PE62124  | CHANGE DIODE                  | MF    | 6-1-81   |       |
| F         | PE62124C | CHANGE CAPACITOR              | MF    | 8-17-81  |       |
| G         | DJ02108  | CHANGE RESISTOR AND CAPACITOR | DLM   | 9/30/81  |       |
| H         | PE62124E | CHANGE INDUCTOR               | MF    | 12-31-81 |       |
| J         | DJ02251  | CHANGE TRANSISTOR             | MJ    | 3-2-82   |       |

UNUSED LOGIC ELEMENTS

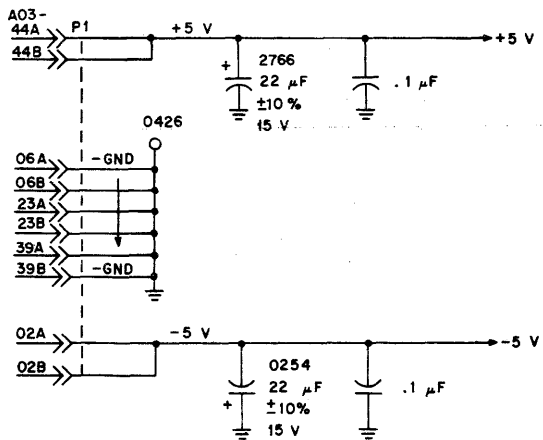


| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 203LS   | 2943     | 10, 12        |
| 148LS   | 2443     | 10            |
| 10125   | 1942     | 13            |
| 195L    | 2909     | 6, 7          |
| 10124   | 1353     | 1, 2, 3, 4    |
| 10102   | 0320     | 14            |
| 10102   | 0853     | 3             |

NOTES:



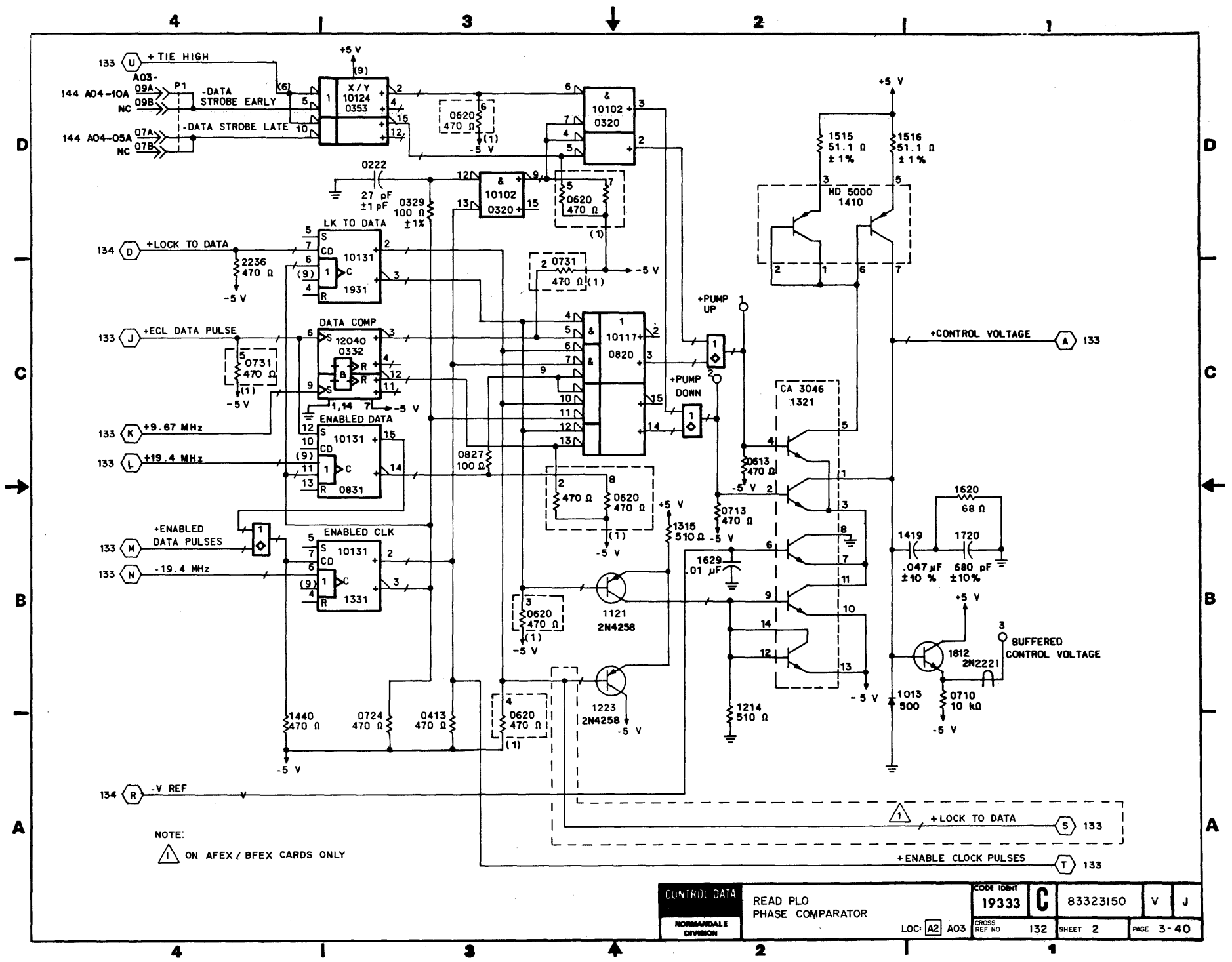
- UNUSED TTL LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- UNLESS OTHERWISE SPECIFIED: ALL ECL IC'S IN THIS DIAGRAM HAVE -5 V ON PIN 8 AND GND ON PINS 1 AND 16.

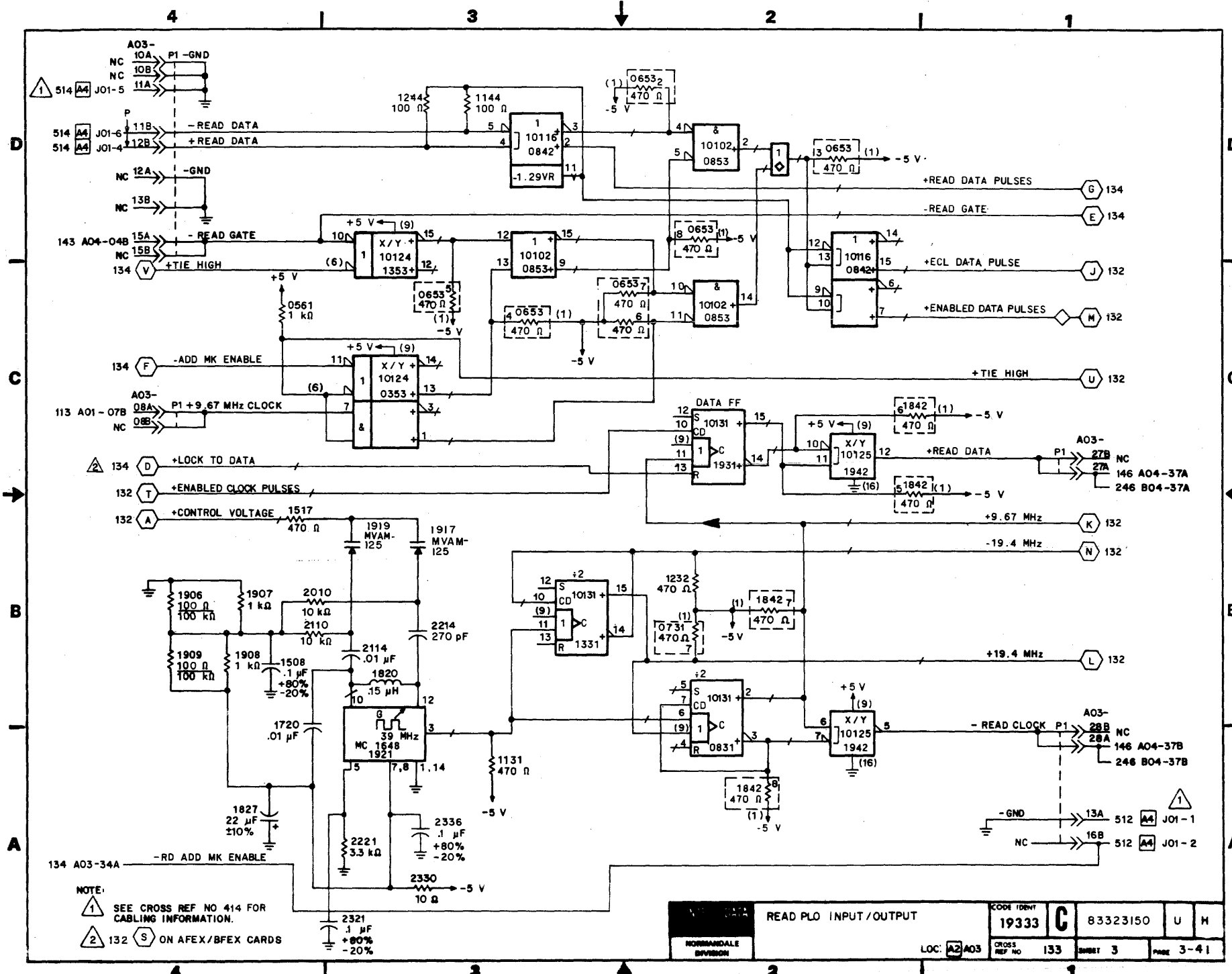


.1 µF FILTER CAPS

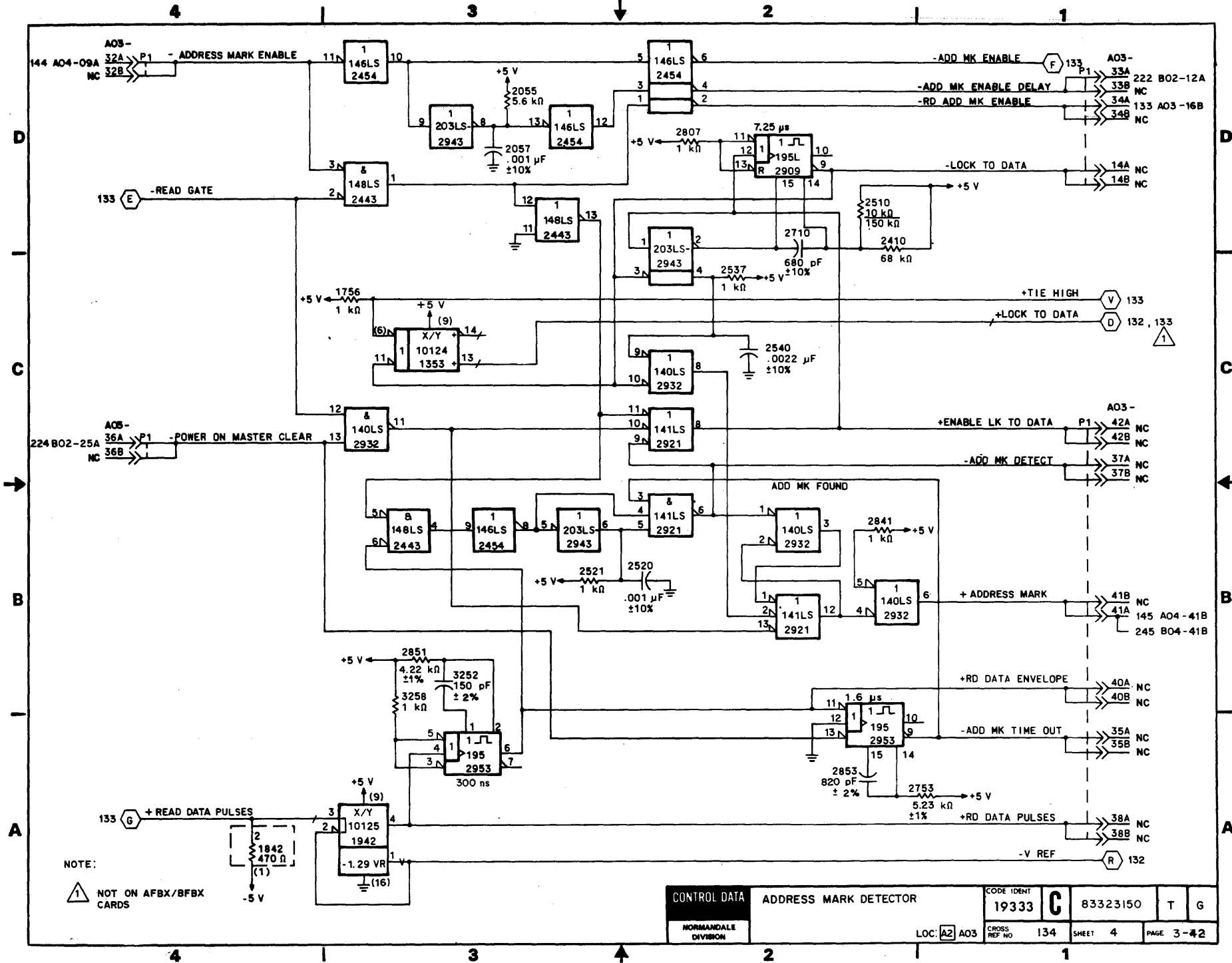
| +5 V | -5 V |
|------|------|
| 1854 | 0635 |
| 0362 | 1137 |
| 2843 | 1736 |
| 2522 | 1429 |
| 2310 | 1344 |
| 2434 | 1643 |
|      | 1655 |

|          |                    |        |              |                            |              |       |       |          |      |              |
|----------|--------------------|--------|--------------|----------------------------|--------------|-------|-------|----------|------|--------------|
| DRAWN    | <i>M. Anderson</i> | 4-9-79 | CONTROL DATA | READ PLO DIAGRAMS A/B/EFEX | CODE IDENT   | 19333 | C     | 83323150 | V    | J            |
| CHECKED  |                    |        |              |                            |              |       |       |          |      |              |
| ENGINEER |                    |        | NORMAN DALE  | TYPE: A/B/EFEX             | ORCS5 REF NO | 131   | SHEET | 1 of 4   | PAGE | 3-39         |
| APPROVED |                    |        | DIVISION     | LOC: A2 A03                |              |       |       |          |      | REF 75121604 |





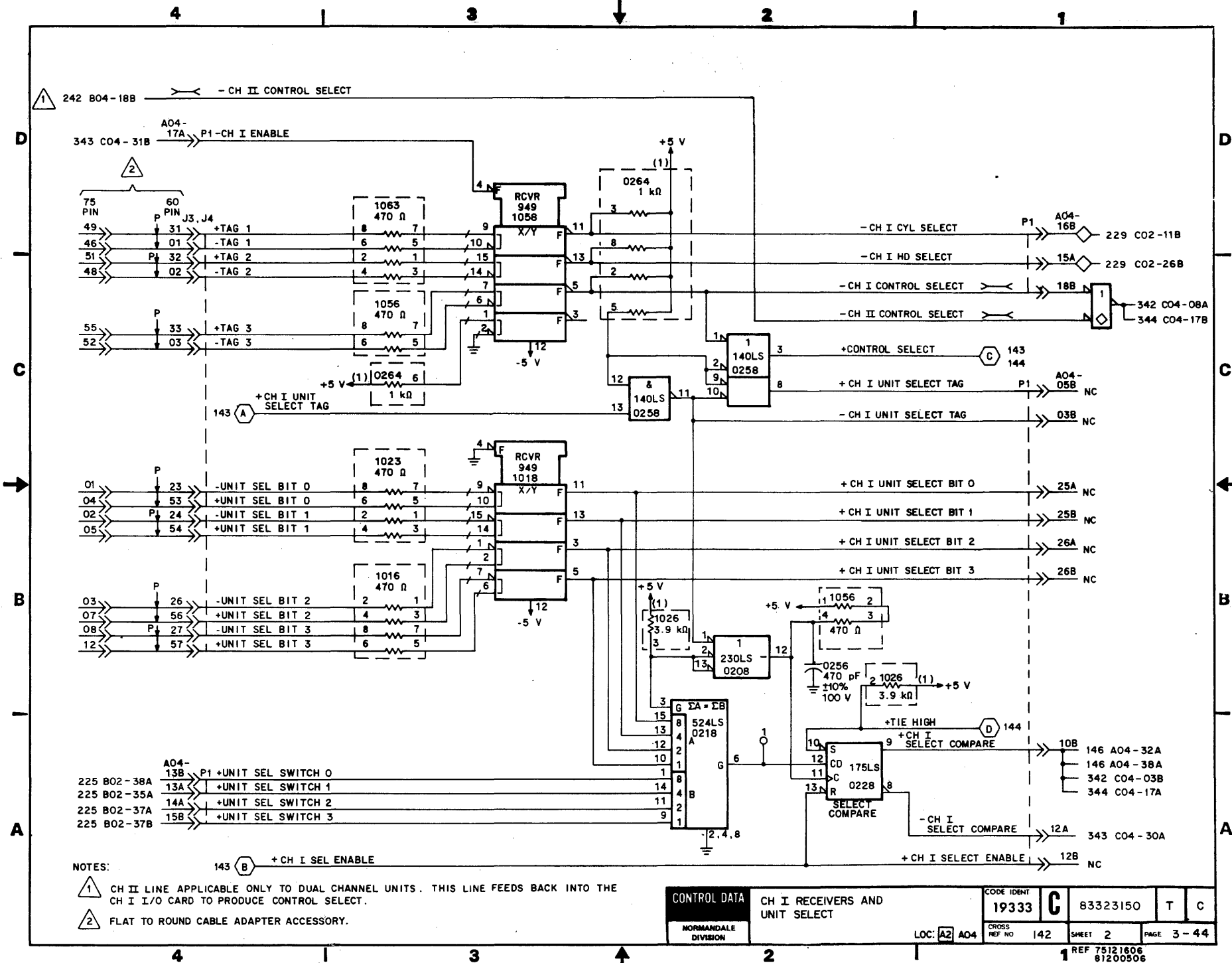
NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.  
 2 132 (S) ON AFEX/BFEX CARDS



NOTE:  
 1 NOT ON AFBX/BFBX CARDS

|                     |  |                       |  |              |         |           |   |   |
|---------------------|--|-----------------------|--|--------------|---------|-----------|---|---|
| CONTROL DATA        |  | ADDRESS MARK DETECTOR |  | CODE IDENT   | C       | 83323150  | T | G |
| NORMANDALE DIVISION |  | LOC: A2 AO3           |  | CROSS REF NO |         |           |   |   |
|                     |  |                       |  | 134          | SHEET 4 | PAGE 3-42 |   |   |

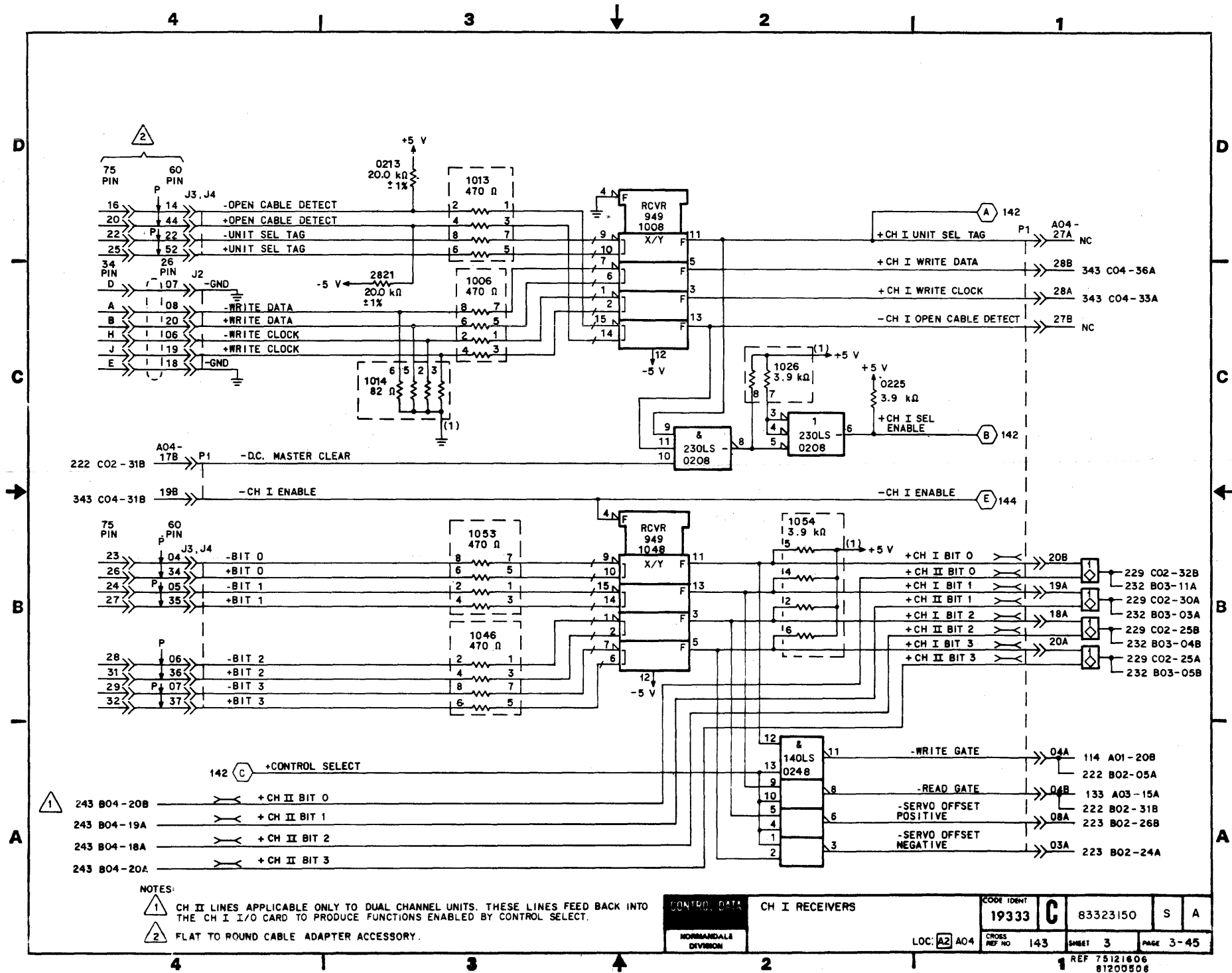




NOTES: 143 (A) +CH I SEL ENABLE

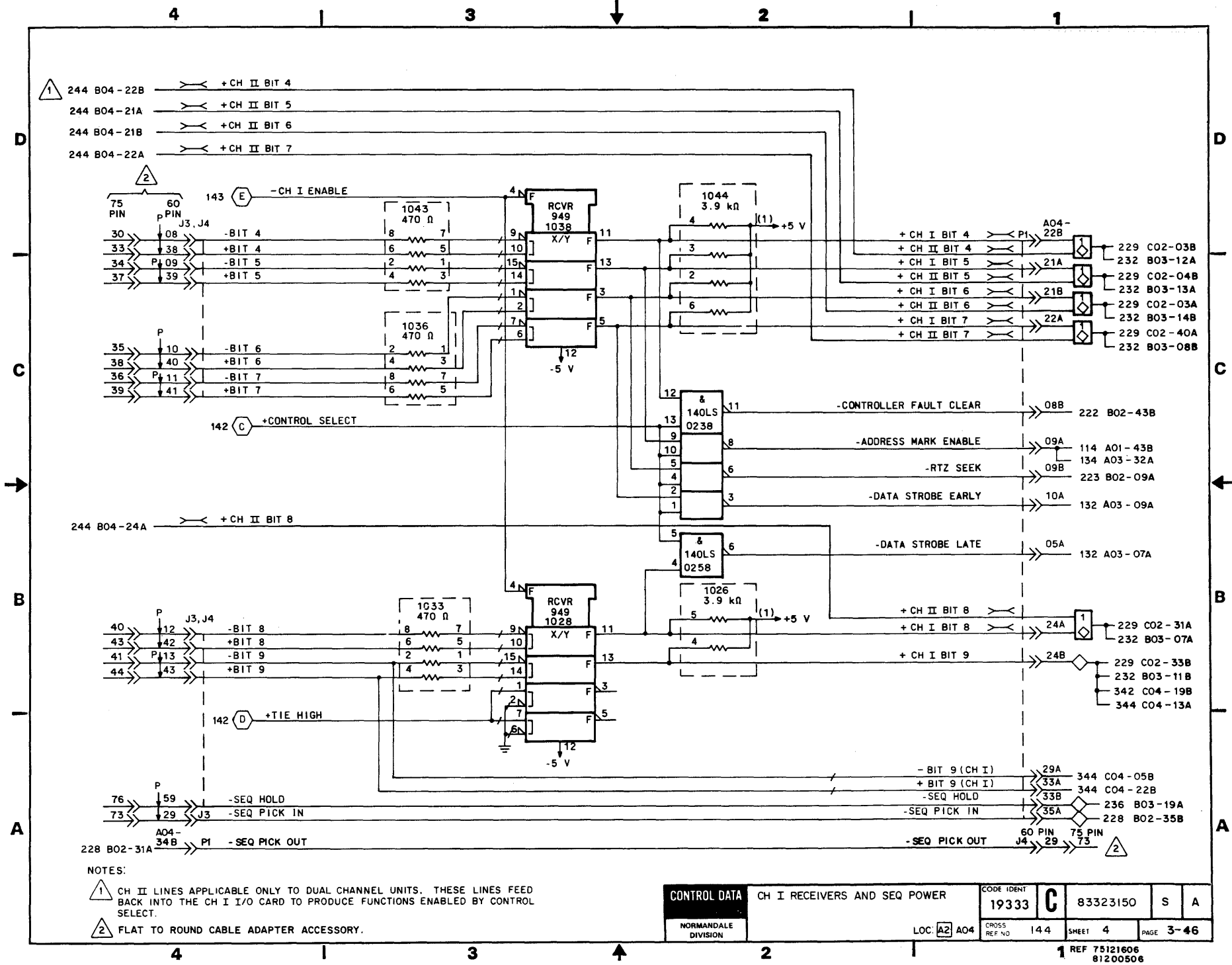
- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |  |                                |  |                       |          |                   |   |
|----------------------|--|--------------------------------|--|-----------------------|----------|-------------------|---|
| CONTROL DATA         |  | CH I RECEIVERS AND UNIT SELECT |  | CODE IDENT            | 83323150 | T                 | C |
| NORMANDEALE DIVISION |  | LOC: A2 A04                    |  | 19333                 | C        | SHEET 2 PAGE 3-44 |   |
|                      |  | CROSS REF NO 142               |  | REF 75121606 81200506 |          |                   |   |



NOTES:  
 ① CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.  
 ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |        |                |     |            |   |          |      |   |
|---------------------|--------|----------------|-----|------------|---|----------|------|---|
| CONTROL DATA        |        | CH I RECEIVERS |     | CODE IDENT | C | 83323150 | S    | A |
| NORMANDALE DIVISION |        |                |     | 19333      |   |          |      |   |
| LOC:                | A2 A04 | CROSS REF NO   | 143 | SHEET      | 3 | PAGE     | 3-45 |   |

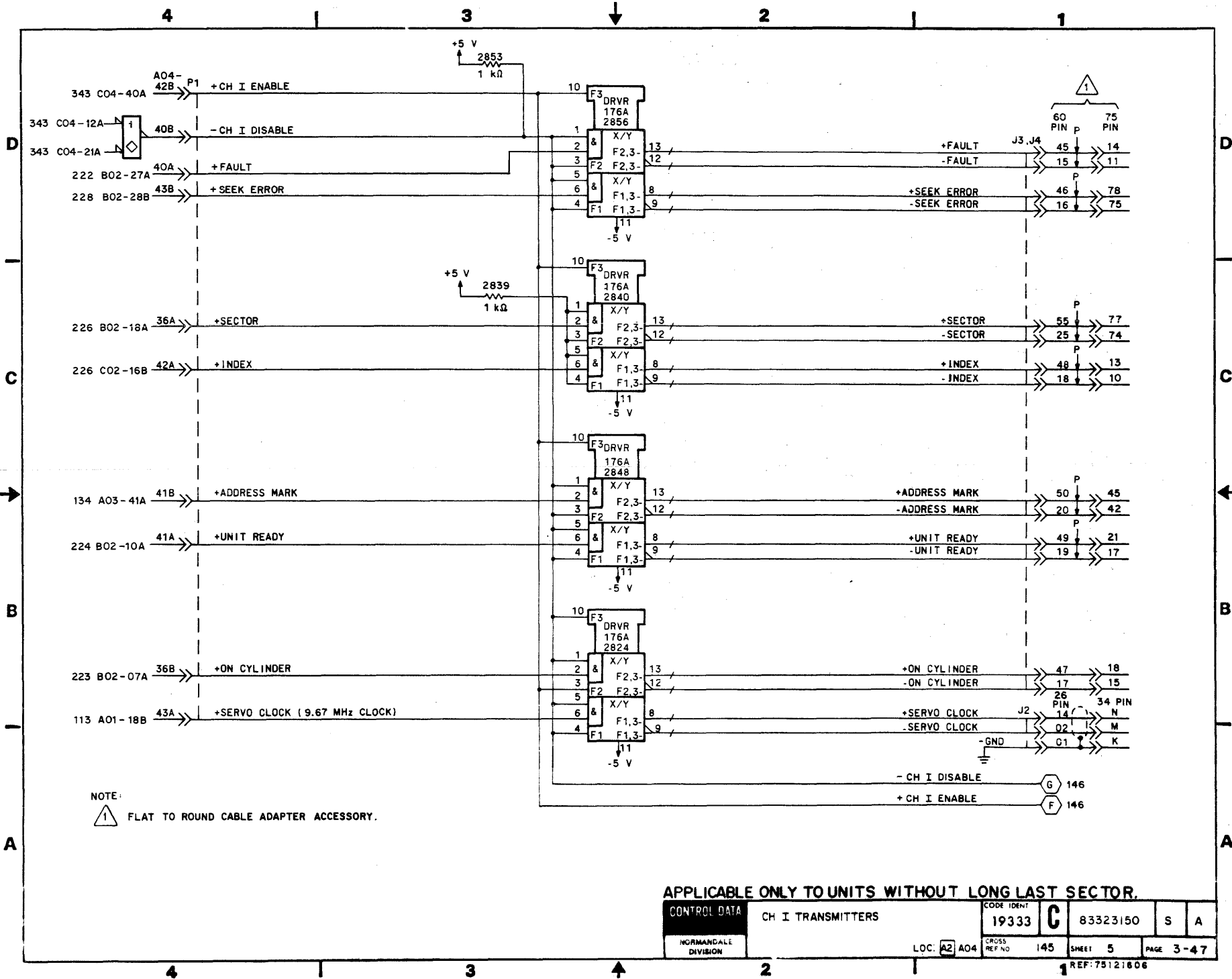


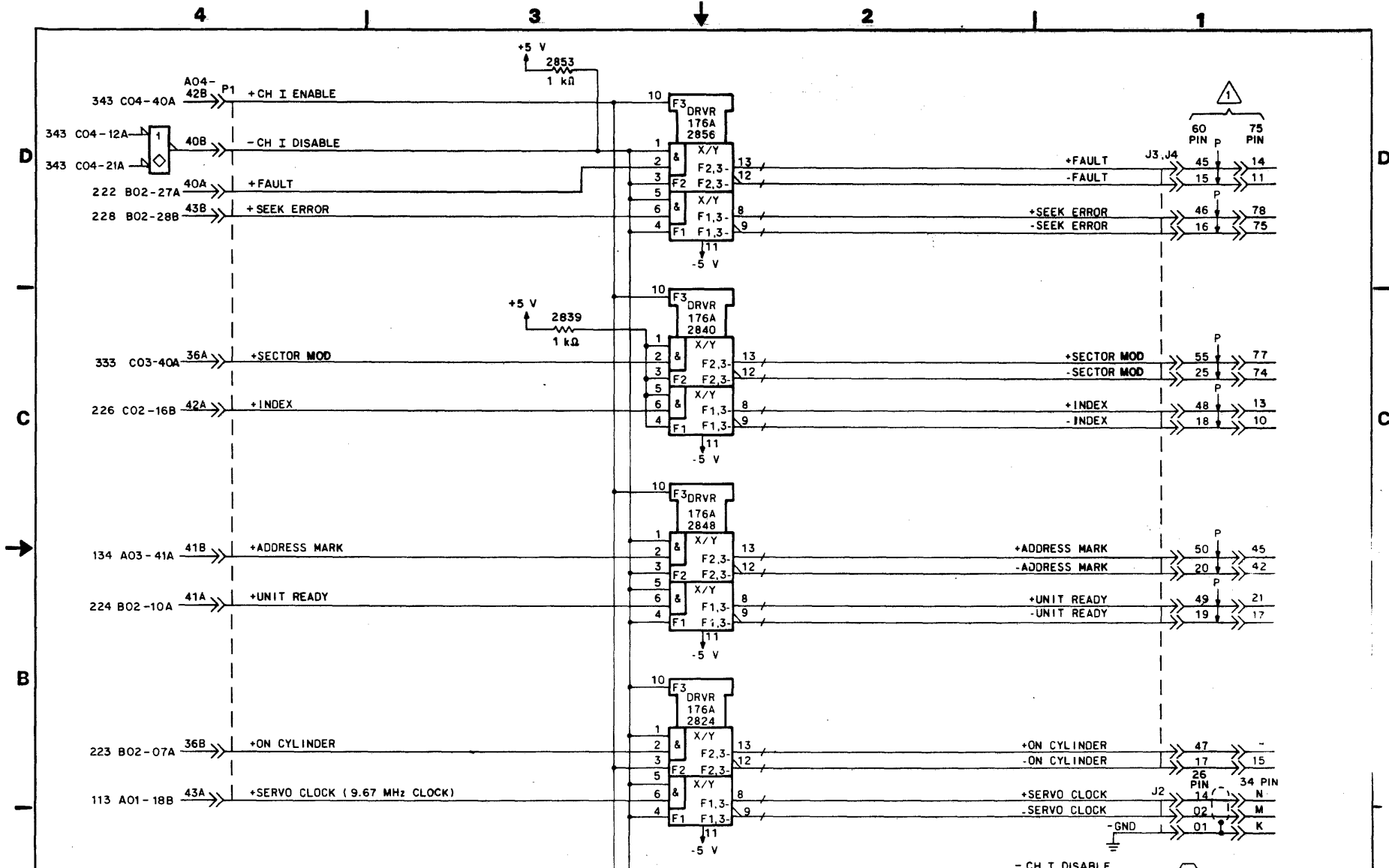
NOTES:

- ① CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
- ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|              |                              |         |            |   |          |   |   |
|--------------|------------------------------|---------|------------|---|----------|---|---|
| CONTROL DATA | CH I RECEIVERS AND SEQ POWER |         | CODE IDENT | C | 83323150 | S | A |
|              | NORMANDEALE DIVISION         | LOC. A2 | AO4        |   |          |   |   |







NOTE:  
 ⚠ FLAT TO ROUND CABLE ADAPTER ACCESSORY.

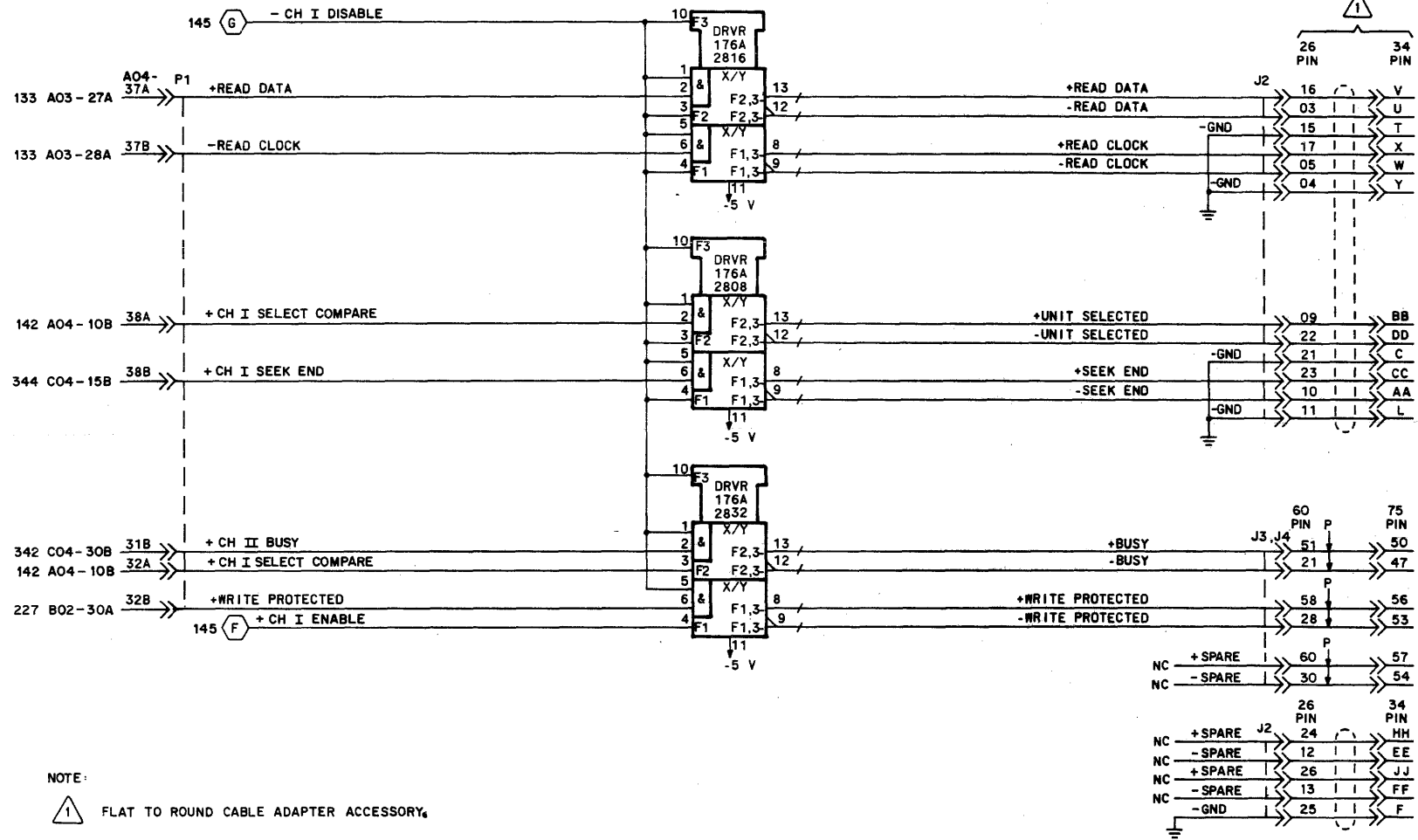
APPLICABLE ONLY TO UNITS WITH LONG LAST SECTOR.

|              |                      |             |              |       |   |          |   |      |
|--------------|----------------------|-------------|--------------|-------|---|----------|---|------|
| CONTROL DATA | CH I TRANSMITTERS    |             | CODE IDENT   | 19333 | C | 83323150 | S | A    |
|              | NORMANDEALE DIVISION | LOC: A2 A04 | CR155 REF NO | 145   |   | SHEET    | 5 | PAGE |

4 | 3 | 2 | 1

D  
C  
B  
A

D  
C  
B  
A



NOTE:  
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |  |                   |     |              |     |          |   |              |
|---------------------|--|-------------------|-----|--------------|-----|----------|---|--------------|
| CONTROL DATA        |  | CH I TRANSMITTERS |     | CODE IDENT   | C   | 83323150 | S | A            |
| NORMANDALE DIVISION |  | LOC: A2           | AD4 | CROSS REF NO | 146 | SHEET    | 6 | PAGE 3-49/50 |

4 | 3 | 2 | 1

REF 75121606  
81200506



REVISION STATUS OF SHEETS

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | B | B | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | C | B | A | A | C | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D | D | D | A | A | C | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1026     | 6     |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 175LS   | 0228     | 5,6           |



NOTES:

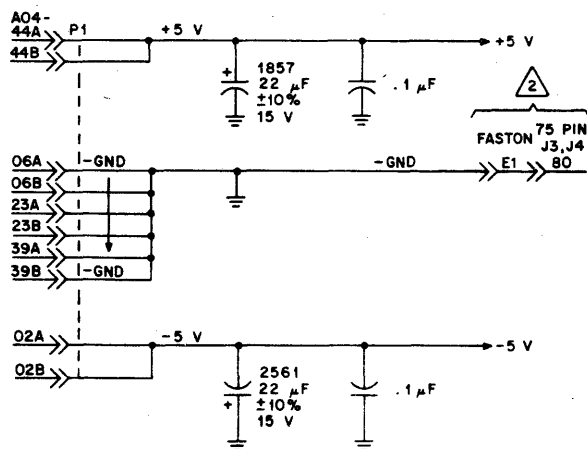


UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.



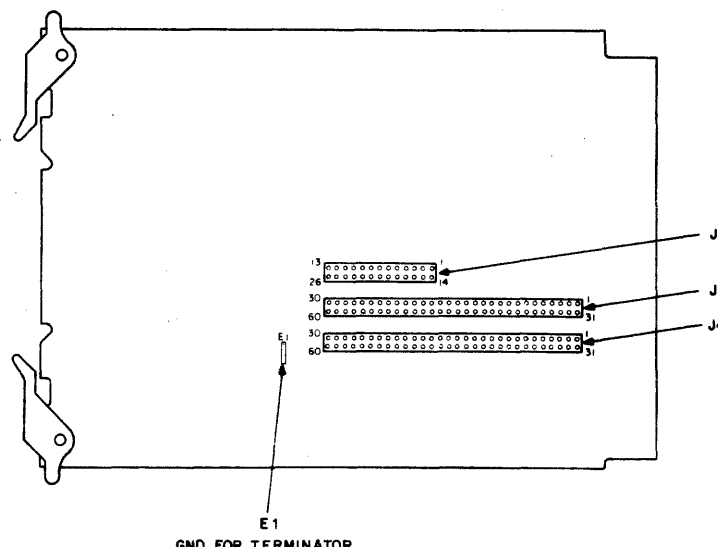
FLAT TO ROUND CABLE ADAPTER ACCESSORY.

| REVISIONS |         |             |      |          |
|-----------|---------|-------------|------|----------|
| REV.      | ECO     | DESCRIPTION | DRFT | DATE     |
| A         | PE23000 | RELEASED    | MF   | 11-2-81  |
| B         | PE62165 | CORRECTIONS | MF   | 8-17-81  |
| C         | PE62248 | CORRECTIONS | MF   | 8-17-81  |
| D         | DJ02075 | CHANGE IC   | MF   | 12-31-81 |



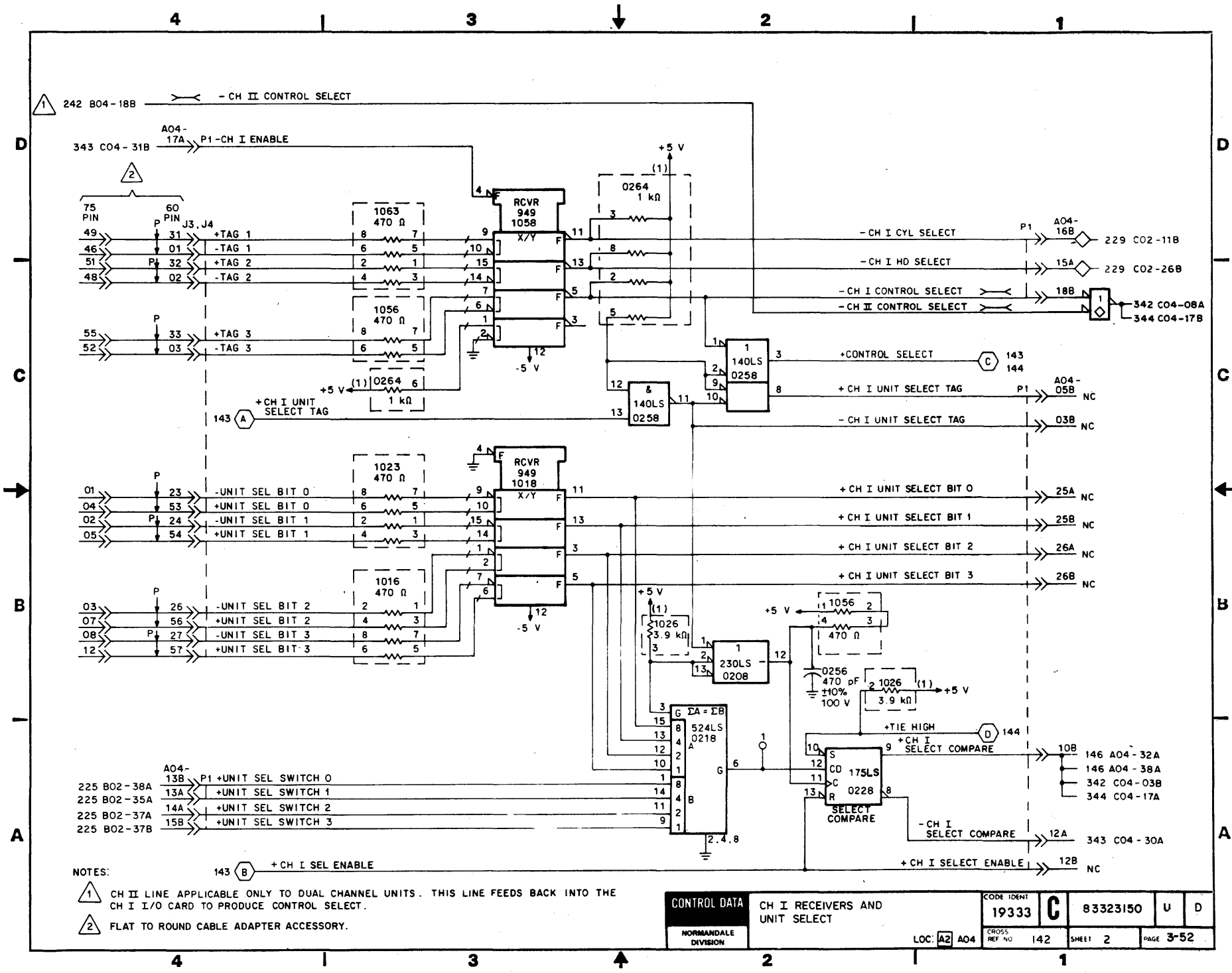
1 μF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |



APPLICABLE ONLY TO UNITS WITHOUT CARRIAGE OFFSET CAPABILITY.

|          |                    |        |                     |                        |              |        |       |          |      |      |
|----------|--------------------|--------|---------------------|------------------------|--------------|--------|-------|----------|------|------|
| DRAWN    | <i>M. Anderson</i> | 2/8/80 | CONTROL DATA        | CHANNEL I I/O DIAGRAMS | CODE IDENT   | 19333  | C     | 83323150 | U    | D    |
| CHECKED  |                    |        |                     |                        | CROSS REF NO | 141    | SHEET | 1 of 6   | PAGE | 3-51 |
| ENGINEER |                    |        | NORMANDALE DIVISION | TYPE: DFAX             | LOC:         | A2/A04 |       |          |      |      |
| APPROVED |                    |        |                     |                        |              |        |       |          |      |      |



NOTES: 143 (A) +CH I UNIT SELECT TAG

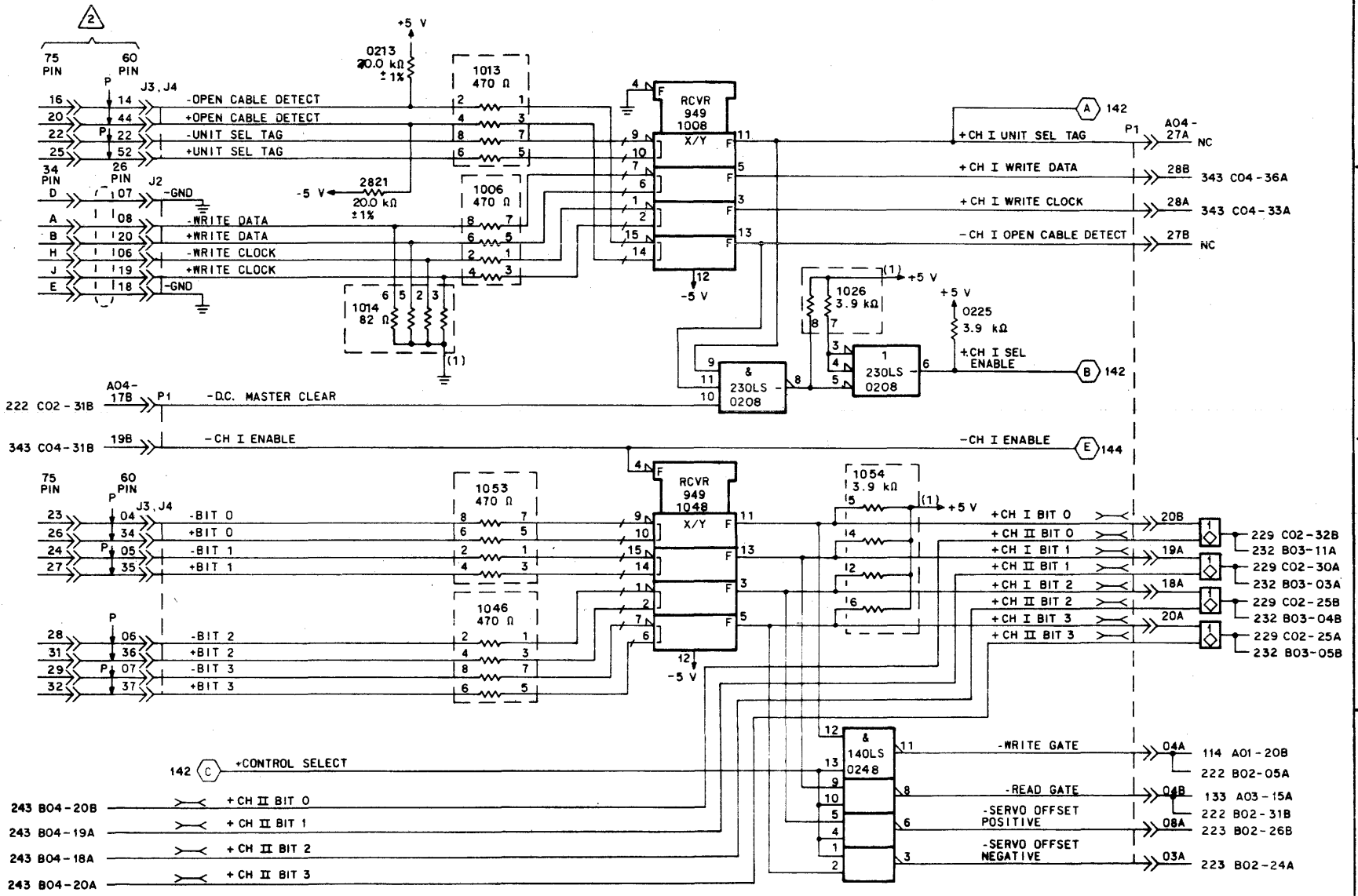
- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|  |                                   |            |          |      |      |
|--|-----------------------------------|------------|----------|------|------|
| CONTROL DATA<br>NORMANDALE<br>DIVISION | CH I RECEIVERS AND<br>UNIT SELECT | CODE IDENT | 83323150 | U    | D    |
|  |                                   | 19333      | C        |      |      |
| CROSS<br>REF NO                        | 142                               | SHEET      | 2        | PAGE | 3-52 |
| LOC: A2                                | A04                               |            |          |      |      |

4 | 3 | 2 | 1

D  
C  
B  
A

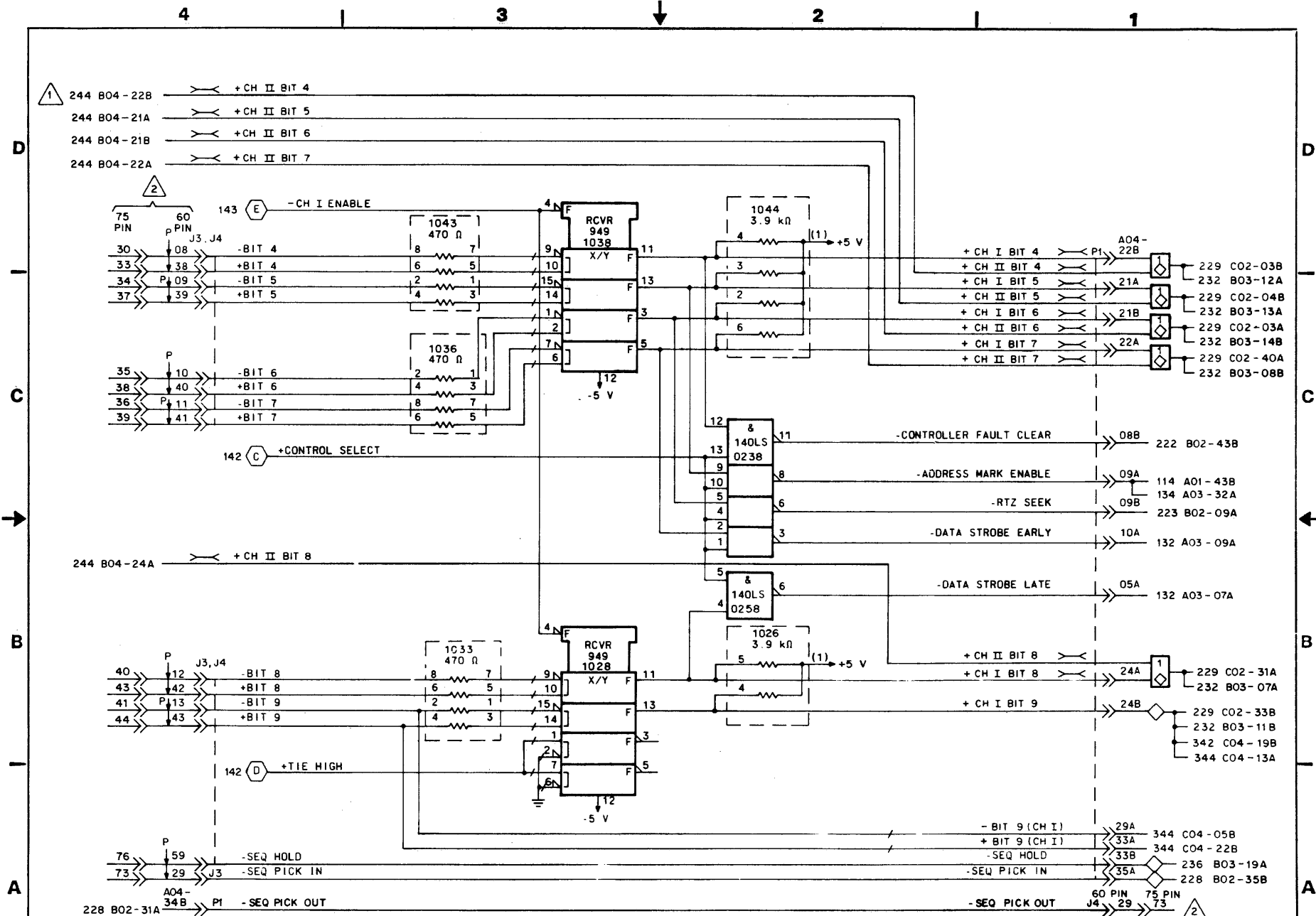
D  
C  
B  
A



NOTES:  
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |  |                |  |            |   |         |   |   |
|---------------------|--|----------------|--|------------|---|---------|---|---|
| CONTROL DATA        |  | CH I RECEIVERS |  | CODE IDENT | C | J323150 | S | A |
| NORMANDALE DIVISION |  | LOC A2 A04     |  | 19333      |   |         |   |   |

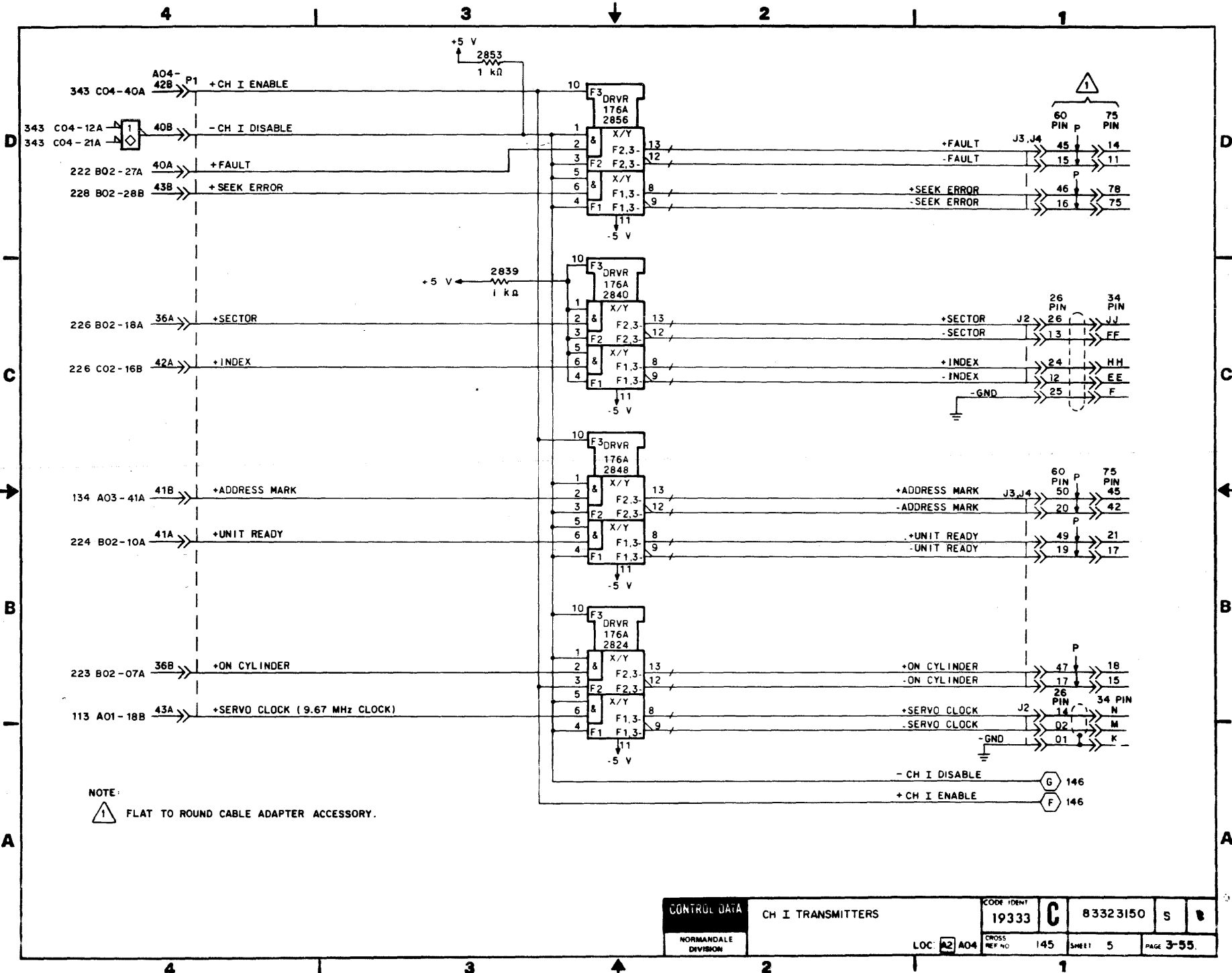
4 | 3 | 2 | 1



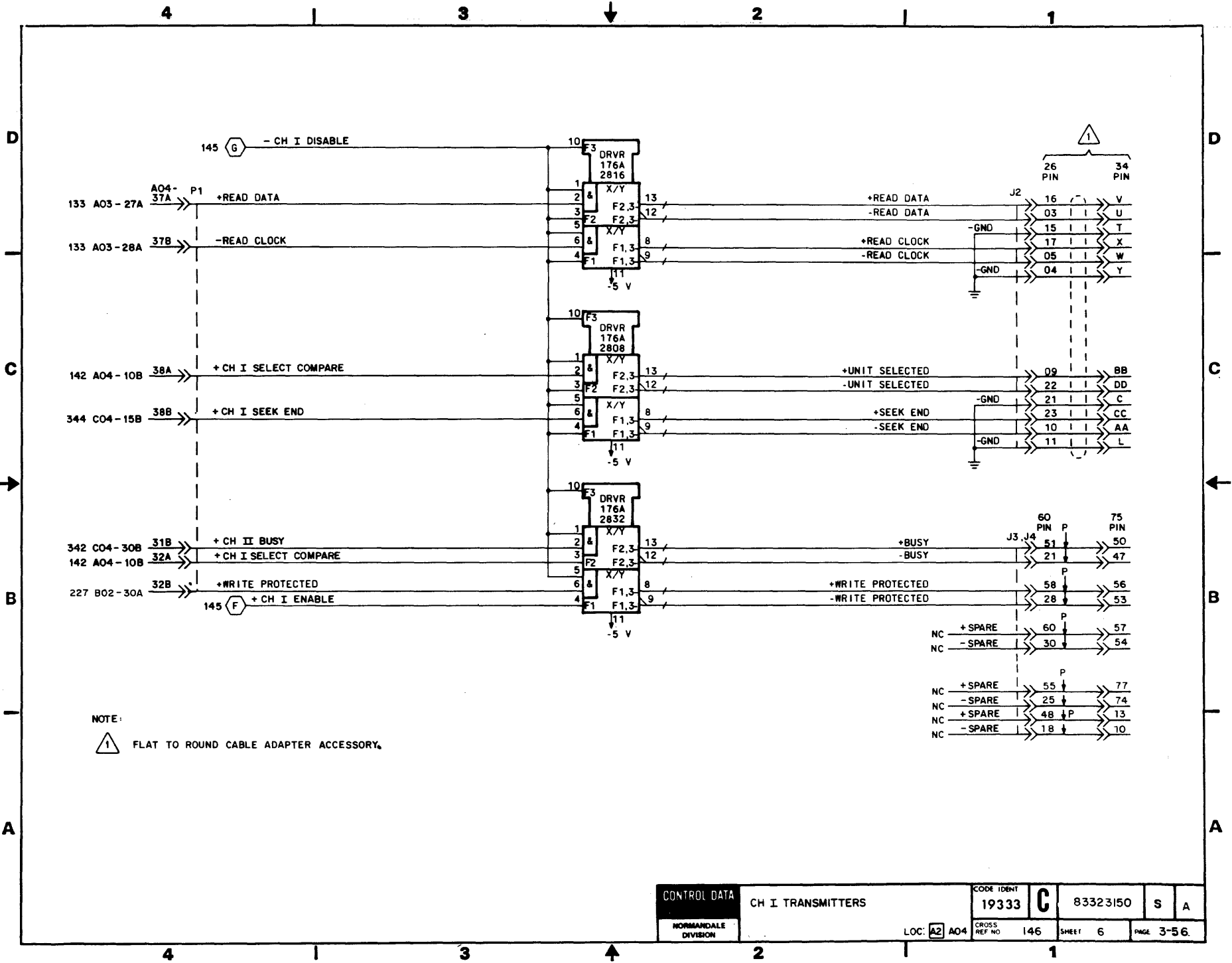
NOTES:  
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.


|              |                              |             |            |   |          |   |   |
|--------------|------------------------------|-------------|------------|---|----------|---|---|
| CONTROL DATA | CH I RECEIVERS AND SEQ POWER |             | CODE IDENT | C | 83323150 | S | A |
|              | NORMANDEALE DIVISION         | LOC. A2 A04 | 19333      |   |          |   |   |





NOTE:  
 (1) FLAT TO ROUND CABLE ADAPTER ACCESSORY.



NOTE:  
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|              |                     |             |              |   |          |   |   |
|--------------|---------------------|-------------|--------------|---|----------|---|---|
| CONTROL DATA | CH I TRANSMITTERS   |             | CODE IDENT   | C | 83323150 | S | A |
|              | NORMANDALE DIVISION | LOC: A2 A04 | CROSS REF NO |   |          |   |   |

REVISION STATUS OF SHEETS

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | A | A | A | A | B | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | C | C | A | A | B | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1026     | 6     |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

UNUSED LOGIC ELEMENTS

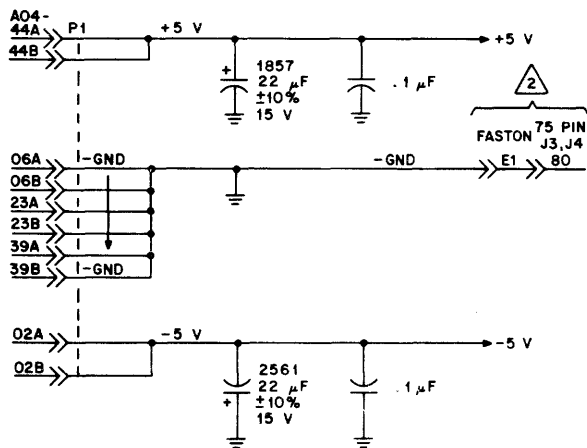
| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 175LS   | 0228     | 5,6           |



NOTES:

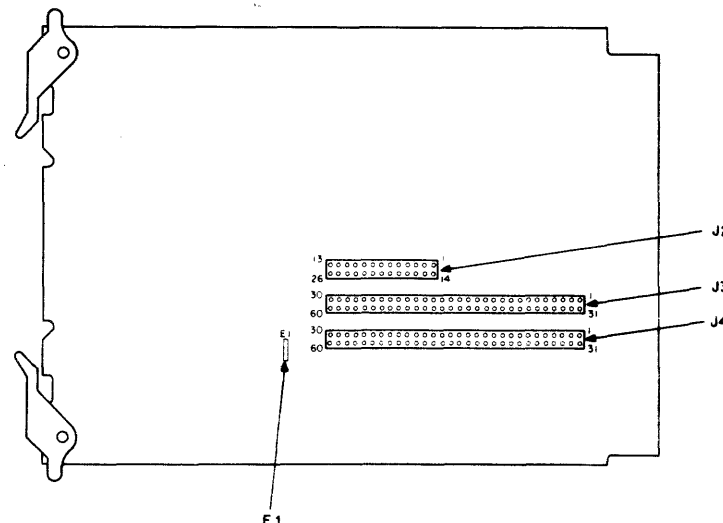
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

| REVISIONS |         |             |      |          |
|-----------|---------|-------------|------|----------|
| REV       | ECO     | DESCRIPTION | DRFT | DATE     |
| A         | PE23000 | RELEASED    |      |          |
| B         | PE62248 | CORRECTIONS |      | 3-18-81  |
| C         | DJ02075 | CHANGE IC   | MJ   | 12-31-81 |



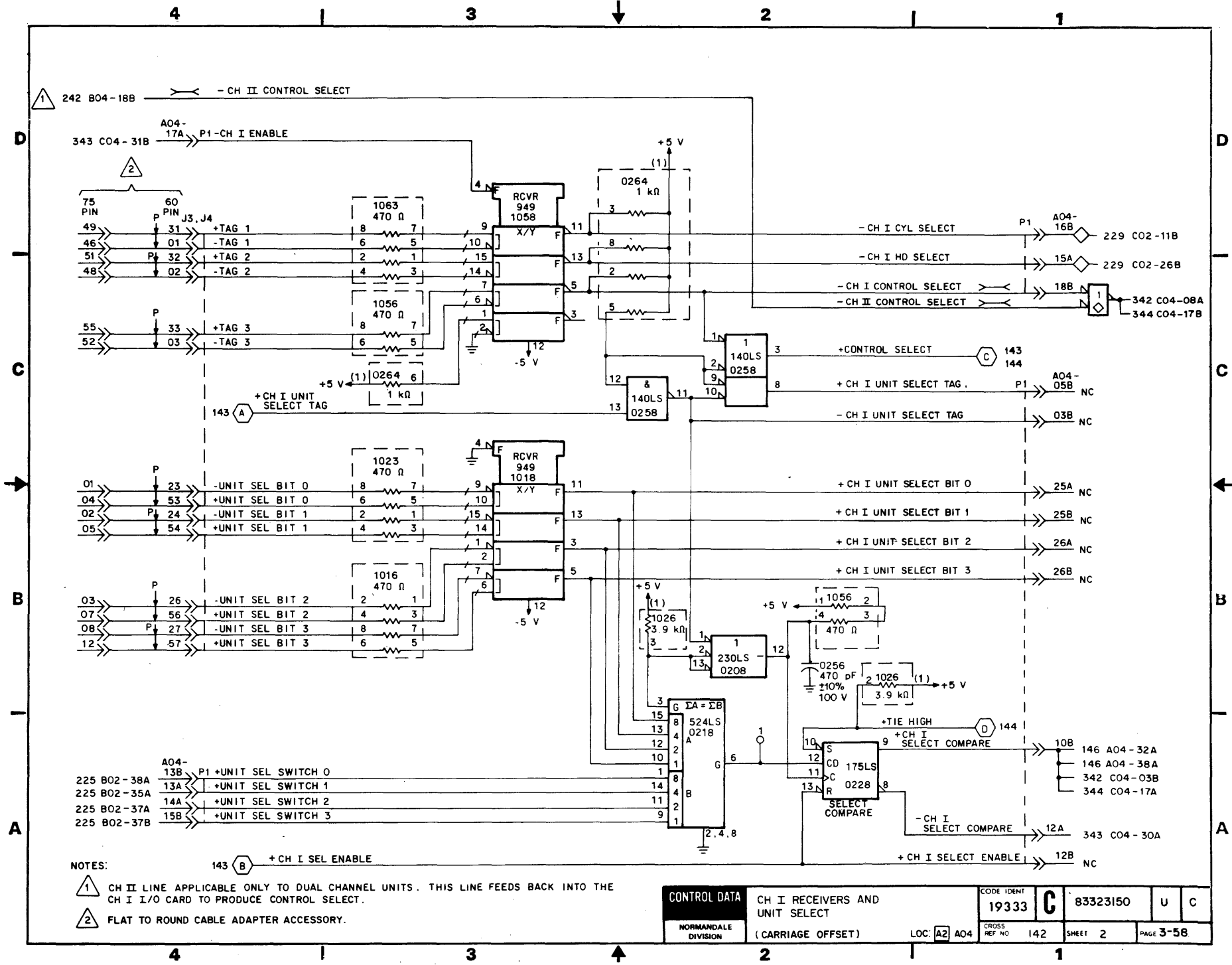
.1 µF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |



GND FOR TERMINATOR  
**APPLICABLE ONLY TO UNITS WITH CARRIAGE  
 OFFSET CAPABILITY.**

|          |         |        |                         |                           |                     |     |                 |              |   |
|----------|---------|--------|-------------------------|---------------------------|---------------------|-----|-----------------|--------------|---|
| DRAWN    | T. Army | 5/6/80 | CONTROL DATA            | CHANNEL I I/O<br>DIAGRAMS | CODE IDENT<br>19333 | C   | 83323150        | U            | C |
| CHECKED  |         |        |                         |                           |                     |     |                 |              |   |
| ENGINEER |         |        | NORMAN DALE<br>DIVISION | TYPE: DFAX                | CROSS REF<br>NO     | 141 | SHEET<br>1 of 6 | PAGE<br>3-57 |   |
| APPROVED |         |        |                         |                           | LOC: A2             | A04 |                 |              |   |

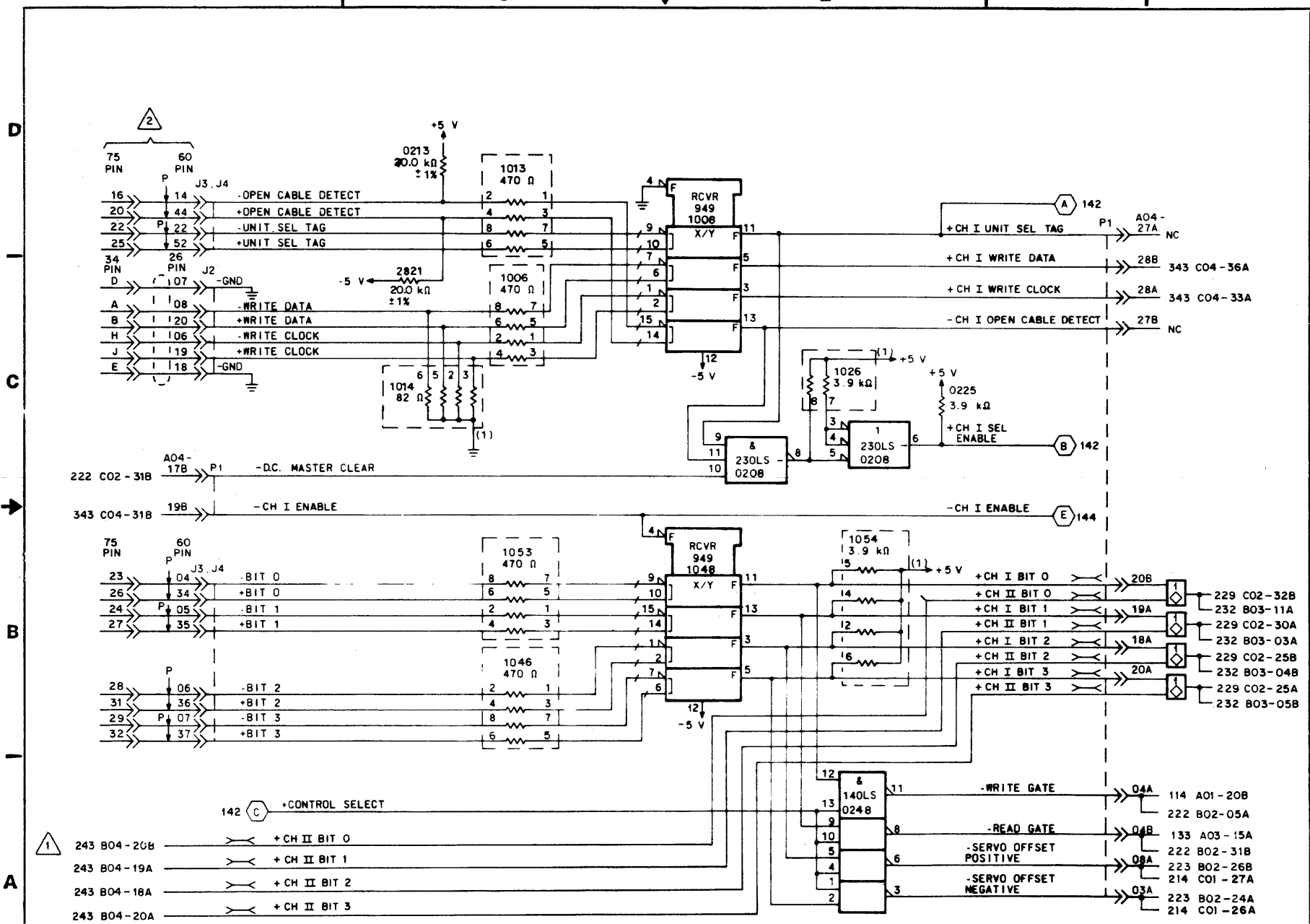


NOTES: 143 (B) + CH I SEL ENABLE

- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|              |                                |                   |            |       |          |           |   |
|--------------|--------------------------------|-------------------|------------|-------|----------|-----------|---|
| CONTROL DATA | CH I RECEIVERS AND UNIT SELECT |                   | CODE IDENT | C     | 83323150 | U         | C |
|              | NORMANDEALE DIVISION           | (CARRIAGE OFFSET) | 19333      |       |          |           |   |
| LOC: A2 A04  |                                | CROSS REF NO      | 142        | SHEET | 2        | PAGE 3-58 |   |

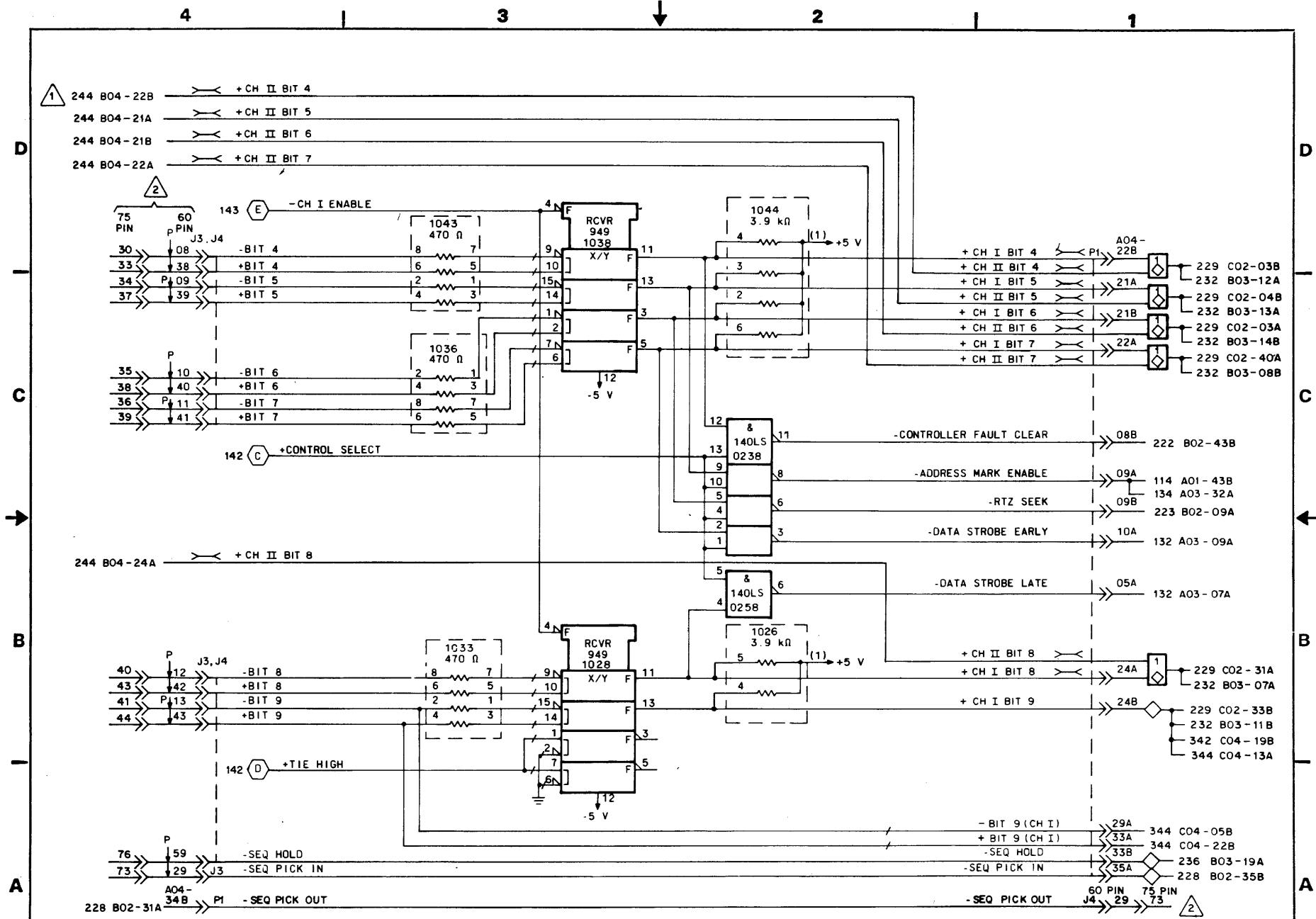
4 3 2 1



NOTES  
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

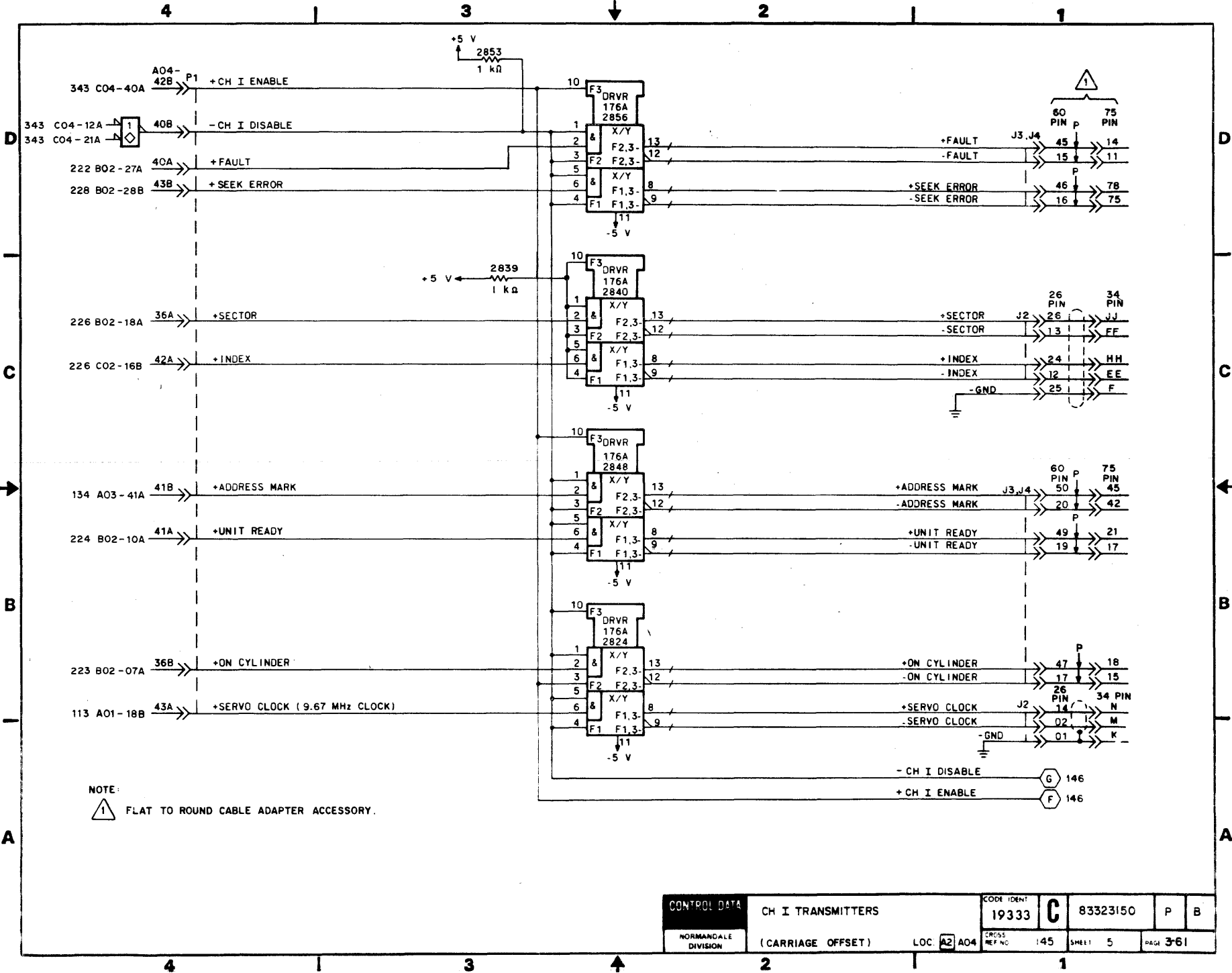
|                     |                   |                 |         |            |   |   |
|---------------------|-------------------|-----------------|---------|------------|---|---|
| NORANDA<br>DIVISION | CH I RECEIVERS    | CODE IDENT      | C       | 83323150   | N | A |
|                     | (CARRIAGE OFFSET) | 19333           |         |            |   |   |
| LOC A2 A04          |                   | 7285 REF NO 143 | SHEET 3 | PAGE 3-59. |   |   |

4 3 2 1

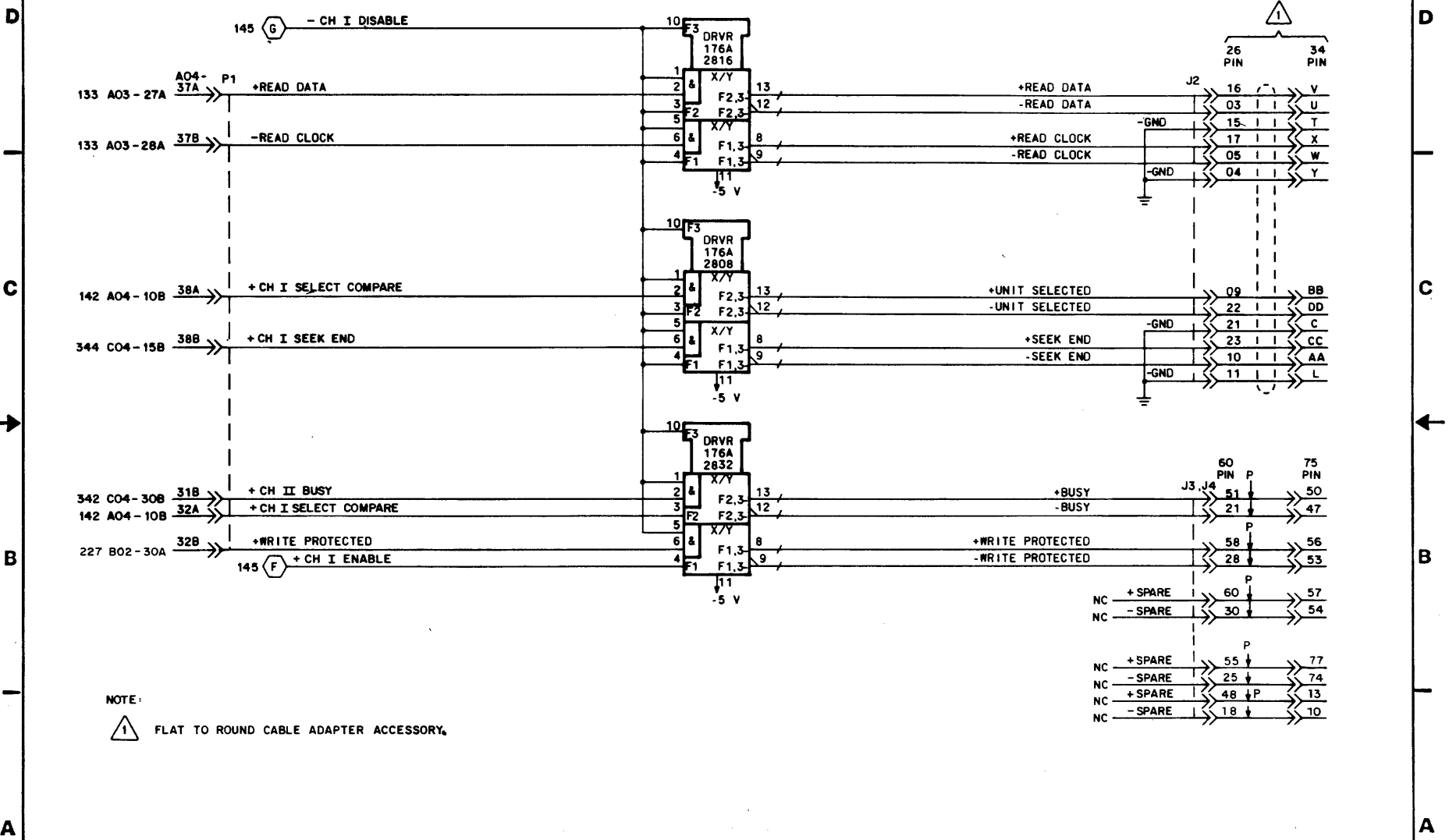


NOTES:  
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |  |                              |  |            |        |  |              |     |          |       |      |      |  |
|---------------------|--|------------------------------|--|------------|--------|--|--------------|-----|----------|-------|------|------|--|
| CONTROL DATA        |  | CH I RECEIVERS AND SEQ POWER |  | CODE IDENT | 19333  |  | C            |     | 83323150 |       | N    | A    |  |
| NORMANDALE DIVISION |  | (CARRIAGE OFFSET)            |  | LOC        | A2 A04 |  | CR/CS REF NO | 144 |          | SHEET | 4    |      |  |
|                     |  |                              |  |            |        |  |              |     |          |       | PAGE | 3-60 |  |



4 | 3 | 2 | 1



NOTE:  
 1 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |  |                   |  |            |         |              |          |       |   |           |
|----------------------|--|-------------------|--|------------|---------|--------------|----------|-------|---|-----------|
| <b>CONTROL DATA</b>  |  | CH I TRANSMITTERS |  | CODE IDENT | 19333 C |              | 83323150 |       | N | A         |
| NORMANDEALE DIVISION |  | (CARRIAGE OFFSET) |  | LOC: A2    | A04     | CROSS REF NO | 146      | SHEET | 6 | PAGE 3-62 |

4 | 3 | 2 | 1



| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 1                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | B | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | B | A | A | C | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |             |      |          |       |
|-----------|---------|-------------|------|----------|-------|
| REV.      | ECO.    | DESCRIPTION | DW'T | DATE     | CHK'D |
| A         | PE23000 | RELEASED    |      |          |       |
| B         | DJO2075 | CHANGE IC   |      | 12-31-81 |       |
| C         | DJO2158 | CORRECTION  |      | 12-31-81 |       |

UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1026     | 6     |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

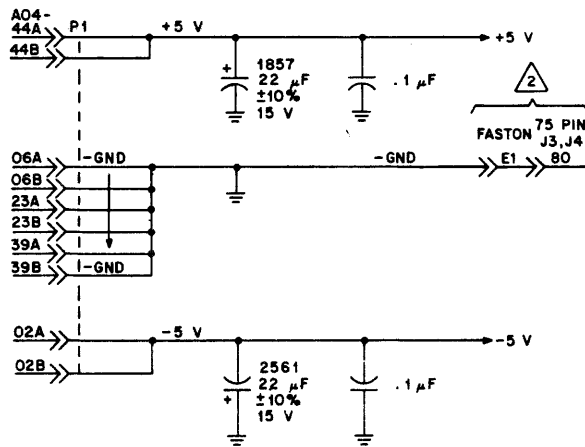
UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 175LS   | 0228     | 5,6           |



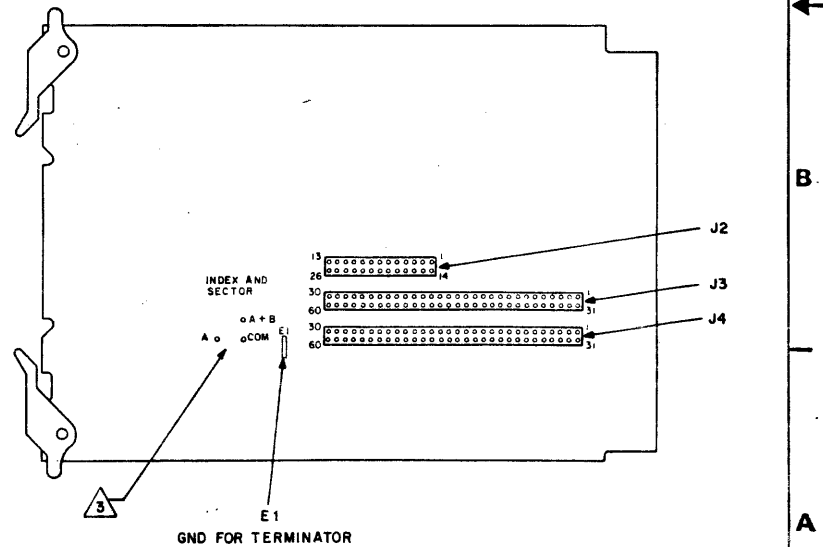
NOTES:

- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.
- 3 INDEX/SECTOR CABLE DETERMINATION JUMPER

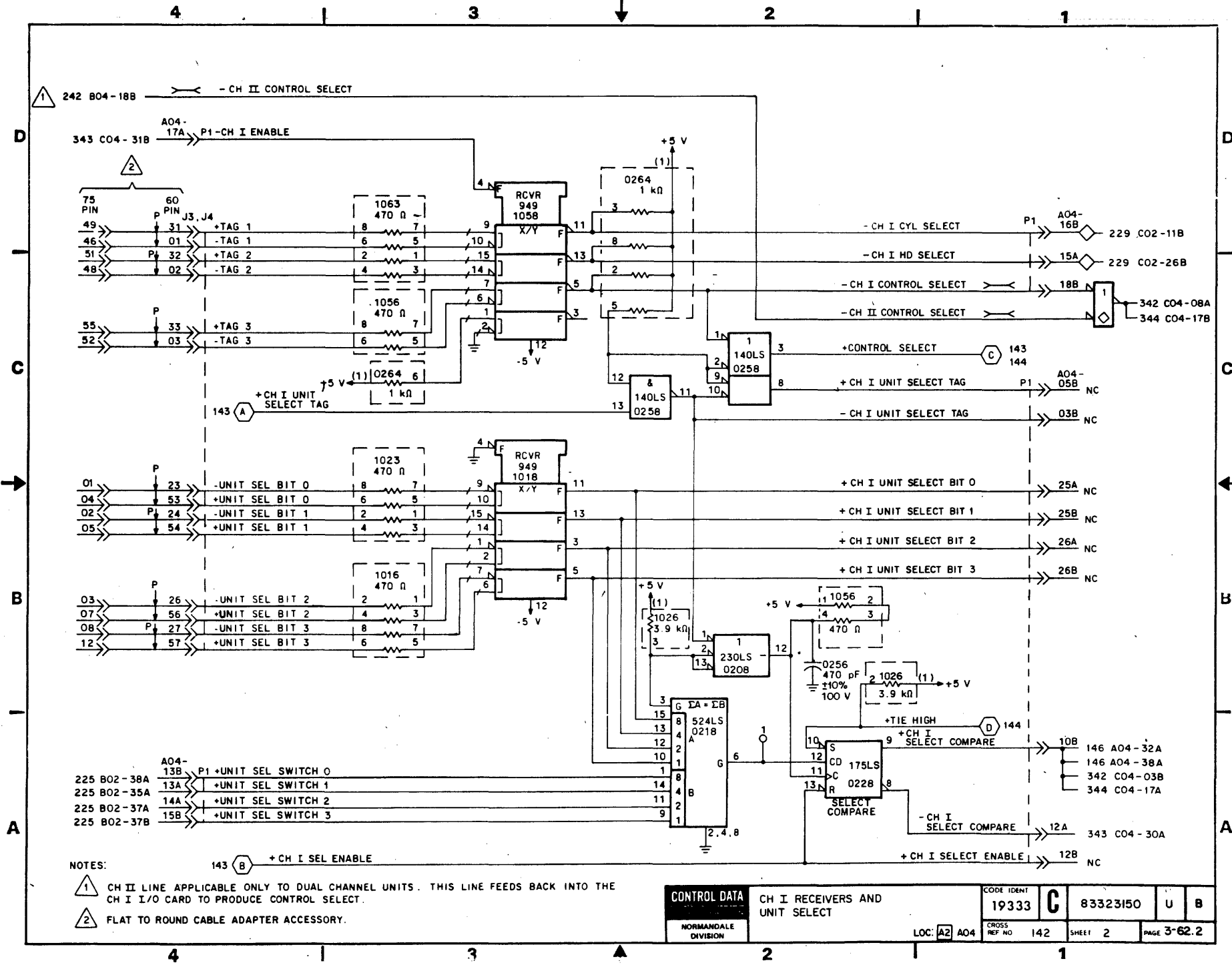


.1 μF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |



|          |                   |                      |            |       |       |          |      |        |
|----------|-------------------|----------------------|------------|-------|-------|----------|------|--------|
| DRAWN    | <i>Thompson</i>   | CONTROL DATA         | CODE IDENT | 19333 | C     | 83323150 | U    | C      |
| CHECKED  |                   |                      | CROSS REF  | 141   | SHEET | 6        | PAGE | 3-62.1 |
| ENGINEER | <i>EK Johnson</i> | NORMANDEALE DIVISION | LOC        | A2    | A04   |          |      |        |
| APPROVED |                   |                      |            |       |       |          |      |        |

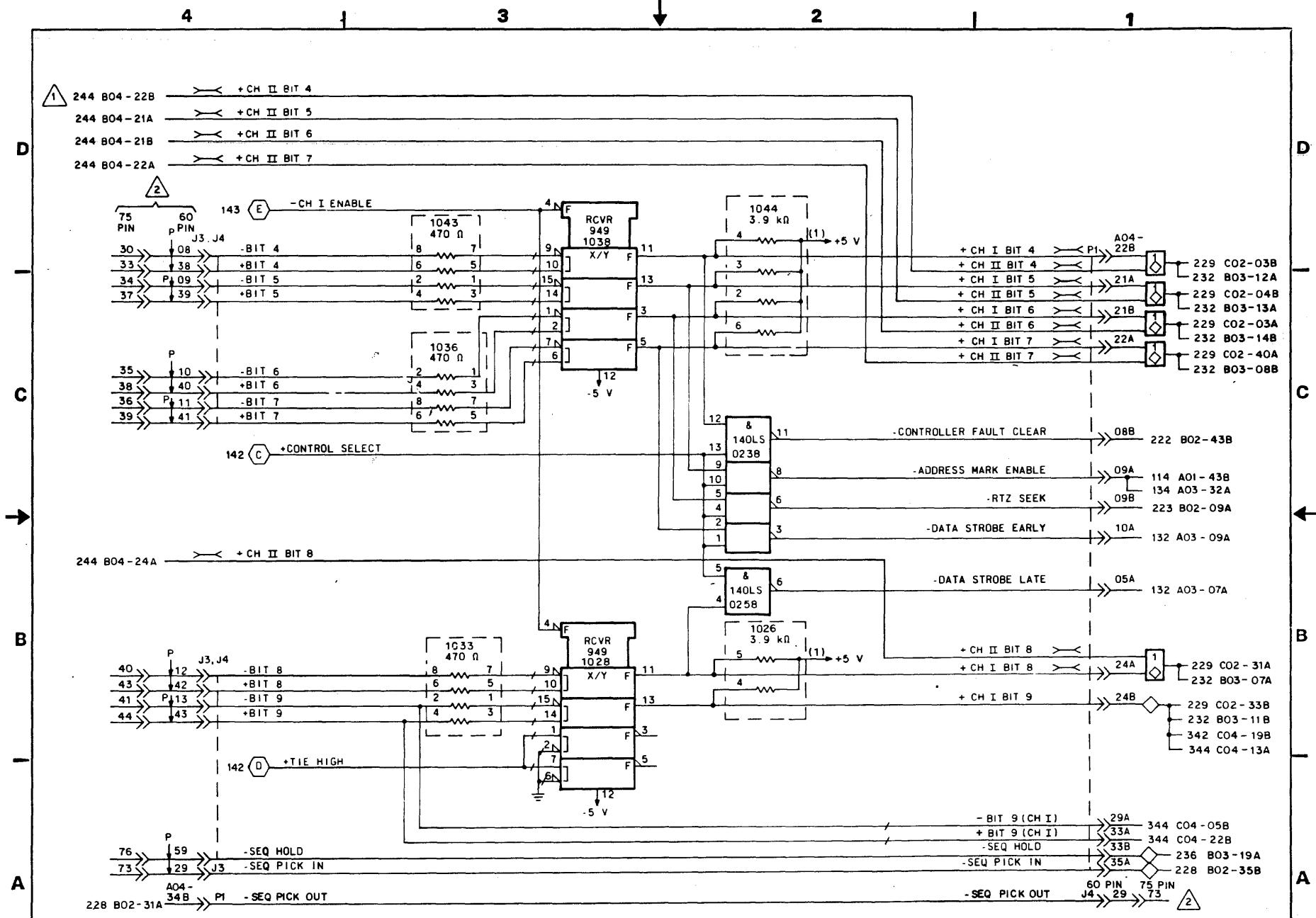


NOTES: 143 (B) +CH I SEL ENABLE

- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|   |                                   |                     |         |             |   |   |
|---|-----------------------------------|---------------------|---------|-------------|---|---|
| CONTROL DATA<br>NORMANDEALE<br>DIVISION | CH I RECEIVERS AND<br>UNIT SELECT | CODE IDENT<br>19333 | C       | 83323150    | U | B |
|   | LOC: A2 A04                       | CROSS<br>REF NO 142 | SHEET 2 | PAGE 3-62.2 |   |   |



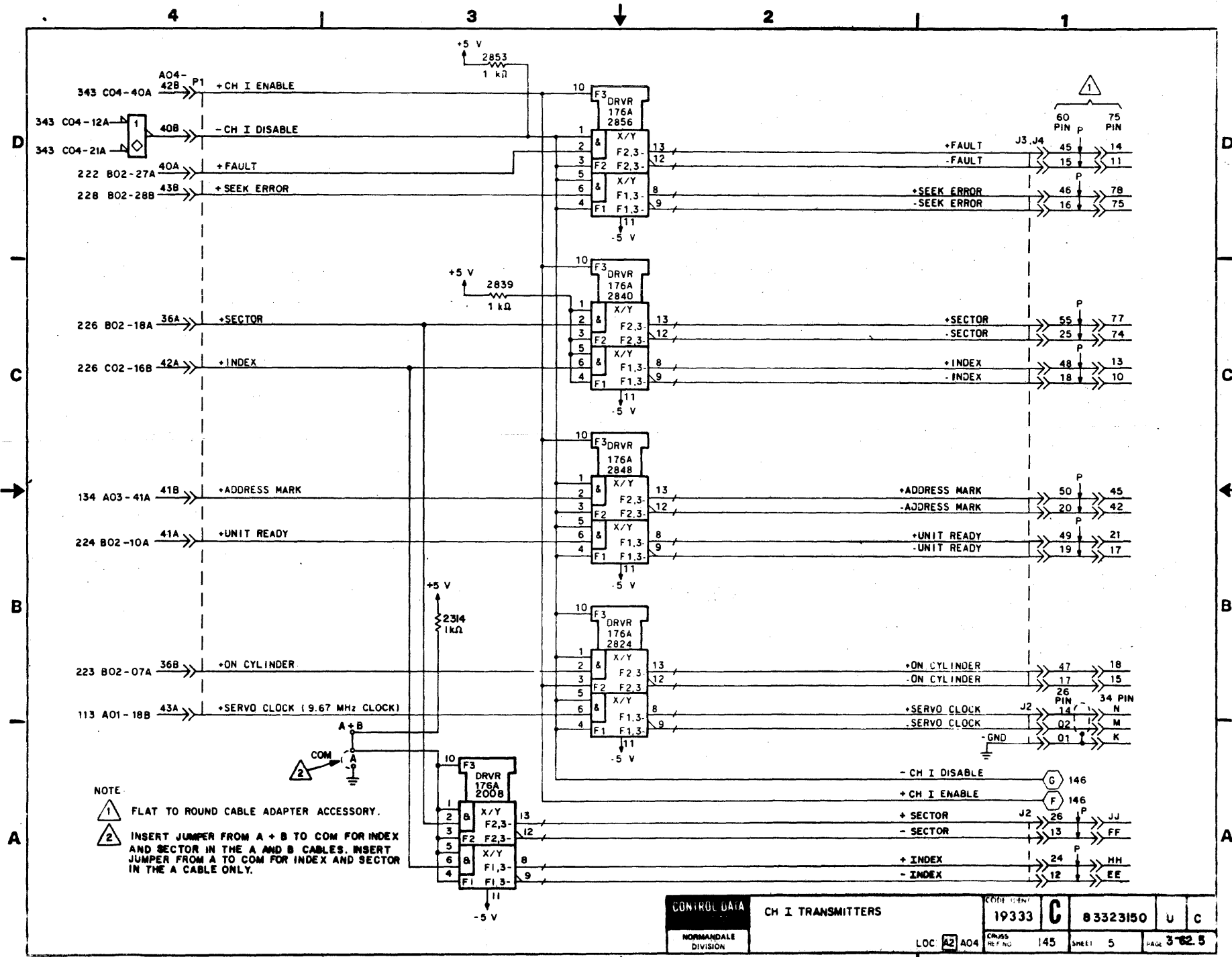


NOTES:

① CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.

② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|              |                              |             |                   |   |          |   |   |
|--------------|------------------------------|-------------|-------------------|---|----------|---|---|
| CONTROL DATA | CH I RECEIVERS AND SEQ POWER |             | CODE IDENT        | C | 83323150 | R | A |
|              | NORMANDALE DIVISION          | LOC: A2 A04 | CROSS REF NO. 144 |   |          |   |   |



NOTE.

(1) FLAT TO ROUND CABLE ADAPTER ACCESSORY.

(2) INSERT JUMPER FROM A + B TO COM FOR INDEX AND SECTOR IN THE A AND B CABLES. INSERT JUMPER FROM A TO COM FOR INDEX AND SECTOR IN THE A CABLE ONLY.

4

3

2

1

D

D

C

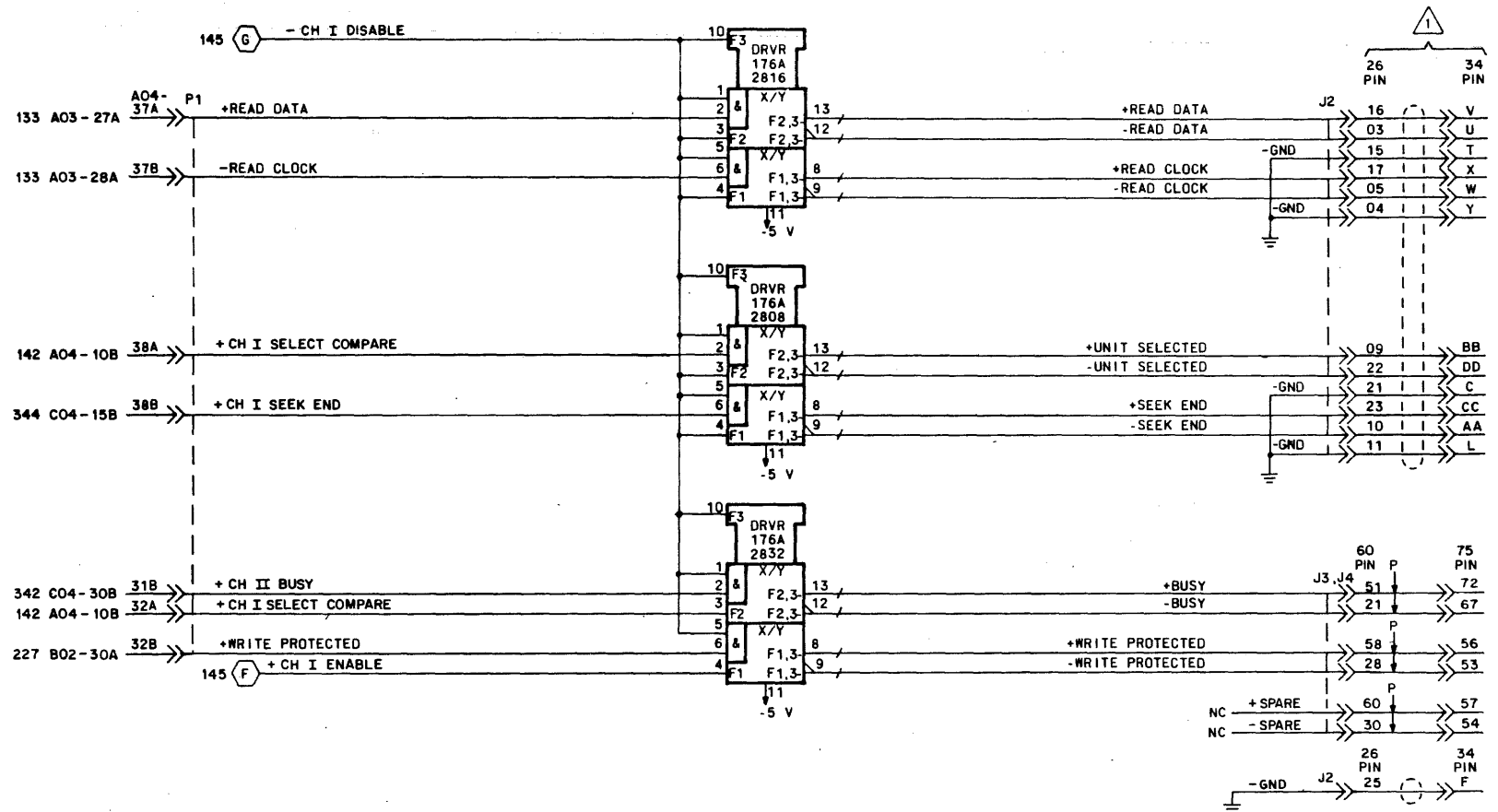
C

B

B

A

A



NOTE:  
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |         |                   |              |            |   |          |   |   |
|----------------------|---------|-------------------|--------------|------------|---|----------|---|---|
| CONTROL DATA         |         | CH I TRANSMITTERS |              | CODE IDENT | C | 83323150 | R | A |
| NORMANDEALE DIVISION | LOC: A2 | A04               | CROSS REF NO | 19333      |   |          |   |   |

REVISION STATUS OF SHEETS

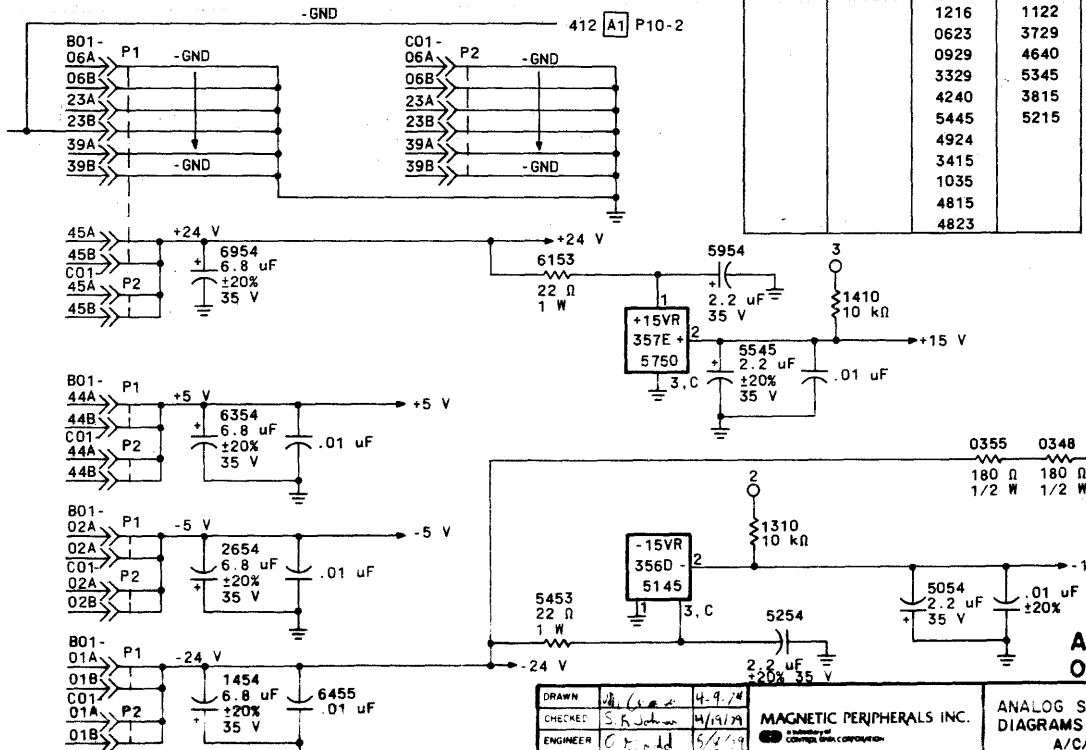
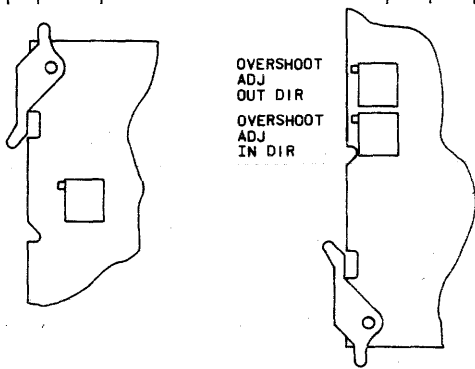
| I | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A | A |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | A | A | A | A | A | B |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | A | A | A | A | C | A |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D | A | A | A | D | D | A |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E | A | A | A | A | E | A |   |   |    |    |    |    |    |    |    |    |    |    |    |
| F | A | A | A | A | F | A |   |   |    |    |    |    |    |    |    |    |    |    |    |
| G | A | G | A | A | F | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| H | A | G | A | A | H | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| J | A | G | A | A | J | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| K | A | G | A | A | K | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| L | A | G | A | A | L | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| M | A | G | A | A | M | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| N | A | G | A | A | N | G |   |   |    |    |    |    |    |    |    |    |    |    |    |
| P | A | G | A | A | P | G |   |   |    |    |    |    |    |    |    |    |    |    |    |

UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 195     | 6451     | 9, 10         |
| 324     | 4341     | 1             |
| 202LS   | 5831     | 8             |
| 148LS   | 6422     | 4, 10         |

| REVISIONS |          |                    |       |         |       |
|-----------|----------|--------------------|-------|---------|-------|
| REV.      | ECO.     | DESCRIPTION        | DRFT. | DATE    | CHK'D |
| A         | PE23000  | RELEASED           |       |         |       |
| B         | PE50636  | IMPROVE OVERSHOOT  |       |         |       |
| C         | PE49146  | CORRECT LOGIC DIA  | TH    | 7-25-79 |       |
| D         | PE50705  | CORRECTIONS        | TH    | 2-26-79 |       |
| E         | PE50593  | BKBX TO CKBX       | TH    | 2-26-79 |       |
| F         | PE50630  | ONE TRACK SEEK     | TH    | 2-26-79 |       |
| G         | PE50659  | SERVO OVERSHOOT    | TH    | 2-26-79 |       |
| H         | PE50691A | NEW BOARD BLANK    | CB    | 3-2-80  |       |
| J         | PE50916A | CKBX TO GKBX       | MF    | 7-1-80  |       |
| K         | PE62057  | REMOVE CAPACITOR   | CB    | 10-8-80 |       |
| L         | PE62226  | GKBX TO LKBX       | MF    | 8-17-81 |       |
| M         | DJ02159  | CHANGE BOARD BLANK | MJ    | 1-6-82  |       |
| N         | DJ02163  | CHANGE BOARD BLANK | MJ    | 1-6-82  |       |
| P         | DJ02218  | CORRECTIONS        | MJ    | 3-2-82  | (8/3) |

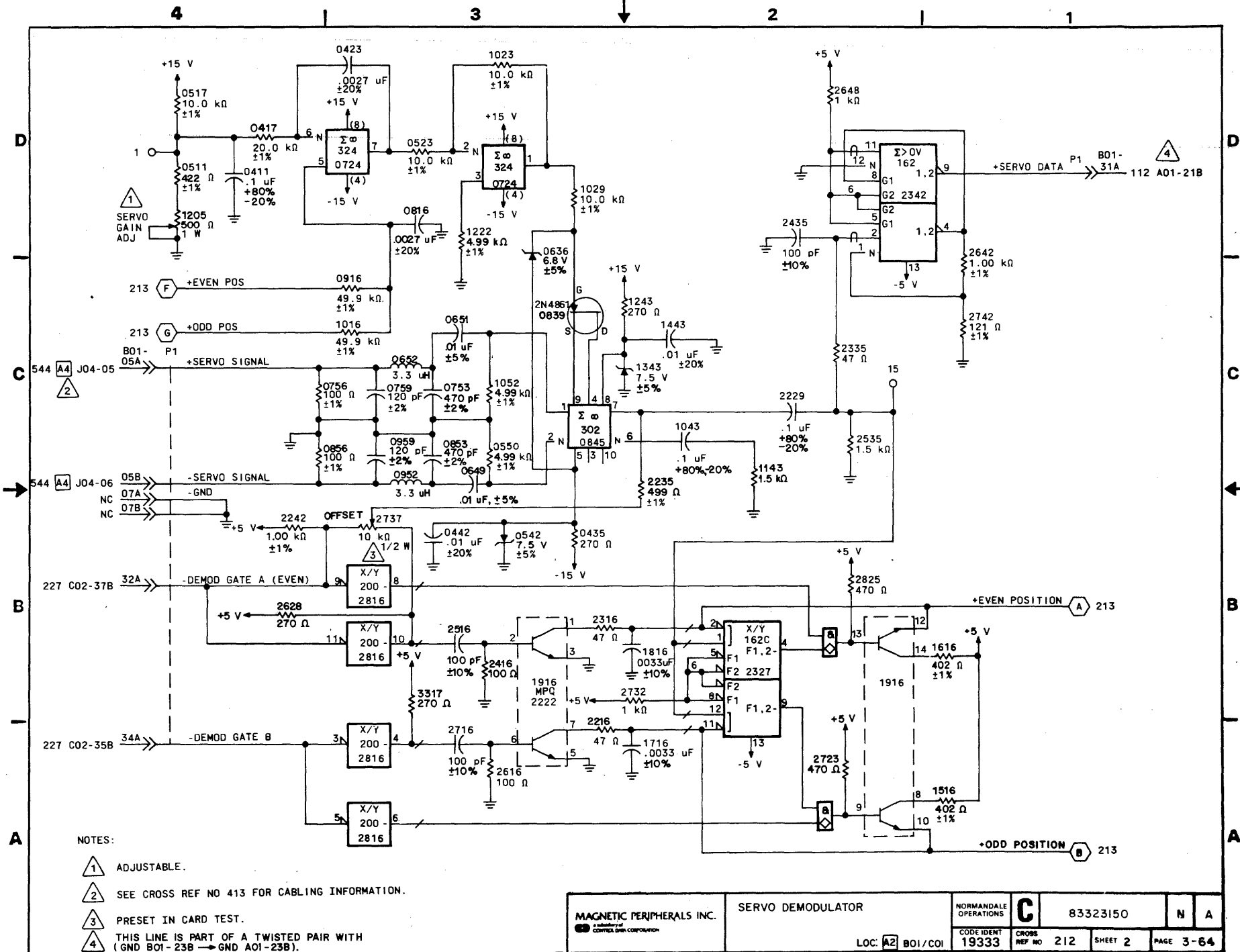
| .01 uF FILTER CAPS |      |       |       |
|--------------------|------|-------|-------|
| +5 V               | -5 V | +15 V | -15 V |
| 5640               | 4652 | 5608  | 6008  |
| 2708               | 2456 | 4808  | 5208  |
|                    | 1735 | 3408  | 3808  |
|                    |      | 1508  | 1908  |
|                    |      | 1216  | 1122  |
|                    |      | 0623  | 3729  |
|                    |      | 0929  | 4640  |
|                    |      | 3329  | 5345  |
|                    |      | 4240  | 3815  |
|                    |      | 5445  | 5215  |
|                    |      | 4924  |       |
|                    |      | 3415  |       |
|                    |      | 1035  |       |
|                    |      | 4815  |       |
|                    |      | 4823  |       |



- NOTES:
- 1. UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED EXCEPT \*
  - 2. SEE CROSS REF NO 413 FOR CABLING INFORMATION.

APPLICABLE ONLY TO UNITS WITHOUT CARRIAGE OFFSET CAPABILITY.

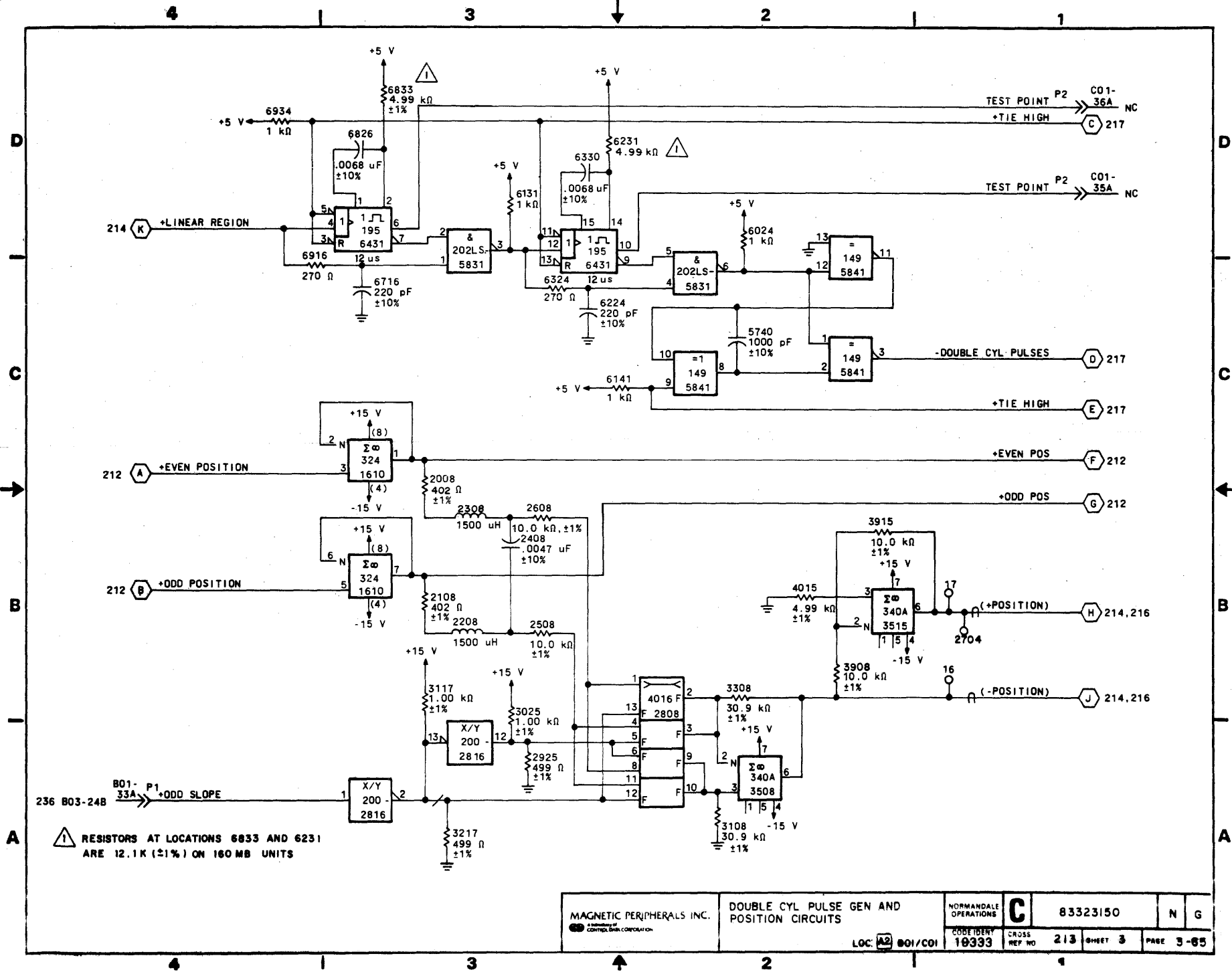
|  |   |  |  |                      |
|--|---|--|--|----------------------|
| DRAWN: <i>[Signature]</i><br>CHECKED: S. H. Johnson<br>ENGINEER: <i>[Signature]</i><br>APPROVED: | MAGNETIC PERIPHERALS INC.<br>A member of<br>COMPTON CORPORATION | ANALOG SERVO DIAGRAMS<br>TYPE: A/C/E/G/LKBX<br>LOC: 82 B01/COI | NORMANDAE OPERATIONS<br>CROSS REF NO: 211<br>SHEET: 1 of 7<br>PAGE: 3-63 | C<br>83323150<br>V P |
|--|---|--|--|----------------------|



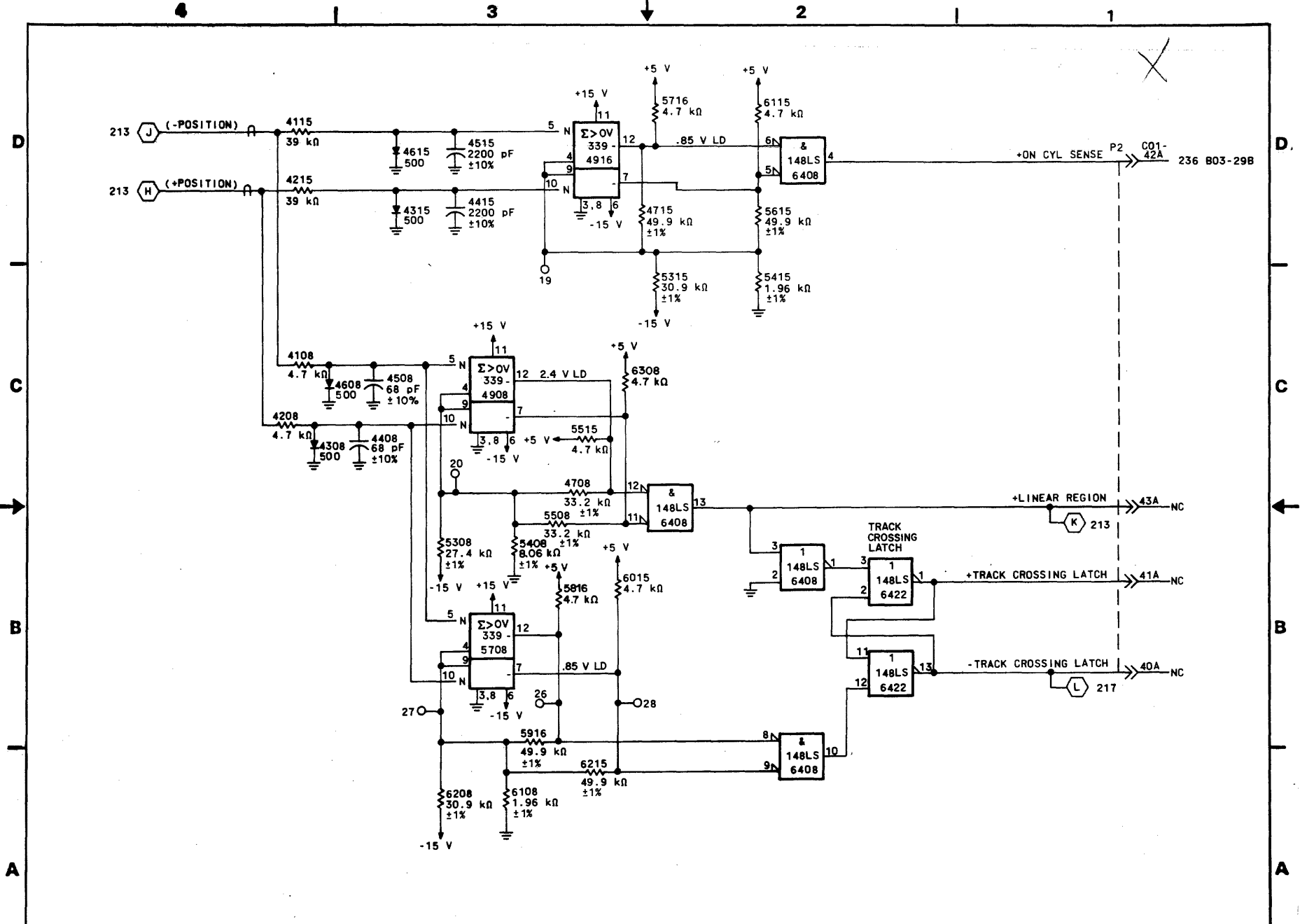
- NOTES:
- 1 ADJUSTABLE.
  - 2 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
  - 3 PRESET IN CARD TEST.
  - 4 THIS LINE IS PART OF A TWISTED PAIR WITH (GND B01-23B → GND A01-23B).

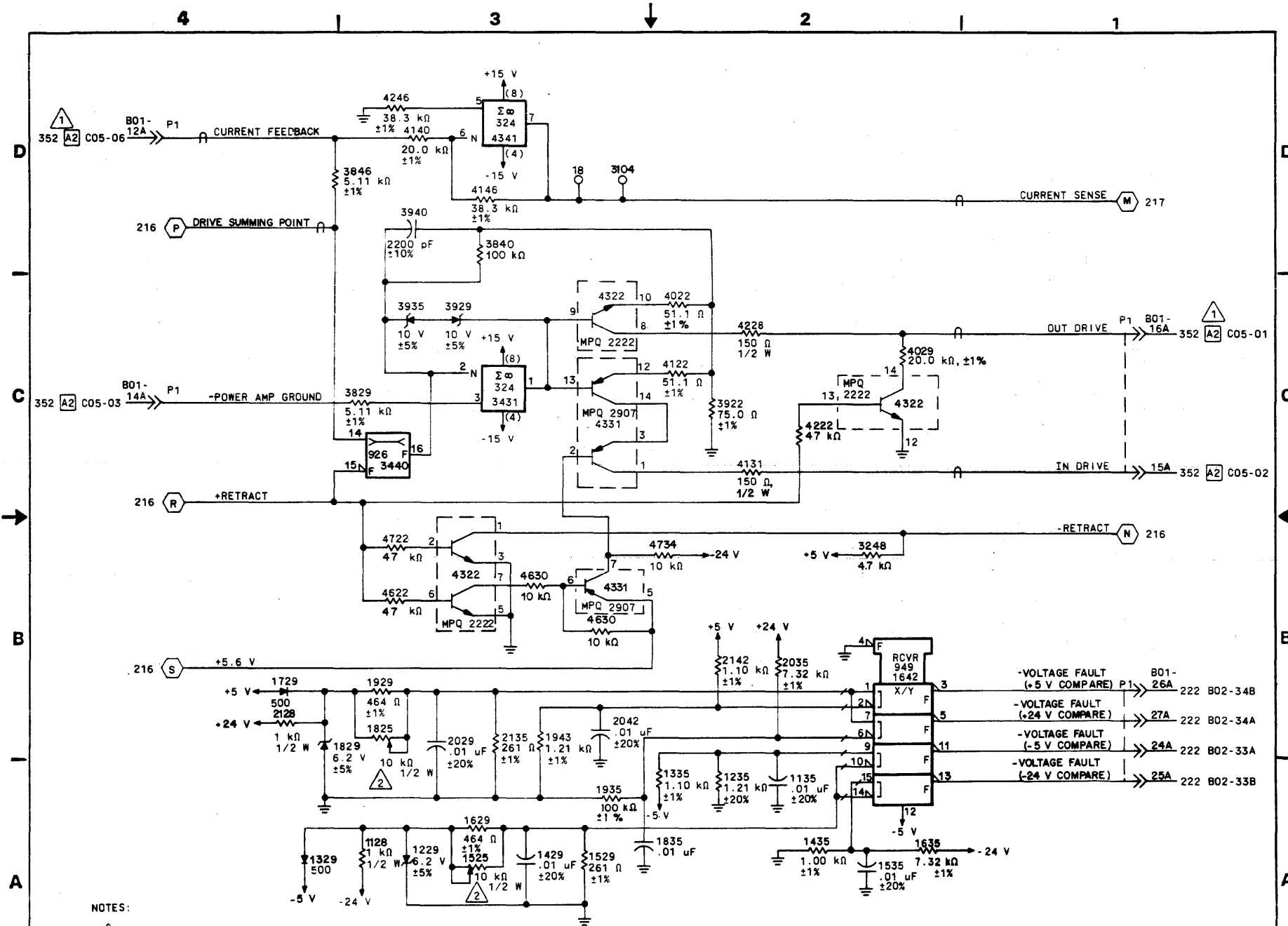
|  |                          |                     |                                      |          |           |   |
|--|--------------------------|---------------------|--------------------------------------|----------|-----------|---|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>a subsidiary of<br/>         COMTECH DATA CORPORATION</small> | <b>SERVO DEMODULATOR</b> |                     | NORMANDALE<br>OPERATIONS<br><b>C</b> | 83323150 | N         | A |
|  | LOC: A2 B01/COI          | CODE IDENT<br>19333 | CROSS<br>REF NO 212                  | SHEET 2  | PAGE 3-64 |   |



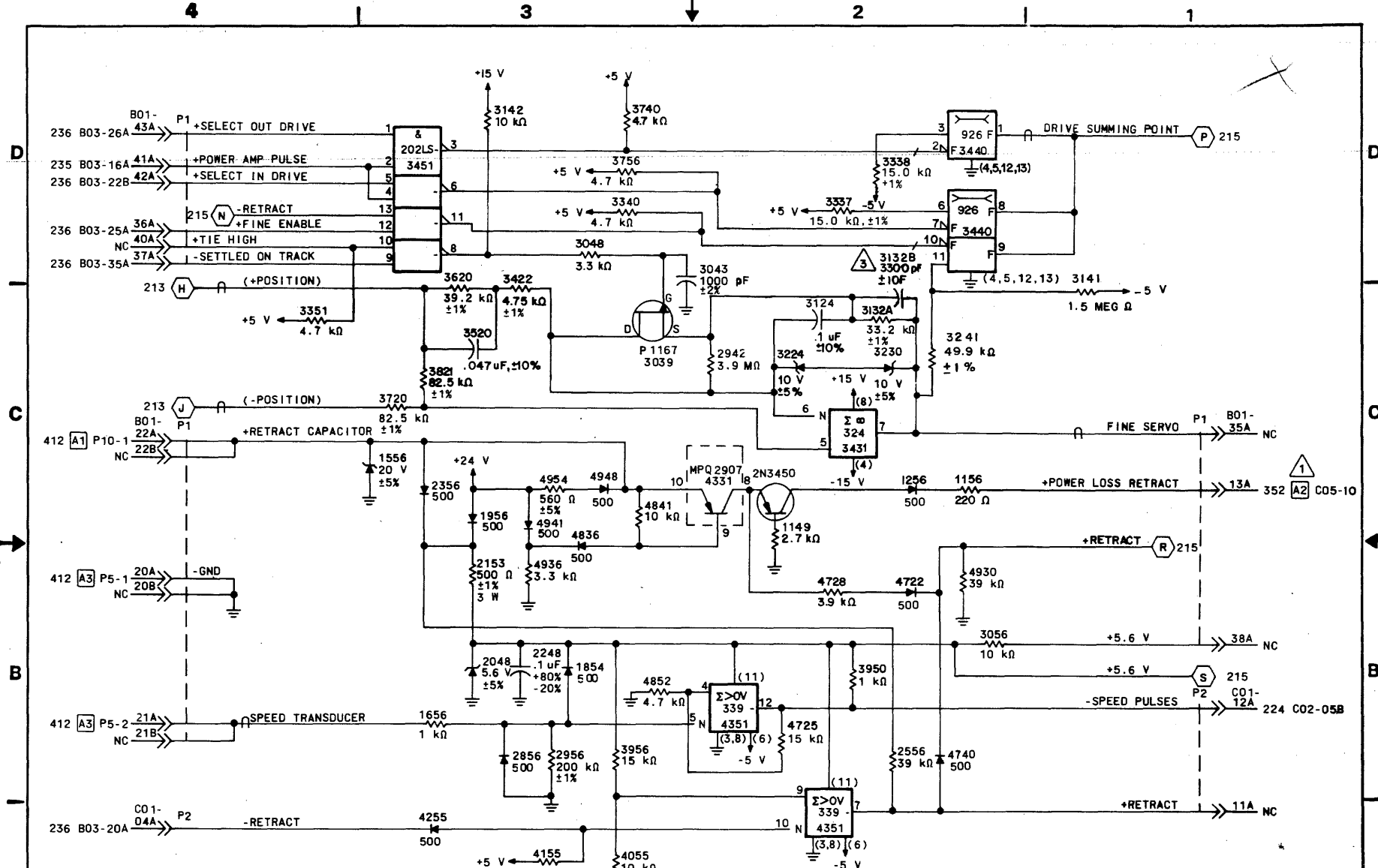


⚠ RESISTORS AT LOCATIONS 6833 AND 6231 ARE 12.1K (±1%) ON 160 MB UNITS

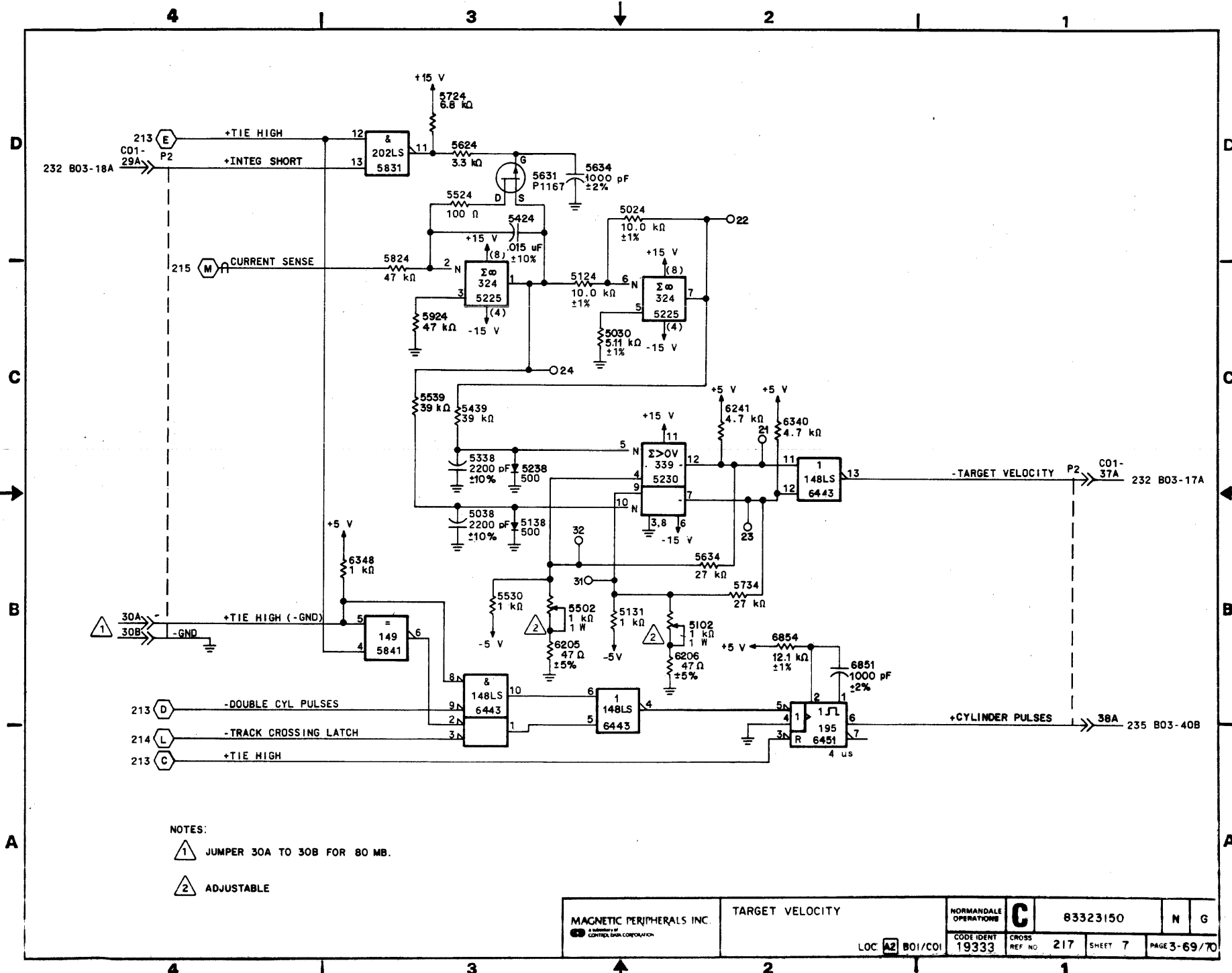




- NOTES:
- 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
  - 2 PRESET IN CARD TEST.



- NOTES:
- 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
  - 2 VALUE OF RESISTOR AT LOCATION 3241 IS 75.0 kΩ (±1%) FOR 160 MB UNITS
  - 3 CAPACITOR ON LKBX CARD ONLY.



NOTES:

- ⚠️ JUMPER 30A TO 30B FOR 80 MB.
- ⚙️ ADJUSTABLE

|  |                       |                        |                      |          |              |   |
|--|-----------------------|------------------------|----------------------|----------|--------------|---|
| MAGNETIC PERIPHERALS INC.<br>A subsidiary of<br>CONTROL DATA CORPORATION | TARGET VELOCITY       | NORMANDE<br>OPERATIONS | <b>C</b>             | 83323150 | N            | G |
|  | LOC <b>A2</b> B01/CO1 | CODE IDENT<br>19333    | CROSS<br>REF NO. 217 | SHEET 7  | PAGE 3-69/70 |   |

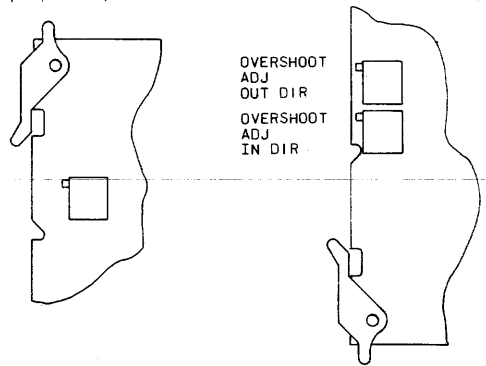


| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 1                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A | A |   |   |    |    |    |    |    |    |    |    |    |    |    |

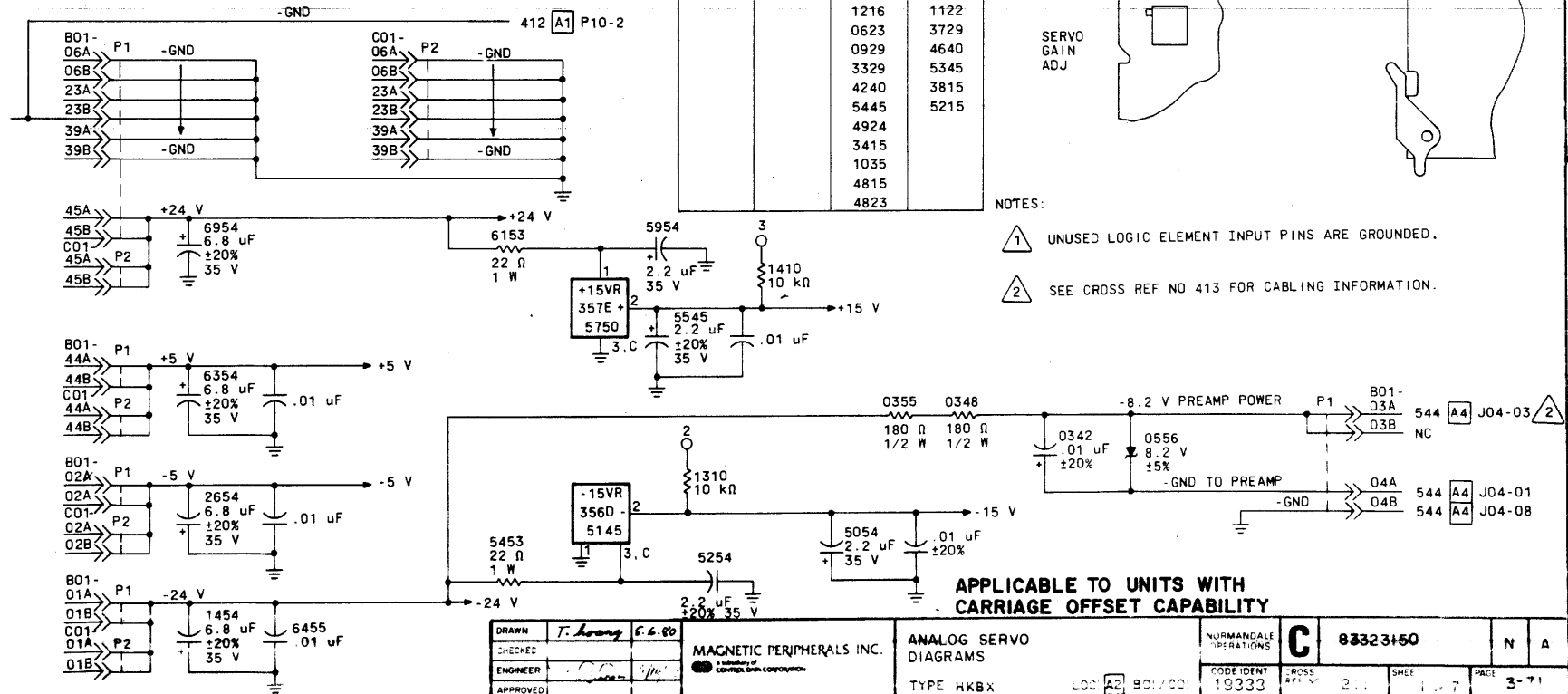
| UNUSED LOGIC ELEMENTS |          |               |
|-----------------------|----------|---------------|
| ELEMENT               | LOCATION | OUTPUT PIN(S) |
| 195                   | 6451     | 9, 10         |
| 148LS                 | 6422     | 4, 10         |

| .01 uF FILTER CAPS |      |       |       |
|--------------------|------|-------|-------|
| +5 V               | -5 V | +15 V | -15 V |
| 5640               | 4652 | 5608  | 6008  |
| 2708               | 2456 | 4808  | 5208  |
|                    | 1735 | 3408  | 3808  |
|                    |      | 1508  | 1908  |
|                    |      | 1216  | 1122  |
|                    |      | 0623  | 3729  |
|                    |      | 0929  | 4640  |
|                    |      | 3329  | 5345  |
|                    |      | 4240  | 3815  |
|                    |      | 5445  | 5215  |
|                    |      | 4924  |       |
|                    |      | 3415  |       |
|                    |      | 1035  |       |
|                    |      | 4815  |       |
|                    |      | 4823  |       |

| REVISION |                  |         |    |
|----------|------------------|---------|----|
| NO.      | DESCRIPTION      | DATE    | BY |
| A        | PE23000 RELEASED | 1/10/60 |    |

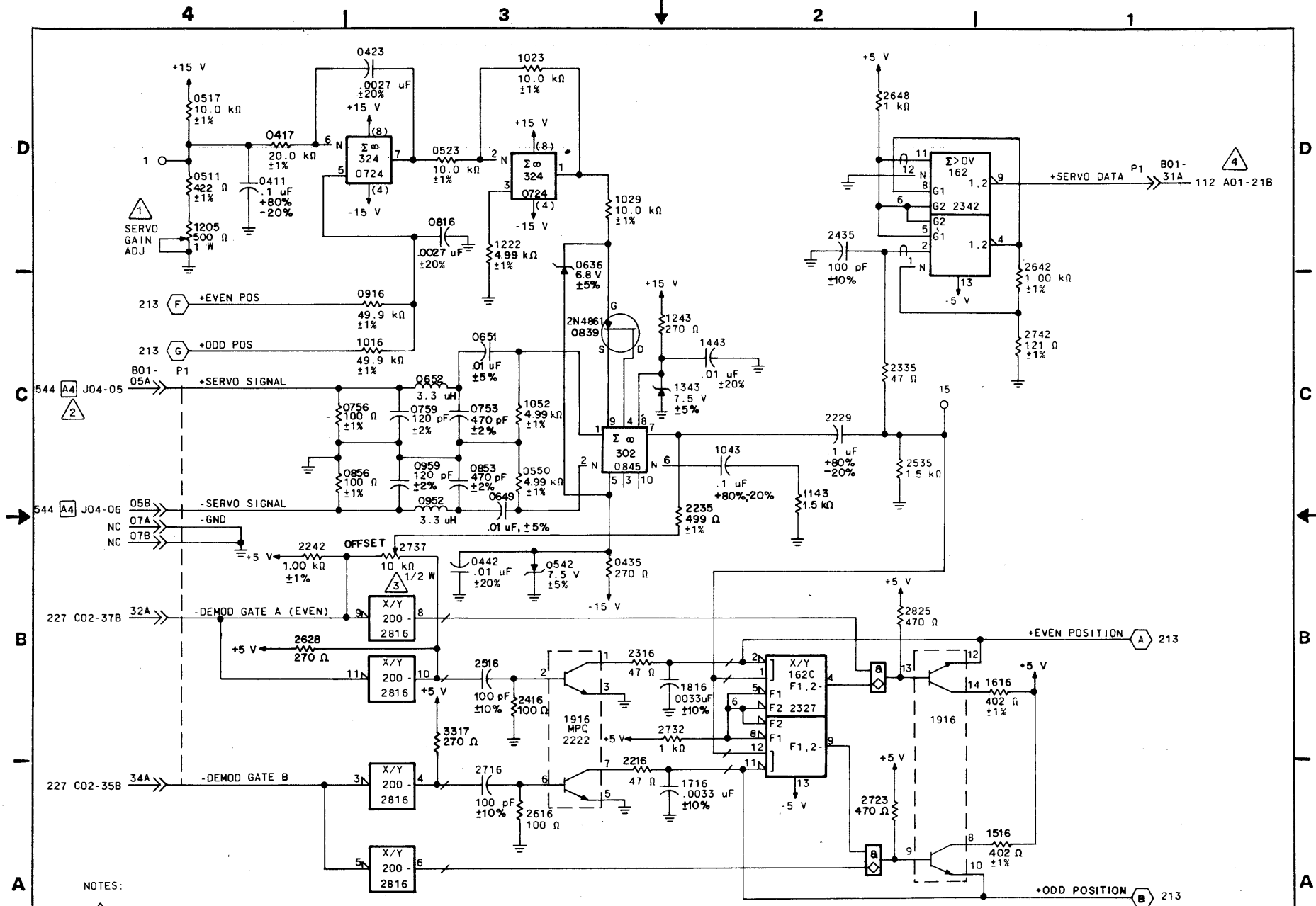


- NOTES:
- 1. UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
  - 2. SEE CROSS REF NO 413 FOR CABLING INFORMATION.



APPLICABLE TO UNITS WITH CARRIAGE OFFSET CAPABILITY

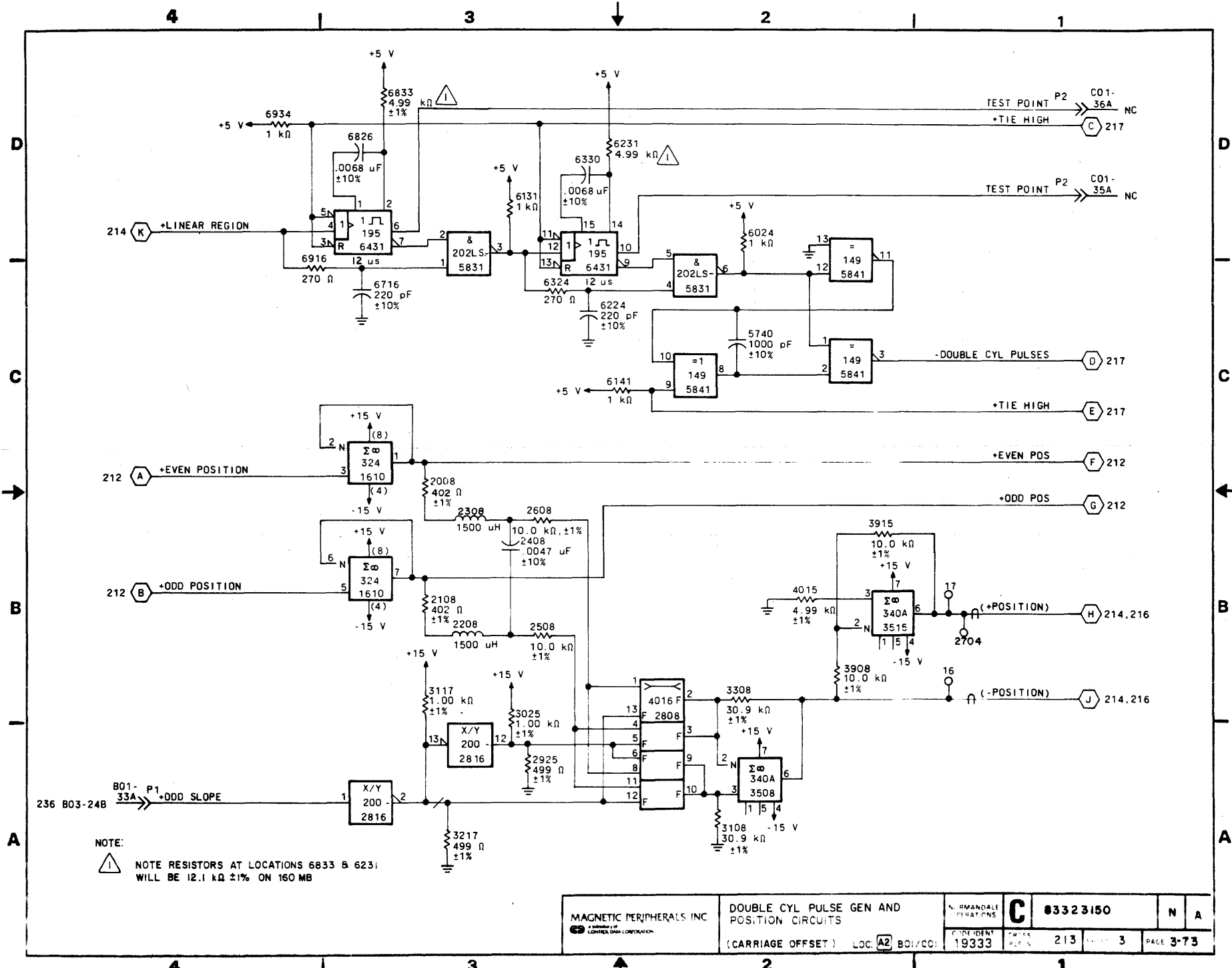
|   |  |                                    |   |
|---|--|------------------------------------|---|
| DRAWN: T. Long 6.6.60<br>CHECKED:<br>ENGINEER:<br>APPROVED: | MAGNETIC PERIPHERALS INC.<br>a subsidiary of<br>CONTROL DATA CORPORATION | ANALOG SERVO DIAGRAMS<br>TYPE HKBX | NORMANDALE OPERATIONS<br><b>C</b> 83323+50<br>CODE IDENT 19333<br>SHEET 7 of 7<br>PAGE 3-71 |
|---|--|------------------------------------|---|



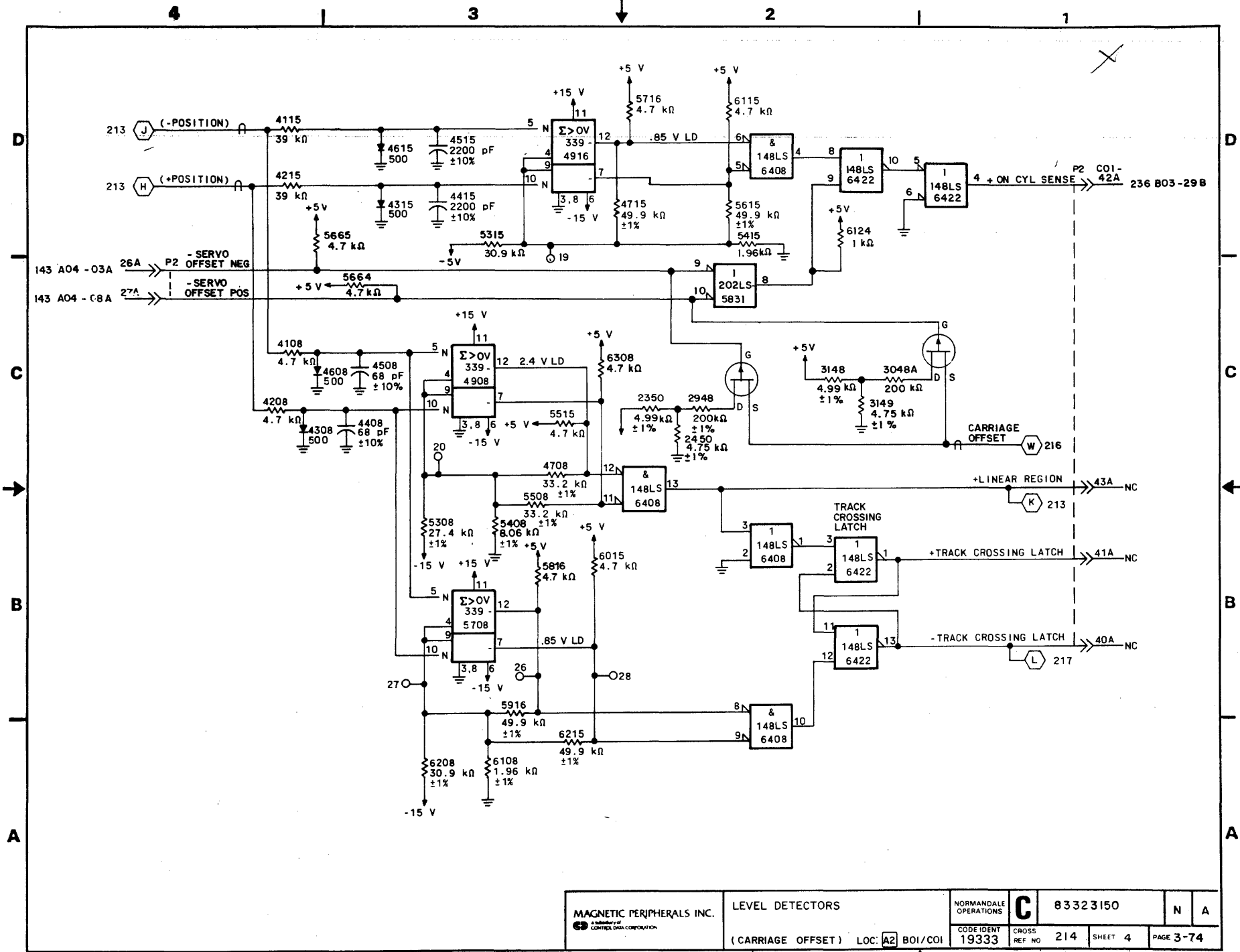
- NOTES:
- ① ADJUSTABLE.
  - ② SEE CROSS REF NO 413 FOR CABLING INFORMATION.
  - ③ PRESET IN CARD TEST.
  - ④ THIS LINE IS PART OF A TWISTED PAIR WITH (GND B01-23B → GND A01-23B).

|                                |  |                                   |  |                       |  |                  |  |                   |  |
|--------------------------------|--|-----------------------------------|--|-----------------------|--|------------------|--|-------------------|--|
| MAGNETIC PERIPHERALS INC.      |  | SERVO DEMODULATOR                 |  | NORMANDALE OPERATIONS |  | C 83323150       |  | N A               |  |
| SUBSIDIARY OF<br>CORNING CORP. |  | (CARRIAGE OFFSET) LOC. A2 B01/COI |  | CODE IDENT 19333      |  | CROSS REF NO 212 |  | SHEET 2 PAGE 3-72 |  |

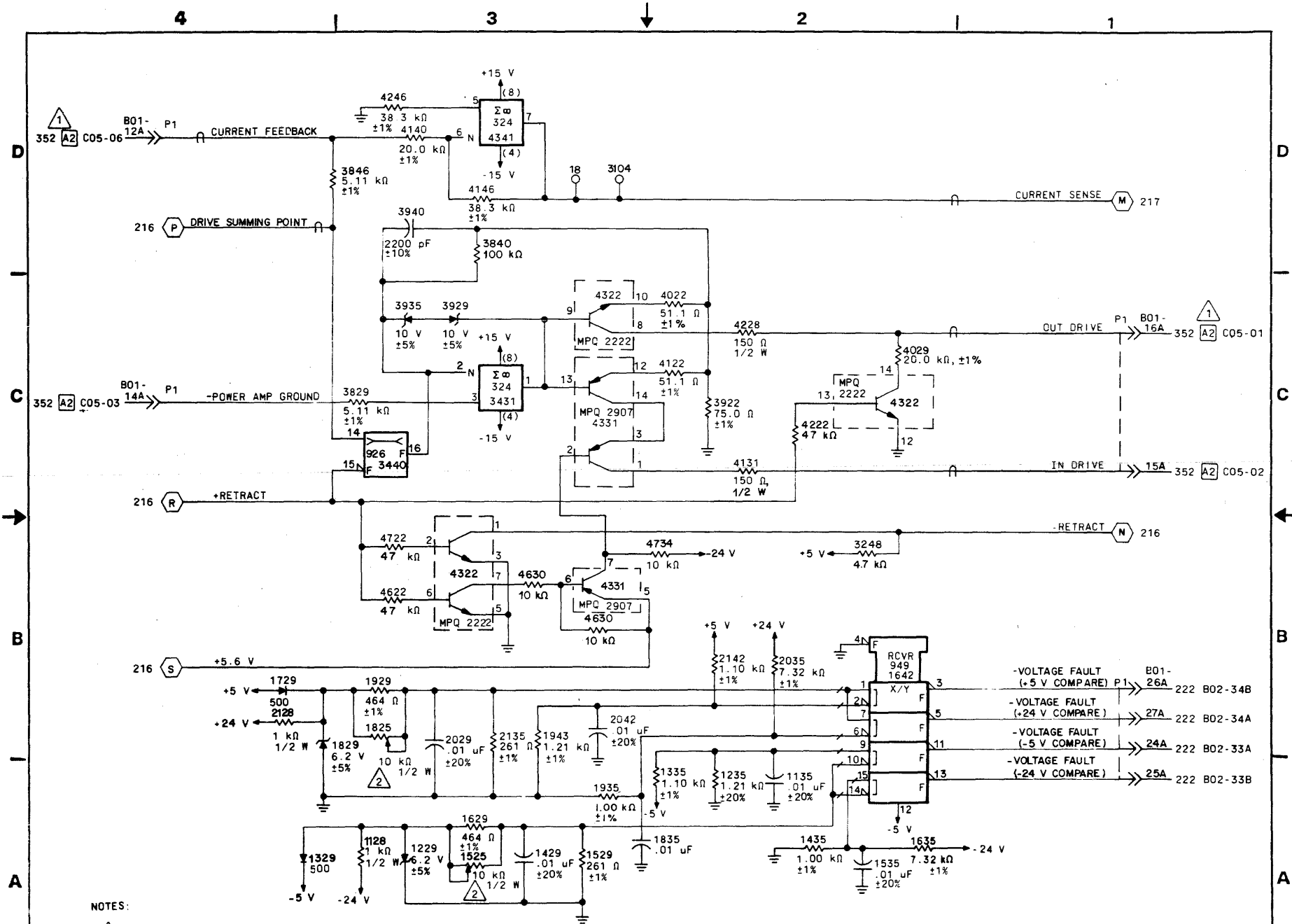




NOTE:  
 NOTE RESISTORS AT LOCATIONS 6833 & 6231 WILL BE 12.1 kΩ ±1% ON 160 MB



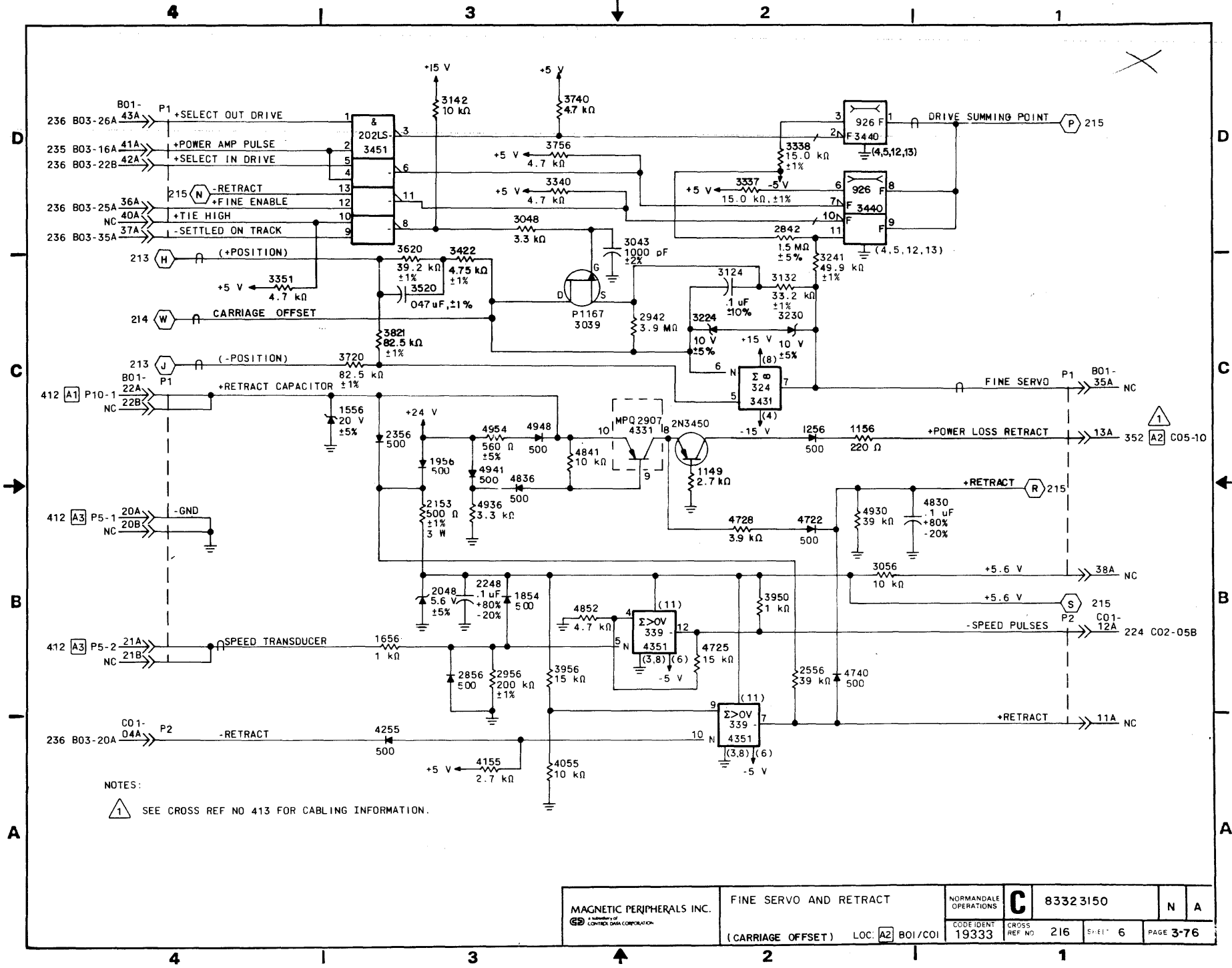
|   |                                   |                       |                  |          |           |   |
|---|-----------------------------------|-----------------------|------------------|----------|-----------|---|
| MAGNETIC PERIPHERALS INC.<br><small>A DIVISION OF<br/>         CONTROL DATA CORPORATION</small> | LEVEL DETECTORS                   | NORMANDALE OPERATIONS | <b>C</b>         | 83323150 | N         | A |
|   | (CARRIAGE OFFSET) LOC: A2 B01/COI | CODE IDENT 19333      | CROSS REF NO 214 | SHEET 4  | PAGE 3-74 |   |



NOTES:

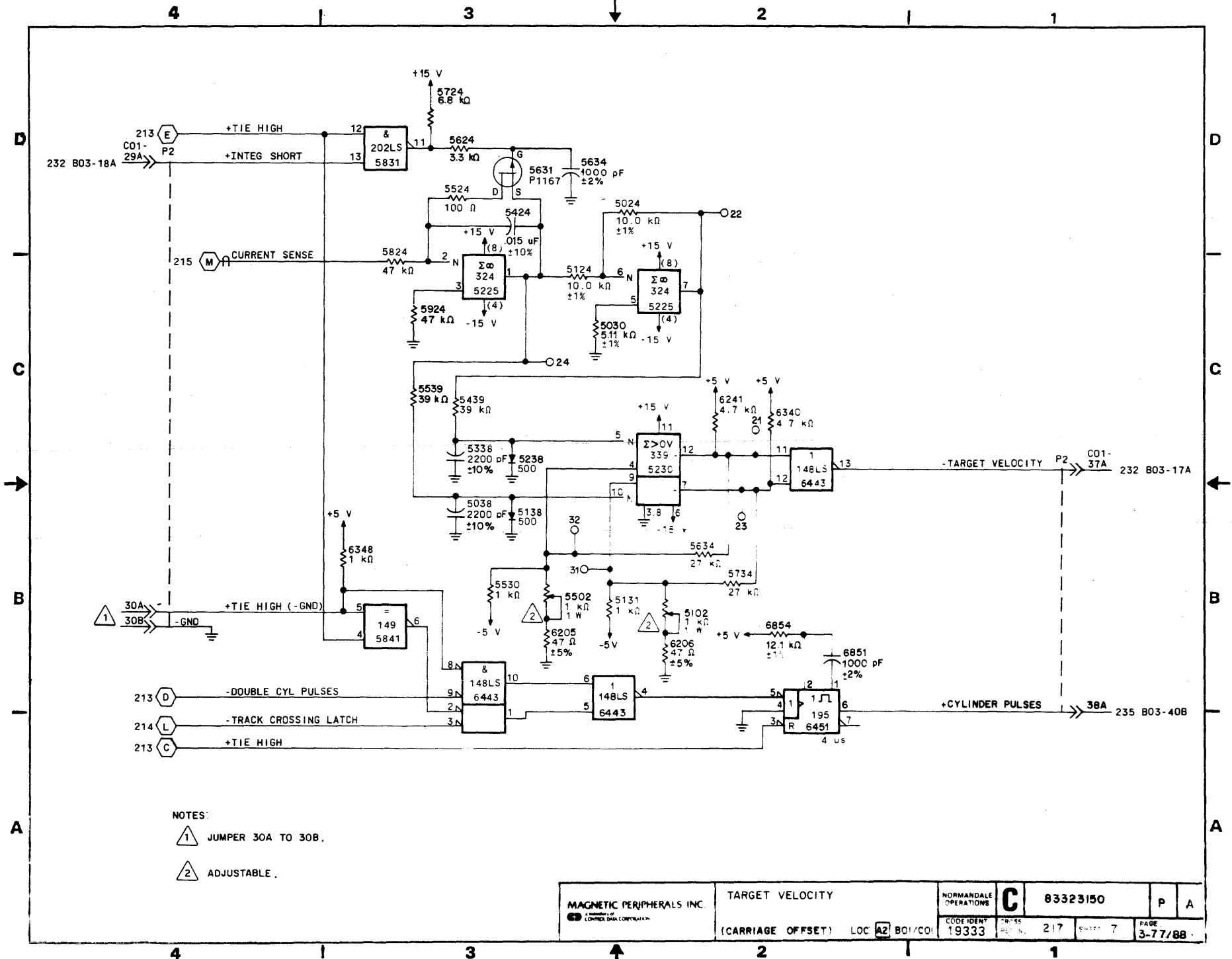
- ① SEE CROSS REF NO 413 FOR CABLING INFORMATION.
- ② PRESET IN CARD TEST

|   |   |                                   |                 |     |
|---|---|-----------------------------------|-----------------|-----|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>A DIVISION OF CONTROL DATA CORPORATION</small> | <b>POWER AMP DRIVE AND VOLTAGE FAULT</b><br>(CARRIAGE OFFSET) LOC. A2 B01/C01 | NORMANDALE OPERATIONS<br><b>C</b> | <b>83323150</b> | N A |
| CODE IDENT 19333  | CROSS REF. NO. 215  | REV. 5                            | PAGE 3-75       |     |



NOTES:  
 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.

|  |                        |                 |                       |                  |           |           |   |
|--|------------------------|-----------------|-----------------------|------------------|-----------|-----------|---|
| MAGNETIC PERIPHERALS INC.<br><small>A MEMBER OF</small><br><small>CONTROL DATA CORPORATION</small> | FINE SERVO AND RETRACT |                 | NORMANDALE OPERATIONS | <b>C</b>         | 8332 3150 | N         | A |
|  | (CARRIAGE OFFSET)      | LOC: A2 BOI/COI | CODE IDENT 19333      | CROSS REF NO 216 | SHEET 6   | PAGE 3-76 |   |

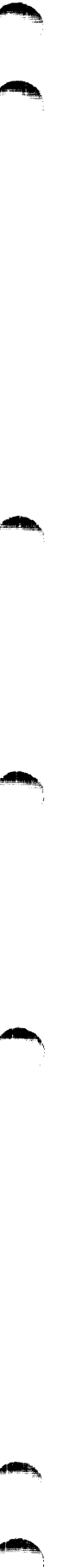


NOTES:

1 JUMPER 30A TO 30B.

2 ADJUSTABLE.

|  |                   |                       |                     |                |         |              |
|--|-------------------|-----------------------|---------------------|----------------|---------|--------------|
| MAGNETIC PERIPHERALS INC.<br><small>CONTRACTOR OF</small><br><small>CONTROL DATA CORPORATION</small> | TARGET VELOCITY   | NORMANDALE OPERATIONS | <b>C</b>            | 83323150       | P       | A            |
|  | (CARRIAGE OFFSET) | LOC <b>A2</b> B01/CO1 | CODE IDENTITY 19333 | PRINTED BY 217 | SHEET 7 | PAGE 3-77/88 |



| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A | A | A | A | A |    |    |    |    |    |    |    |    |    |    |    |
| B                         | B | B | A | B | B | B | B | A | A |    |    |    |    |    |    |    |    |    |    |    |
| C                         | C | C | A | C | C | C | C | A | A |    |    |    |    |    |    |    |    |    |    |    |
| D                         | D | D | C | C | C | C | D | A | A |    |    |    |    |    |    |    |    |    |    |    |
| E                         | D | D | C | C | C | C | E | A | A |    |    |    |    |    |    |    |    |    |    |    |
| F                         | F | D | C | F | C | F | A | A |   |    |    |    |    |    |    |    |    |    |    |    |
| G                         | G | D | G | F | C | F | A | A |   |    |    |    |    |    |    |    |    |    |    |    |
| H                         | G | D | H | F | C | F | A | A |   |    |    |    |    |    |    |    |    |    |    |    |
| J                         | J | J | J | F | C | F | J | J |   |    |    |    |    |    |    |    |    |    |    |    |
| K                         | J | J | J | F | K | F | J | J |   |    |    |    |    |    |    |    |    |    |    |    |
| L                         | J | J | J | F | K | F | L | J |   |    |    |    |    |    |    |    |    |    |    |    |

UNUSED RESISTOR PACKS

| LOCATION | PIN(S)        |
|----------|---------------|
| 2809     | 2, 7, 8       |
| 4009     | 2, 5, 6, 7, 8 |
| 5308     | 2             |
| 5809     | 2             |

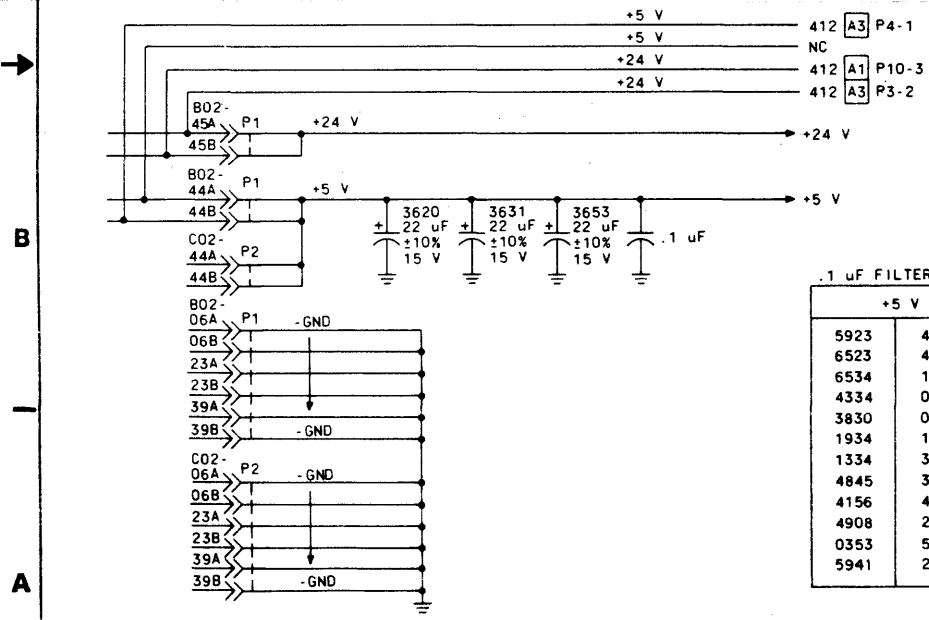
UNUSED TRANSISTOR PACKS

| TYPE    | LOCATION | PIN(S)  |
|---------|----------|---------|
| MPQ2222 | 4443     | 5, 6, 7 |

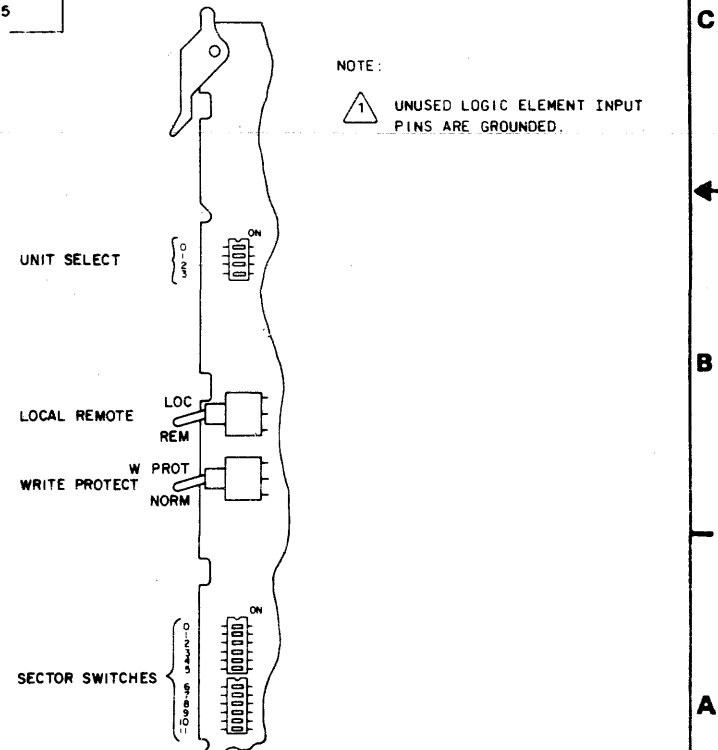
UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 146LS   | 6121     | 10, 12        |
| 149LS   | 3921     | 8             |
| 175LS   | 4432     | 8, 9          |
| 554LS   | 2153     | 4             |
| 4049    | 2120     | 10            |
| 226LS   | 2143     | 5             |

| REVISIONS |          |                             |      |         |       |
|-----------|----------|-----------------------------|------|---------|-------|
| REV       | ECN      | DESCRIPTION                 | DRFT | DATE    | CHK'D |
| A         | PE23000  | RELEASED                    |      | 5-14-79 | WLB   |
| B         | PE50603  | ADD TWISTED PAIR            |      | 9-13-79 | WLB   |
| C         | PE49146  | CORRECT LOGIC D.A.          |      | 9-13-79 | WLB   |
| D         | PE50681  | FGX COMP -455               |      | 11-1-79 | WLB   |
| E         | PE50681A | FGX COMP CHG                |      | 12-4-79 | WLB   |
| F         | PE50705  | CORRECT LD                  |      | 12-4-79 | WLB   |
| G         | PE50870  | CHG CARDS                   |      | 4-18-80 | WLB   |
| H         | PE62029  | CFR X TO FFBX               |      | 5-14-80 | WLB   |
| J         | PE52070  | TFGX TO WFGX                |      | "       | "     |
| K         | PE62165  | CORRECTIONS                 |      | 1-12-81 | WLB   |
| L         | DJO223-4 | MOVE RESISTOR AND CAPACITOR |      | 3-2-82  | WLB   |



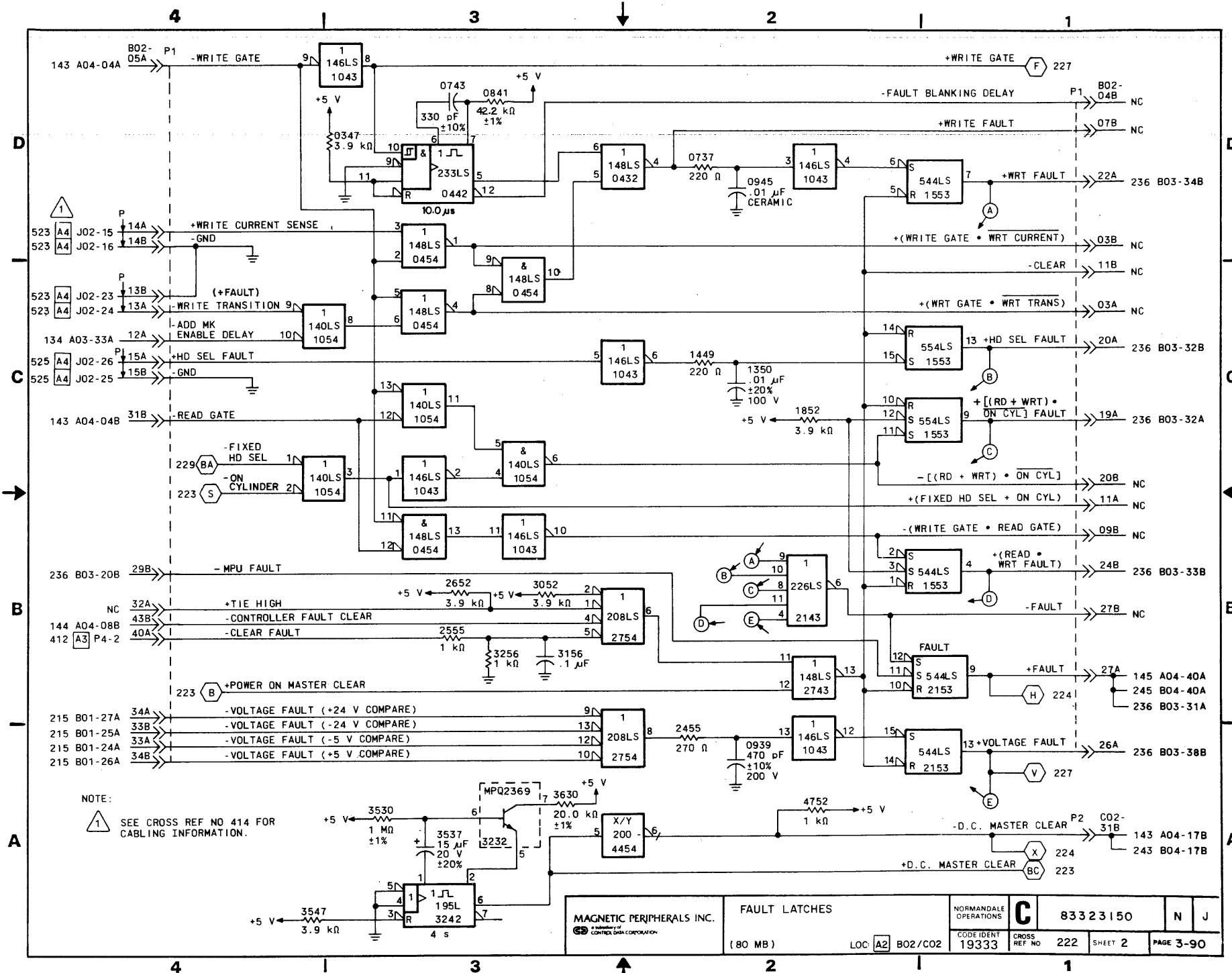
| .1 uF FILTER CAPS |      |
|-------------------|------|
| +5 V              |      |
| 5923              | 4808 |
| 6523              | 4212 |
| 6534              | 1412 |
| 4334              | 0323 |
| 3830              | 0923 |
| 1934              | 1319 |
| 1334              | 3123 |
| 4845              | 3523 |
| 4156              | 4823 |
| 4908              | 2539 |
| 0353              | 5356 |
| 5941              | 2052 |



NOTE:  
 ⚠ UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.

APPLICABLE ONLY TO 80 MB UNITS

|          |              |         |  |                          |                       |                |          |       |        |      |      |
|----------|--------------|---------|--|--------------------------|-----------------------|----------------|----------|-------|--------|------|------|
| DRAWN    | G. Bagline   | 4-9-79  | MAGNETIC PERIPHERALS INC.<br><small>3M COMPANY</small> | FAULT / CONTROL DIAGRAMS | NORMANDALE OPERATIONS | C              | 83323150 | V     | L      |      |      |
| CHECKED  | S.K. Johnson | 9/25/79 |  | TYPE: WFGX               | CODE IDENT            | CROSS REF. NO. | 221      | SHEET | 1 of 9 | PAGE | 3-89 |
| ENGINEER | D. Smith     | 5/3/79  |  | LOC                      | A2                    | B02/CO2        |          |       |        |      |      |
| APPROVED |              |         |  |                          |                       |                |          |       |        |      |      |



NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

MAGNETIC PERIPHERALS INC.  
 A subsidiary of CONTROL DATA CORPORATION

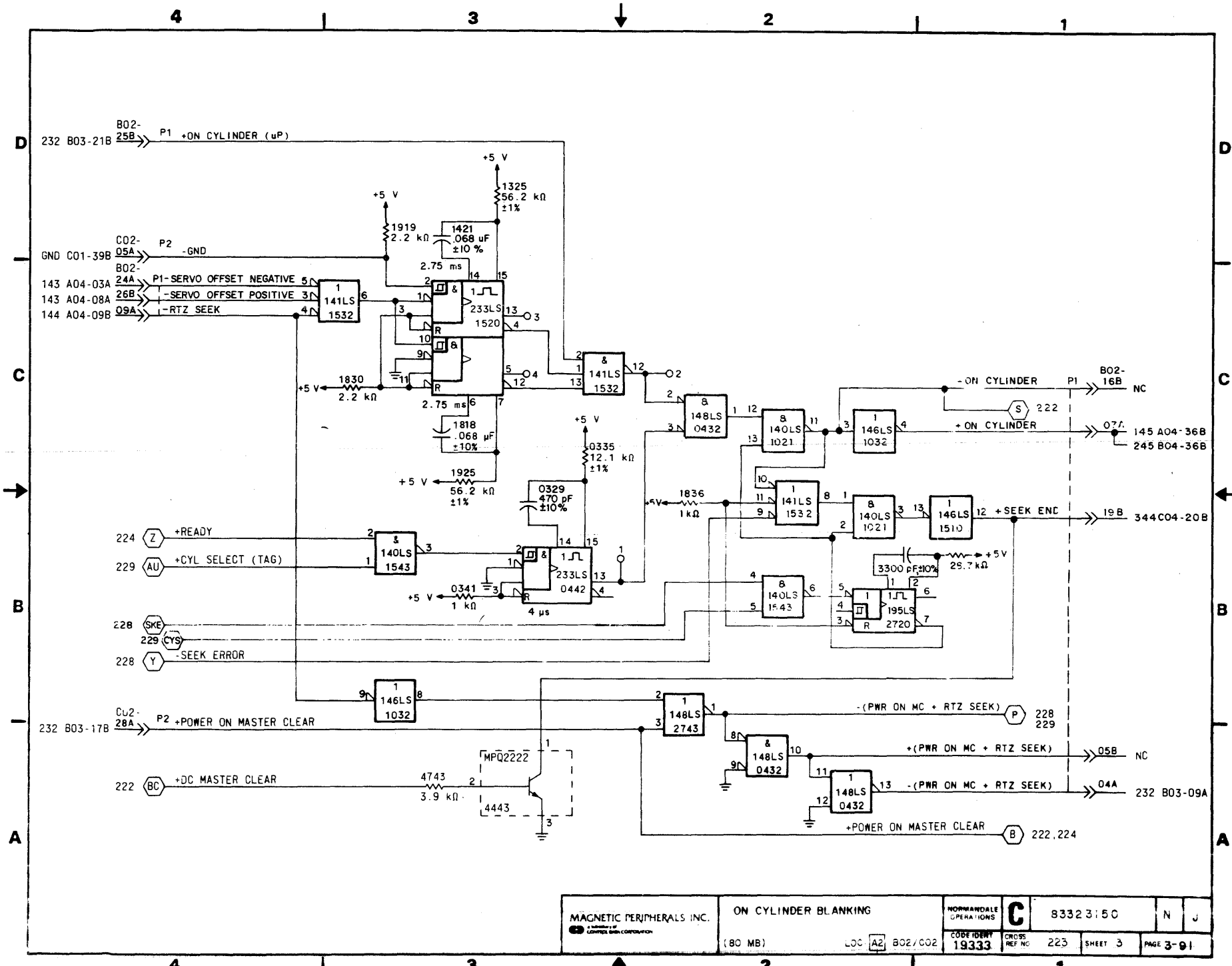
FAULT LATCHES

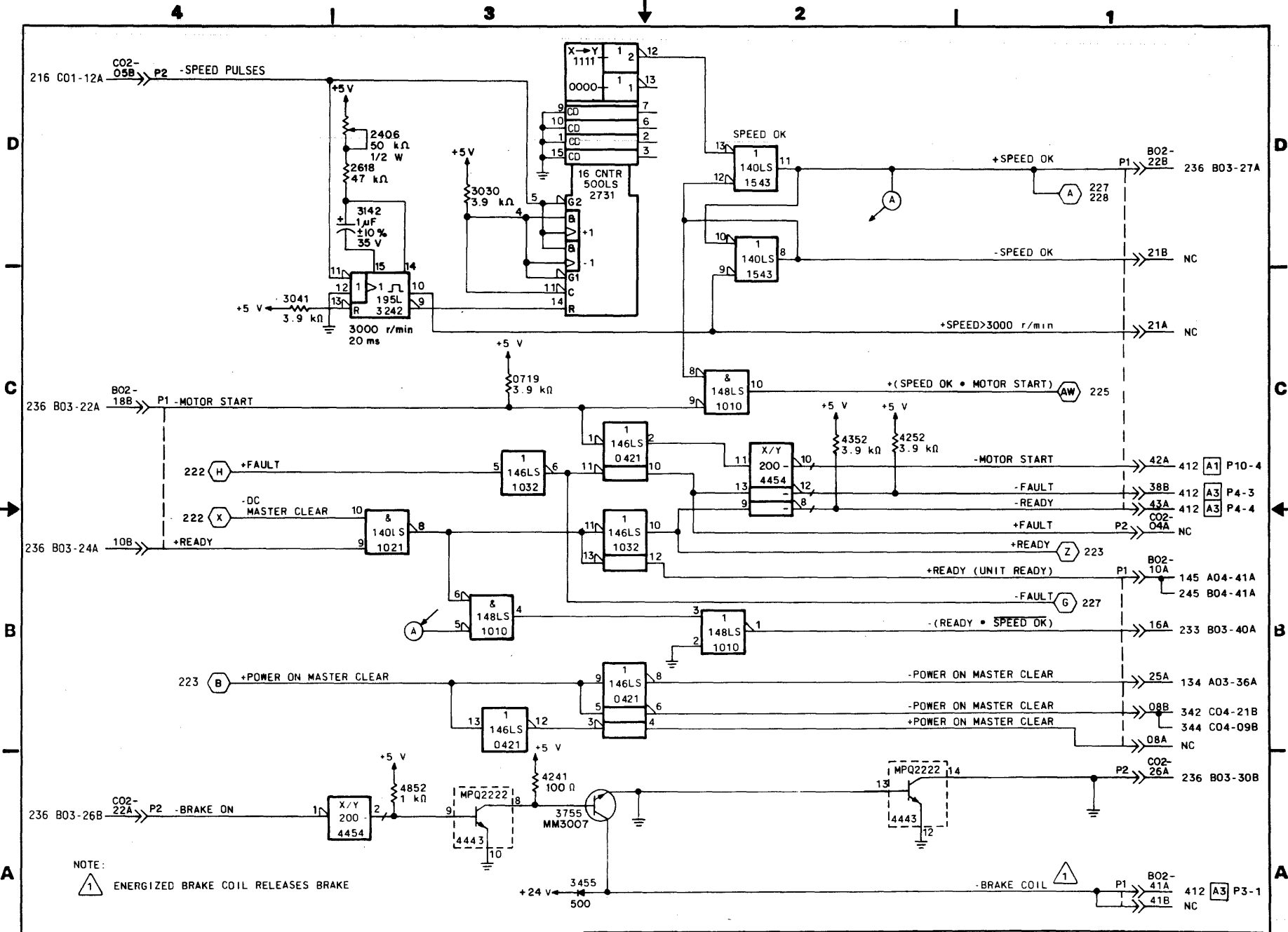
(80 MB)

LOC A2 B02/CO2

|                       |              |           |      |   |
|-----------------------|--------------|-----------|------|---|
| NORMANDALE OPERATIONS | <b>C</b>     | 833 23150 | N    | J |
| CODE IDENT            | CROSS REF NO | SHEET     | PAGE |   |
| 19333                 | 222          | 2         | 3-90 |   |





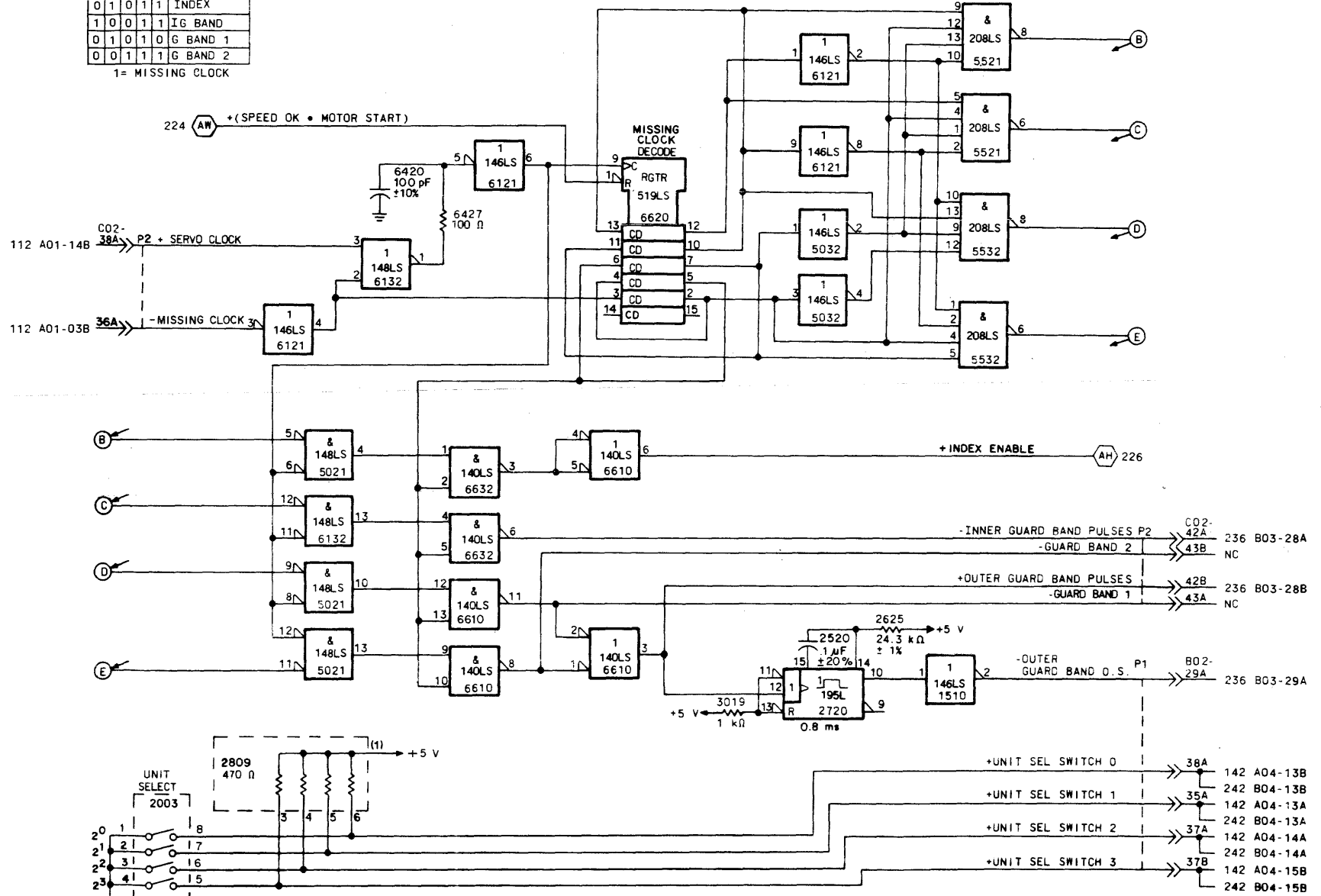


NOTE:  
 1 ENERGIZED BRAKE COIL RELEASES BRAKE

|  |   |                                      |                        |         |           |
|--|---|--------------------------------------|------------------------|---------|-----------|
| MAGNETIC PERIPHERALS INC.<br><small>A DIVISION OF CONTROL DATA CORPORATION</small> | POWER ON CONTROL AND<br>SPEED OK<br>(80 MB) | NORMANDALE<br>OPERATIONS<br><b>C</b> | 83323150               | N       | J         |
|  | LOC: A2 B02/CO2                             | CODE IDENT<br>19333                  | CROSS<br>REF NO<br>224 | SHEET 4 | PAGE 3-92 |

| MISSING CLOCK DECODER |   |   |   |          |
|-----------------------|---|---|---|----------|
| 0                     | 1 | 0 | 1 | INDEX    |
| 1                     | 0 | 0 | 1 | IG BAND  |
| 0                     | 1 | 0 | 1 | G BAND 1 |
| 0                     | 0 | 1 | 1 | G BAND 2 |

1= MISSING CLOCK



4

3

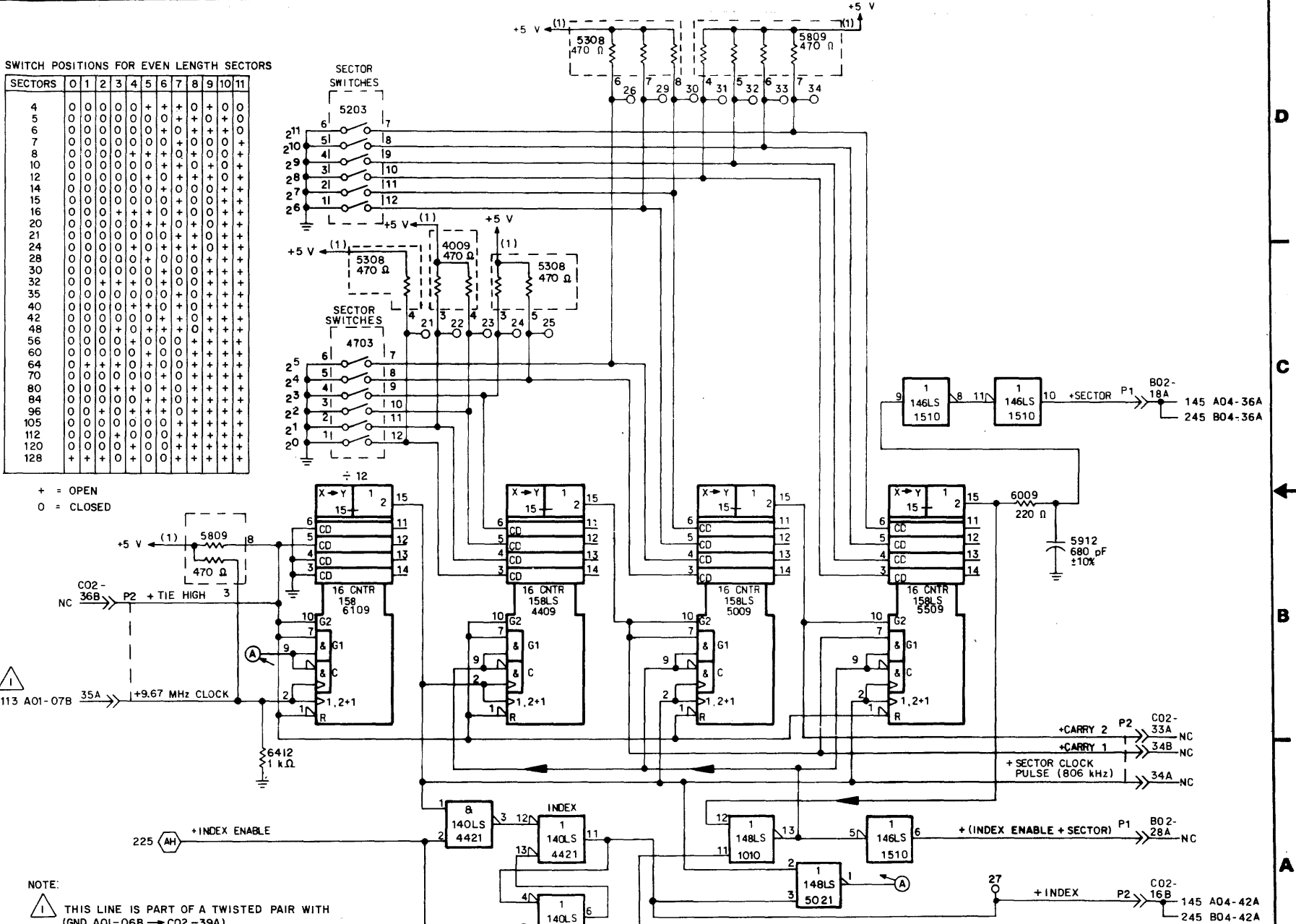
2

1

SWITCH POSITIONS FOR EVEN LENGTH SECTORS

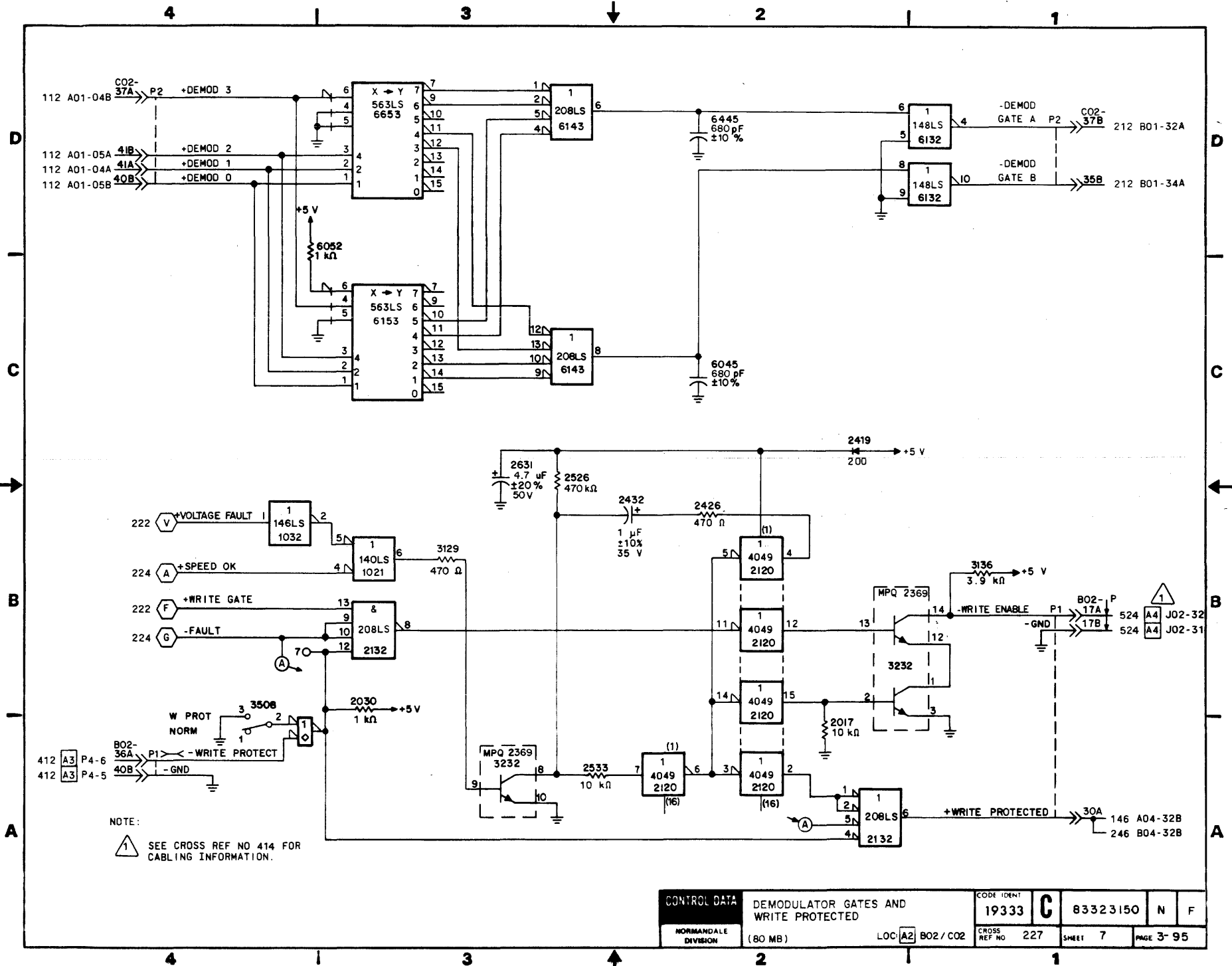
| SECTORS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---------|---|---|---|---|---|---|---|---|---|---|----|----|
| 4       | 0 | 0 | 0 | 0 | + | + | + | + | + | 0 | 0  | 0  |
| 5       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 6       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 7       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 8       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 10      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 12      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 14      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 15      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 16      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 20      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 21      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 24      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 28      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 30      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 32      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 35      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 40      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 42      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 48      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 56      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 60      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 64      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 70      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 80      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 84      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 96      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 105     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 112     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 120     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 128     | + | + | + | + | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |

+ = OPEN  
0 = CLOSED



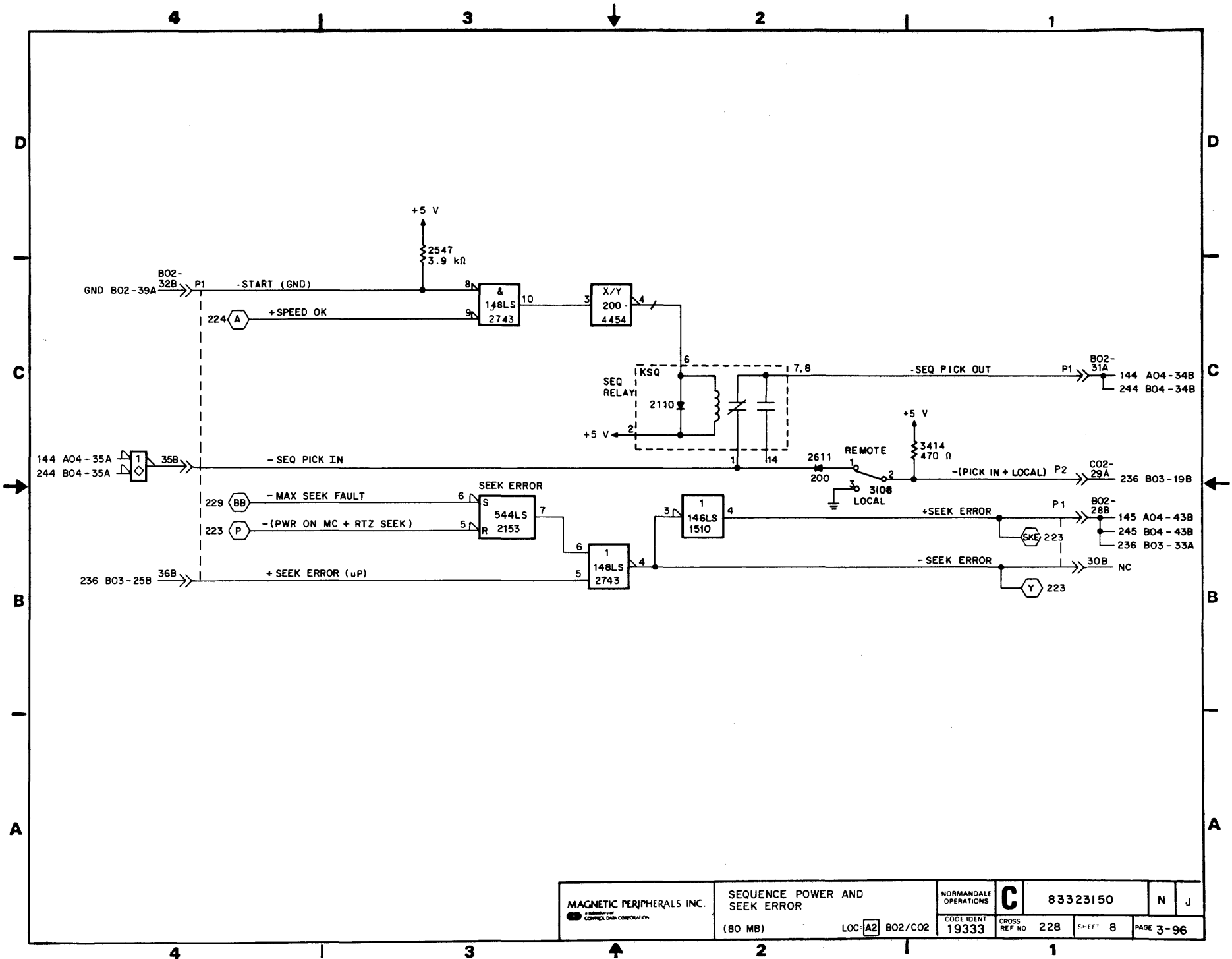
NOTE:  
THIS LINE IS PART OF A TWISTED PAIR WITH (GND A01-06B → CO2-39A)

|                                      |                |         |                     |   |          |   |   |
|--------------------------------------|----------------|---------|---------------------|---|----------|---|---|
| CONTROL DATA<br>NORMANDEALE DIVISION | SECTOR COUNTER |         | CODE IDENT<br>19333 | C | 83323150 | N | K |
|                                      | (80 MB)        | LOC: A2 | BO2/CO2             |   |          |   |   |

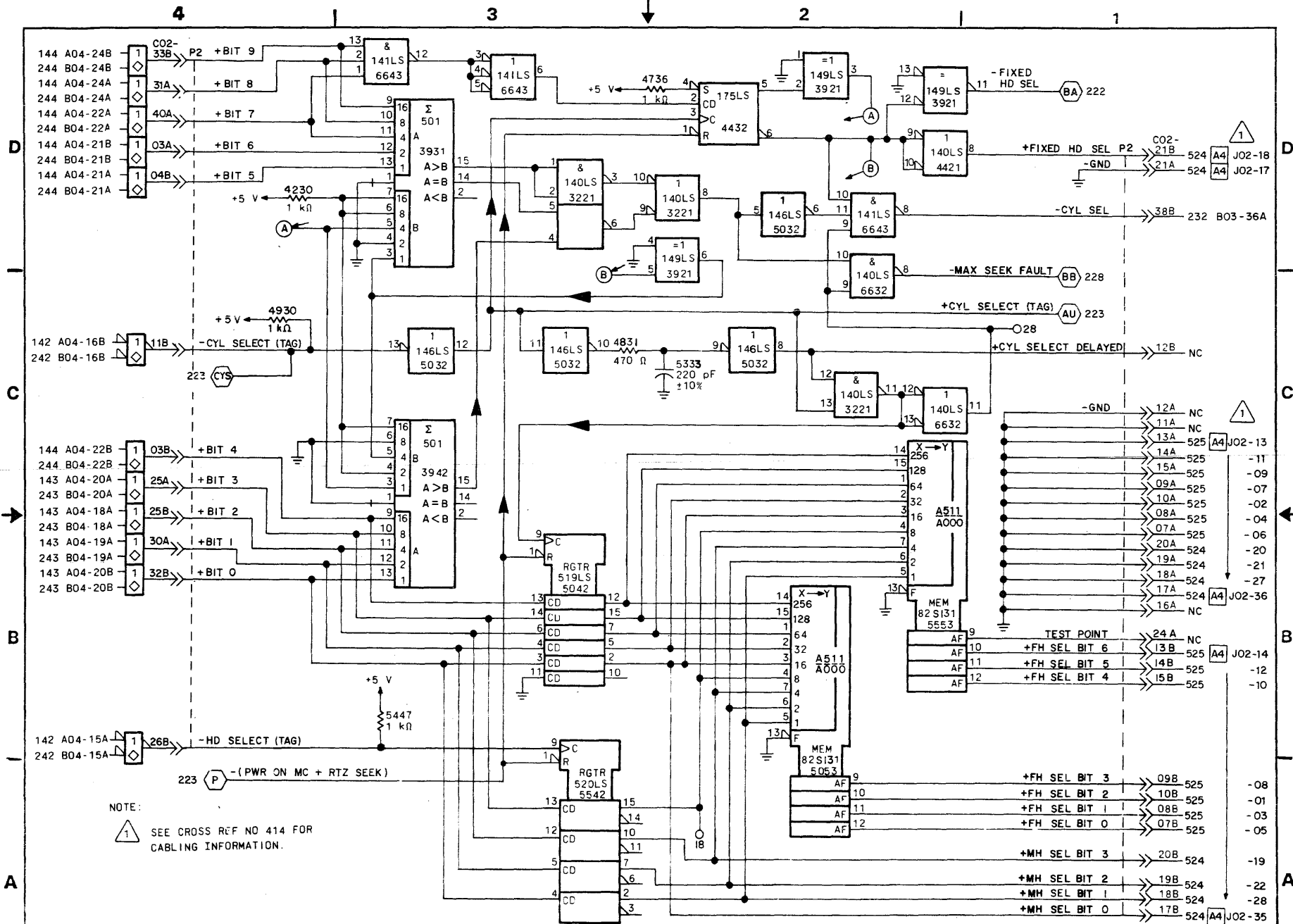


|              |                                       |            |              |     |          |   |      |
|--------------|---------------------------------------|------------|--------------|-----|----------|---|------|
| CONTROL DATA | DEMODULATOR GATES AND WRITE PROTECTED | CODE IDENT | 19333        | C   | 83323150 | N | F    |
|              | NORMANDEALE DIVISION                  | (80 MB)    | CROSS REF NO | 227 | SHEET    | 7 | PAGE |

LOC: A2 B02 / C02



|   |   |                            |                                   |                 |                  |          |
|---|---|----------------------------|-----------------------------------|-----------------|------------------|----------|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>a subsidiary of</small><br><b>CONTECH DATA CORPORATION</b> | <b>SEQUENCE POWER AND SEEK ERROR</b><br>(80 MB) |                            | NORMANDALE OPERATIONS<br><b>C</b> | <b>83323150</b> | <b>N</b>         | <b>J</b> |
|   | LOC: <b>A2</b> B02/C02                          | CODE IDENT<br><b>19333</b> | CROSS REF NO<br><b>228</b>        | SHEET <b>8</b>  | PAGE <b>3-96</b> |          |



NOTE:  
 △ SEE CROSS REF NO 414 FOR  
 CABLING INFORMATION.





| RÉVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |   |
|---------------------------|---|---|---|---|---|---|---|---|---|
| 1                         | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| A                         | A | A | A | A | A | - | A | A | A |
| B                         | B | B | B | B | A | - | B | A | A |
| C                         | C | C | B | C | A | - | C | A | A |
| D                         | C | C | B | C | A | - | D | A | A |
| E                         | E | C | B | E | A | - | E | A | A |
| F                         | F | C | F | E | A | - | E | A | A |
| G                         | G | C | G | E | A | G | E | G | G |
| H                         | G | H | G | E | A | G | E | G | G |

UNUSED RESISTOR PACKS

| LOCATION | PIN(S)        |
|----------|---------------|
| 2809     | 2, 7, 8       |
| 4009     | 2, 5, 6, 7, 8 |
| 5308     | 2             |
| 5809     | 2             |

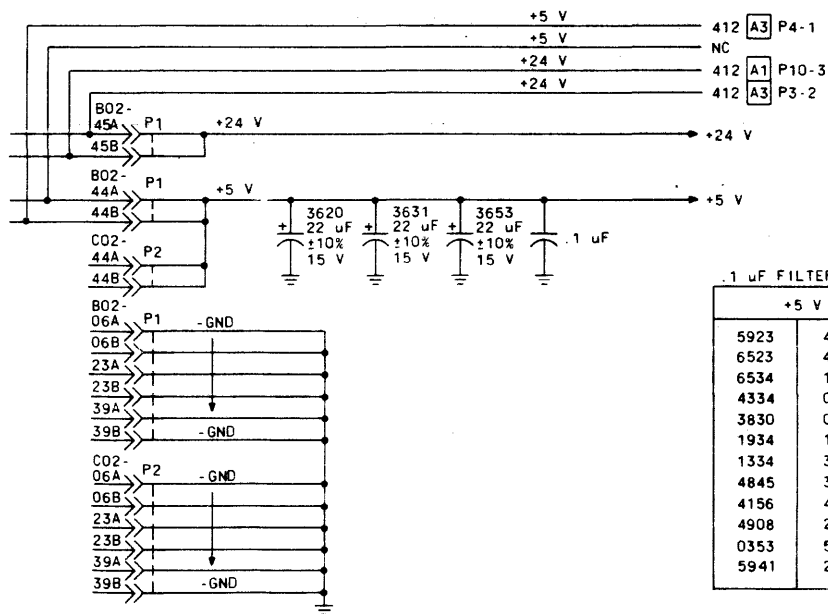
UNUSED TRANSISTOR PACKS

| TYPE    | LOCATION | PIN(S)  |
|---------|----------|---------|
| MPQ2222 | 4443     | 5, 6, 7 |

UNUSED LOGIC ELEMENTS

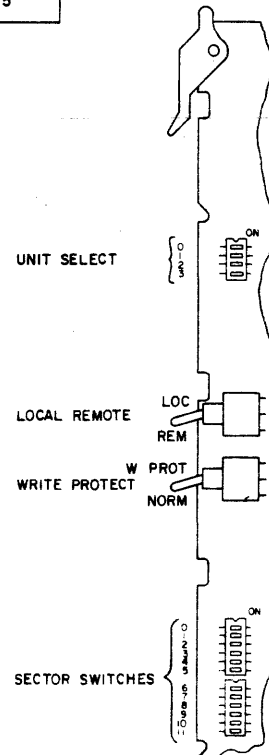
| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 146 LS  | F121     | 10, 12        |
| 149 LS  | 3921     | 8             |
| 175 LS  | 4432     | 8, 9          |
| 554 LS  | 2153     | 4             |
| 4049    | 2120     | 10            |
| 226 LS  | 2143     | 5             |


| REVISIONS |          |                   |      |          |       |
|-----------|----------|-------------------|------|----------|-------|
| REV.      | ECC      | DESCRIPTION       | DWGT | DATE     | CHK'D |
| A         | PE23000  | RELEASED          | FD   | 12/4/82  |       |
| B         | PE49146  | CORRECT LOGIC CIA | MA   |          | MA    |
| C         | PE50681  | FXG COMP CHGS     | CB   |          |       |
| D         | PE50681A | FXG COMP CHGS     | TH   | 12/28/82 |       |
| E         | PE50705  | CORREC LD         | TH   | 1/17/83  |       |
| F         | PE50870  | CHG CARDS         | CB   | 1/21/83  |       |
| G         | PE62084  | SFGX TO XFGX      | TH   | 5-26-83  |       |
| H         | DJ02199  | CORRECTION        | MJ   | 11-6-82  |       |



.1 uF FILTER CAPS

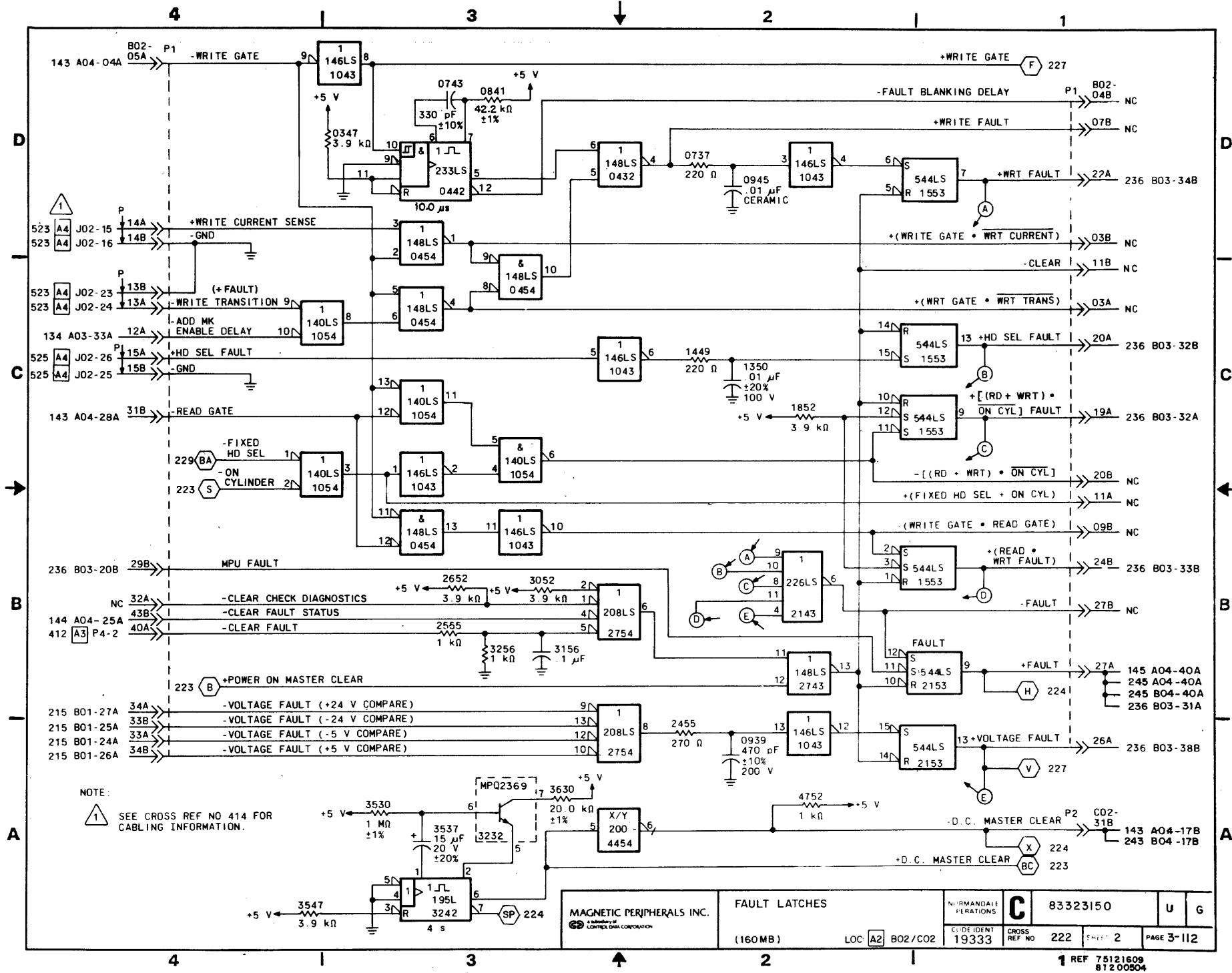
| +5 V |      |
|------|------|
| 5923 | 4808 |
| 6523 | 4212 |
| 6534 | 1412 |
| 4334 | 0323 |
| 3830 | 0923 |
| 1934 | 1319 |
| 1334 | 3123 |
| 4845 | 3523 |
| 4156 | 4823 |
| 4908 | 2539 |
| 0353 | 5356 |
| 5941 | 2052 |



NOTE:  
 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.

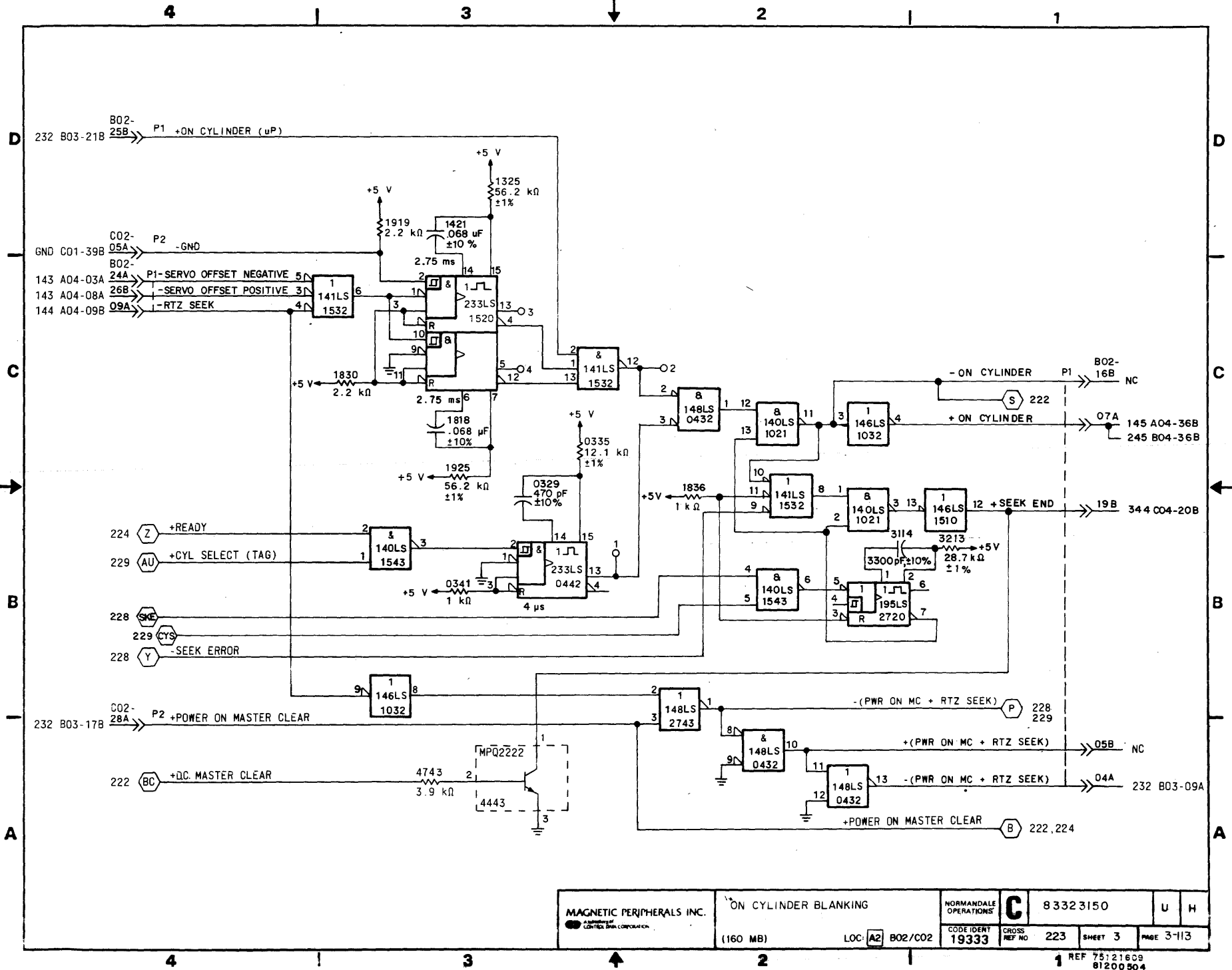
APPLICABLE ONLY TO 160MB UNITS

|      |          |  |                          |                      |            |          |              |     |       |        |      |
|------|----------|--|--------------------------|----------------------|------------|----------|--------------|-----|-------|--------|------|
| RAWN | G. Raine | MAGNETIC PERIPHERALS INC.<br>A MEMBER OF<br>COMPTON DATA CORPORATION | FAULT / CONTROL DIAGRAMS | NORMAN DALE PERNAULT | C          | 83323150 | U            | H   |       |        |      |
| REV. |          |  | TYPE: XFGX               | LOC: A21 B02/CO2     | CODE IDENT | 19333    | CROSS REF NO | 221 | SHEET | 1 of 9 | PAGE |

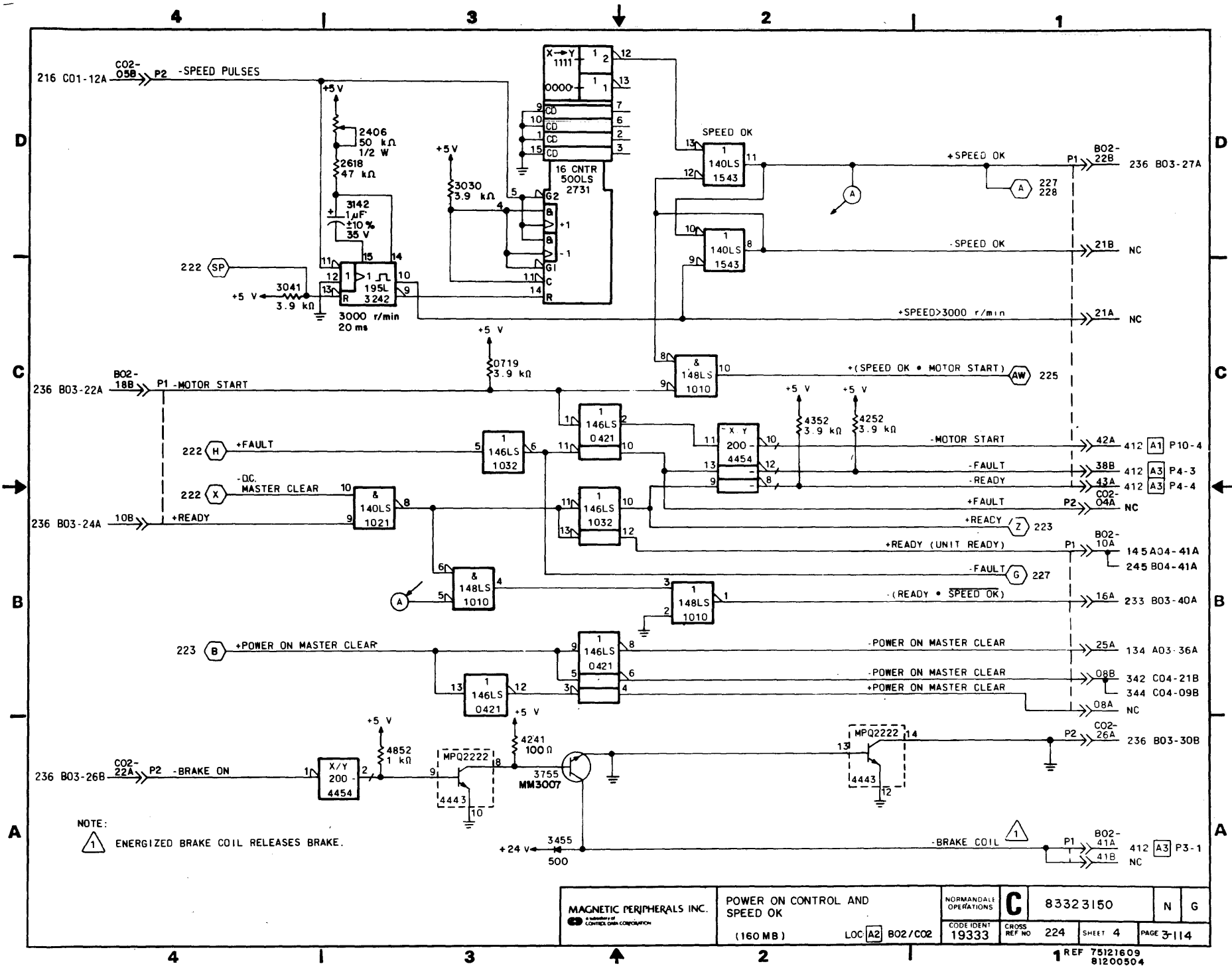


NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

|   |                          |                       |   |                     |         |
|---|--------------------------|-----------------------|---|---------------------|---------|
| MAGNETIC PERIPHERALS INC.<br><small>A member of<br/>   CONTROL DATA CORPORATION</small> | FAULT LATCHES<br>(160MB) | LOC <b>A2</b> B02/CO2 | NUMERICAL IDENTIFICATION<br><b>C</b> 83323150 | U                   | G       |
|   |                          |                       | CODE IDENT<br>19333                           | CROSS REF NO<br>222 | SHEET 2 |



|   |                      |                 |   |          |            |   |
|---|----------------------|-----------------|---|----------|------------|---|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>CONTROL DATA CORPORATION</small> | ON CYLINDER BLANKING |                 | <b>C</b><br>NORMANDALE OPERATIONS<br>CODE IDENT 19333<br>CROSS REF NO 223 | 83323150 | U          | H |
|   | (160 MB)             | LOC: A2 B02/C02 |   | SHEET 3  | PAGE 3-113 |   |

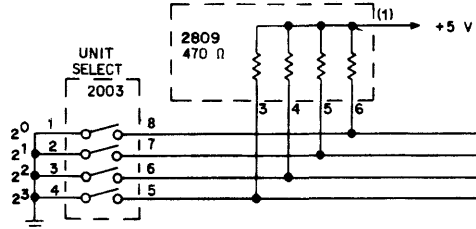
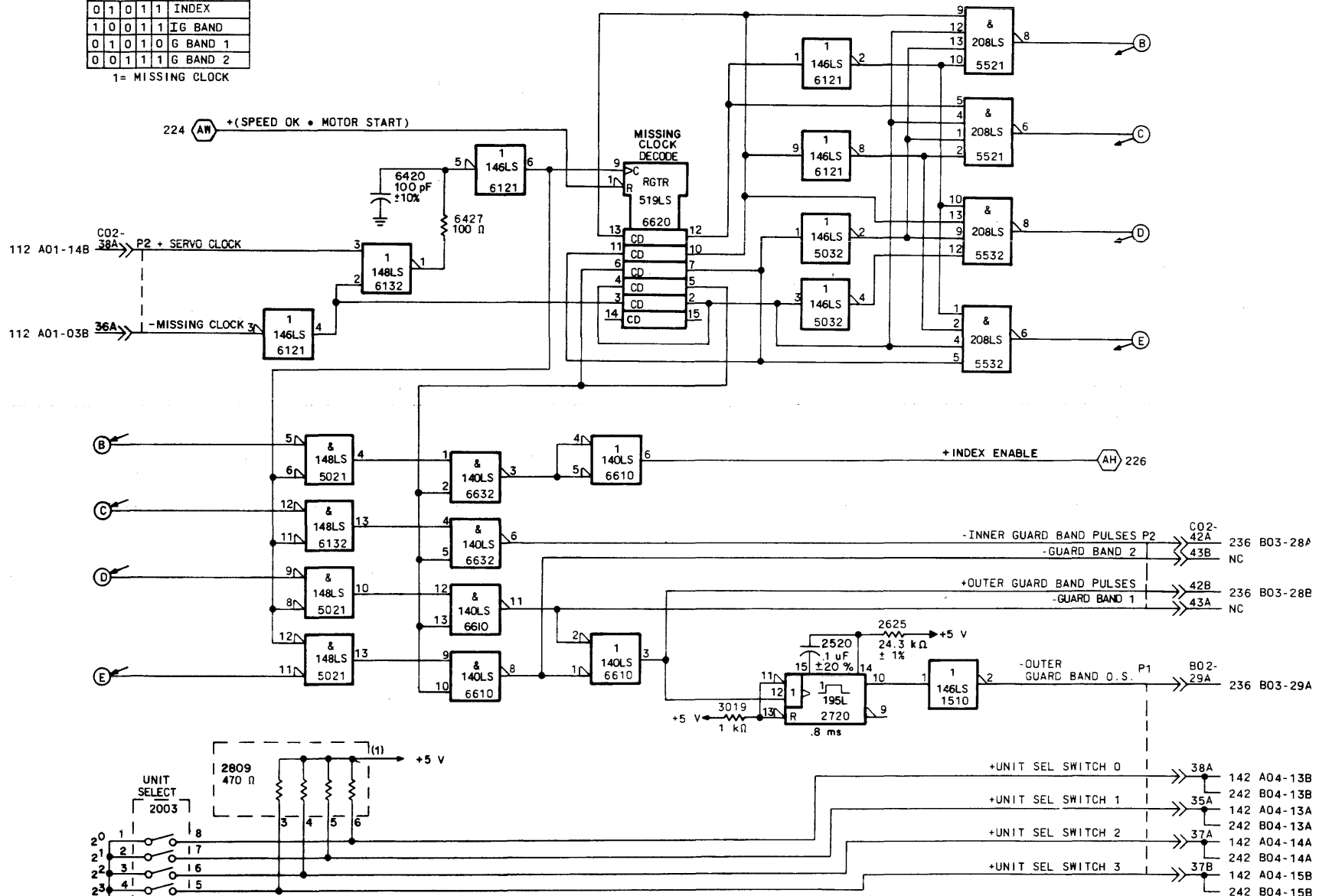


NOTE:  
 ⚠ ENERGIZED BRAKE COIL RELEASES BRAKE.

|  |  |                  |                                   |          |            |   |
|--|--|------------------|-----------------------------------|----------|------------|---|
| MAGNETIC PERIPHERALS INC.<br><small>a subsidiary of CONTROL DATA CORPORATION</small> | <b>POWER ON CONTROL AND SPEED OK</b><br>(160 MB) |                  | NORMANDALE OPERATIONS<br><b>C</b> | 83323150 | N          | G |
|  | LOC <b>A2</b> B02/CO2                            | CODE IDENT 19333 | CROSS REF NO 224                  | SHEET 4  | PAGE 3-114 |   |

| MISSING CLOCK DECODER |   |   |   |          |
|-----------------------|---|---|---|----------|
| 0                     | 1 | 0 | 1 | INDEX    |
| 1                     | 0 | 0 | 1 | IG BAND  |
| 0                     | 1 | 0 | 1 | G BAND 1 |
| 0                     | 0 | 1 | 1 | G BAND 2 |

1 = MISSING CLOCK

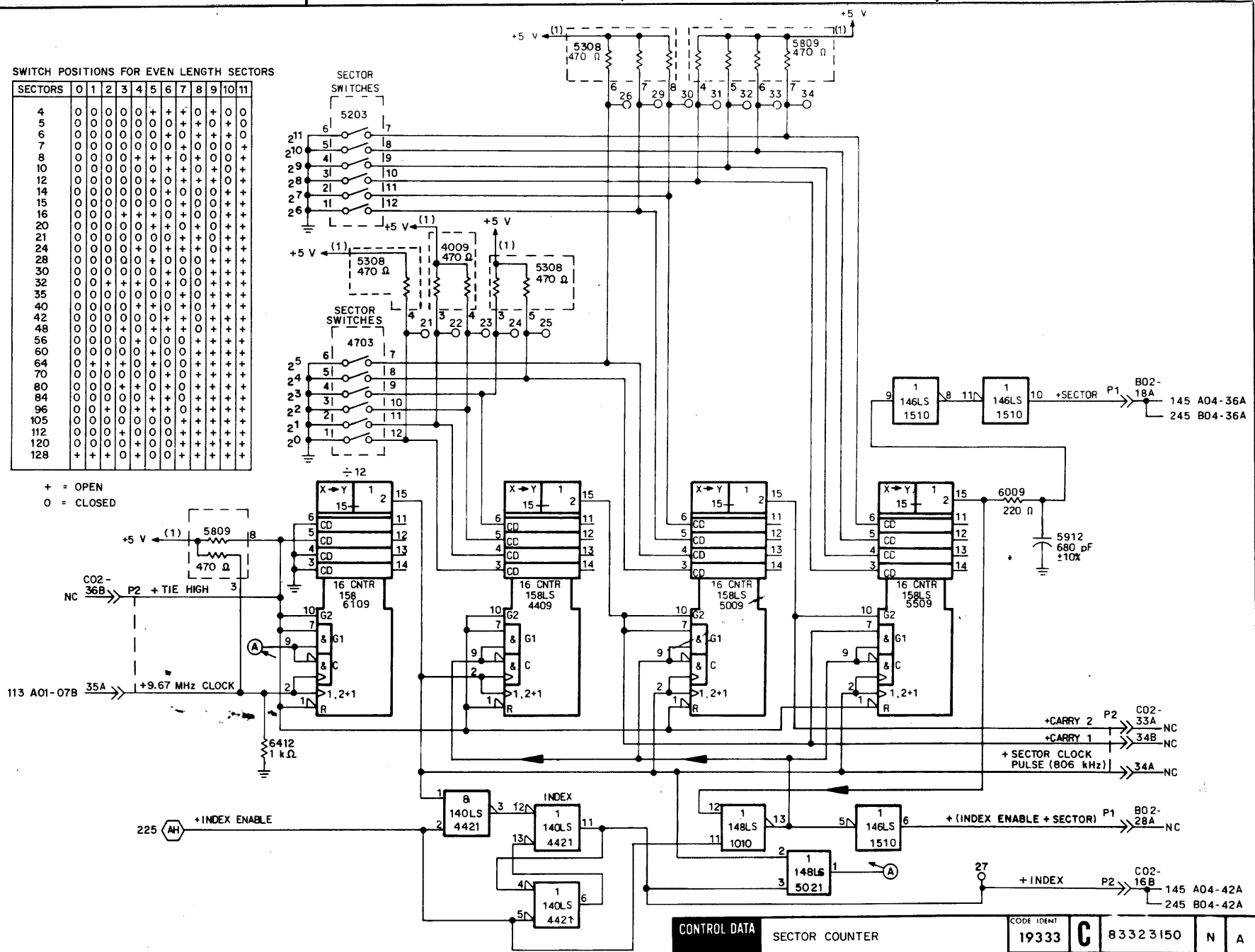


|                      |                           |         |            |                  |         |            |
|----------------------|---------------------------|---------|------------|------------------|---------|------------|
| CONTR. DATA          | GUARD BANDS / UNIT SELECT |         | CODE IDENT | 83323150         | N       | E          |
|                      | 19333                     | C       |            |                  |         |            |
| NORMANDEALE DIVISION | (160 MB)                  | LOC: A2 | B02/CO2    | CROSS REF NO 225 | SHEET 5 | PAGE 3-115 |

SWITCH POSITIONS FOR EVEN LENGTH SECTORS

| SECTORS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---------|---|---|---|---|---|---|---|---|---|---|----|----|
| 4       | 0 | 0 | 0 | 0 | + | + | + | + | 0 | + | 0  | 0  |
| 5       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 6       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 7       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 8       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 10      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 12      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 14      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 15      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 16      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 20      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 21      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 24      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 28      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 30      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 32      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 35      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 40      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 42      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 48      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 56      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 60      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 64      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 70      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 80      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 84      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 96      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 105     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 112     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 120     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 128     | + | + | + | + | + | + | + | + | + | + | +  | +  |

+ = OPEN  
0 = CLOSED



APPLICABLE ONLY TO UNITS WITHOUT LONG LAST SECTOR.

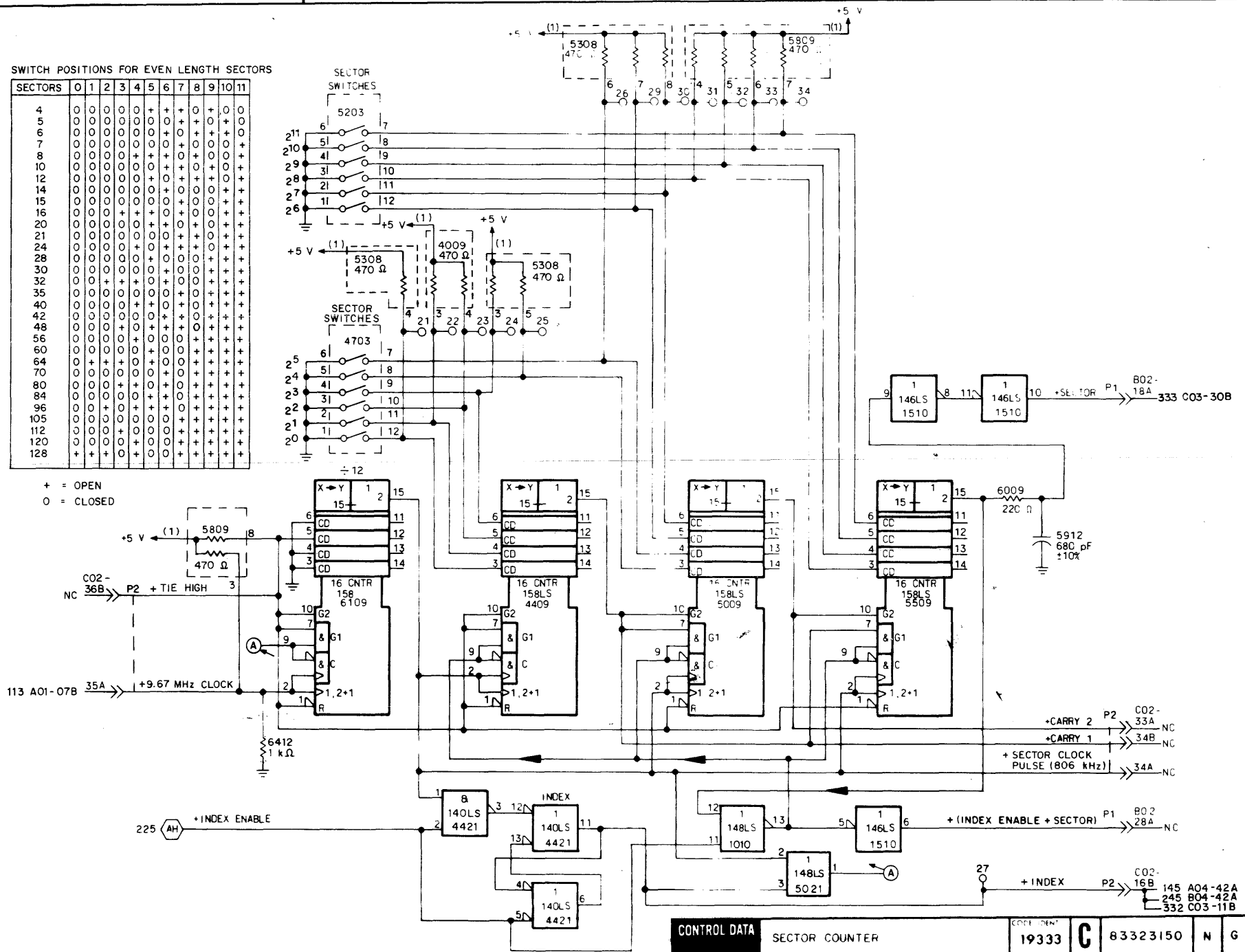
|              |                      |          |              |     |          |   |      |       |
|--------------|----------------------|----------|--------------|-----|----------|---|------|-------|
| CONTROL DATA | SECTOR COUNTER       |          | CODE IDENT   | C   | 83323150 | N | A    |       |
|              | NORMANDEALE DIVISION | (160 MB) | 19333        |     |          |   |      |       |
|              |                      |          | CROSS REF NO | 226 | SHEET    | 6 | PAGE | 3-116 |

LOC: A2 B02/CO2 REF 75121609

SWITCH POSITIONS FOR EVEN LENGTH SECTORS

| SECTORS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---------|---|---|---|---|---|---|---|---|---|---|----|----|
| 4       | 0 | 0 | 0 | 0 | + | + | + | + | + | + | 0  | 0  |
| 5       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 6       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 7       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 8       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 10      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 12      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 14      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 15      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 16      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 20      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 21      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 24      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 28      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 30      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 32      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 35      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 40      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 42      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 48      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 56      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 60      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 64      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 70      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 80      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 84      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 96      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 105     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 112     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 120     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |
| 128     | + | + | + | + | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  |

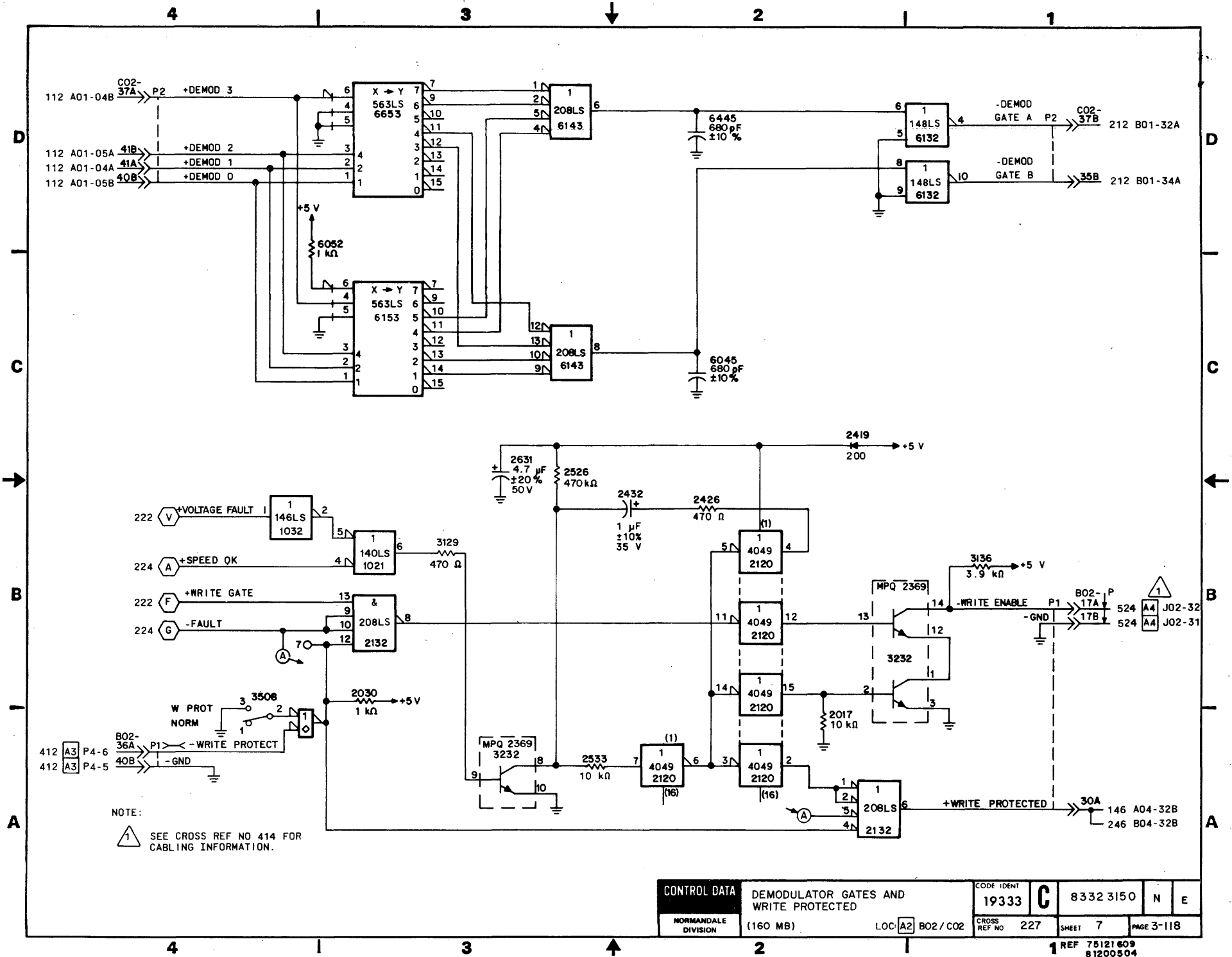
+ = OPEN  
0 = CLOSED



APPLICABLE ONLY TO UNITS WITH LONG LAST SECTOR.

|                     |  |                |  |                    |   |          |            |   |   |
|---------------------|--|----------------|--|--------------------|---|----------|------------|---|---|
| <b>CONTROL DATA</b> |  | SECTOR COUNTER |  | CODE NO. 19333     | C | 83323150 |            | N | G |
| NORMANDELE DIVISION |  | (160 MB)       |  | CROSS REF. NO. 226 |   | SHEET 6  | PAGE 3-117 |   |   |

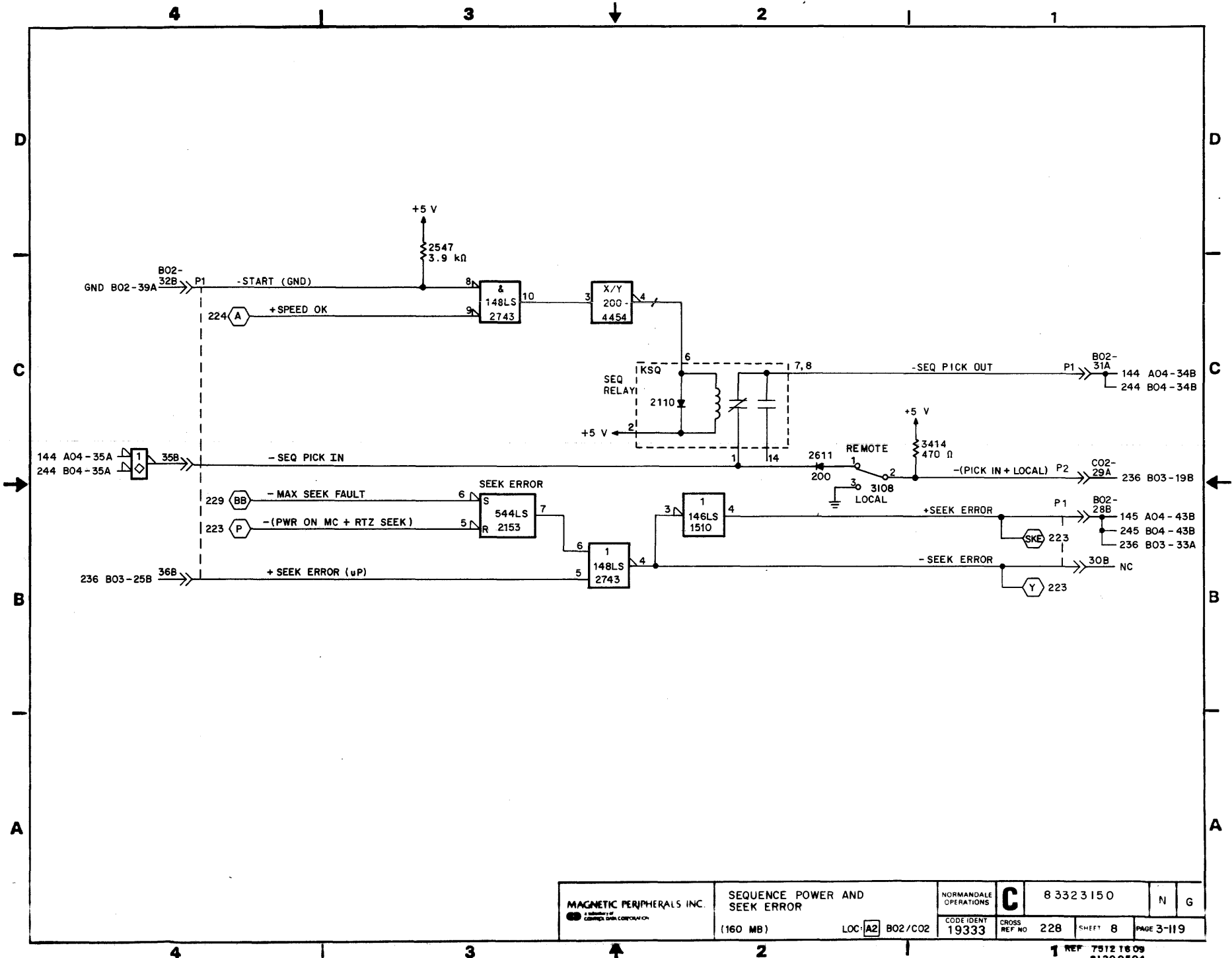
REF: 81200504

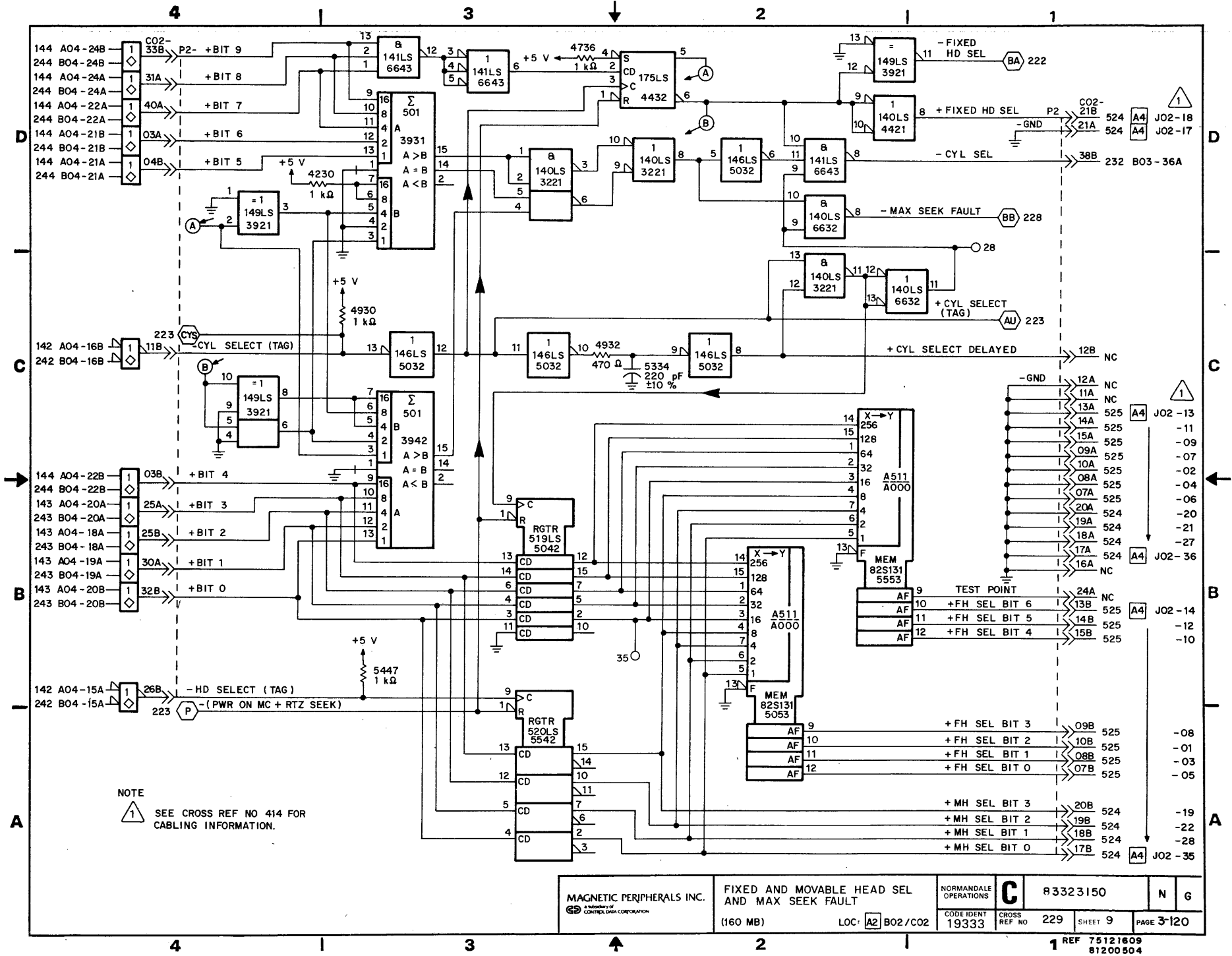


NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

|                     |  |                                       |                   |                  |          |            |   |   |
|---------------------|--|---------------------------------------|-------------------|------------------|----------|------------|---|---|
| <b>CONTROL DATA</b> |  | DEMODULATOR GATES AND WRITE PROTECTED |                   | CODE IDENT       | <b>C</b> | 8332 3150  | N | E |
| NORMANDALE DIVISION |  | (160 MB)                              | LOC: A2 B02 / CO2 | CROSS REF NO 227 |          |            |   |   |
|                     |  |                                       |                   |                  | SHEET 7  | PAGE 3-118 |   |   |







NOTE  
 1 SEE CROSS REF NO 414 FOR  
 CABLING INFORMATION.

|   |  |  |  |  |                                    |                     |   |   |  |
|---|--|--|--|--|------------------------------------|---------------------|---|---|--|
| MAGNETIC PERIPHERALS INC.<br><small>A subsidiary of<br/>   CONTROL DATA CORPORATION</small> |  | FIXED AND MOVABLE HEAD SEL<br>AND MAX SEEK FAULT<br>(160 MB)                      LOC: <u>A2</u> B02 / C02 |  | NORMANDAILE<br>OPERATIONS<br>CODE IDENT<br>19333 | <b>C</b><br>CROSS<br>REF NO<br>229 | 83323150<br>SHEET 9 | N | G |  |
|   |  |  |  | 1 REF 75121609<br>81200504                       |                                    | PAGE 3-120          |   |   |  |

REVISION STATUS OF SHEETS

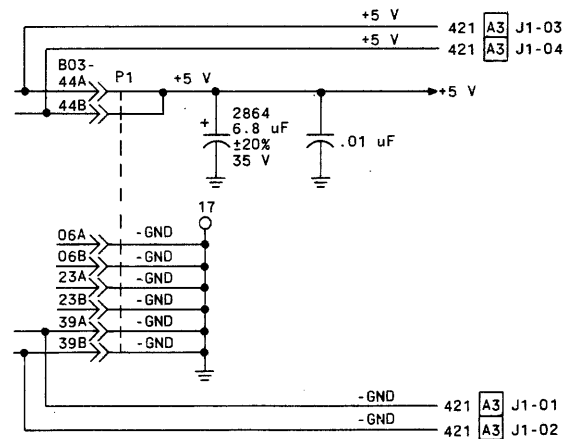
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|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | B | B | A | A | B |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | C | B | A | C | C |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D | C | B | A | C | C |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E | C | B | A | C | C |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| F | C | B | A | C | C |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| G | C | B | A | C | G |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| H | C | B | A | C | G |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 148     | 0409     | 1, 10, 13     |

REVISIONS

| REV | ECO     | DESCRIPTION            | DRFT | DATE     | CHK'D |
|-----|---------|------------------------|------|----------|-------|
| A   | PE23000 | RELEASED               |      |          |       |
| B   | PE49146 | CORRECT LOGIC DIA      | TH   | 7-25-79  |       |
| C   | PE50705 | CORRECTIONS            |      |          |       |
| D   | PE50659 | SERVO OVERSHOOT        |      |          |       |
| E   | PE50729 | DESIGN IMPROVEMENT     |      |          |       |
| F   | PE50630 | IMPROVE ACCESS MARGINS | MF   | 8-15-80  |       |
| G   | PE62127 | ADD GND WIRE           | MF   | 11-25-80 |       |
| H   | PE62142 | MJBX TO VJBX           |      | 3-18-81  |       |



.01 uF FILTER CAPS

| +5 V |
|------|
| 0309 |
| 0225 |
| 1062 |
| 2558 |
| 0820 |
| 1512 |
| 3229 |
| 1931 |
| 0529 |
| 1420 |
| 3123 |

|          |               |         |
|----------|---------------|---------|
| DRAWN    | G. KABINE     | 4/3/79  |
| CHECKED  | S. R. Johnson | 4/19/79 |
| ENGINEER | J. E. ...     | 5/1/79  |
| APPROVED |               |         |

MAGNETIC PERIPHERALS INC.  
A subsidiary of  
CONTROL DATA CORPORATION

MICROPROCESSOR CONTROL  
DIAGRAMS

TYPE: RMBX/VJBX

LOC: A2 B03

NORMANDE  
OPERATIONS

C

8332315C

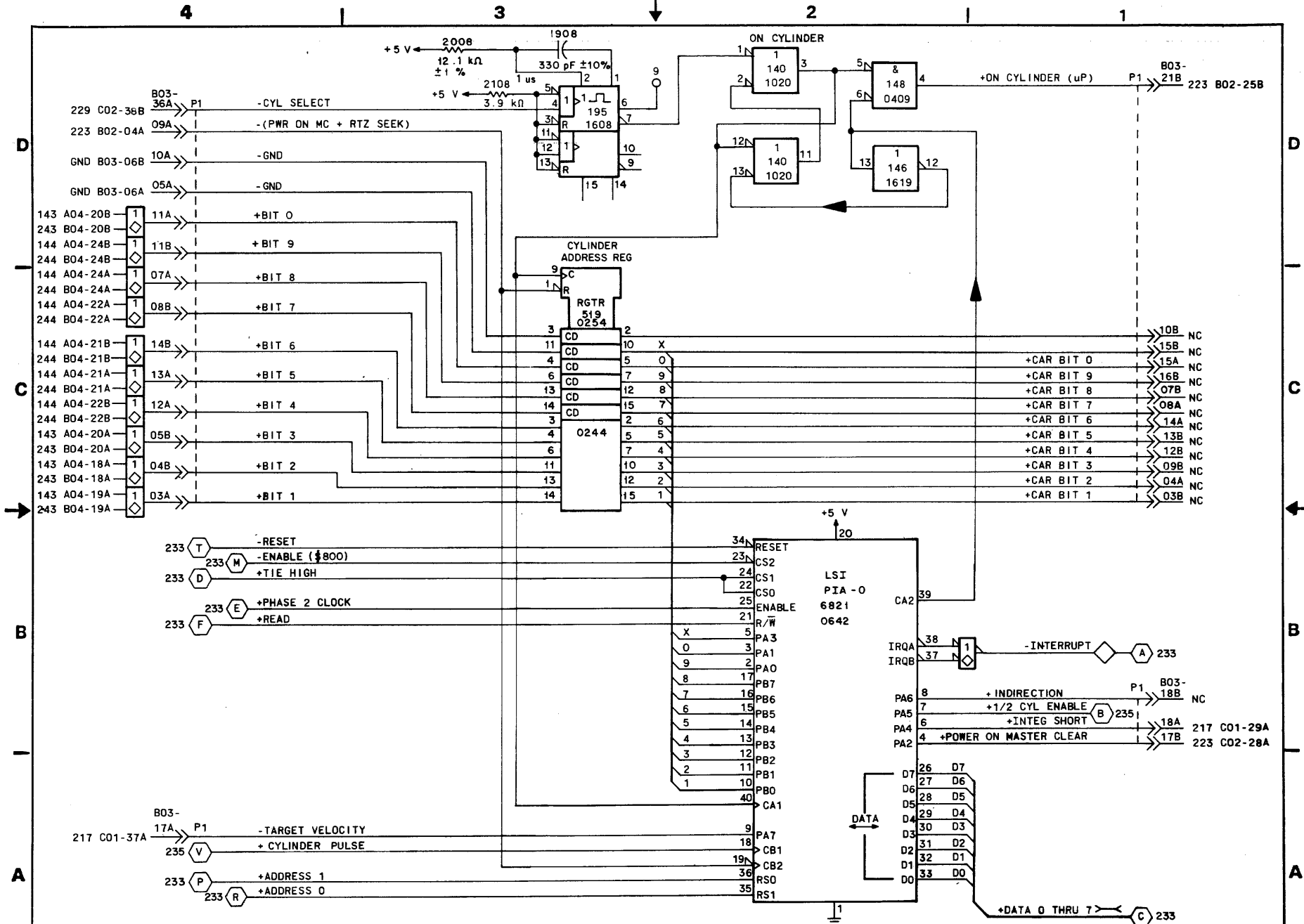
S H

CODE IDENT  
19333

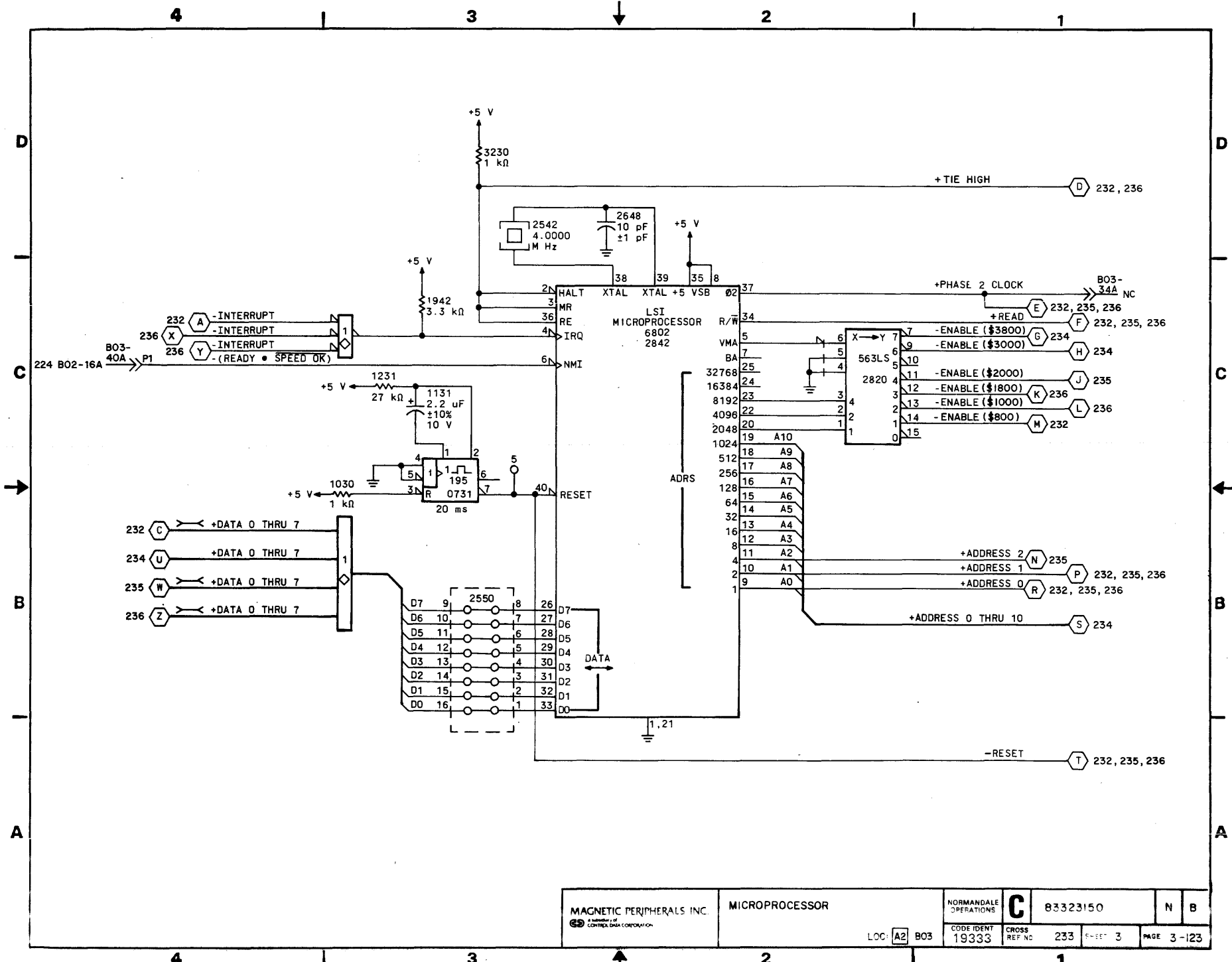
CROSS  
REF NO 231

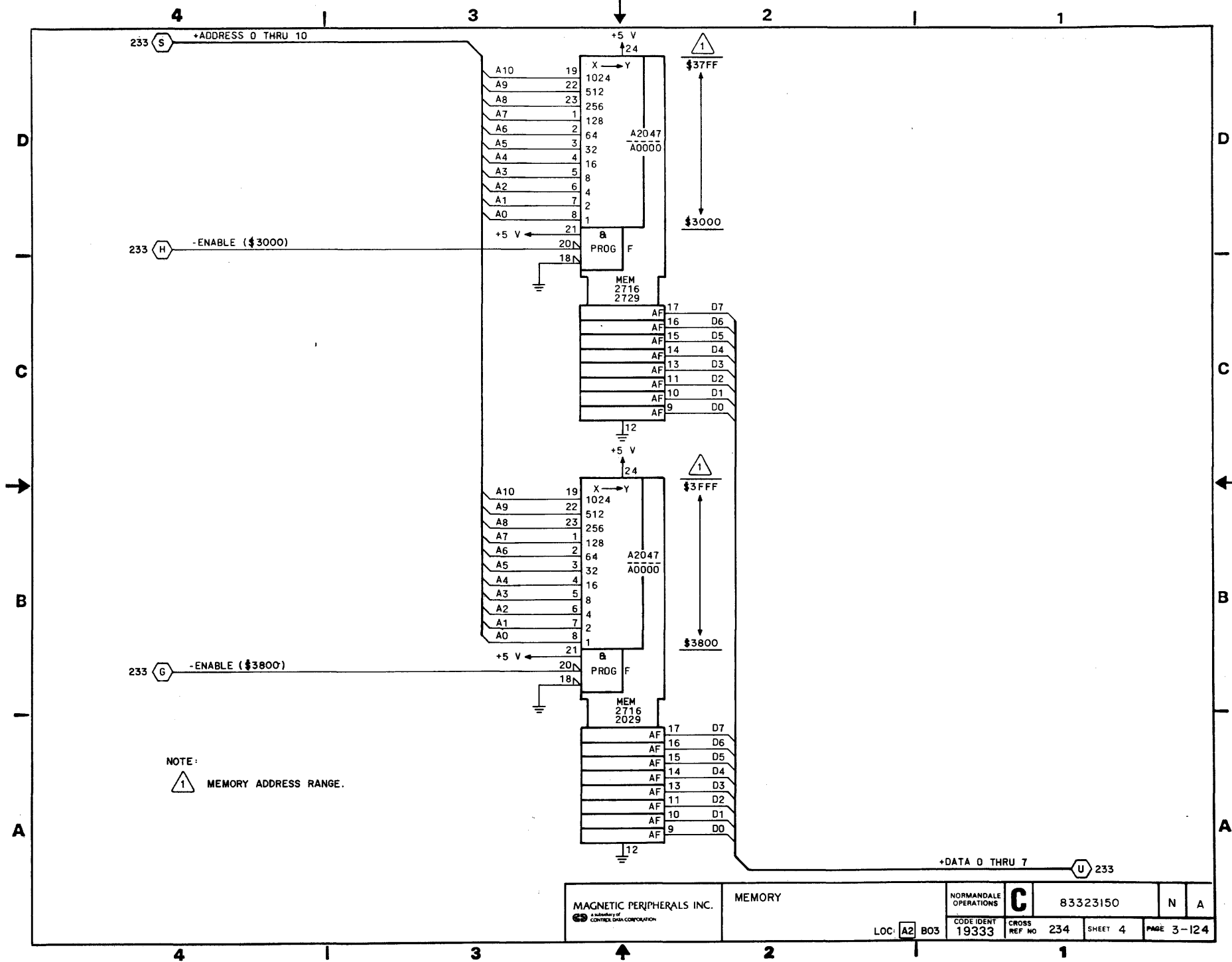
SHEET  
1 OF 6

PAGE  
3-121

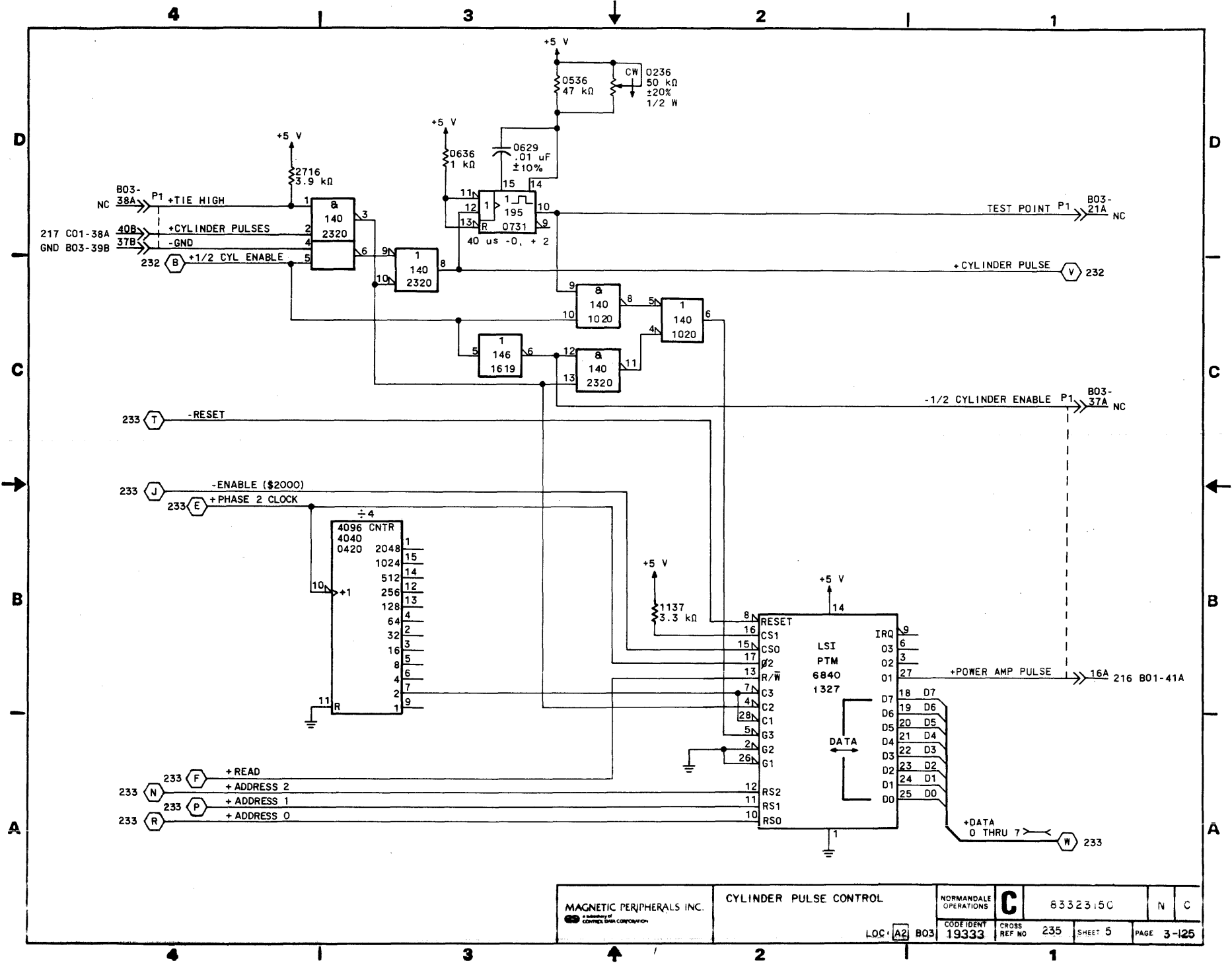


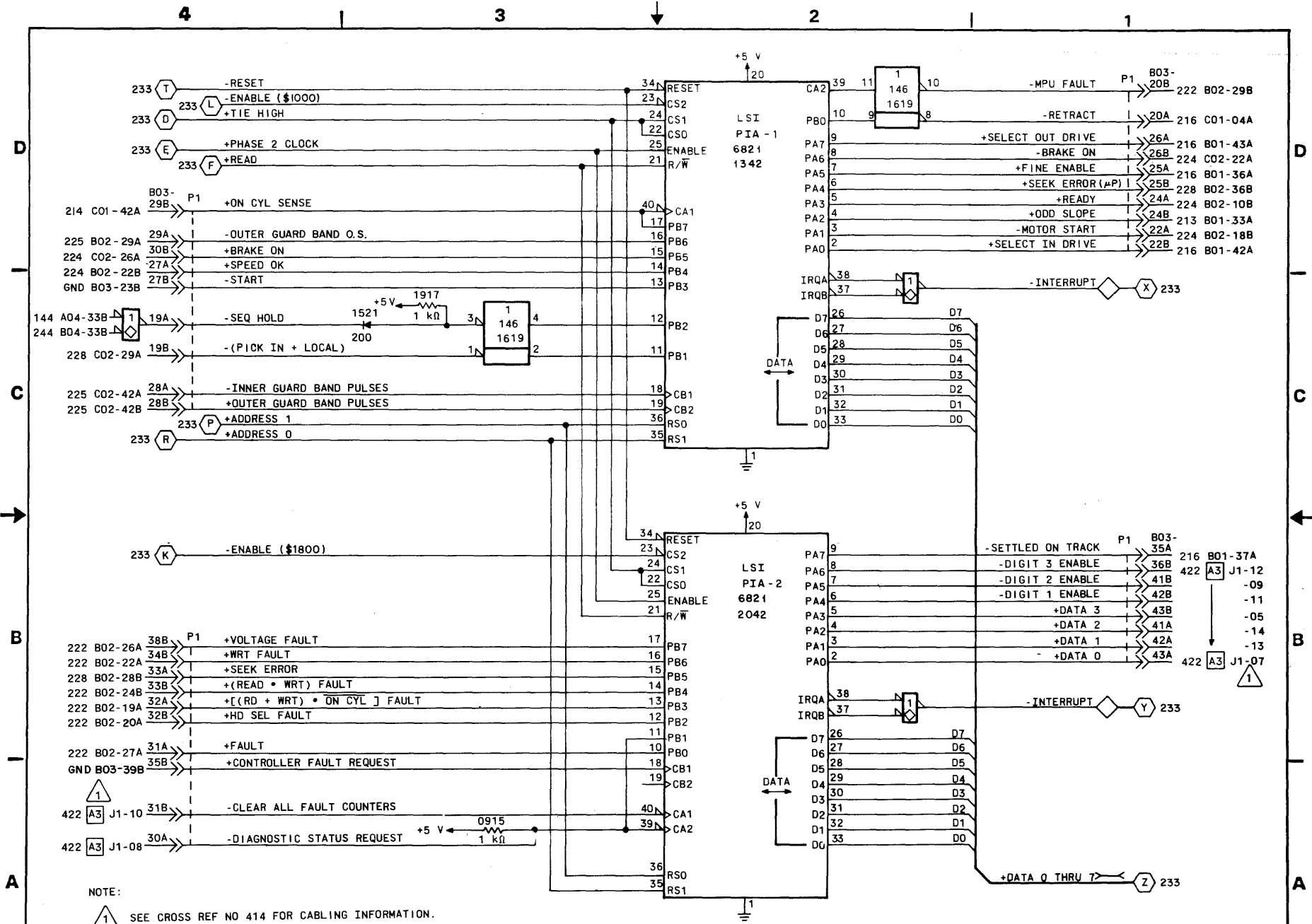
|  |                                  |                            |  |          |            |   |
|--|----------------------------------|----------------------------|--|----------|------------|---|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>A MEMBER OF<br/>         COMPLEX DATA CORPORATION</small> | <b>CYLINDER ADDRESS REGISTER</b> |                            | <b>NORMANDALE OPERATIONS</b><br><b>C</b> | 83323150 | N          | C |
|  | LOC: <b>A2</b> B03               | CODE IDENT<br><b>19333</b> | CROSS REF NO<br>232                      | SHEET 2  | PAGE 3-122 |   |





|   |                    |                     |                                   |          |            |   |
|---|--------------------|---------------------|-----------------------------------|----------|------------|---|
| MAGNETIC PERIPHERALS INC.<br><small>a subsidiary of</small><br>CONTROL DATA CORPORATION | MEMORY             |                     | NORMANDALE OPERATIONS<br><b>C</b> | 83323150 | N          | A |
|   | LOC: <b>A2</b> B03 | CODE IDENT<br>19333 | CROSS REF NO<br>234               | SHEET 4  | PAGE 3-124 |   |





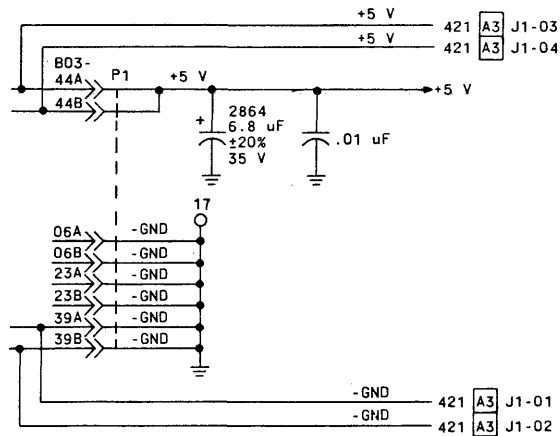
NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.



| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | B | B | B | A | A | B |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | B | B | B | A | A | B |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D                         | B | B | B | A | A | B |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E                         | E | E | B | A | E | E |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| F                         | E | E | B | A | E | E |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| G                         | E | E | B | A | E | E |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| H                         | E | E | B | A | E | H |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| J                         | E | E | B | A | E | H |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| K                         | K | K | K | A | K | K |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| L                         | K | K | K | A | K | K |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| M                         | K | M | M | A | K | K |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| UNUSED LOGIC ELEMENTS |          |               |
|-----------------------|----------|---------------|
| ELEMENT               | LOCATION | OUTPUT PIN(S) |
| 148                   | 0409     | 1             |

| REVISIONS |         |                              |      |          |       |
|-----------|---------|------------------------------|------|----------|-------|
| REV       | ECO.    | DESCRIPTION                  | UNIT | DATE     | CHK'D |
| A         | PE23000 | RELEASED                     | MA   | 12-19-79 | MA    |
| B         | PE49146 | CORRECT LOGIC DIA            | MA   | 3-12-79  | MA    |
| C         | PE50630 | ONE TRACK SEEK               | MA   | 12-7-79  | MA    |
| D         | PE50659 | SERVO OVERSHOOT              | MA   | 12-7-79  | MA    |
| E         | PE50705 | CORRECT LD                   | MA   | 12-7-79  | MA    |
| F         | PE50729 | EPROM CHG                    | MA   | 1-28-80  | MA    |
| G         | PE62112 | JJBX TO RJBX                 | TH   | 10-28-80 | TH    |
| H         | PE62127 | ADD GND WIRE                 | TH   | 1-18-80  | TH    |
| J         | PE62142 | MJBX TO VJBX                 | MF   | 12-18-80 | MF    |
| K         | PE62224 | VJBX → ZJBX AND RJBX TO YJBX | MF   | 2-12-81  | MF    |
| L         | PE21000 | ADD IDD STICKER              | MF   | 2-17-81  | MF    |
| M         | PL62262 | CHG RES ON JJBX              | MF   | 4-8-81   | MF    |



.01 uF FILTER CAPS

| +5 V |
|------|
| 0309 |
| 0225 |
| 1062 |
| 2558 |
| 0820 |
| 1512 |
| 3229 |
| 1931 |
| 0529 |
| 1420 |
| 3123 |

|          |               |         |
|----------|---------------|---------|
| DRAWN    | G. RABINE     | 4/3/79  |
| CHECKED  | S. K. Johnson | 4/17/79 |
| ENGINEER | D. F. Dwyer   | 5/8/79  |
| APPROVED |               |         |

MAGNETIC PERIPHERALS INC.  
A subsidiary of  
 CENTRA DATA CORPORATION

MICROPROCESSOR CONTROL  
 DIAGRAMS

NUMERICAL  
 OPERATIONS

**C**

83323150

R

M

TYPE: Y/ZJBX

LOC: A2 B03

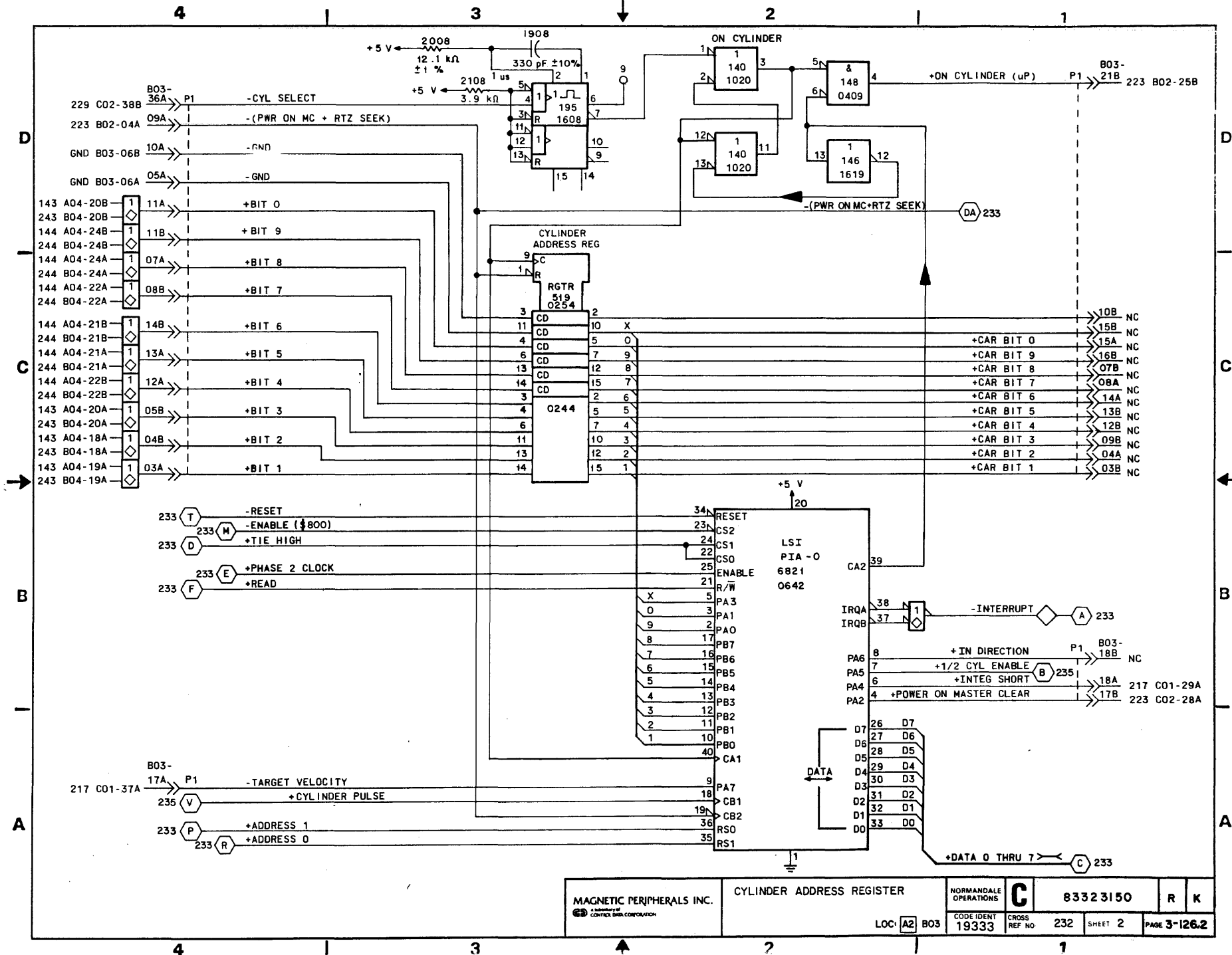
CODE IDENT  
 19333

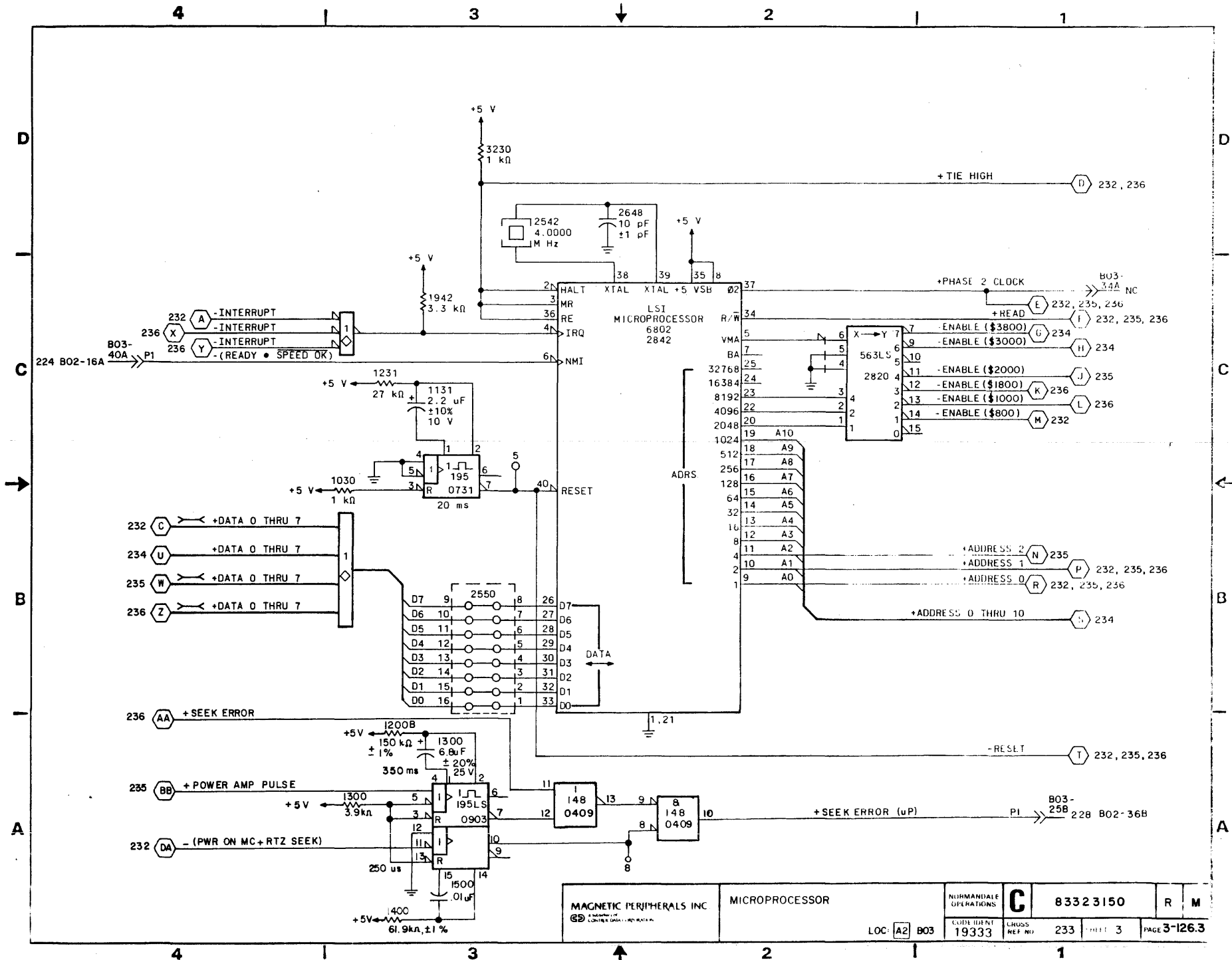
CROSS  
 REF. NO. 231

SHEET  
 1 OF 6

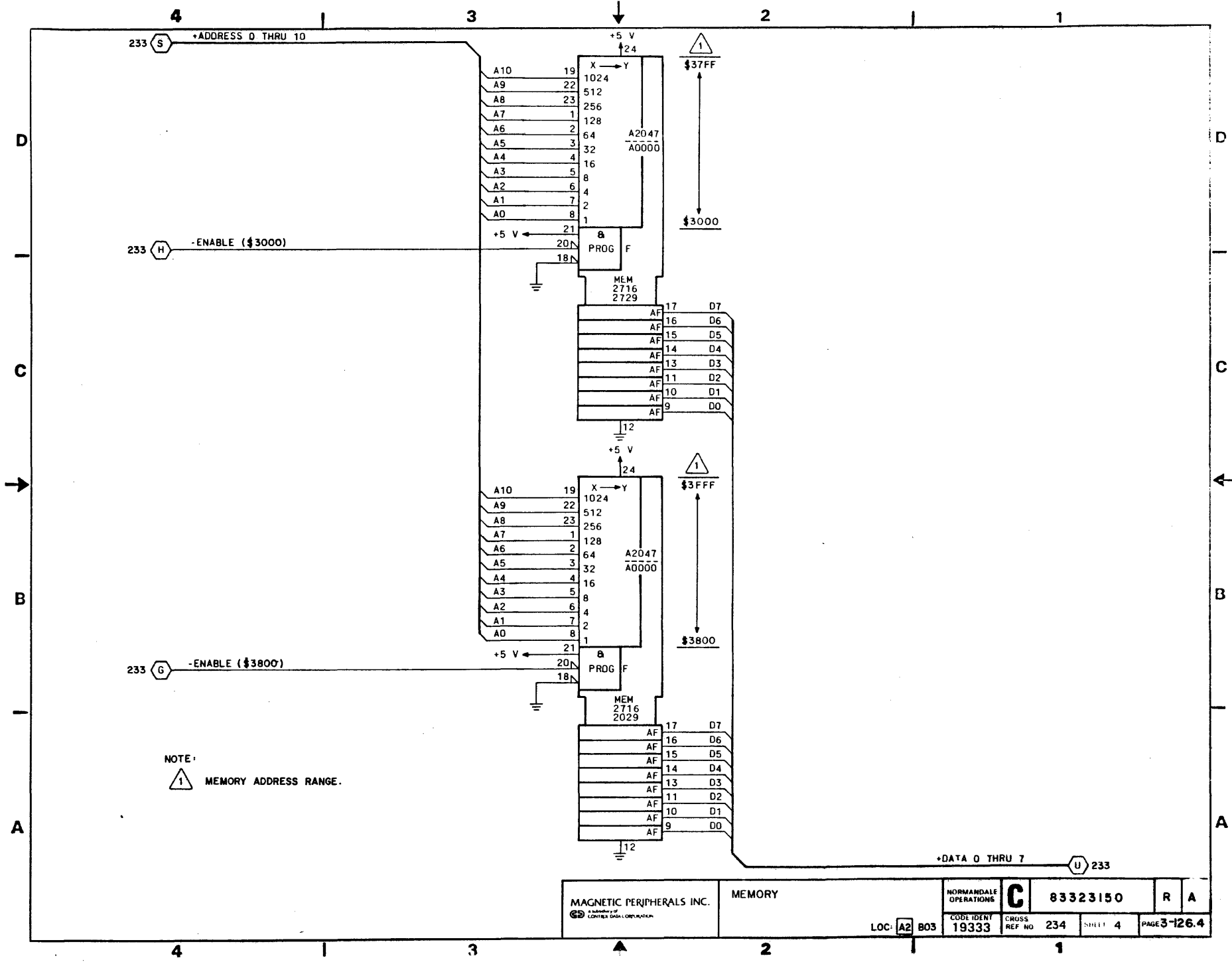
PAGE  
 3-126.1

1 REF: 75121610

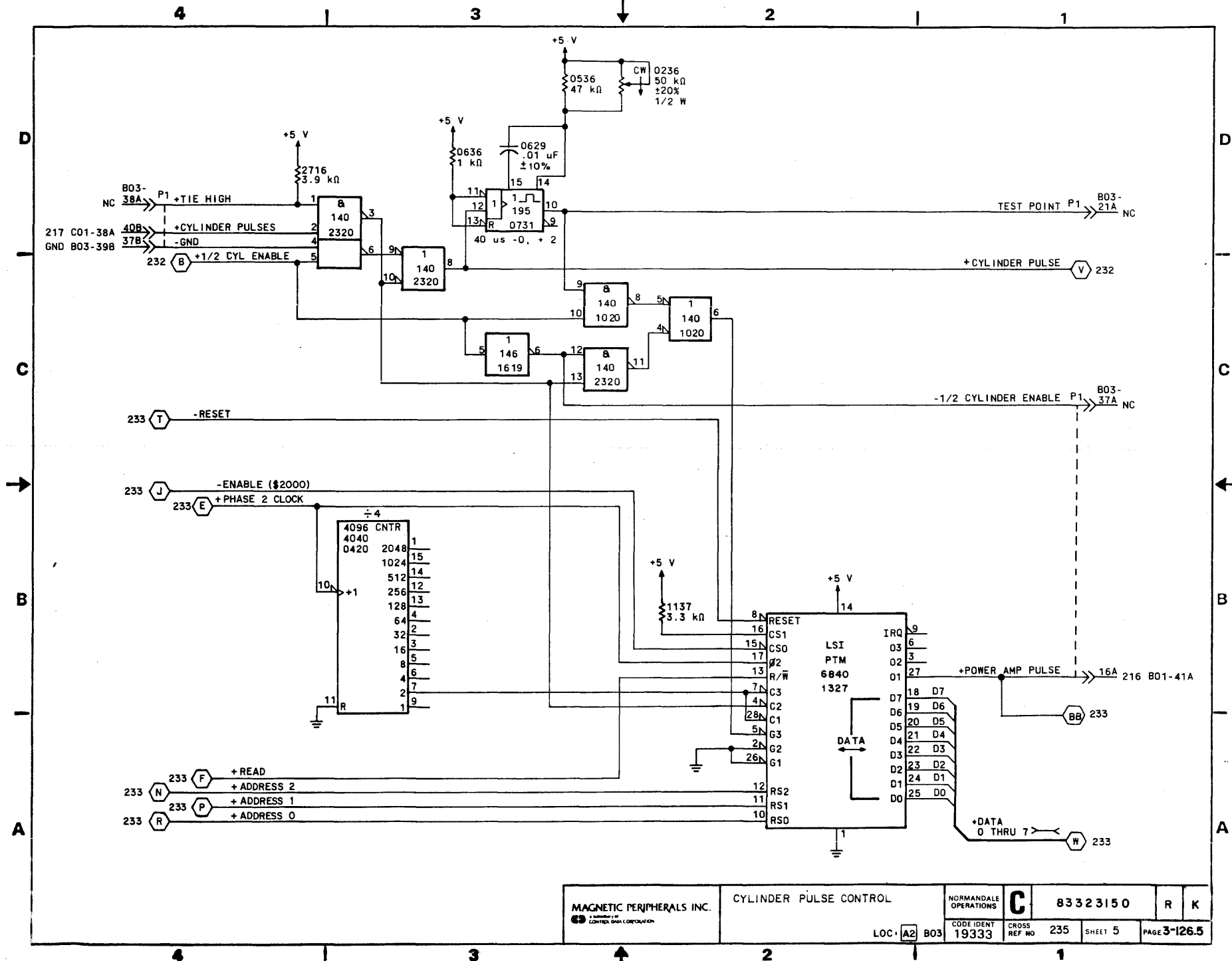


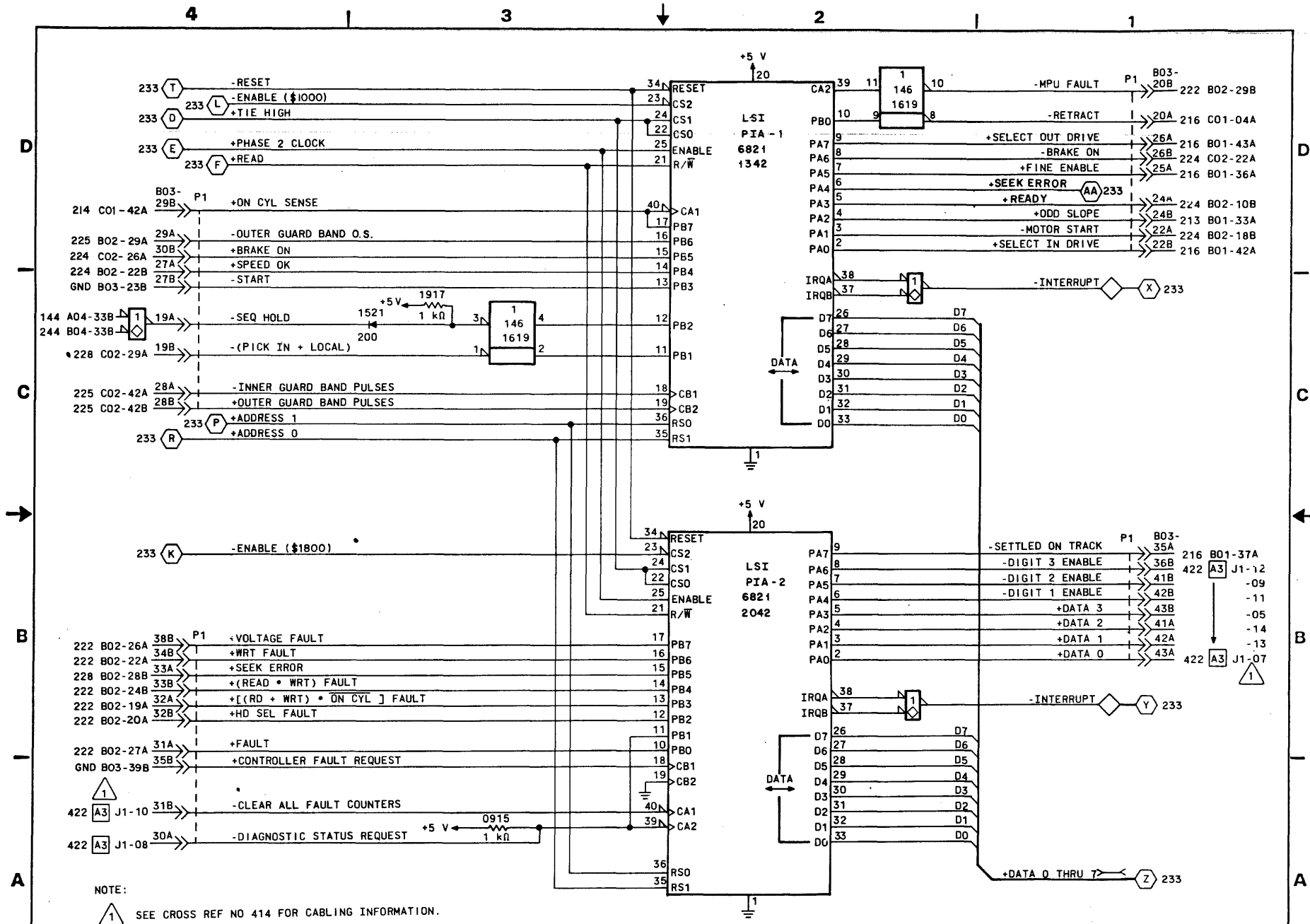


|   |                |     |                        |                 |          |        |       |
|---|----------------|-----|------------------------|-----------------|----------|--------|-------|
| MAGNETIC PERIPHERALS INC<br>EST. 1968<br>A DIVISION OF<br>CONTRACT ELECTRONIC CORPORATION | MICROPROCESSOR |     | NORMANDE<br>OPERATIONS | <b>C</b>        | 83323150 | R      | M     |
|   | LOC: A2        | B03 | CODE IDENT<br>19333    | CROSS<br>REF NO | 233      | PAGE 3 | 126.3 |



NOTE:  
 1 MEMORY ADDRESS RANGE.





NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

REVISION STATUS OF SHEETS

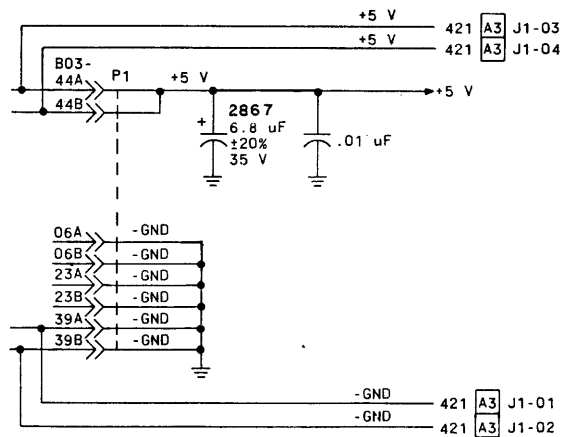
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|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | B | B | A | A | B |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | B | B | A | A | B |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D | B | B | A | A | B |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E | E | B | A | E | E |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| F | E | B | A | E | E |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| G | E | B | A | E | E |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| H | E | B | A | E | H |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| J | E | B | A | E | H |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| K | K | K | A | K | K |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| L | K | K | A | K | K |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| M | K | M | A | K | K |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| N | N | N | N | N | N |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| P | N | N | N | N | N |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 140     | 2918     | 6             |
| 201LS   | 2118     | 8,11          |
| 175LS   | 2408     | 8,9           |

REVISIONS

| REV | ECO     | DESCRIPTION               | DATE     | BY |
|-----|---------|---------------------------|----------|----|
| A   | PE23000 | RELEASED                  |          |    |
| B   | PE49146 | CORRECT LOGIC DIA         | 9-12-79  | MA |
| C   | PE50630 | ONE TRACK SEEK            | 12-7-79  | MA |
| D   | PE50659 | SERVO OVERSHOOT           | 12-7-79  | MA |
| E   | PE50703 | CORRECT LD                |          |    |
| F   | PE50729 | EPROM CHG                 | 1-28-80  | MA |
| G   | PE62112 | JJBX TO RJBX              | 10-28-80 | TH |
| H   | PE62127 | ADD GND WIRE              | 11-18-80 | TH |
| J   | PE62142 | MJBX TO VJBX              | 12-18-80 | MF |
| K   | PE62224 | VJBX → ZJBX               | 2-12-81  | MF |
| L   | PE21000 | ADD IDD STICKER           | 1-5-82   | MF |
| M   | PE62262 | CHG RES ON -JBX           | 4-8-81   | MF |
| N   | DJO2085 | CARD CHGS TO ADJBX/AEJBX  | 8-12-81  | MF |
| P   | DJO2213 | CHANGE CAPACITOR LOCATION | 1-5-82   | MJ |



.01 uF FILTER CAPS

- +5 V
- 0141
- 0308
- 0628
- 0718
- 0818
- 1158
- 1418
- 1834
- 2057
- 2126
- 2140
- 2826
- 3218

|          |               |         |
|----------|---------------|---------|
| DRAWN    | C. KABINE     | 4/3/79  |
| CHECKED  | J. K. Johnson | 9/19/79 |
| ENGINEER | C. J. ...     | 5/4/79  |
| APPROVED |               |         |

MAGNETIC PERIPHERALS INC.  
AN AMERICAN CORPORATION

MICROPROCESSOR CONTROL  
 DIAGRAMS

TYPE AD/AE/JBX

LOC: A2 B03

NUMERICAL  
 OPERATIONS

C

83323150

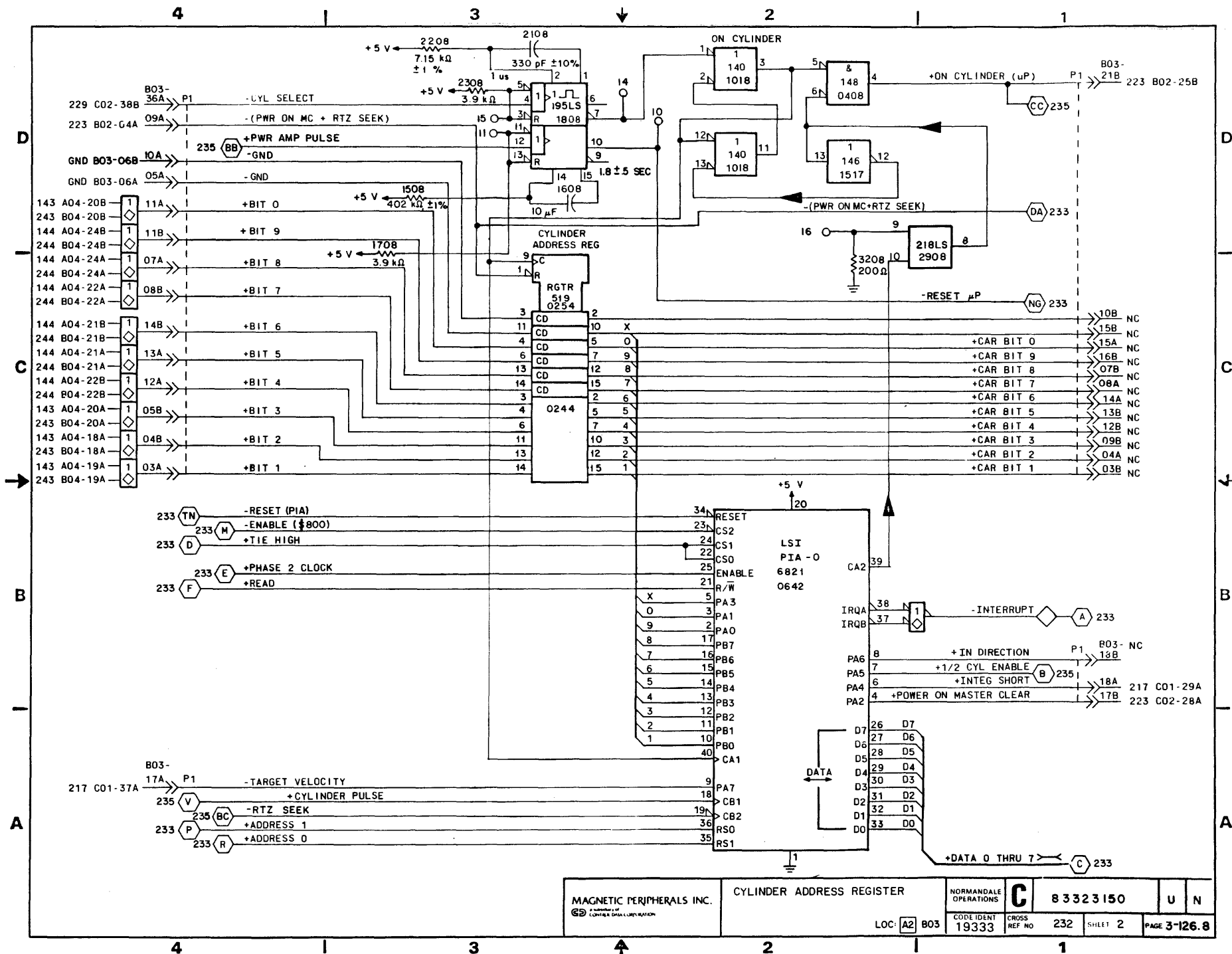
U P

19333

231

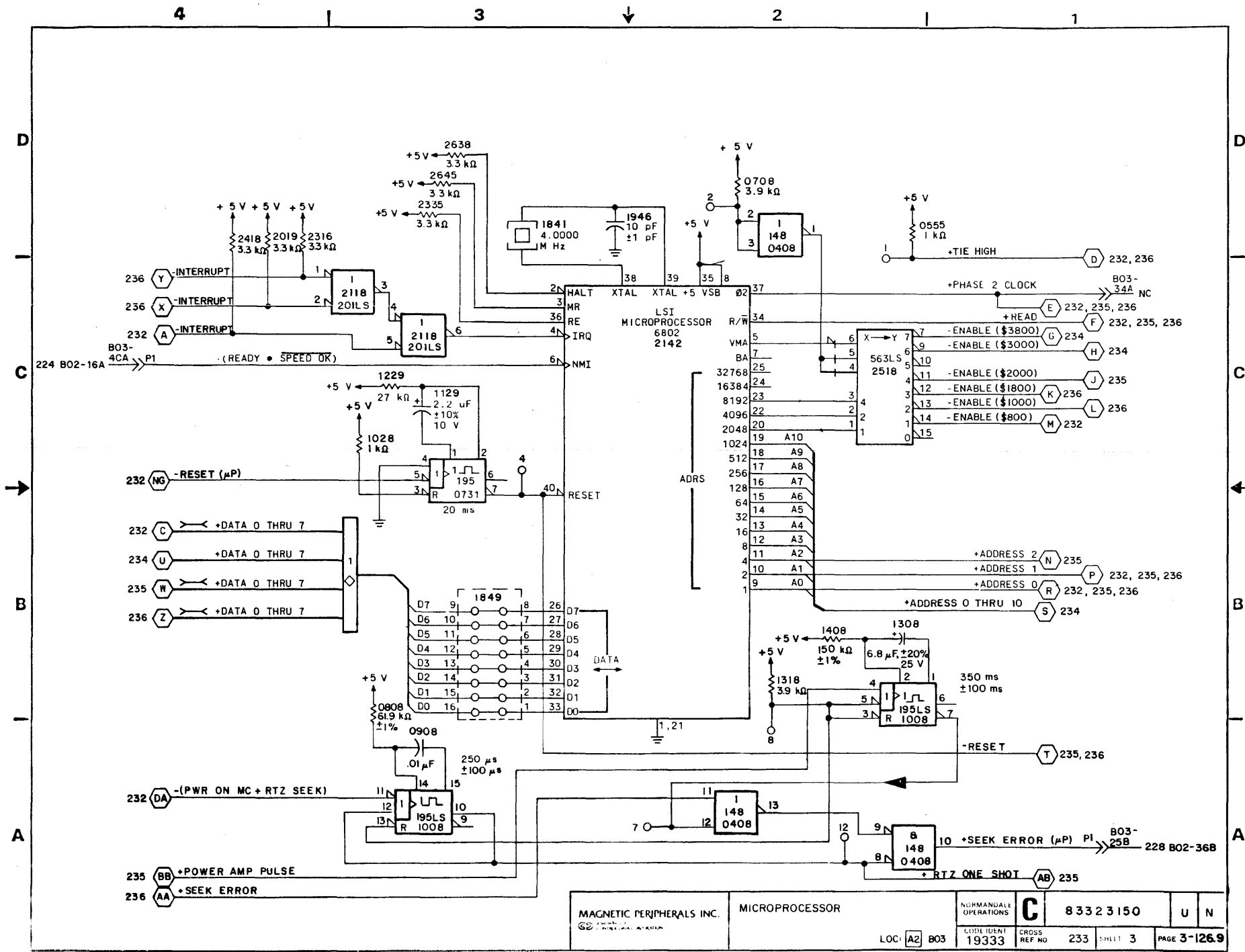
1 OF 6

3-126.7

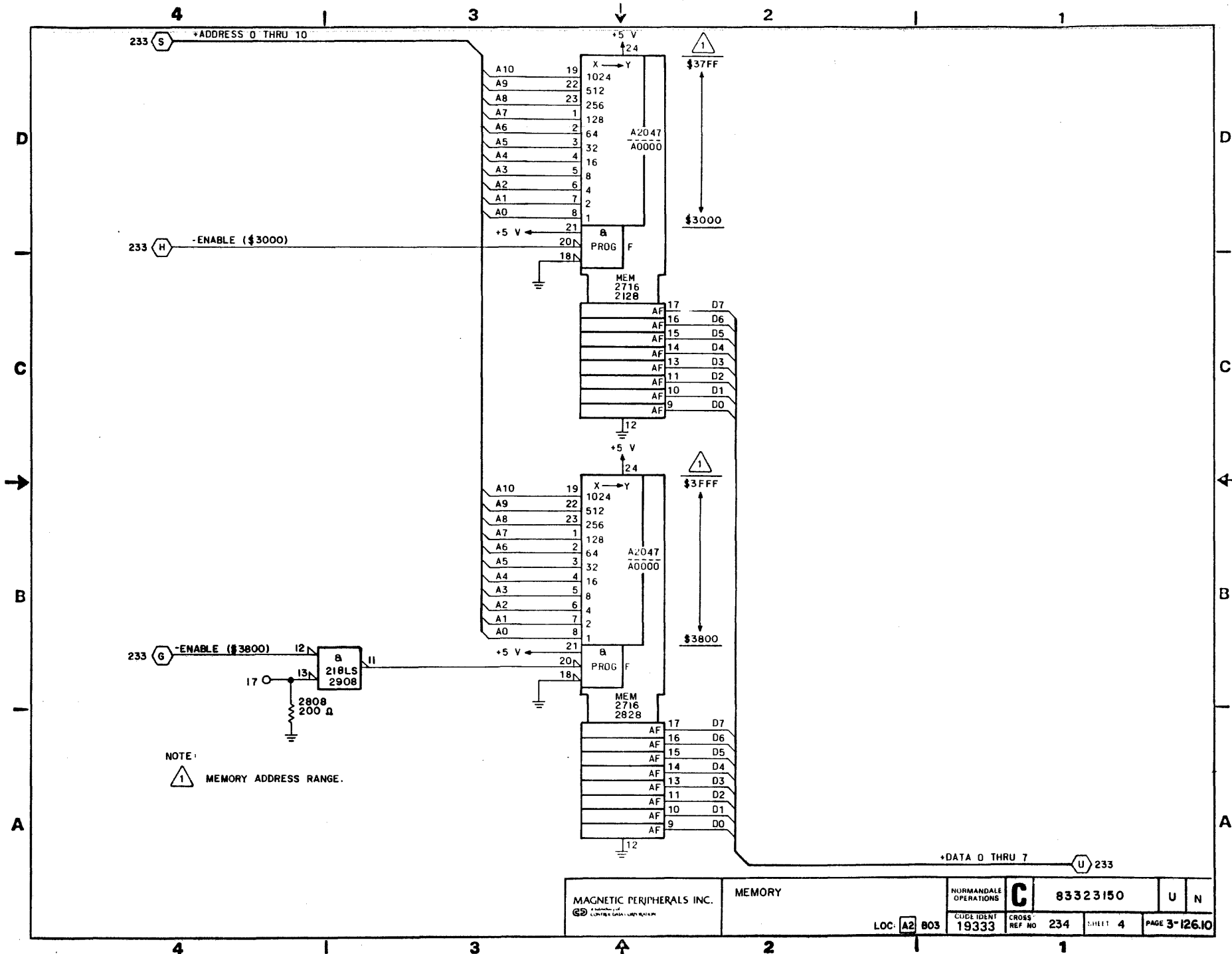


|  |                           |     |                        |                 |                 |         |              |
|--|---------------------------|-----|------------------------|-----------------|-----------------|---------|--------------|
| MAGNETIC PERIPHERALS INC.<br>A DIVISION OF<br>CONTRON DATA CORPORATION | CYLINDER ADDRESS REGISTER |     | NORMANDE<br>OPERATIONS | <b>C</b>        | 8 3 3 2 3 1 5 0 | U       | N            |
|  | LOC: A2                   | B03 | CODE IDENT<br>19333    | CROSS<br>REF NO | 232             | SHEET 2 | PAGE 3-126.8 |





|                           |  |                  |  |                       |  |              |  |            |  |     |  |
|---------------------------|--|------------------|--|-----------------------|--|--------------|--|------------|--|-----|--|
| MAGNETIC PERIPHERALS INC. |  | MICROPROCESSOR   |  | NORMANDALE OPERATIONS |  | C            |  | 8 332 3150 |  | U N |  |
| CODE IDENT 19333          |  | CROSS REF NO 233 |  | SHEET 3               |  | PAGE 3-126.9 |  |            |  |     |  |
| LOC: A2 B03               |  |                  |  |                       |  |              |  |            |  |     |  |



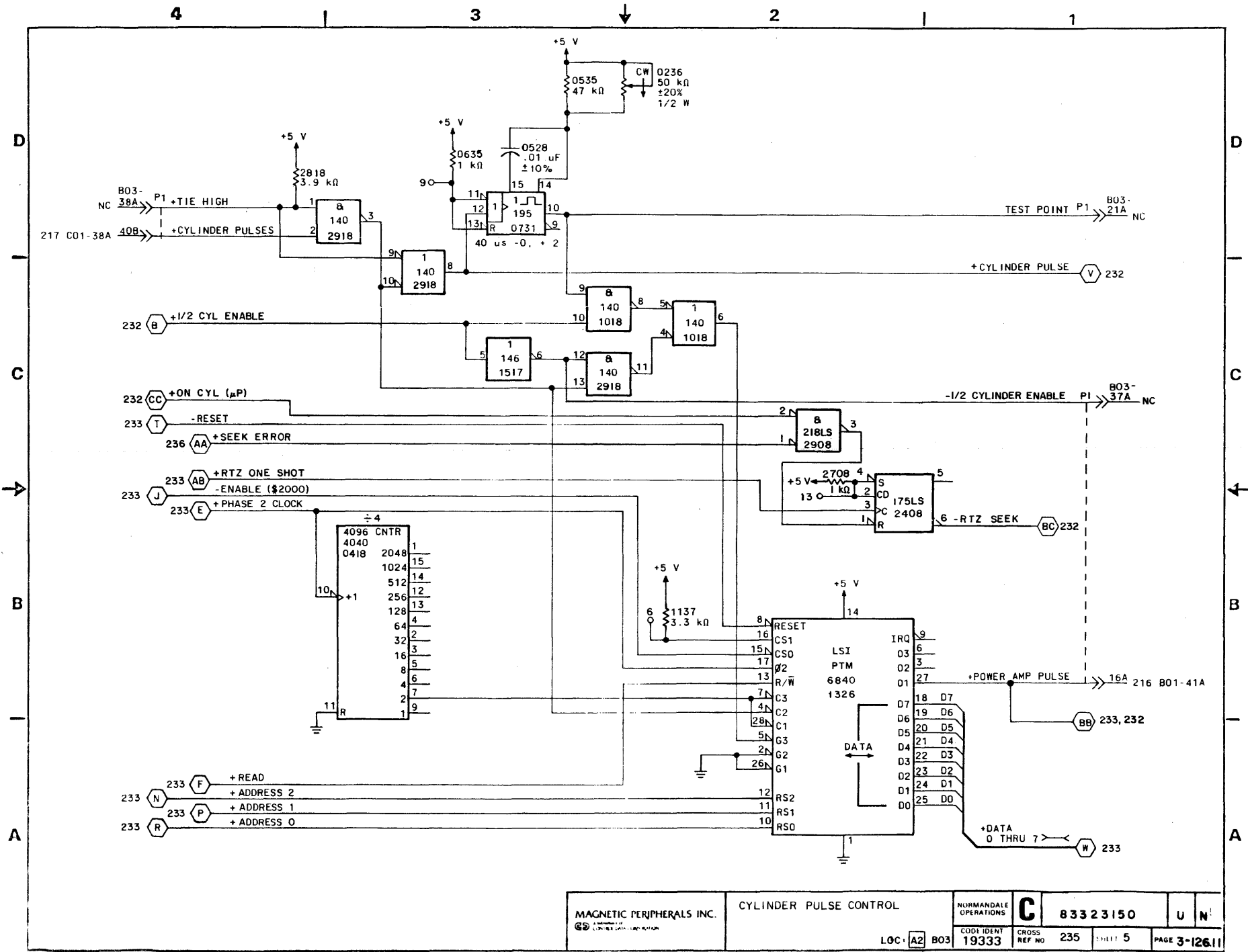
MAGNETIC PERIPHERALS INC.  
© 1974

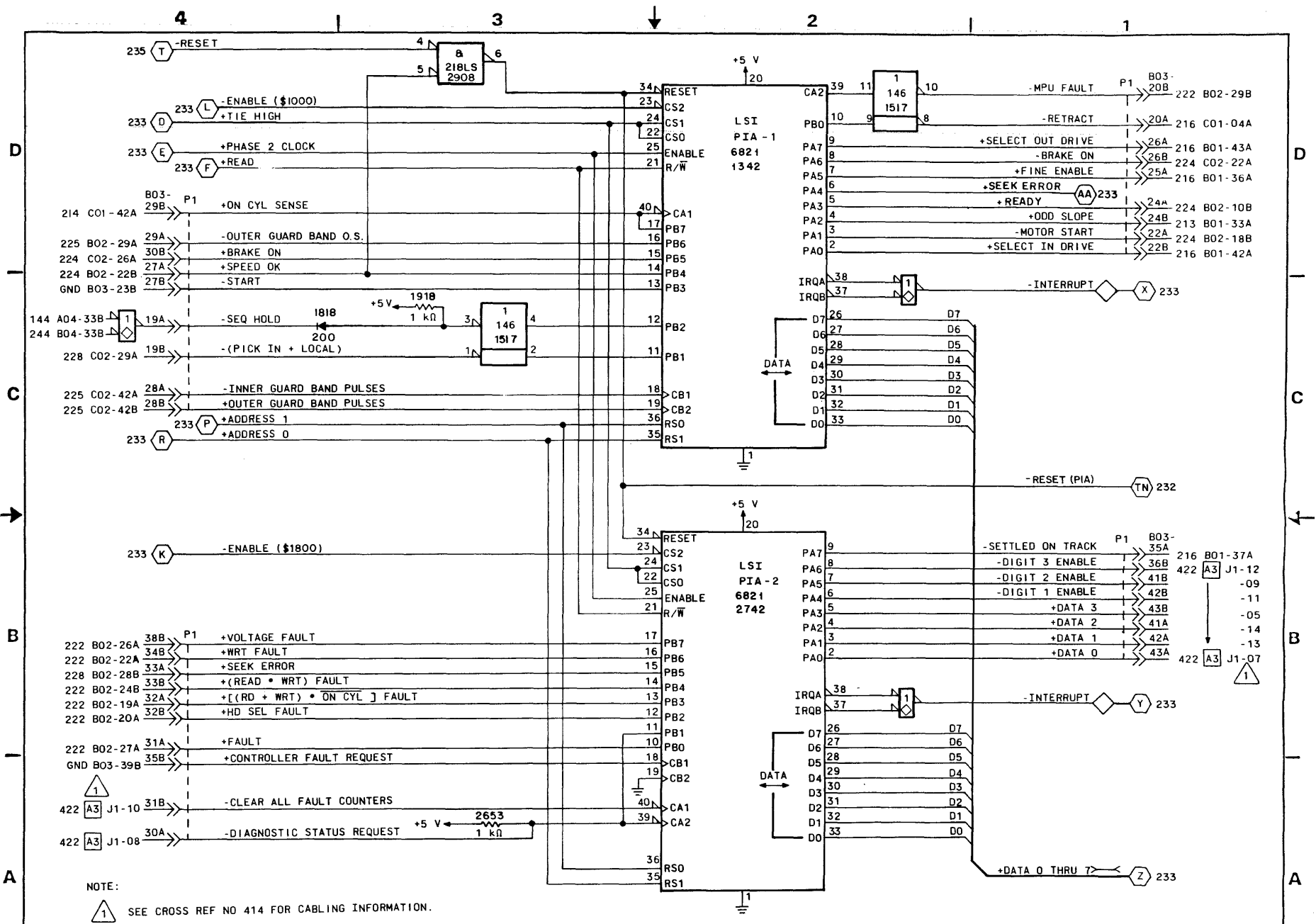
MEMORY

|                        |                        |            |               |   |
|------------------------|------------------------|------------|---------------|---|
| NORMANDE<br>OPERATIONS | <b>C</b>               | 83323150   | U             | N |
| CODE IDENT<br>19333    | CROSS<br>REF NO<br>234 | SHEET<br>4 | PAGE 3-126.10 |   |

LOC: A2 803

U 233





NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| I                         | 2 | 3 | 4 | 5 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | B | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | C | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |                      |       |         |       |
|-----------|---------|----------------------|-------|---------|-------|
| REV.      | ECO.    | DESCRIPTION          | DRFT. | DATE    | CHK'D |
| A         | PE23000 | RELEASED             |       |         |       |
| B         | PE42238 | CHANGE I.C. FAMILIES | MF    | 8-13-80 |       |
| C         | DJ02075 | CHANGE IC            | MF    | 1-6-82  |       |

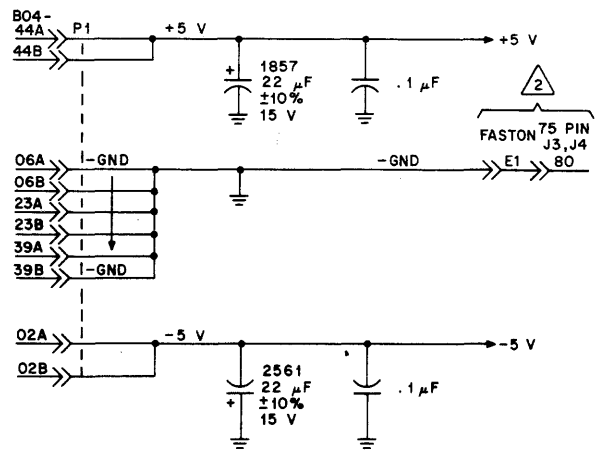
UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1026     | 6     |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

UNUSED LOGIC ELEMENTS

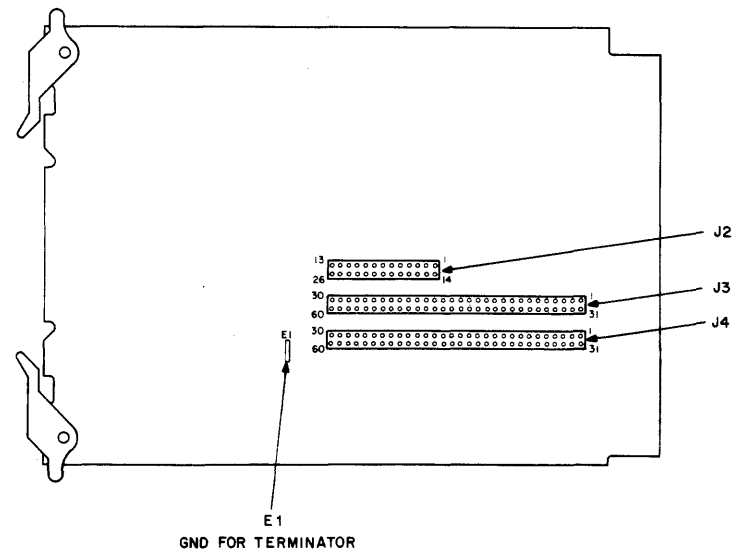
| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 175LS   | 0228     | 5,6           |

- NOTES:
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
  - 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



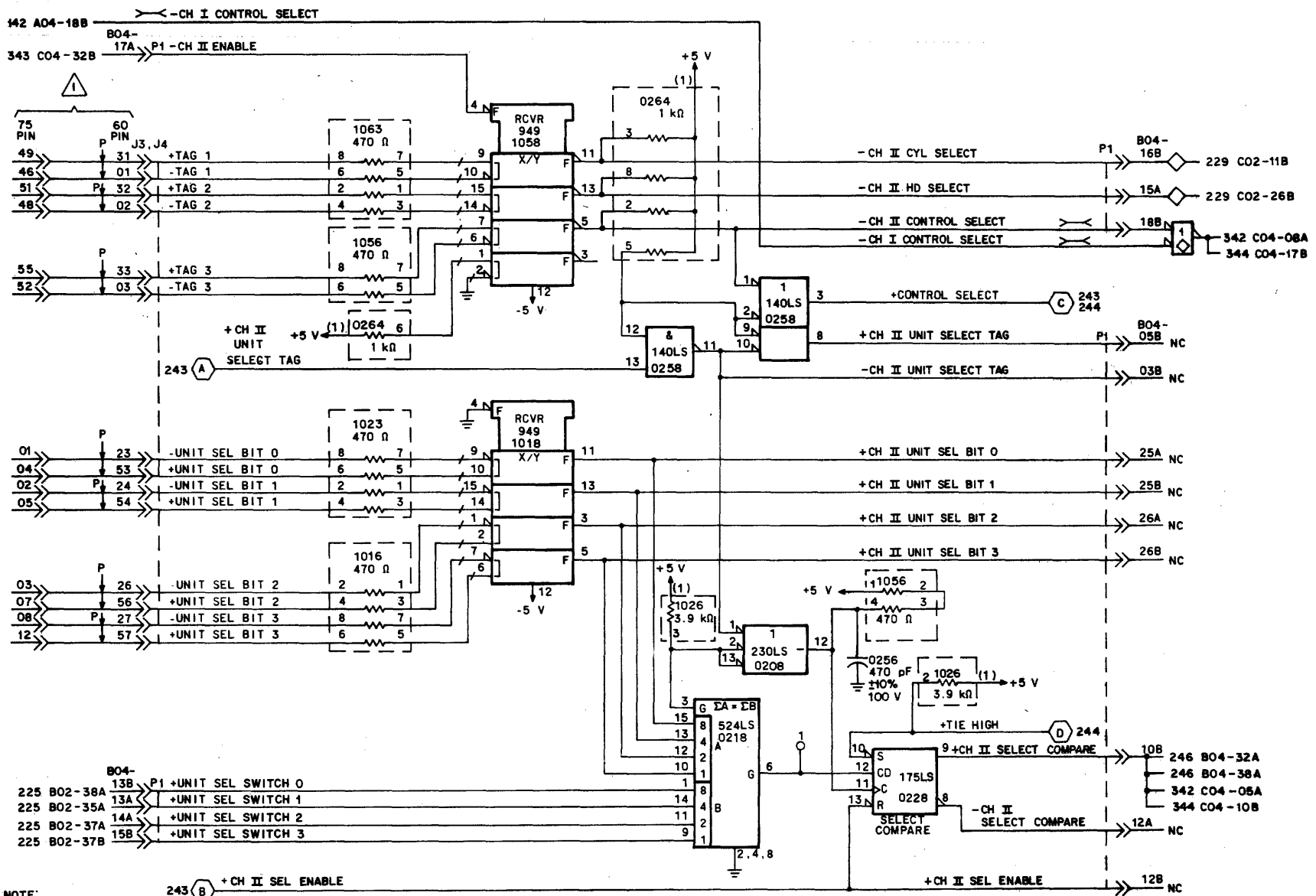
.1 μF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |

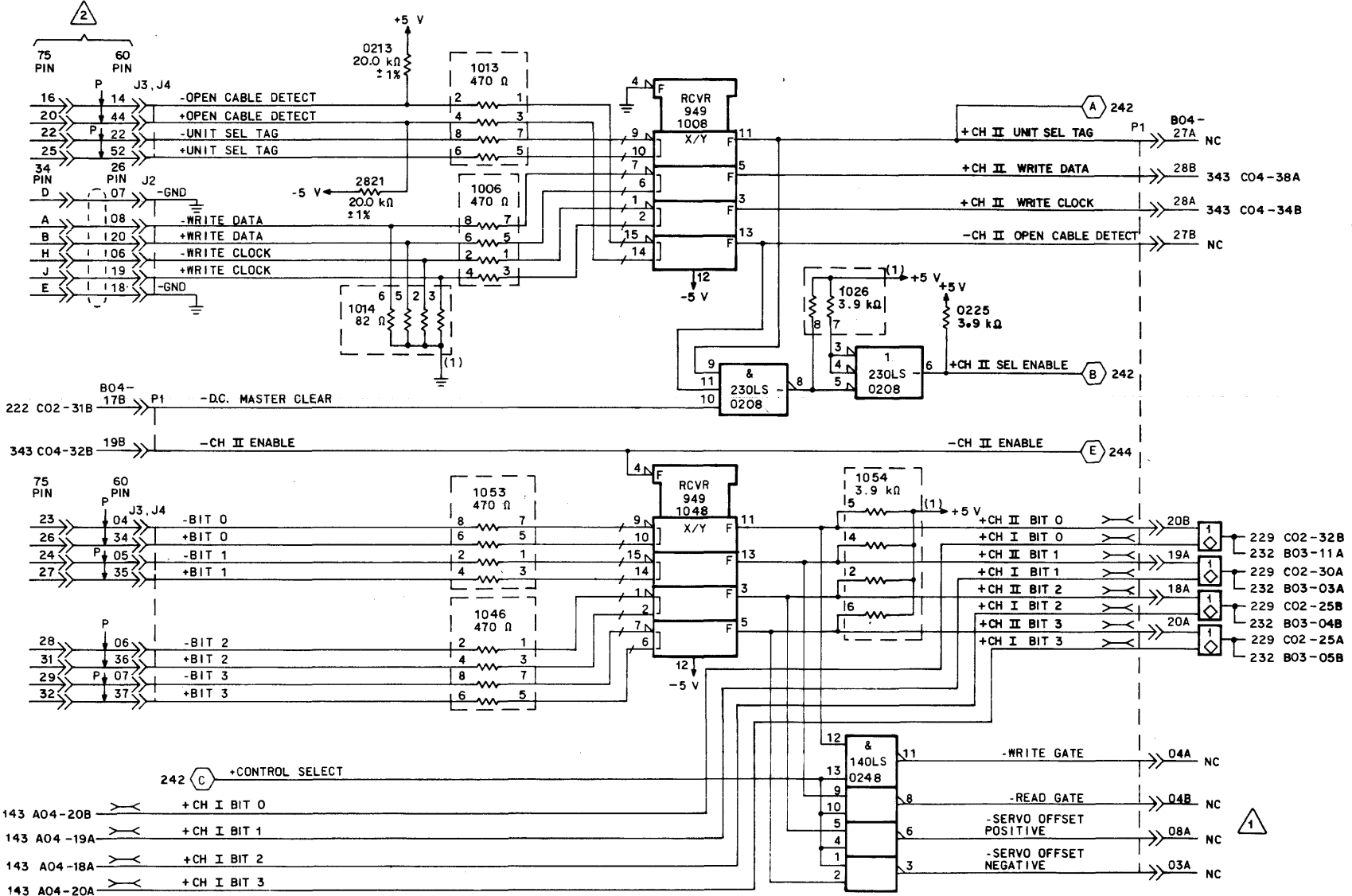
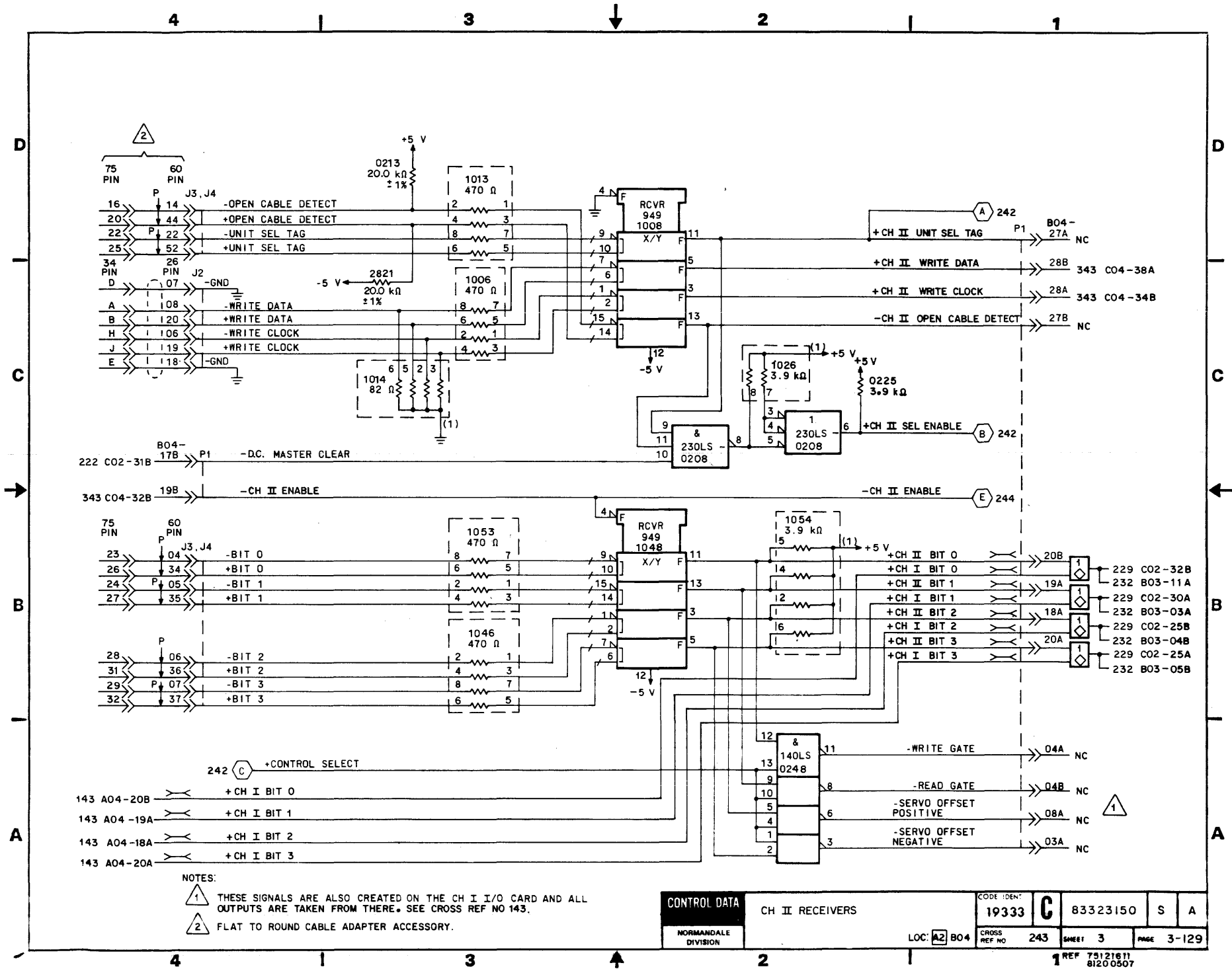


APPLICABLE ONLY TO DUAL CHANNEL UNITS.

|          |                  |                      |                         |              |     |          |            |   |
|----------|------------------|----------------------|-------------------------|--------------|-----|----------|------------|---|
| DRAWN    | <i>G. KASINE</i> | CONTROL DATA         | CODE IDENT              | 19333        | C   | 83323150 | U          | C |
| CHECKED  |                  |                      | CHANNEL II I/O DIAGRAMS |              |     |          |            |   |
| ENGINEER |                  | NORRMANDALE DIVISION | TYPE: CFAX              | CROSS REF NO | 241 | SHEET 6  | PAGE 3-127 |   |
| APPROVED |                  |                      | LOC                     | A2 B04       |     |          |            |   |

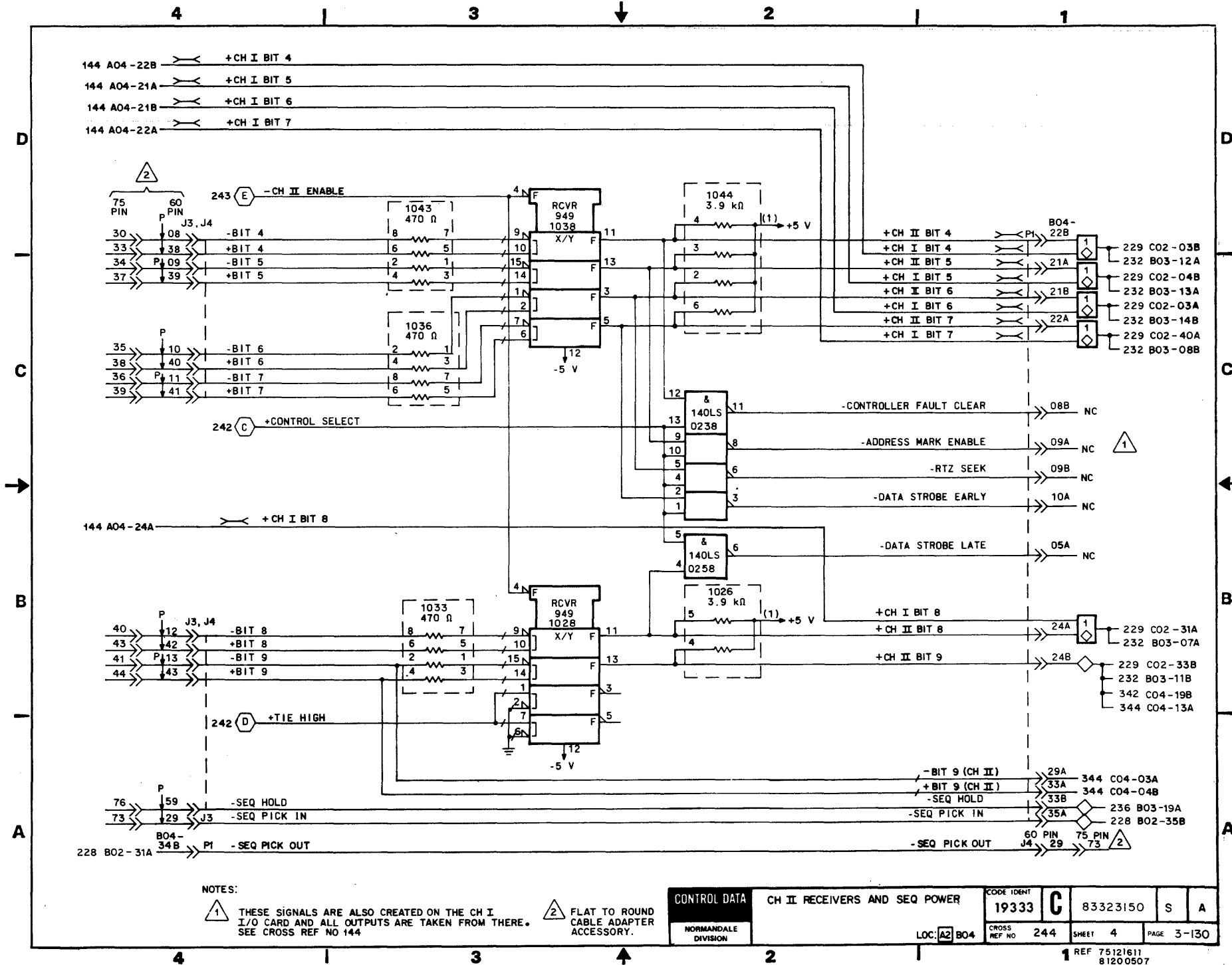


|                      |  |                                 |  |            |            |          |   |   |
|----------------------|--|---------------------------------|--|------------|------------|----------|---|---|
| CONTROL DATA         |  | CH II RECEIVERS AND UNIT SELECT |  | CODE IDENT | C          | 83323150 | U | C |
| NORMANDEALE DIVISION |  | LOC: A2 B04                     |  | 19333      |            |          |   |   |
|                      |  | CROSS REF NO 242                |  | SHEET 2    | PAGE 3-128 |          |   |   |



NOTES:  
 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 143.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |  |                 |  |              |       |       |          |      |       |
|---------------------|--|-----------------|--|--------------|-------|-------|----------|------|-------|
| CONTROL DATA        |  | CH II RECEIVERS |  | CODE IDENT:  | 19333 | C     | 83323150 | S    | A     |
| NORMANDALE DIVISION |  | LOC: A2 B04     |  | CROSS REF NO | 243   | SHEET | 3        | PAGE | 3-129 |



NOTES:



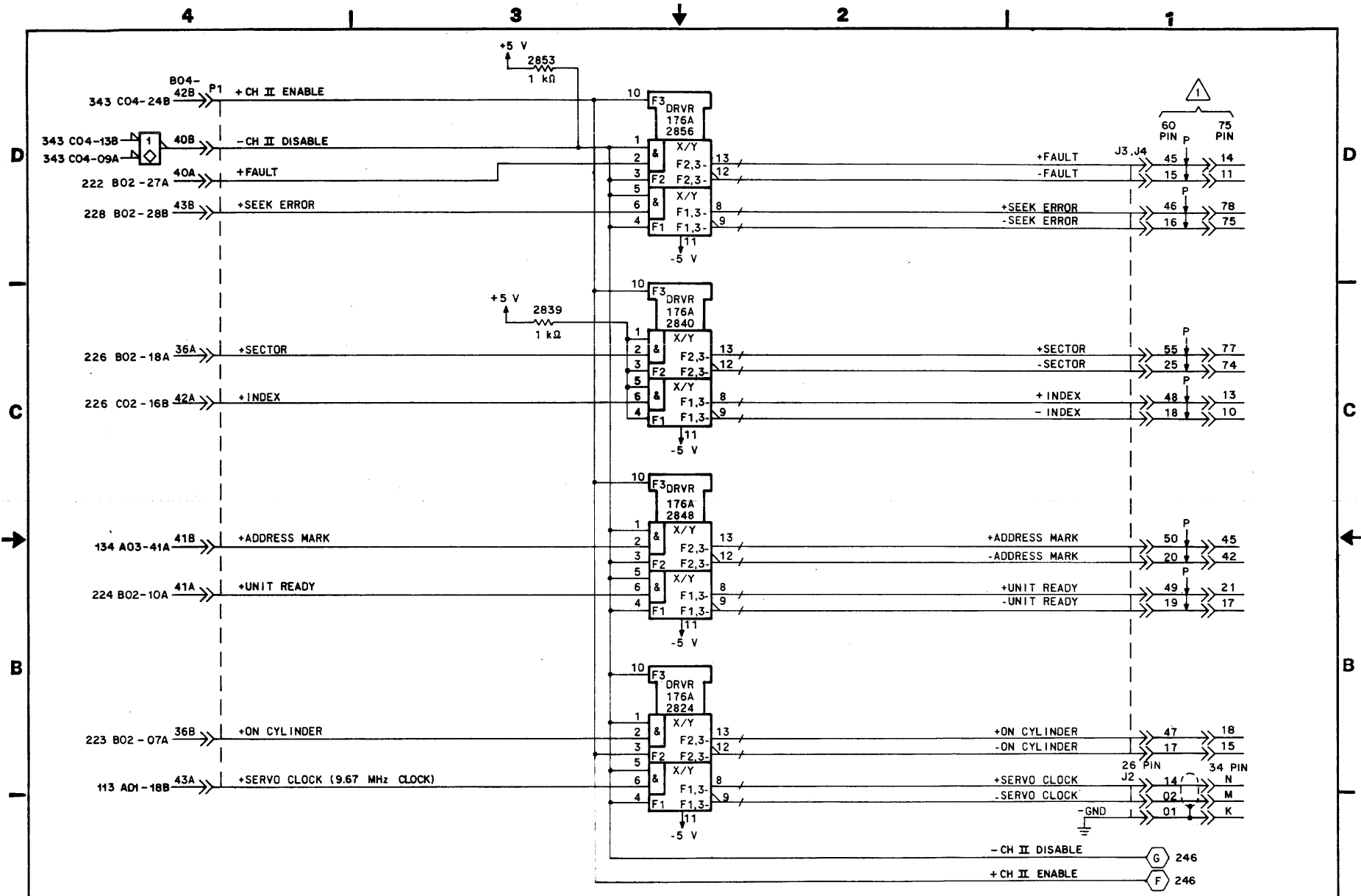
1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144



2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |                               |              |            |       |          |      |       |
|----------------------|-------------------------------|--------------|------------|-------|----------|------|-------|
| CONTROL DATA         | CH II RECEIVERS AND SEQ POWER |              | CODE IDENT | G     | 83323150 | S    | A     |
|                      |                               |              | 19333      |       |          |      |       |
| NORMANDEALE DIVISION | LOC: A2 B04                   | CROSS REF NO | 244        | SHEET | 4        | PAGE | 3-130 |

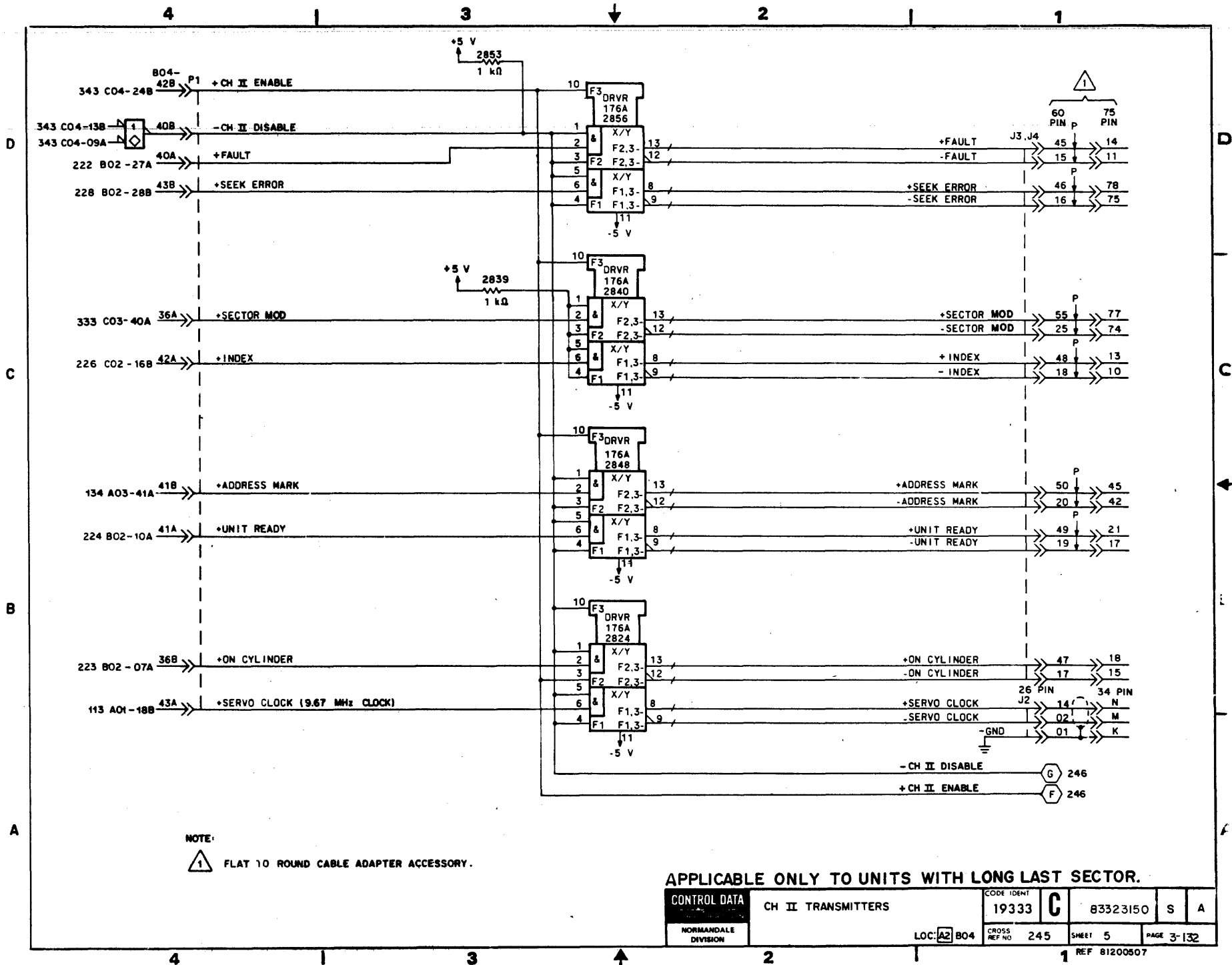




NOTE:  
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

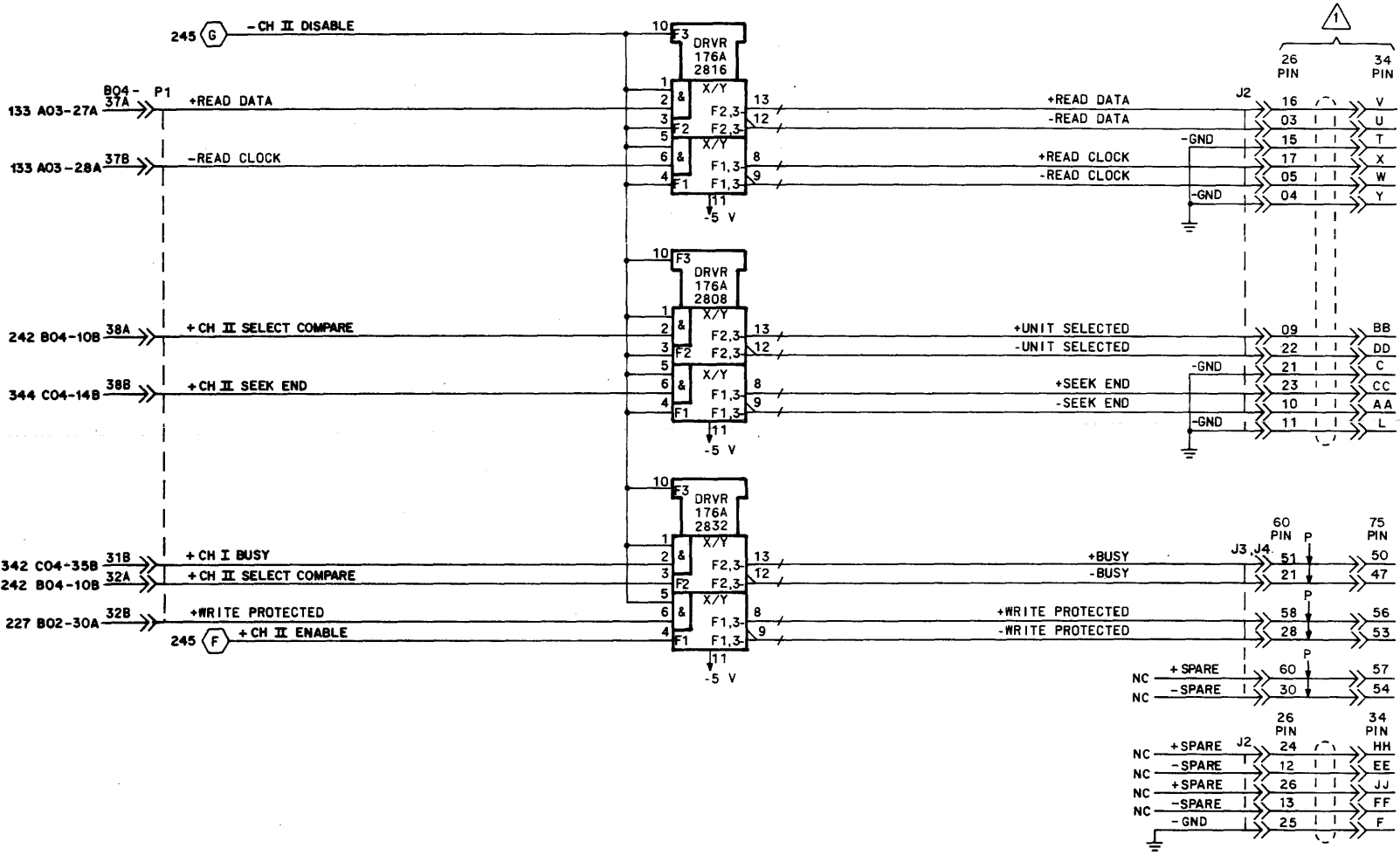
APPLICABLE ONLY TO UNITS WITHOUT LONG LAST SECTOR.

|                      |                    |              |       |       |          |      |       |
|----------------------|--------------------|--------------|-------|-------|----------|------|-------|
| CONTROL DATA         | CH II TRANSMITTERS | CODE IDENT   | 19333 | C     | 83323150 | S    | A     |
|                      |                    | CROSS REF NO | 245   | SHEET | 5        | PAGE | 3-131 |
| NORMANDEALE DIVISION | LOC: A2 B04        | REF 75121611 |       |       |          |      |       |



4 | 3 | 2 | 1

D  
C  
B  
A



NOTE:  
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                   |                    |              |       |          |          |                |   |
|-------------------|--------------------|--------------|-------|----------|----------|----------------|---|
| CONTROL DATA      | CH II TRANSMITTERS | CODE IDENT   | 19333 | C        | 83323150 | S              | A |
|                   |                    | CROSS REF NC | 246   | SHEET    | 6        | PAGE 3-133/134 |   |
| NORMANDE DIVISION | LOC: A2 B04        | REF 75121611 |       | 81200807 |          |                |   |

4 | 3 | 2 | 1



| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| I                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | A | A | A | B | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | C | A | A | B | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |             |      |           |       |
|-----------|---------|-------------|------|-----------|-------|
| REV.      | ECO.    | DESCRIPTION | DRFT | DATE      | CHK'D |
| A         | PE23000 | RELEASED    |      |           |       |
| B         | PE62248 | CORRECTIONS |      | 3-18-81   |       |
| C         | DJ02075 | IC CHANGE   |      | MJ 1-6-82 |       |

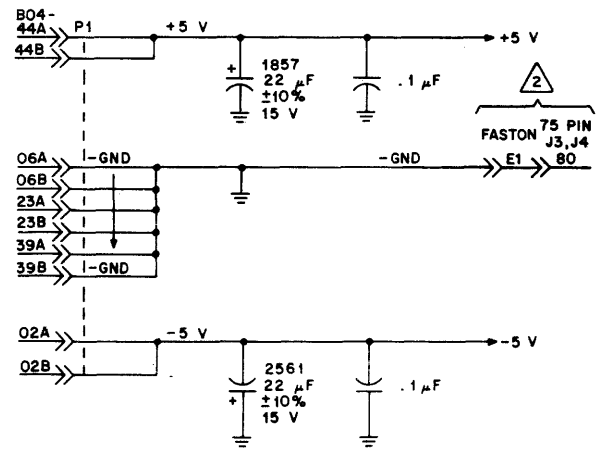
UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1026     | 6     |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

UNUSED LOGIC ELEMENTS

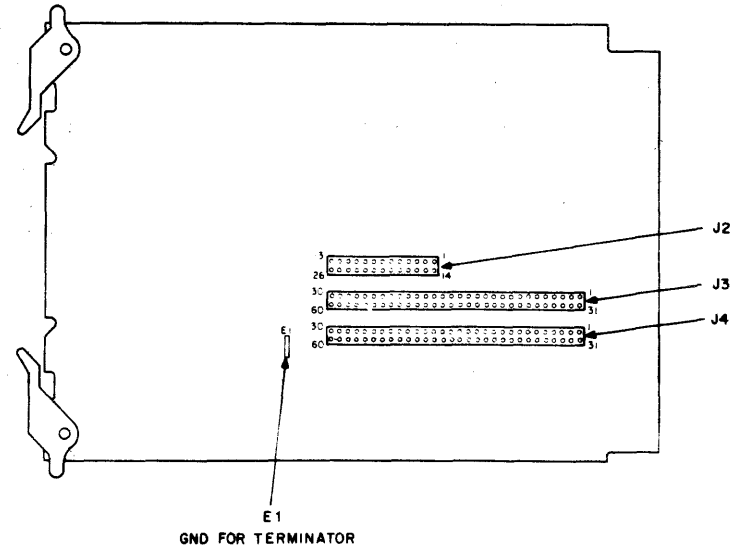
| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 175LS   | 0228     | 5,6           |

- NOTES:
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
  - 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



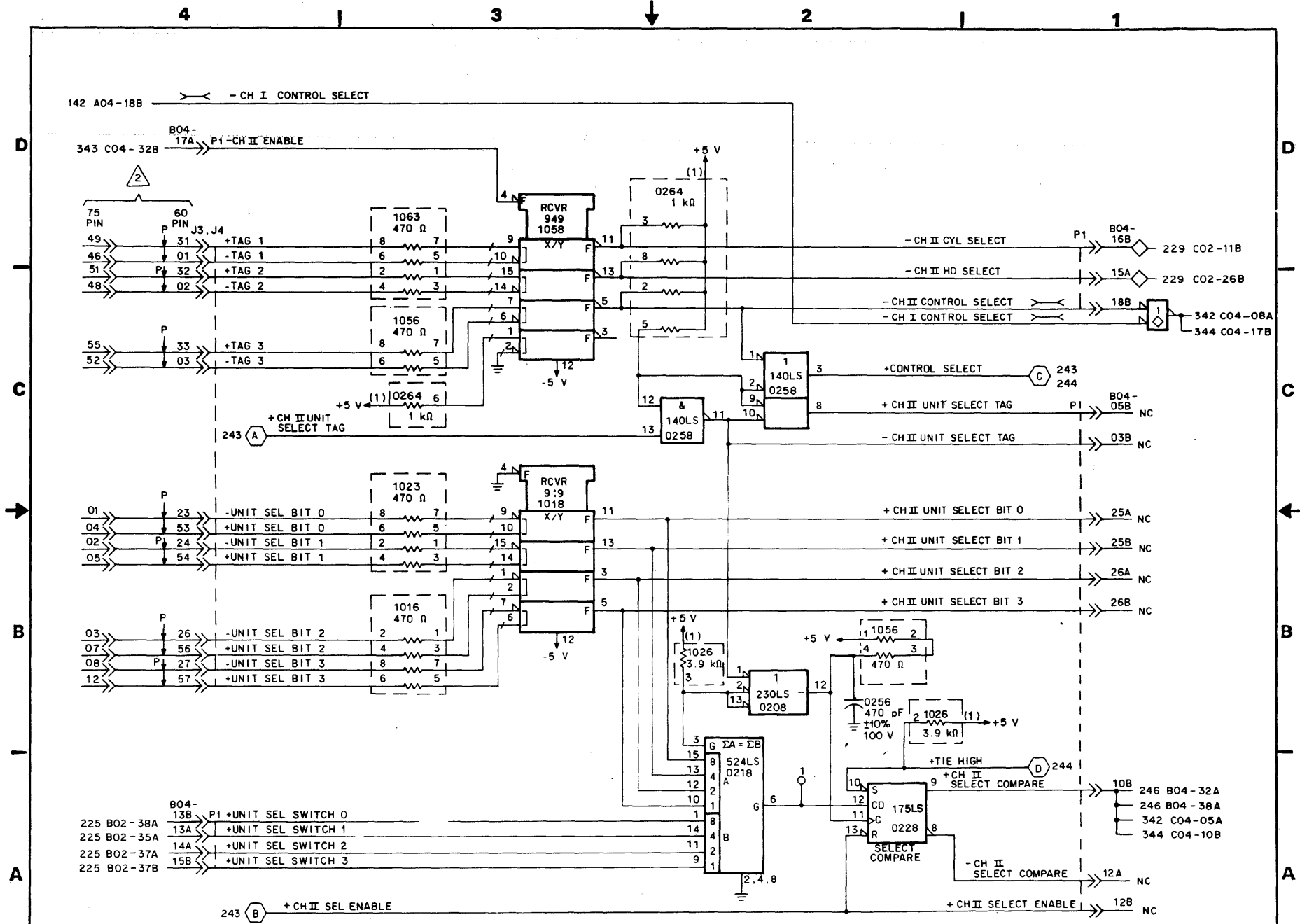
.1 µF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |



APPLICABLE ONLY TO DUAL CHANNEL UNITS.

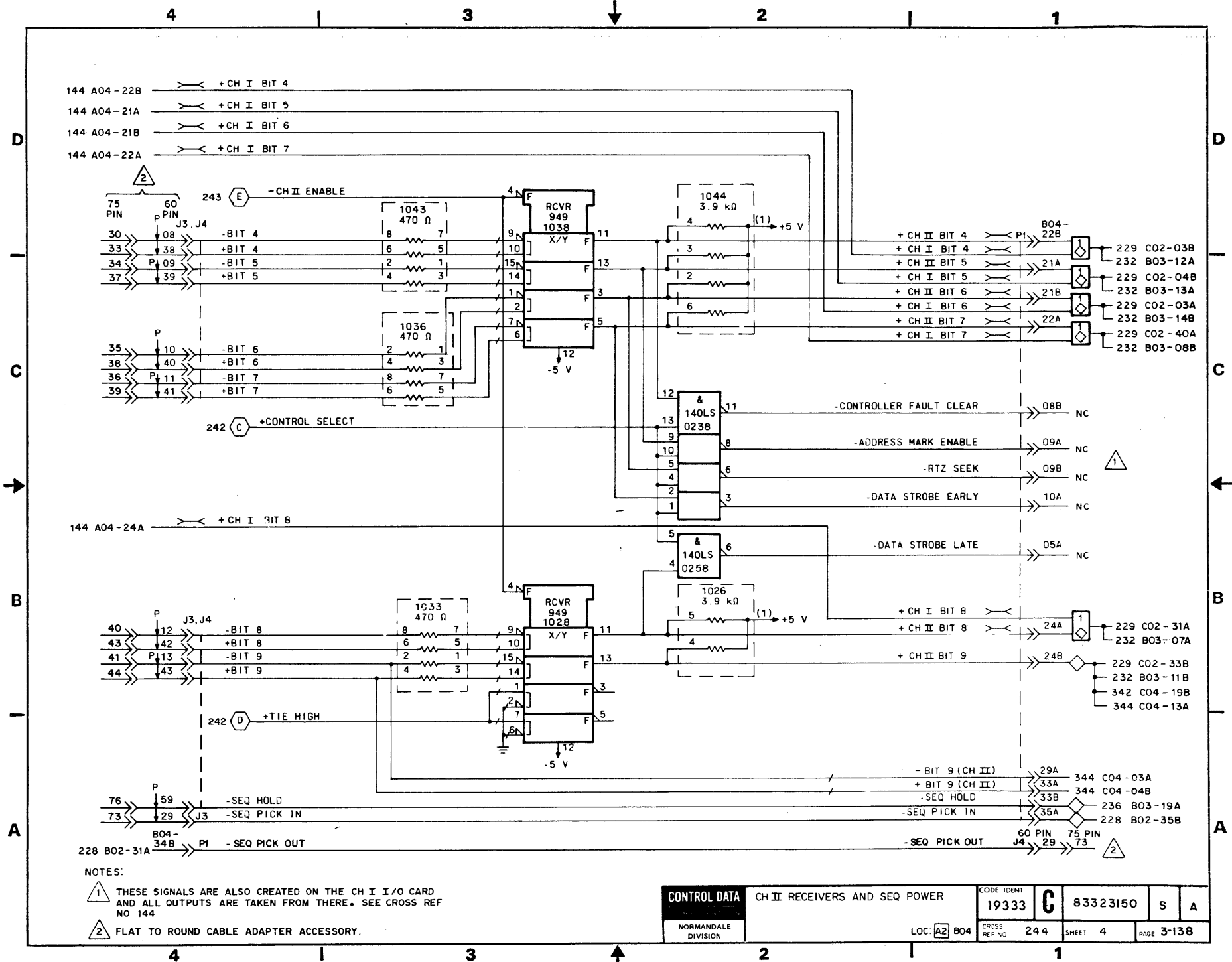
|                                  |                      |                         |                    |         |          |       |   |
|----------------------------------|----------------------|-------------------------|--------------------|---------|----------|-------|---|
| DRAWN: <i>M. Anderson</i> 2/8/80 | CONTROL DATA         | CHANNEL II I/O DIAGRAMS | CODE IDENT: 19333  | C       | 83323150 | U     | C |
| CHECKED: <i>[Signature]</i>      |                      |                         | CROSS REF. NO. 241 | SHEET 1 | PAGE 6   | 3-135 |   |
| ENGINEER: <i>[Signature]</i>     | NORMANDEALE DIVISION | TYPE: DFAX              | LOC: A2 B04        |         |          |       |   |
| APPROVED: <i>[Signature]</i>     |                      |                         |                    |         |          |       |   |



NOTE:  
 1 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                                     |                                 |                     |   |          |   |   |
|-------------------------------------|---------------------------------|---------------------|---|----------|---|---|
| CONTROL DATA<br>NORMANDALE DIVISION | CH II RECEIVERS AND UNIT SELECT | CODE IDENT<br>19333 | C | 83323150 | U | C |
|                                     | LOC: A2 B04                     | CROSS REF NO: 242   |   |          |   |   |



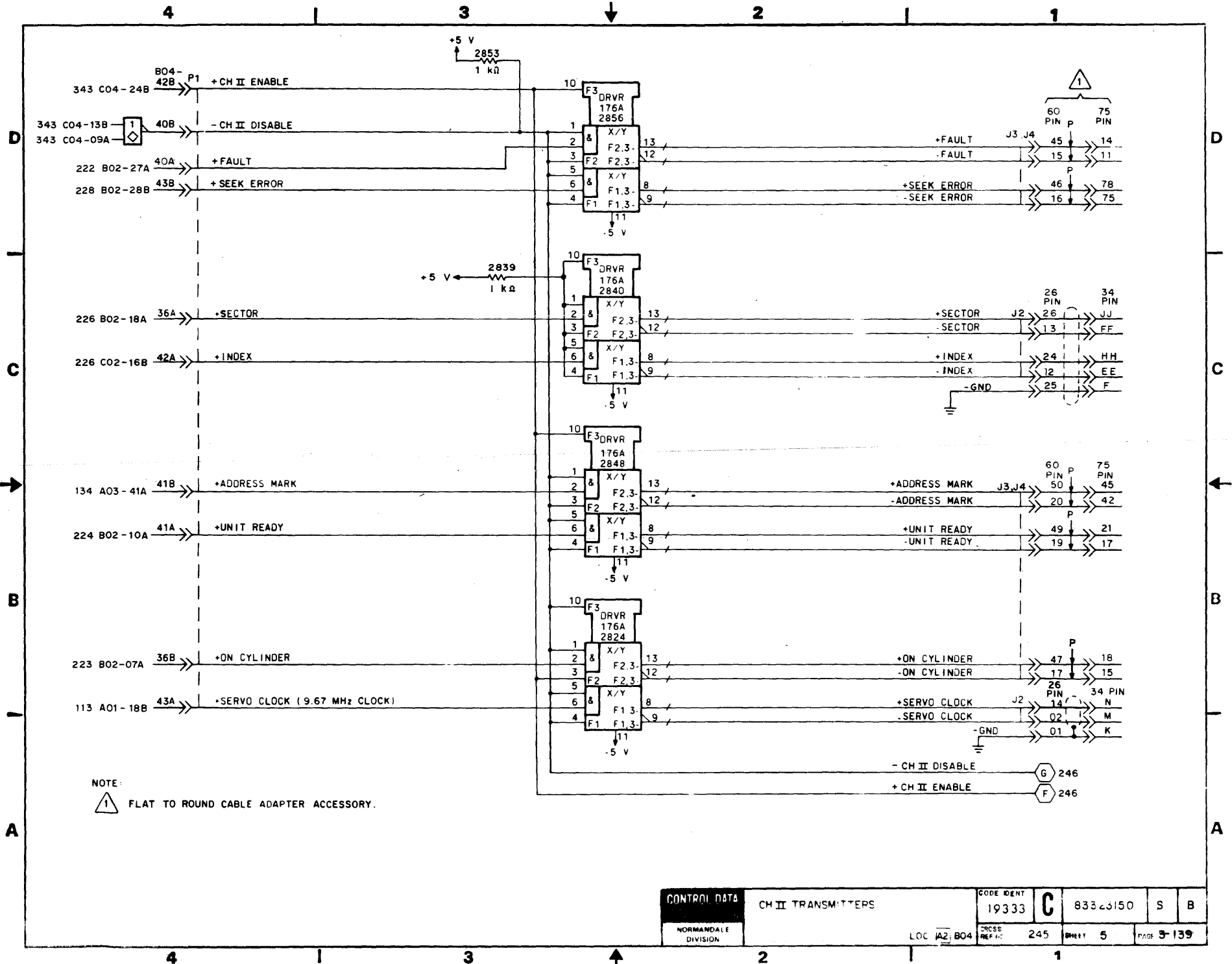


NOTES:

- 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

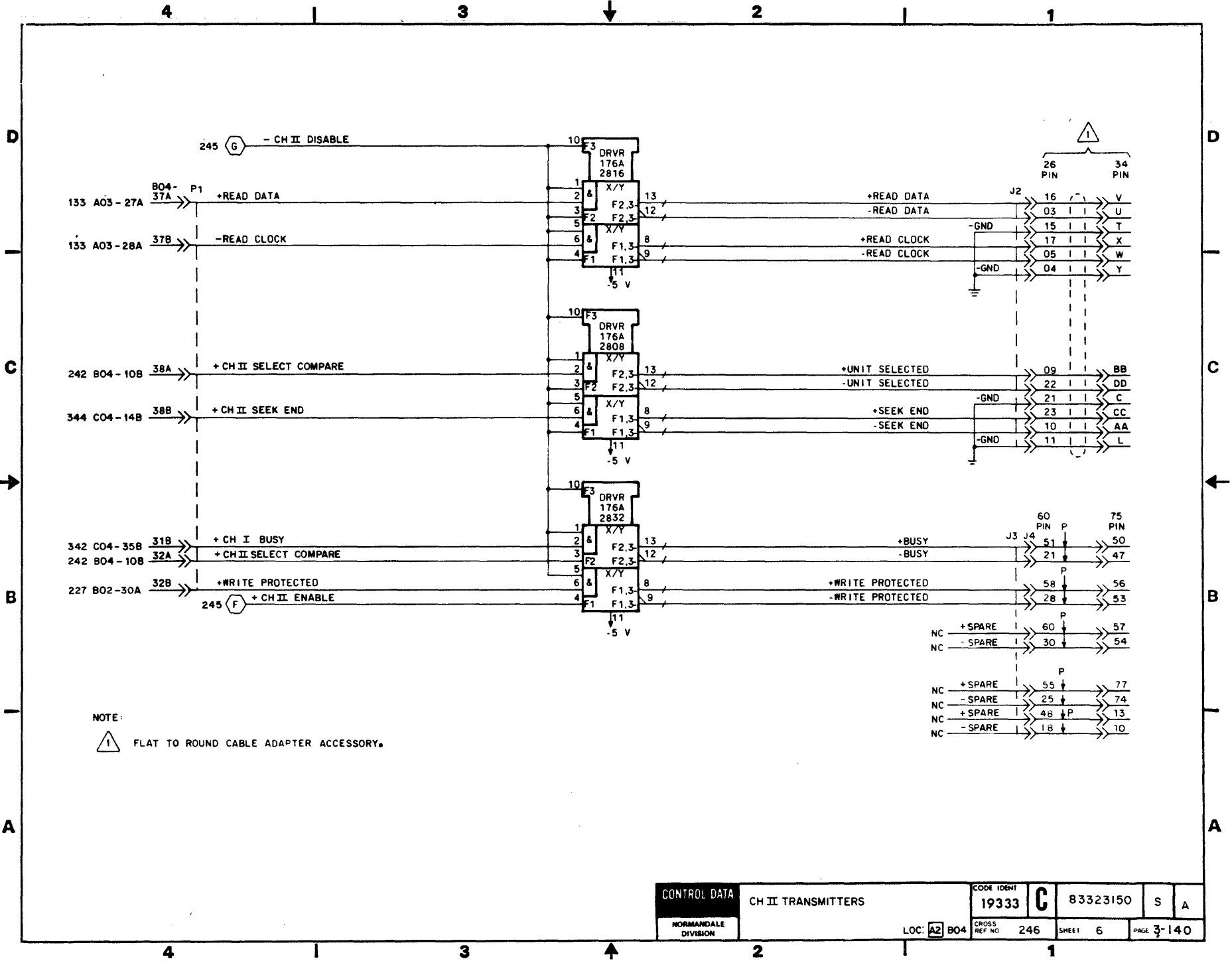
|                      |  |                               |     |              |       |       |          |      |       |
|----------------------|--|-------------------------------|-----|--------------|-------|-------|----------|------|-------|
| <b>CONTROL DATA</b>  |  | CH II RECEIVERS AND SEQ POWER |     | CODE IDENT   | 19333 | C     | 83323150 | S    | A     |
| NORMANDEALE DIVISION |  | LOC. A2                       | B04 | CROSS REF NO | 244   | SHEET | 4        | PAGE | 3-138 |





NOTE:  
 ⚠ FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|   |                    |                 |                     |   |          |   |   |
|---|--------------------|-----------------|---------------------|---|----------|---|---|
| CONTROL DATA<br>NORMANDEALE<br>DIVISION | CH II TRANSMITTERS |                 | CODE IDENT<br>19333 | C | 83323150 | S | B |
|   | LOC A2, B04        | CROSS REF # 245 | SHEET 5             |   |          |   |   |



NOTE:

⚠ FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |                    |                  |         |            |   |   |
|----------------------|--------------------|------------------|---------|------------|---|---|
| CONTROL DATA         | CH II TRANSMITTERS | CODE IDENT       | C       | 83323150   | S | A |
|                      |                    | 19333            |         |            |   |   |
| NORMANDEALE DIVISION | LOC: A2 B04        | CROSS REF NO 246 | SHEET 6 | PAGE 3-140 |   |   |

REVISION STATUS OF SHEETS

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| A | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B | B | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| C | B | A | A | C | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1026     | 6     |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

UNUSED LOGIC ELEMENTS

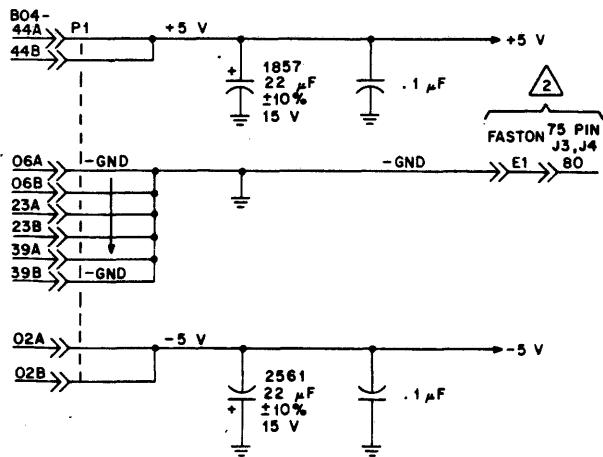
| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 175LS   | 0228     | 5,6           |



NOTES:

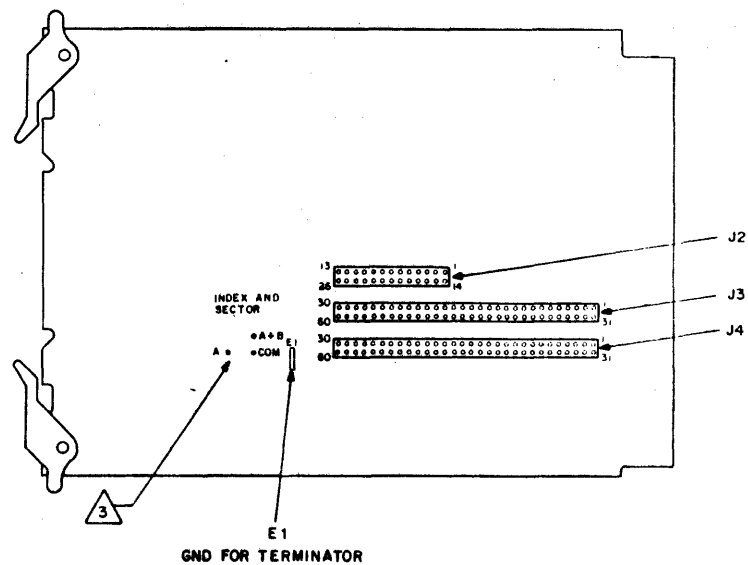
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.
- 3 INDEX/SECTOR CABLE DETERMINATION JUMPER

| REVISIONS |          |             | DRFT | DATE   | CHK'D |
|-----------|----------|-------------|------|--------|-------|
| REV       | ECO      | DESCRIPTION |      |        |       |
| A         | PE23(NC) | RELEASED    |      |        |       |
| B         | DJ02075  | CHANGE IC   | MJ   | 1-6-81 |       |
| C         | DJ02158  | CORRECTION  | MJ   | 1-6-81 |       |



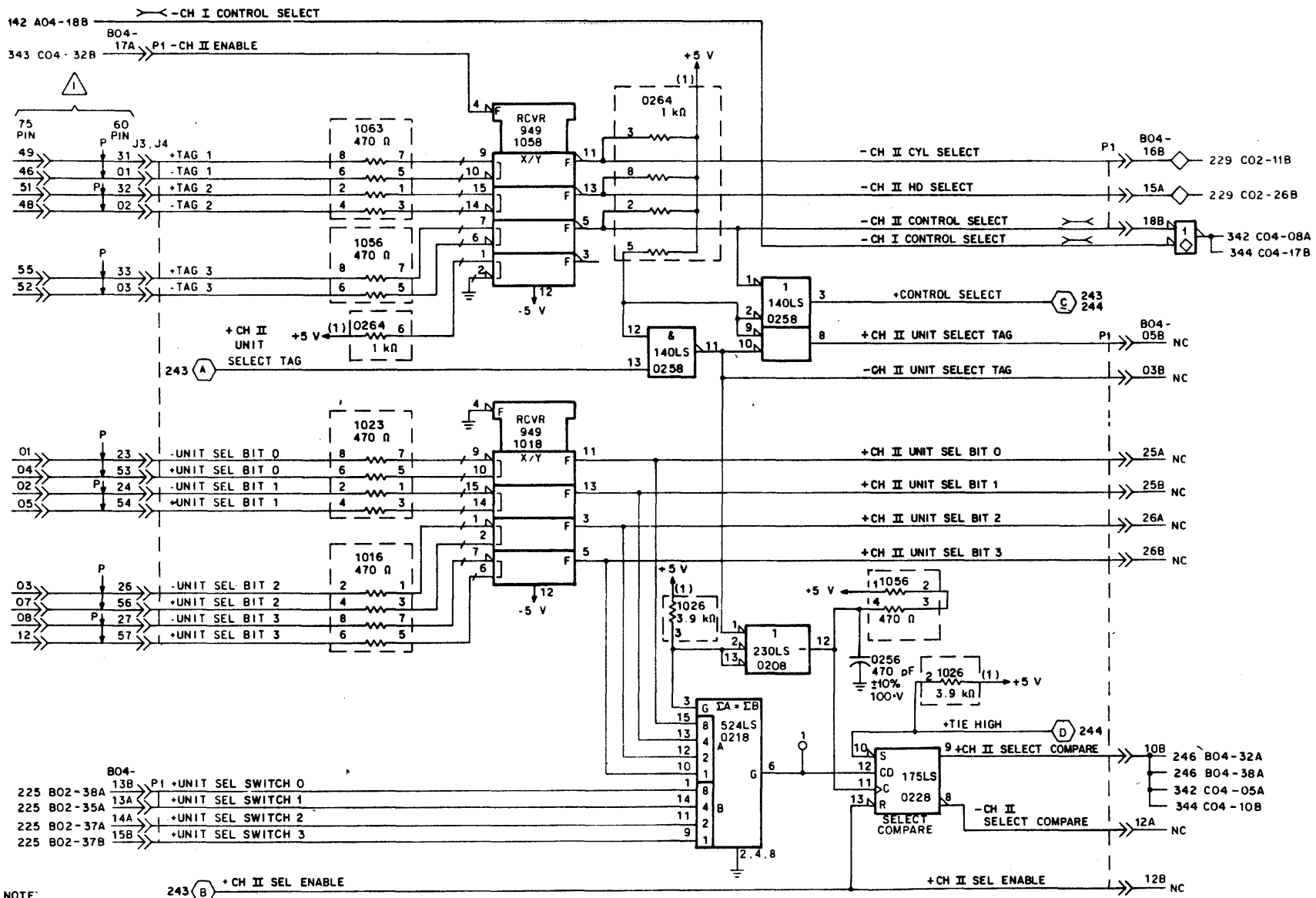
.1 μF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |



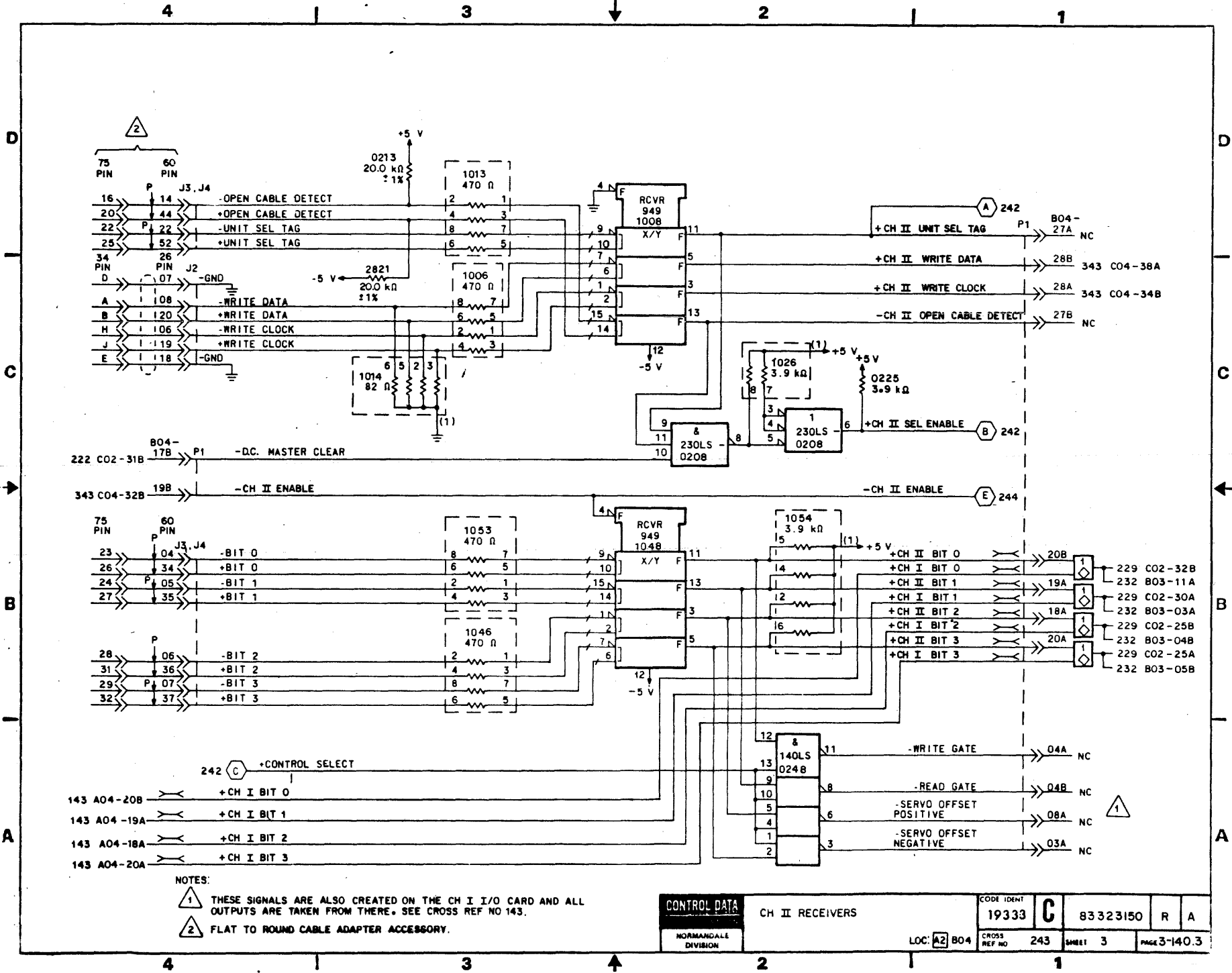
APPLICABLE ONLY TO DUAL CHANNEL UNITS

|          |           |      |          |                     |                |              |        |       |          |      |         |
|----------|-----------|------|----------|---------------------|----------------|--------------|--------|-------|----------|------|---------|
| DRAWN    | T. Hoang  | DATE | 12/12/80 | CONTROL DATA        | CHANNEL II I/O | CODE IDENT   | 19333  | C     | 83323150 | U    | C       |
| CHECKED  |           |      |          |                     | DIAGRAMS       |              |        |       |          |      |         |
| ENGINEER | H. J. ... |      |          | NORMANDALE DIVISION | TYPE M/FAX     | CROSS REF NO | 241    | SHEET | 1 of 6   | PAGE | 3-140.1 |
| APPROVED |           |      |          |                     |                | LOC          | A2 804 |       |          |      |         |



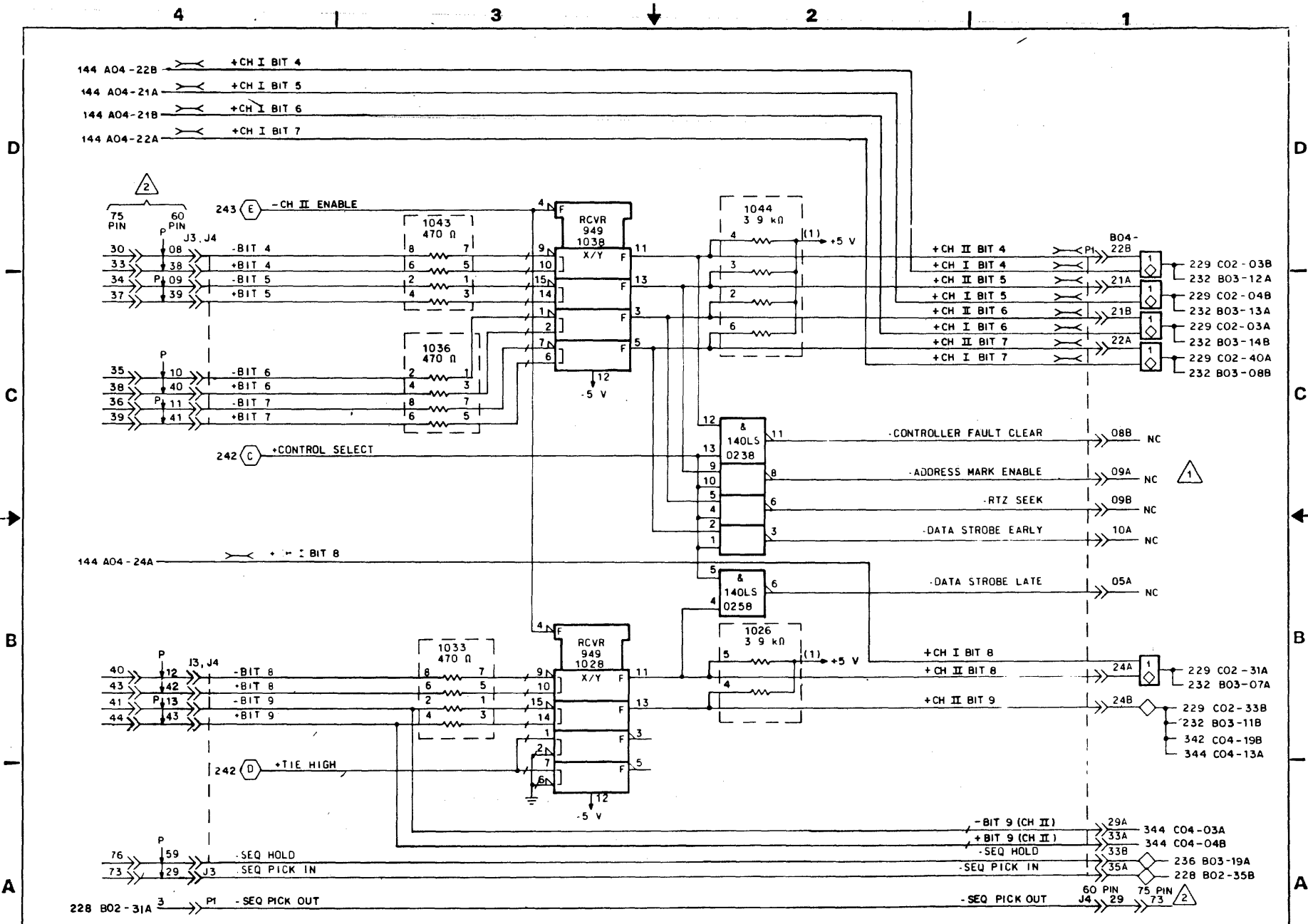
NOTE: 1 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |  |                                 |  |                     |          |          |   |   |
|----------------------|--|---------------------------------|--|---------------------|----------|----------|---|---|
| <b>CONTROL DATA</b>  |  | CH II RECEIVERS AND UNIT SELECT |  | CODE IDENT<br>19333 | <b>C</b> | 83323150 | U | B |
| NORMAN DALE DIVISION |  | LOC: A2 B04                     |  | CRUSS REF NO 242    |          |          |   |   |



NOTES:  
 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 143.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |  |                 |  |                  |          |          |   |   |
|---------------------|--|-----------------|--|------------------|----------|----------|---|---|
| <b>CONTROL DATA</b> |  | CH II RECEIVERS |  | CODE IDENT       | <b>C</b> | 83323150 | R | A |
| NORMANDALE DIVISION |  | LOC: A2 B04     |  | CROSS REF NO 243 |          |          |   |   |

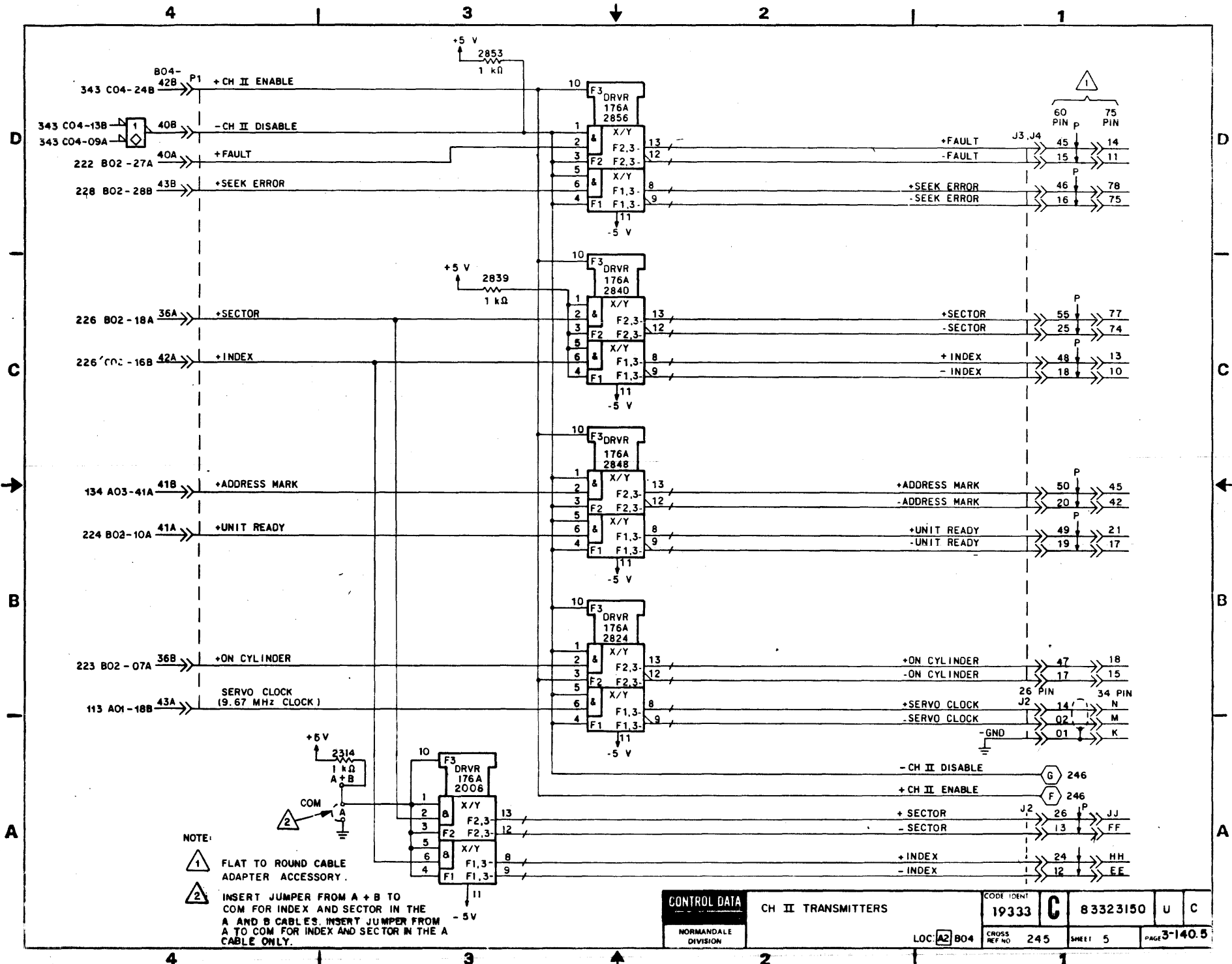


NOTES

1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144

2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                      |  |                               |  |            |   |          |   |   |
|----------------------|--|-------------------------------|--|------------|---|----------|---|---|
| CONTROL DATA         |  | CH II RECEIVERS AND SEQ POWER |  | CODE IDENT | C | 83323150 | R | A |
| NORMANDEALE DIVISION |  | LOC: A2 B04                   |  | 19333      |   |          |   |   |



NOTE:



FLAT TO ROUND CABLE ADAPTER ACCESSORY.



INSERT JUMPER FROM A + B TO COM FOR INDEX AND SECTOR IN THE A AND B CABLES. INSERT JUMPER FROM A TO COM FOR INDEX AND SECTOR IN THE A CABLE ONLY.

CONTROL DATA

CH II TRANSMITTERS

CODE IDENT

19333

C

83323150

U

C

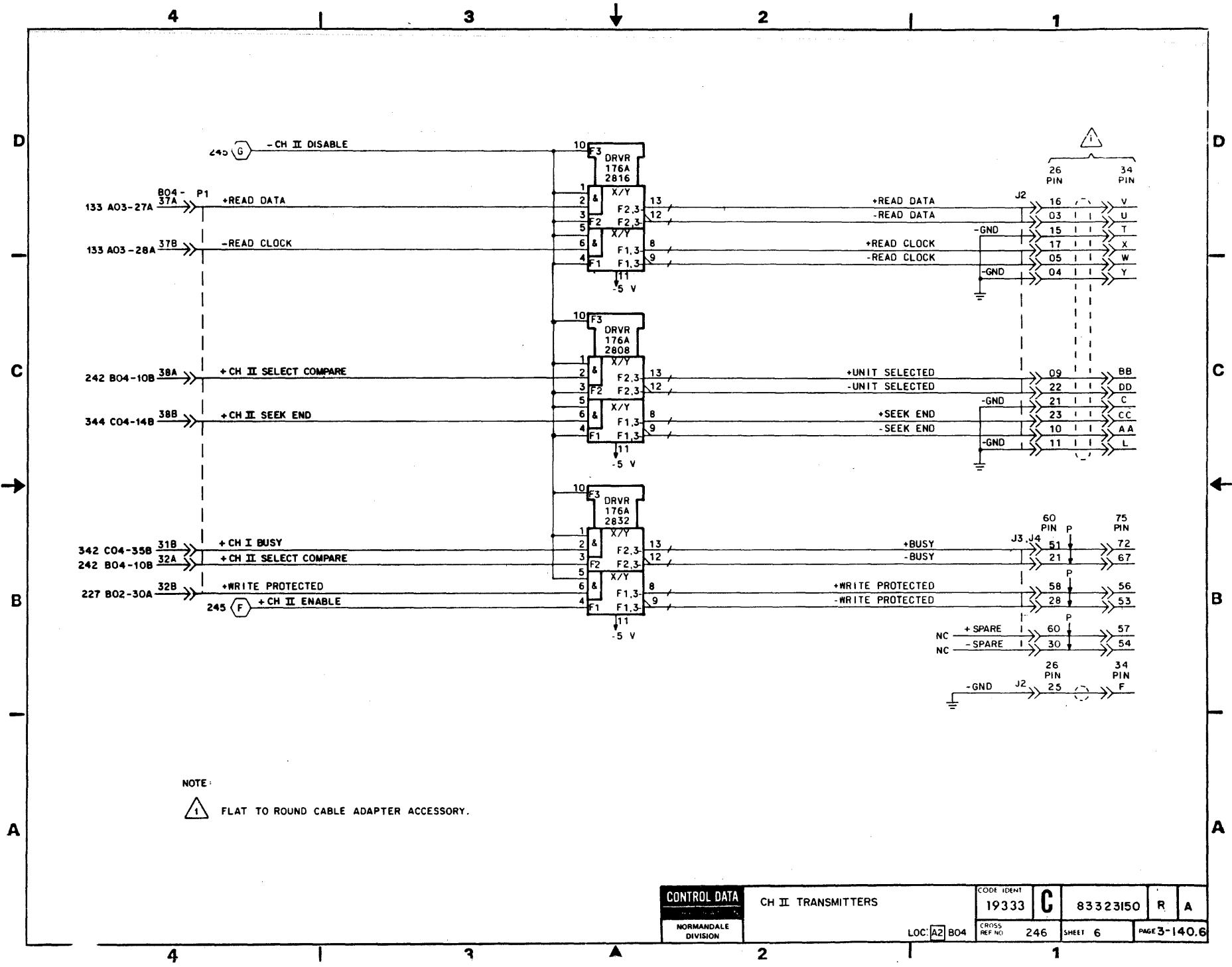
NORMANDEALE DIVISION


LOC: A2 B04

CROSS REF NO 245

SHEET 5

PAGE 3-140.5

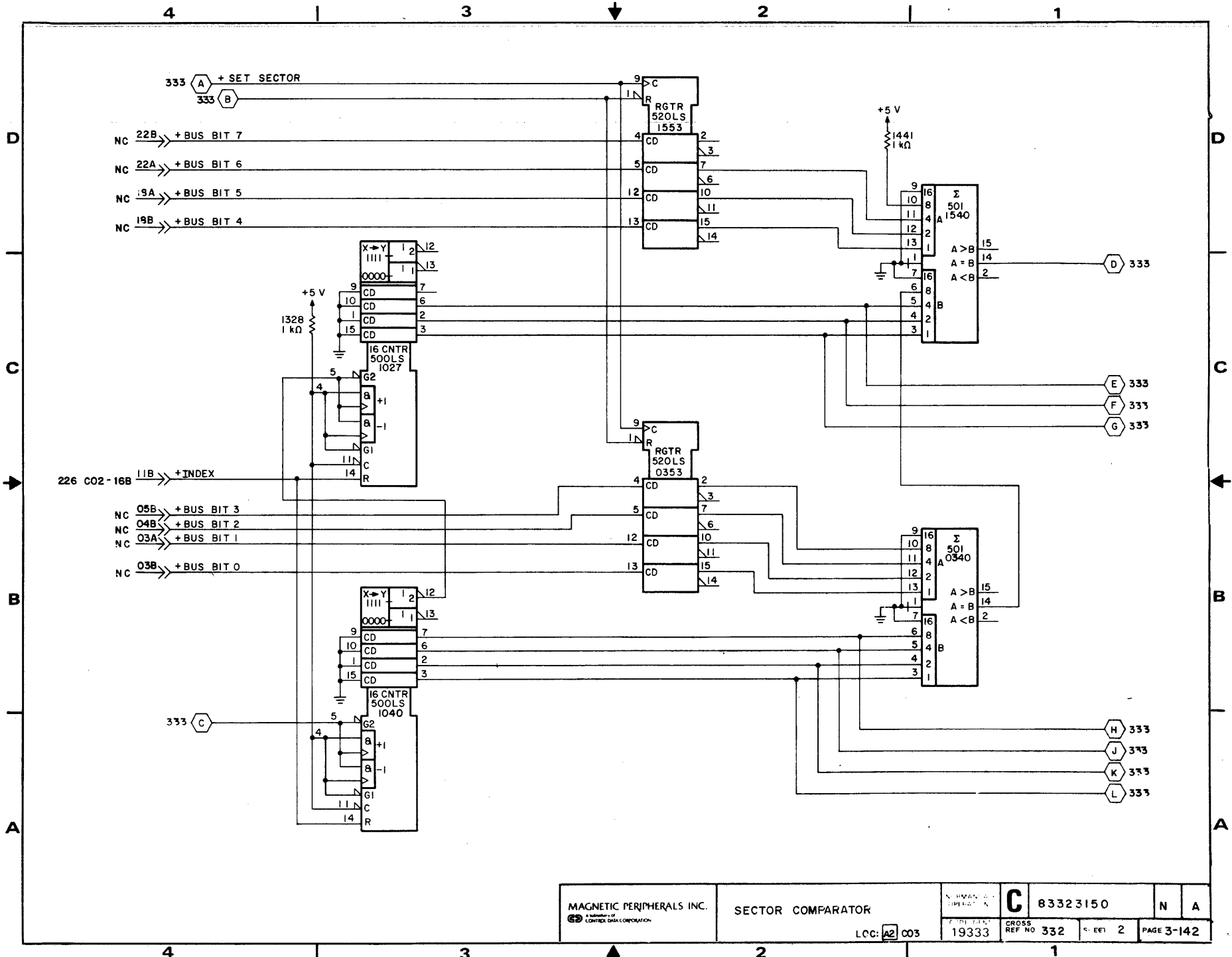


NOTE:  
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|   |                    |              |       |   |          |   |   |
|---|--------------------|--------------|-------|---|----------|---|---|
| CONTROL DATA<br>NORMANDEALE<br>DIVISION | CH II TRANSMITTERS | CODE IDENT   | 19333 | C | 83323150 | R | A |
|   |                    | CROSS REF NO | 246   |   |          |   |   |
| LOC: A2 B04                             |                    |              |       |   |          |   |   |





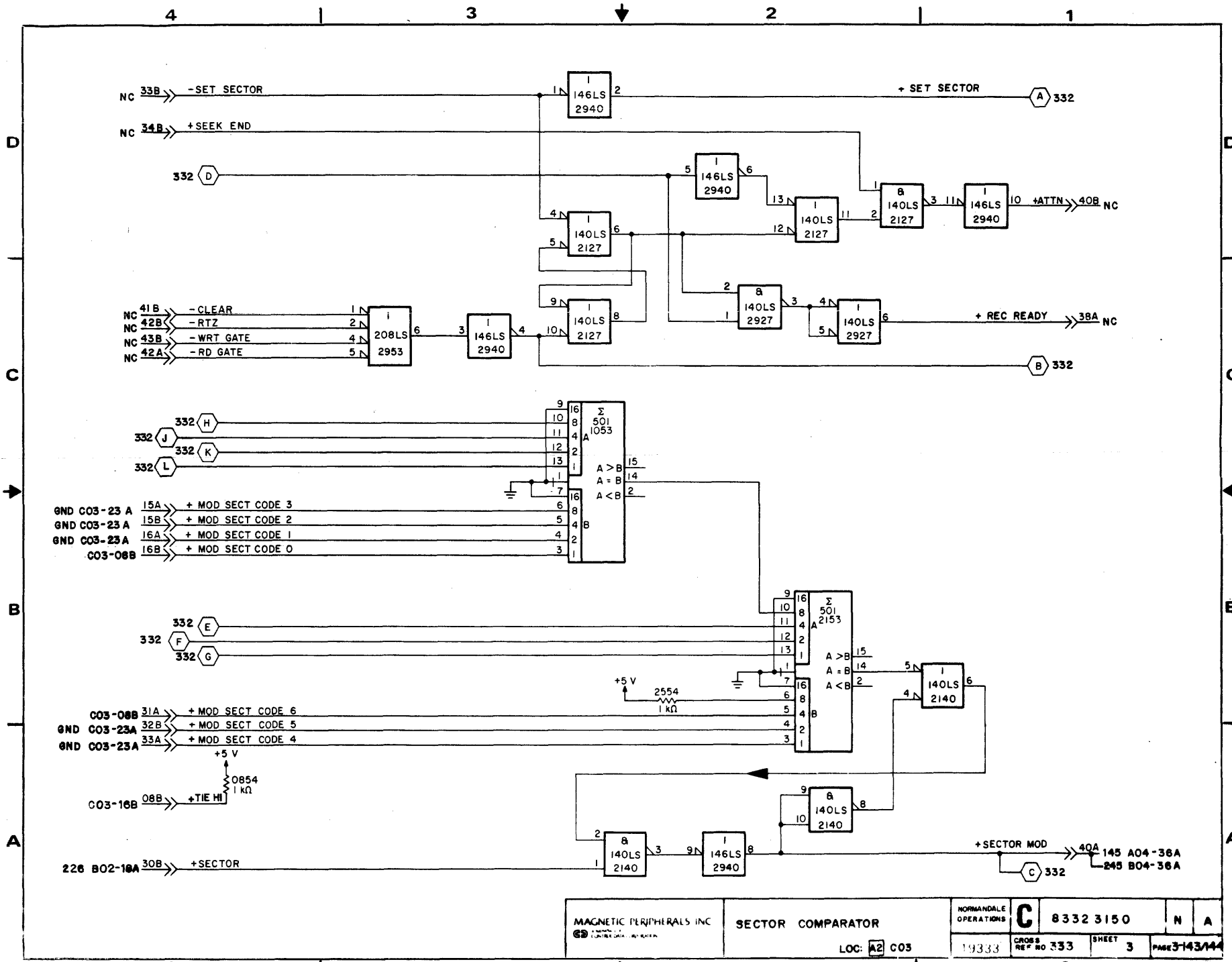


MAGNETIC PERIPHERALS INC.  
a subsidiary of  
 CONTROL DATA CORPORATION

SECTOR COMPARATOR

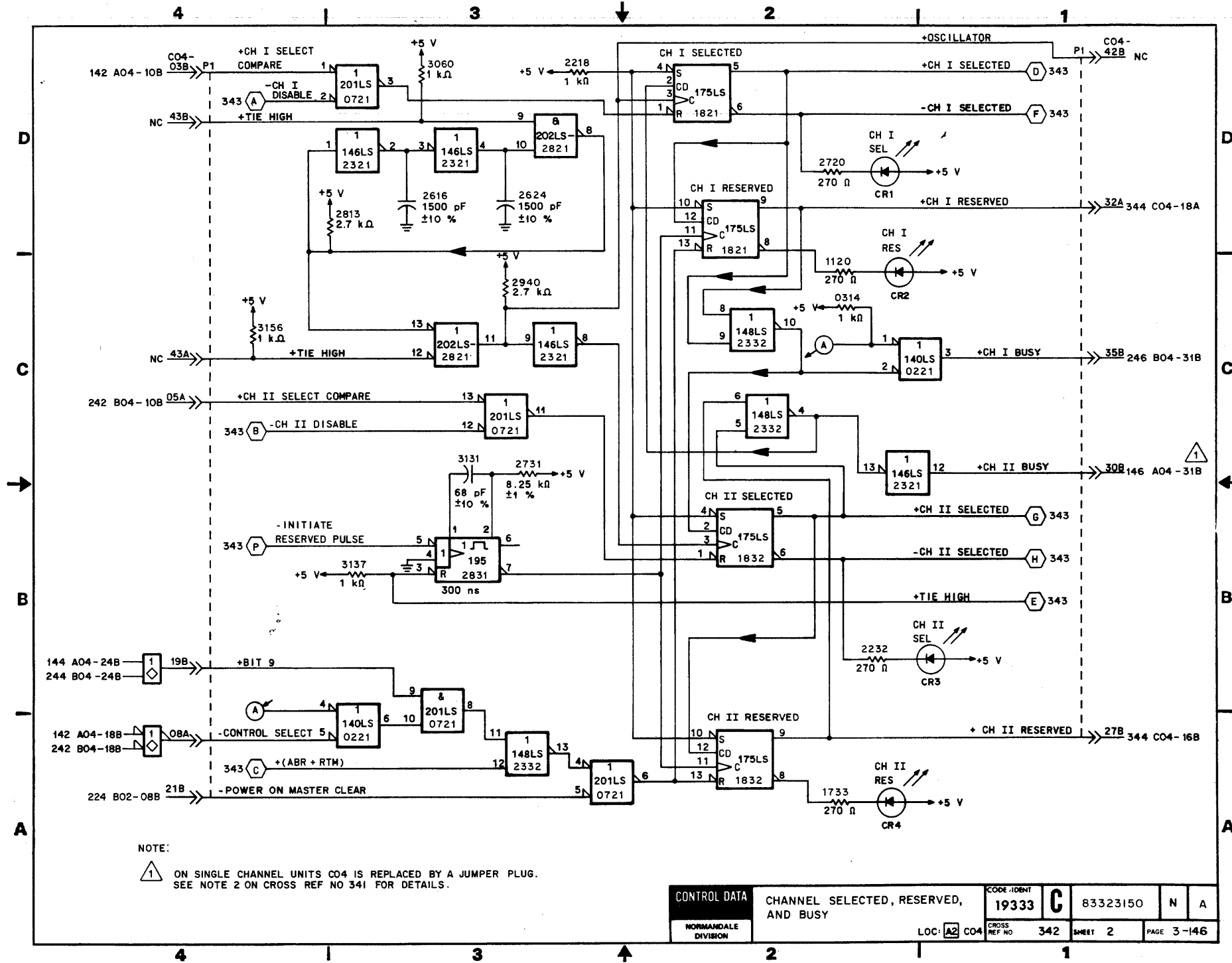
LCC: **A2** 003

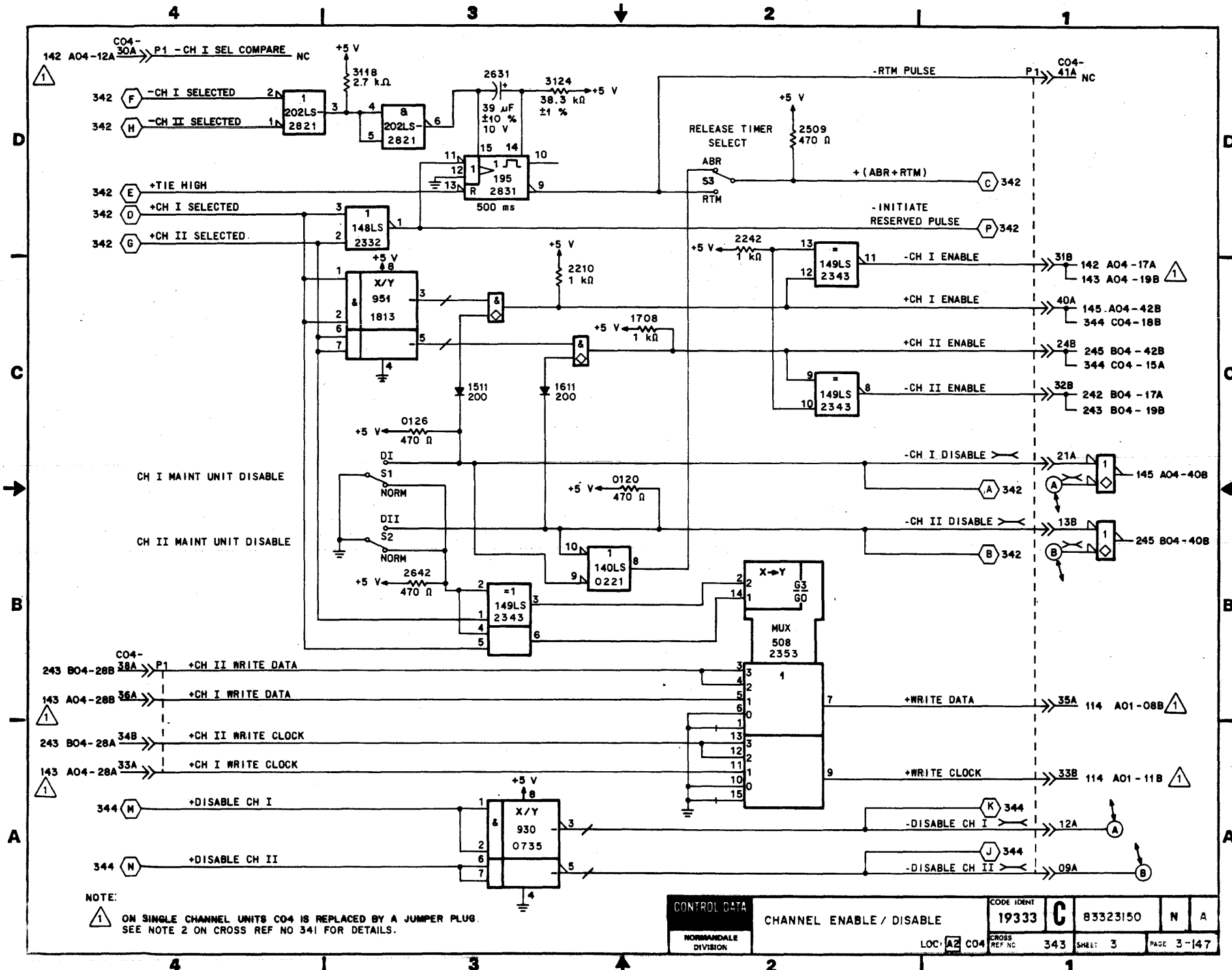
|  |                                 |                            |                    |                      |
|--|---------------------------------|----------------------------|--------------------|----------------------|
|  | PART NO.<br><b>19333</b>        | GROSS REF NO<br><b>332</b> | C. EET<br><b>2</b> | PAGE<br><b>3-142</b> |
|  | CONTROL DATA<br><b>83323150</b> | N                          | A                  |                      |





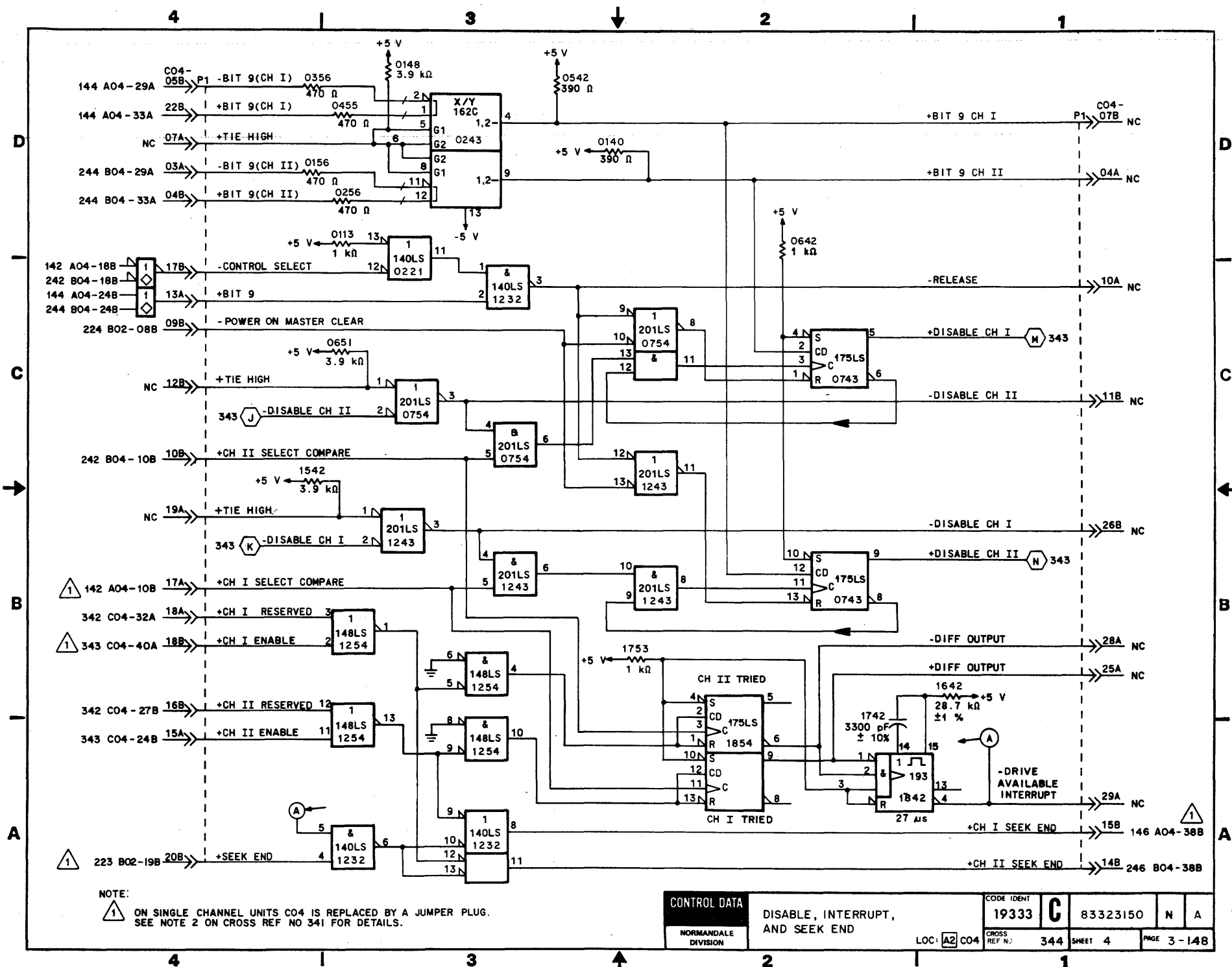






NOTE:  
 1 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.  
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

|              |                          |             |              |       |       |          |      |       |
|--------------|--------------------------|-------------|--------------|-------|-------|----------|------|-------|
| CONTROL DATA | CHANNEL ENABLE / DISABLE |             | CODE IDENT   | 19333 | C     | 83323150 | N    | A     |
|              | NORMANDEALE DIVISION     | LOC: A2 C04 | CROSS REF NC | 343   | SHEET | 3        | PAGE | 3-147 |



NOTE:  
 1 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.  
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

|  |                                     |     |                     |     |          |            |   |
|--|-------------------------------------|-----|---------------------|-----|----------|------------|---|
| CONTROL DATA<br>NORMANDALE<br>DIVISION | DISABLE, INTERRUPT,<br>AND SEEK END |     | CODE IDENT<br>19333 | C   | 83323150 | N          | A |
|  | LOC: A2                             | CO4 | CROSS<br>REF NO:    | 344 | SHEET 4  | PAGE 3-148 |   |



4

1

3

↓

2

1

1

| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| 1                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| A                         | A |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B                         | A |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
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|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
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|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
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|                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

| REVISIONS |          |              |      |        |       |
|-----------|----------|--------------|------|--------|-------|
| REV       | ECO      | DESCRIPTION  | DRT. | DATE   | CHK'D |
| A         | PE 23000 | RELEASED     |      |        |       |
| B         | PE50896A | BZSV TO CZSV | MF   | 7-1-80 |       |
|           |          |              |      |        |       |
|           |          |              |      |        |       |
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|           |          |              |      |        |       |
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| DRAWN    |  | 4-8-79  |  MAGNETIC PERIPHERALS INC.<br><small>a subsidiary of</small><br>CONTROL DATA CORPORATION | POWER AMP<br>DIAGRAM | NORMANDALE<br>OPERATIONS | <b>C</b>        | 83323150 | N               | B             |  |
| CHECKED  |  | 4/11/79 |  | TYPE: BZSV/CZSV      | CODE IDENT<br>19333      | CROSS<br>REF NO | 351      | SHEET<br>1 of 2 | PAGE<br>3-149 |  |
| ENGINEER |  | 5/7/79  |  | LOC: A2 C05          |                          |                 |          |                 |               |  |
| APPROVED |  |         |  |                      |                          |                 |          |                 |               |  |

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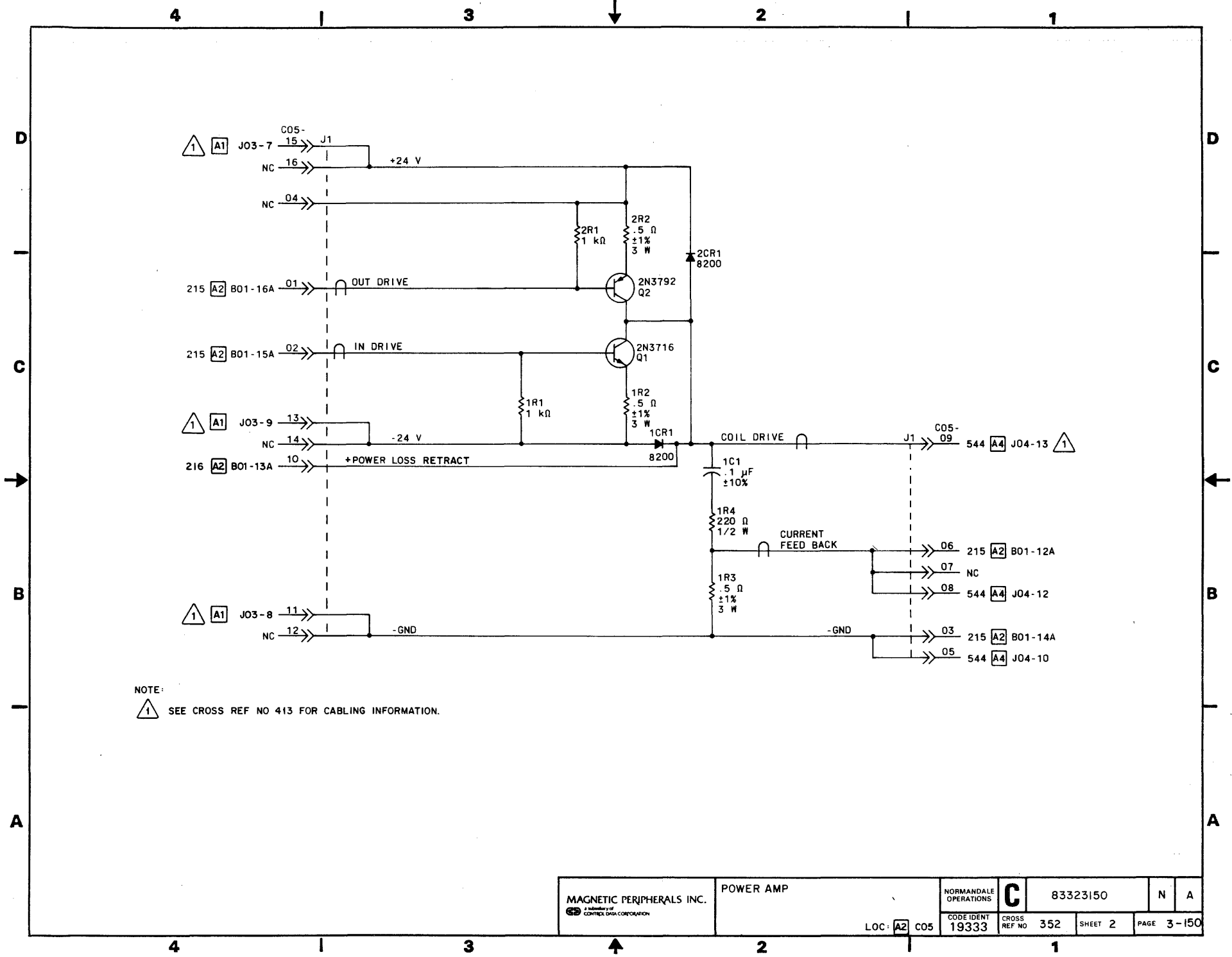
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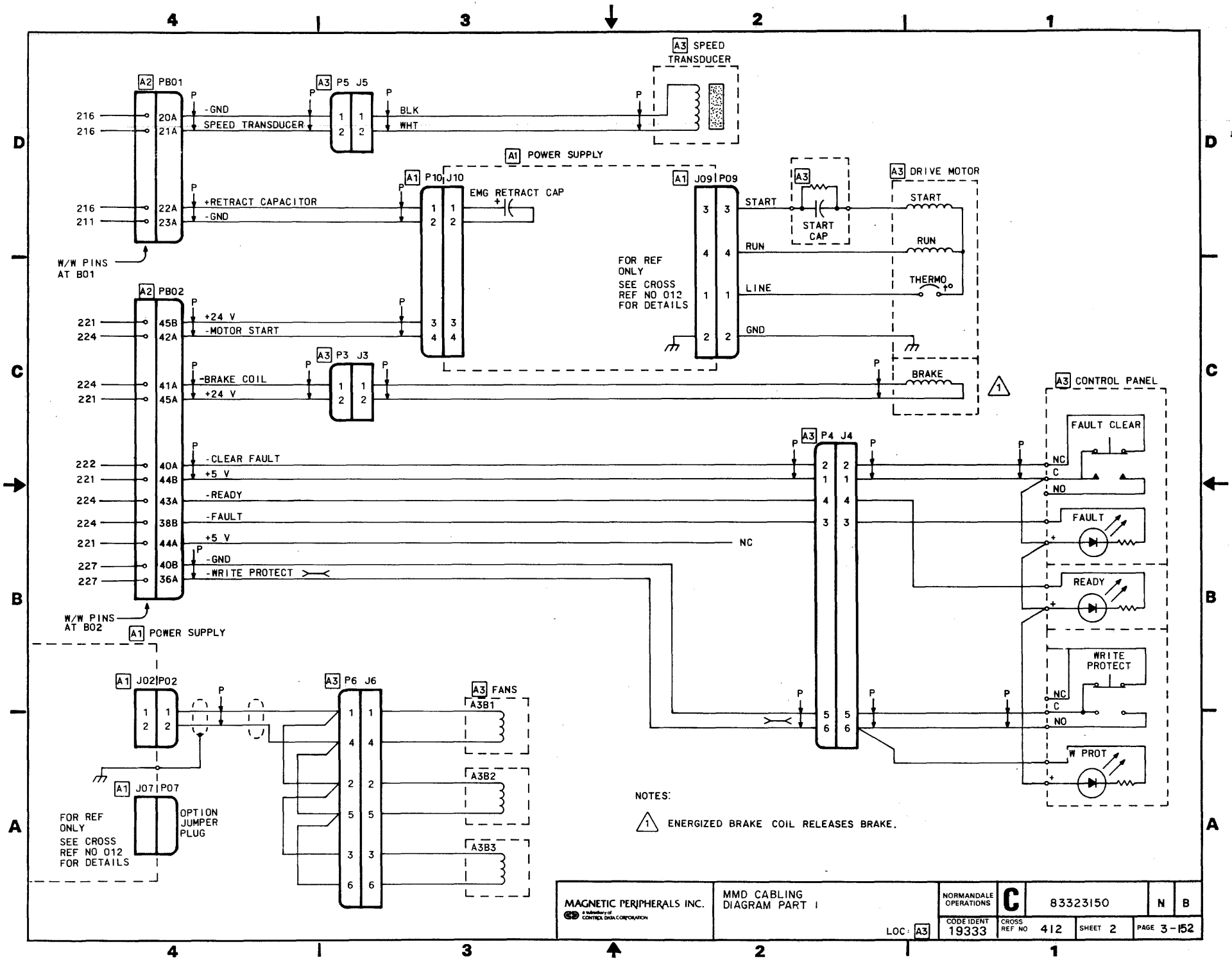
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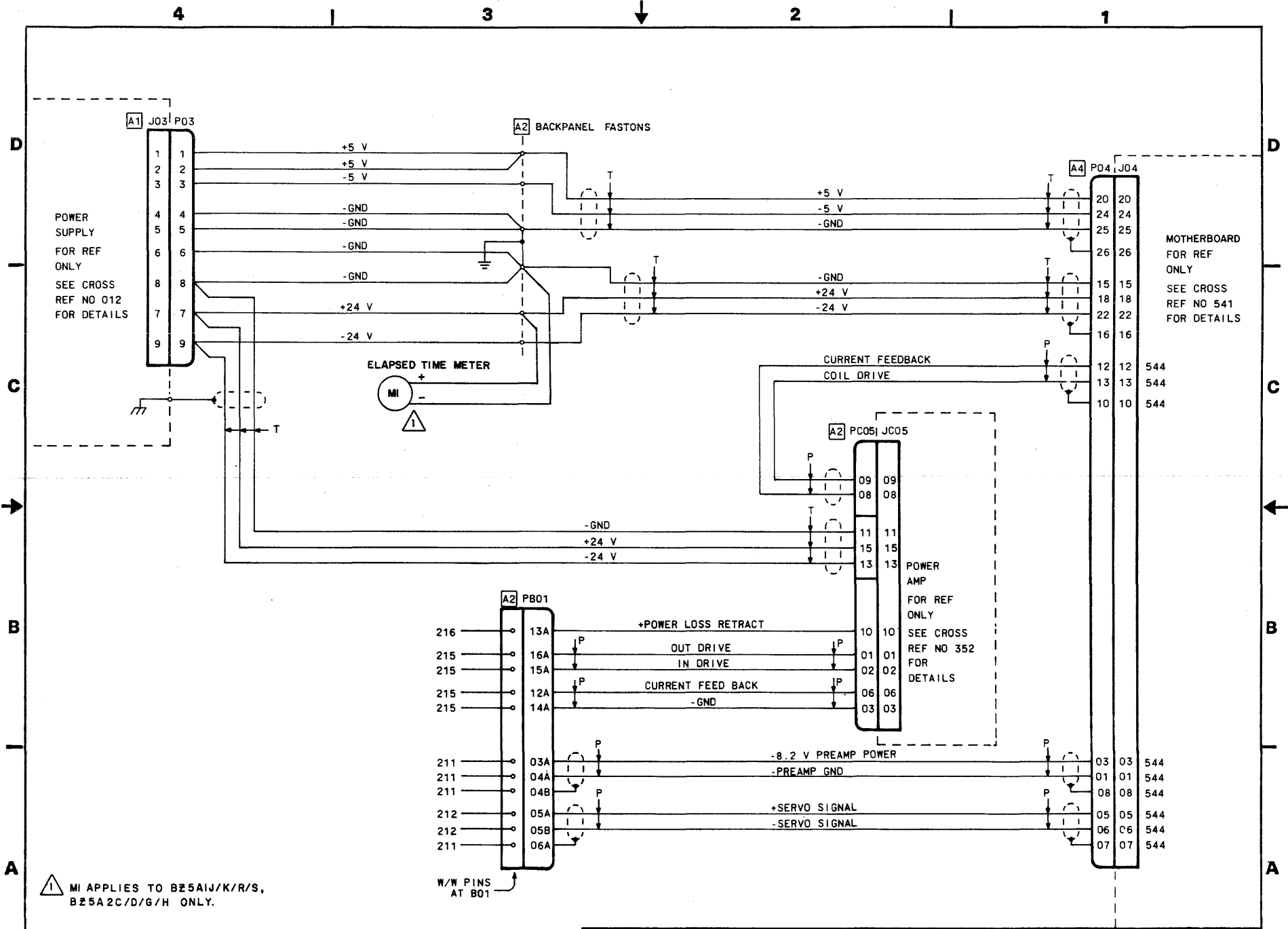


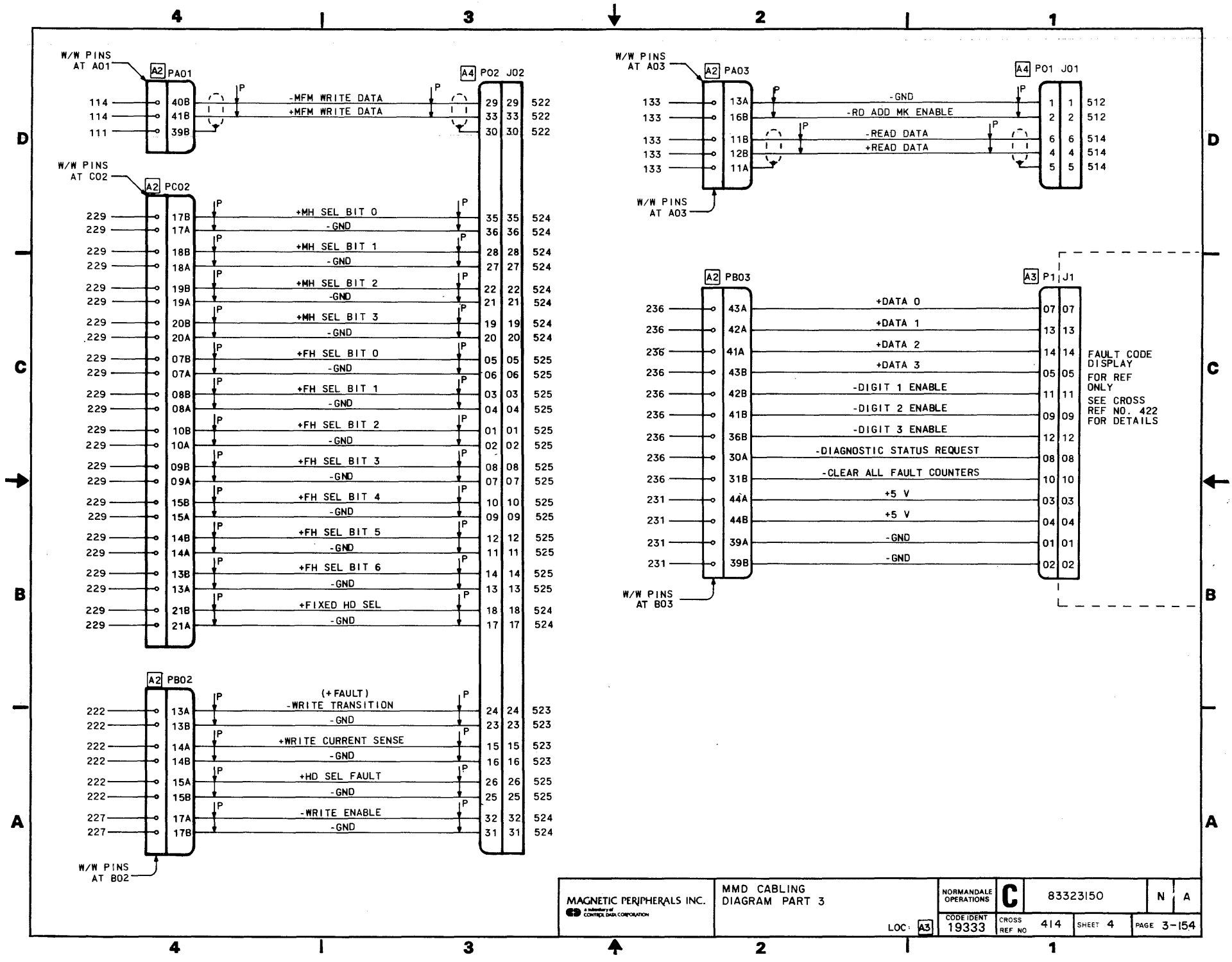
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 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.

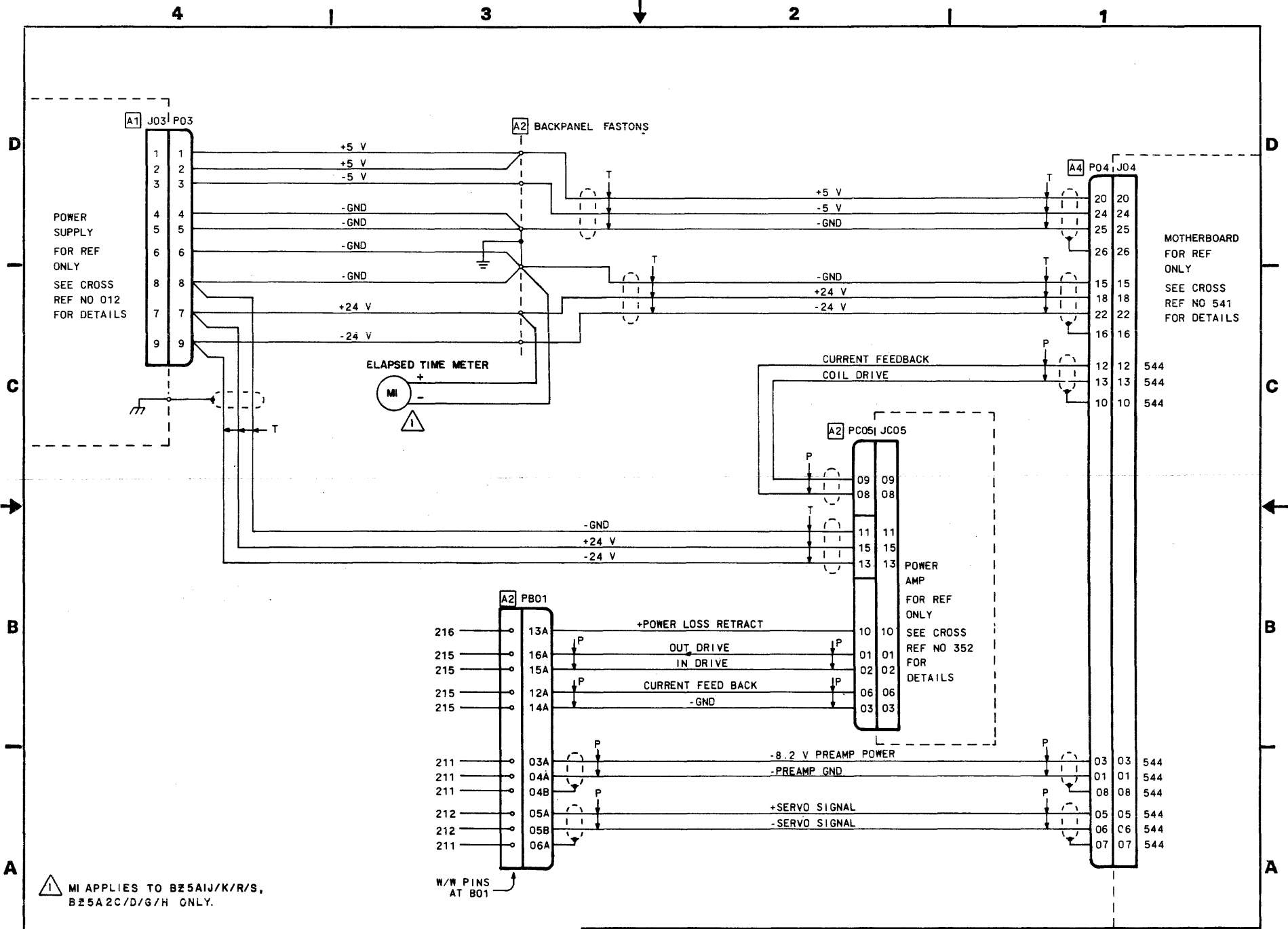
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|---|-------------|--------------------|-----------------------|----------------------|---------|------------|
| MAGNETIC PERIPHERALS INC.<br><small>a subsidiary of</small><br>CONTROL DATA CORPORATION | POWER AMP   |                    | NORMANDALE OPERATIONS | <b>C</b><br>83323150 | N       | A          |
|   | LOC: A2 C05 | CROSS REF NO 19333 | CROSS REF NO 352      |                      | SHEET 2 | PAGE 3-150 |





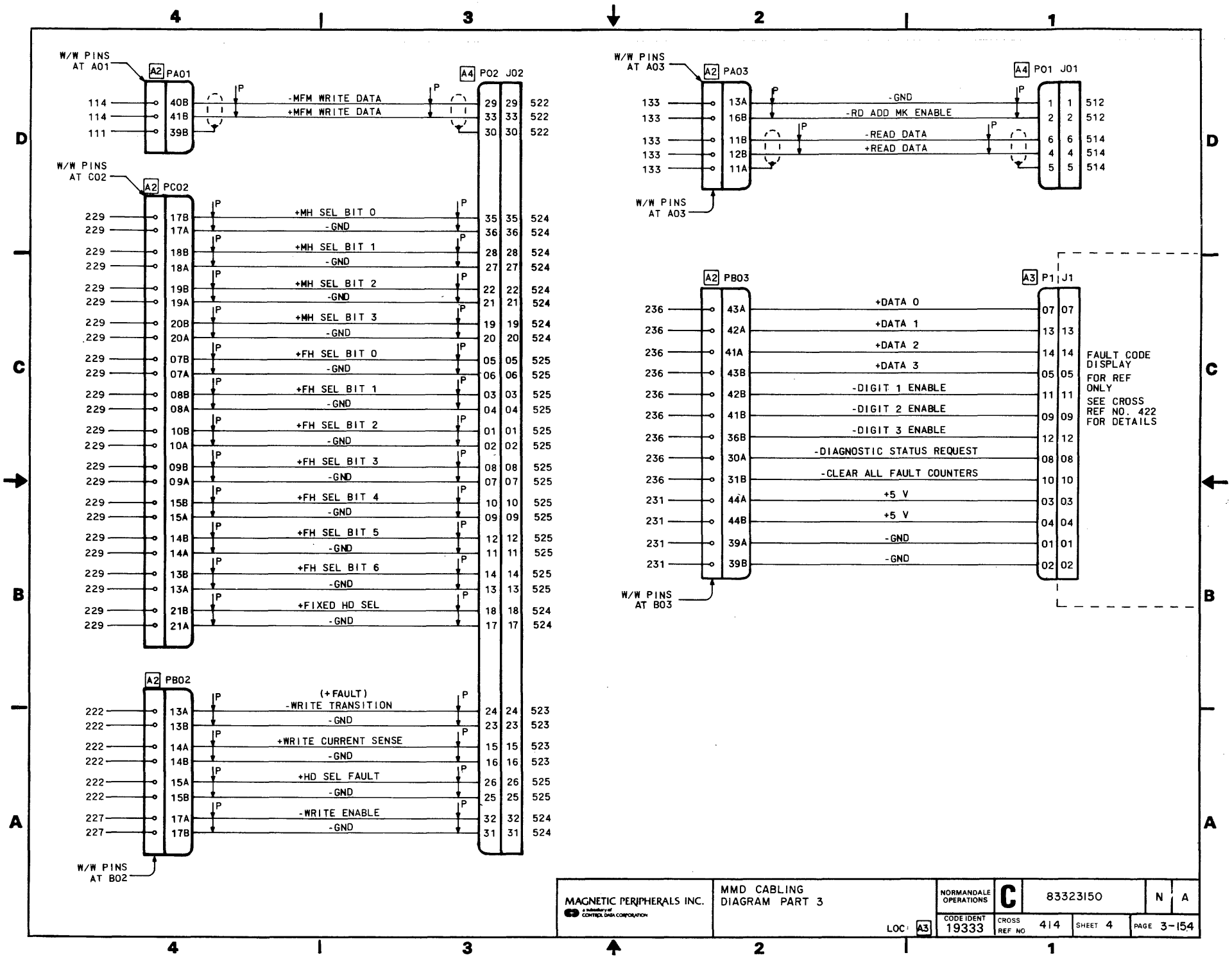






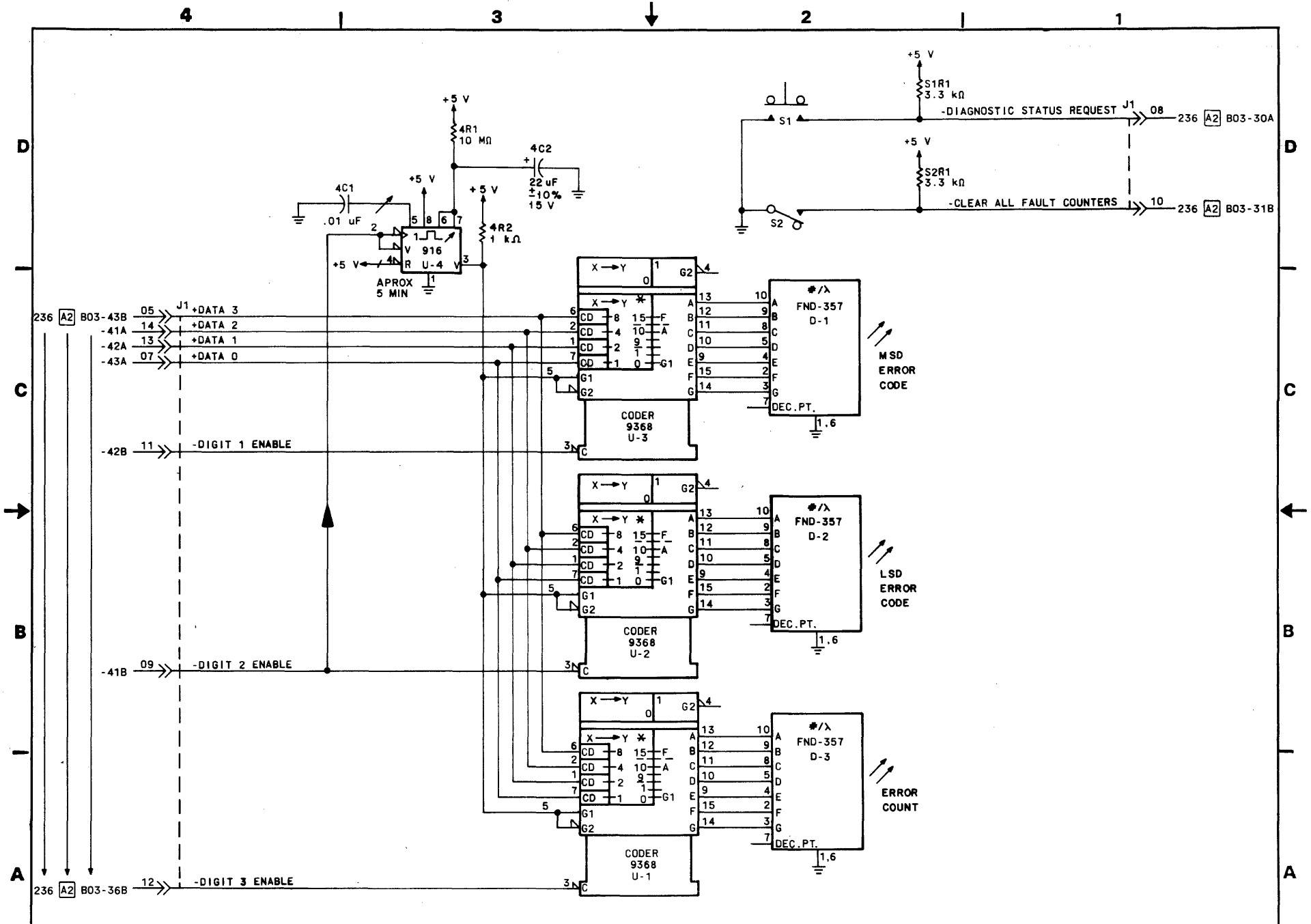
MI APPLIES TO B25AIJ/K/R/S,  
B25A2C/D/G/H ONLY.

W/W PINS AT B01

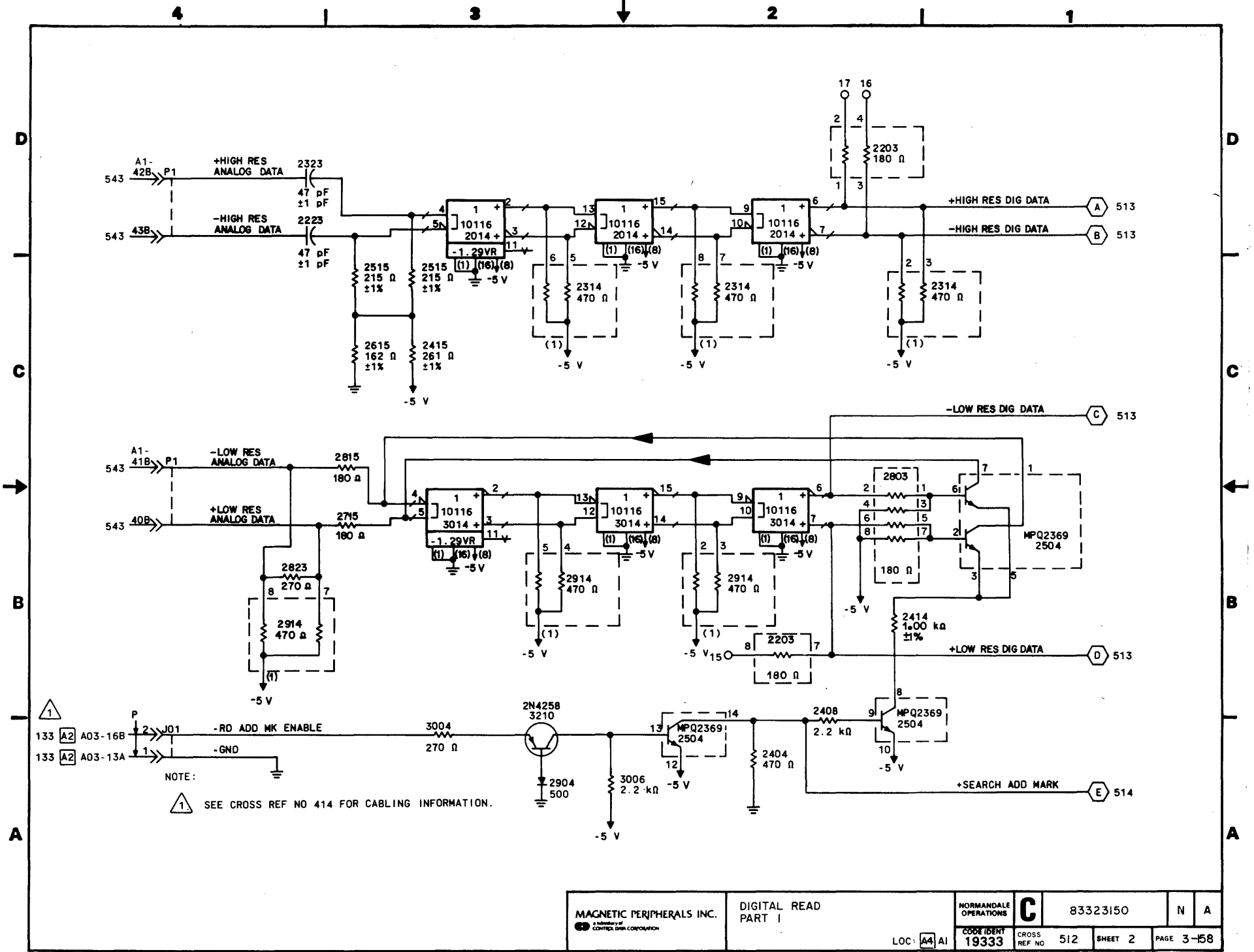




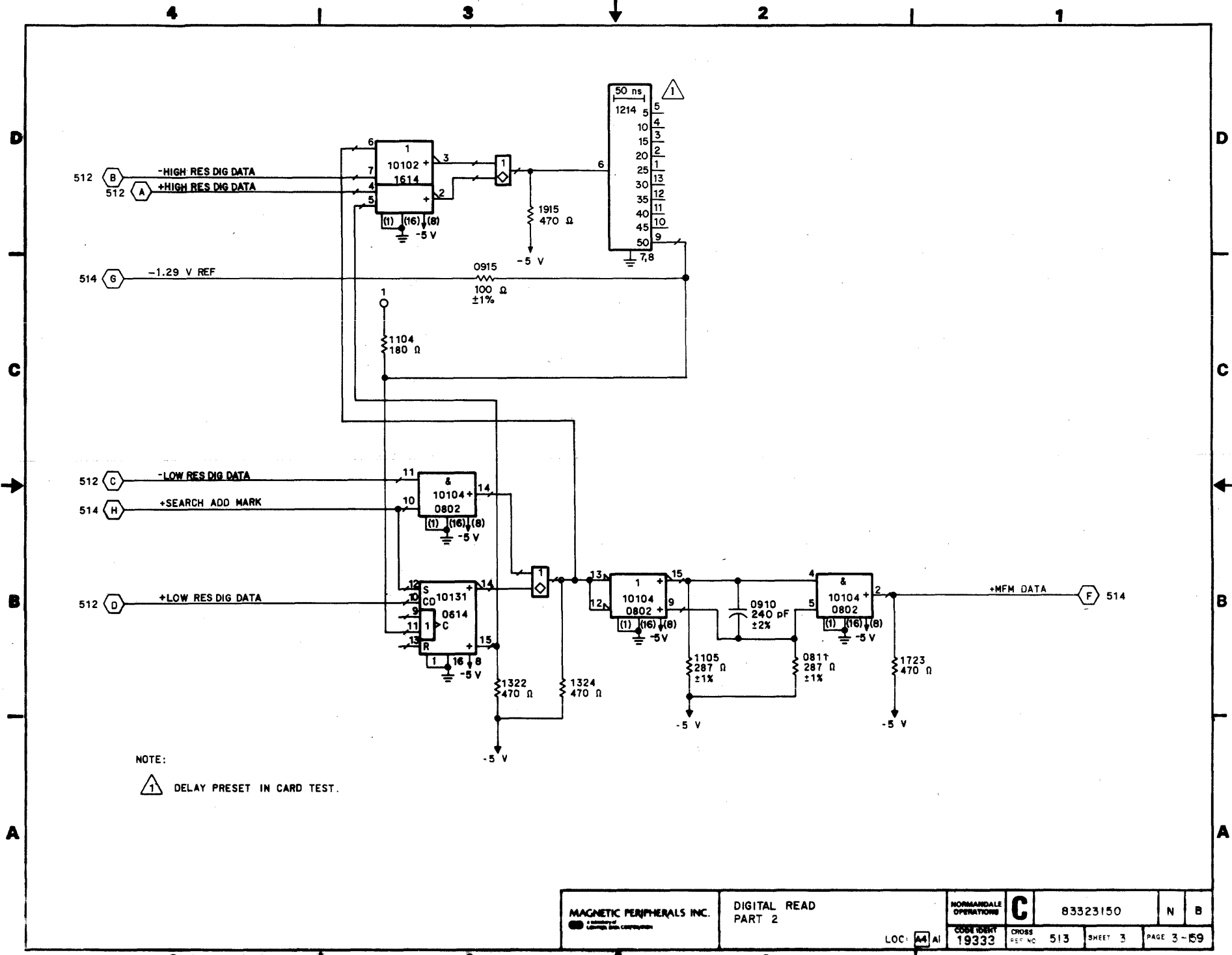




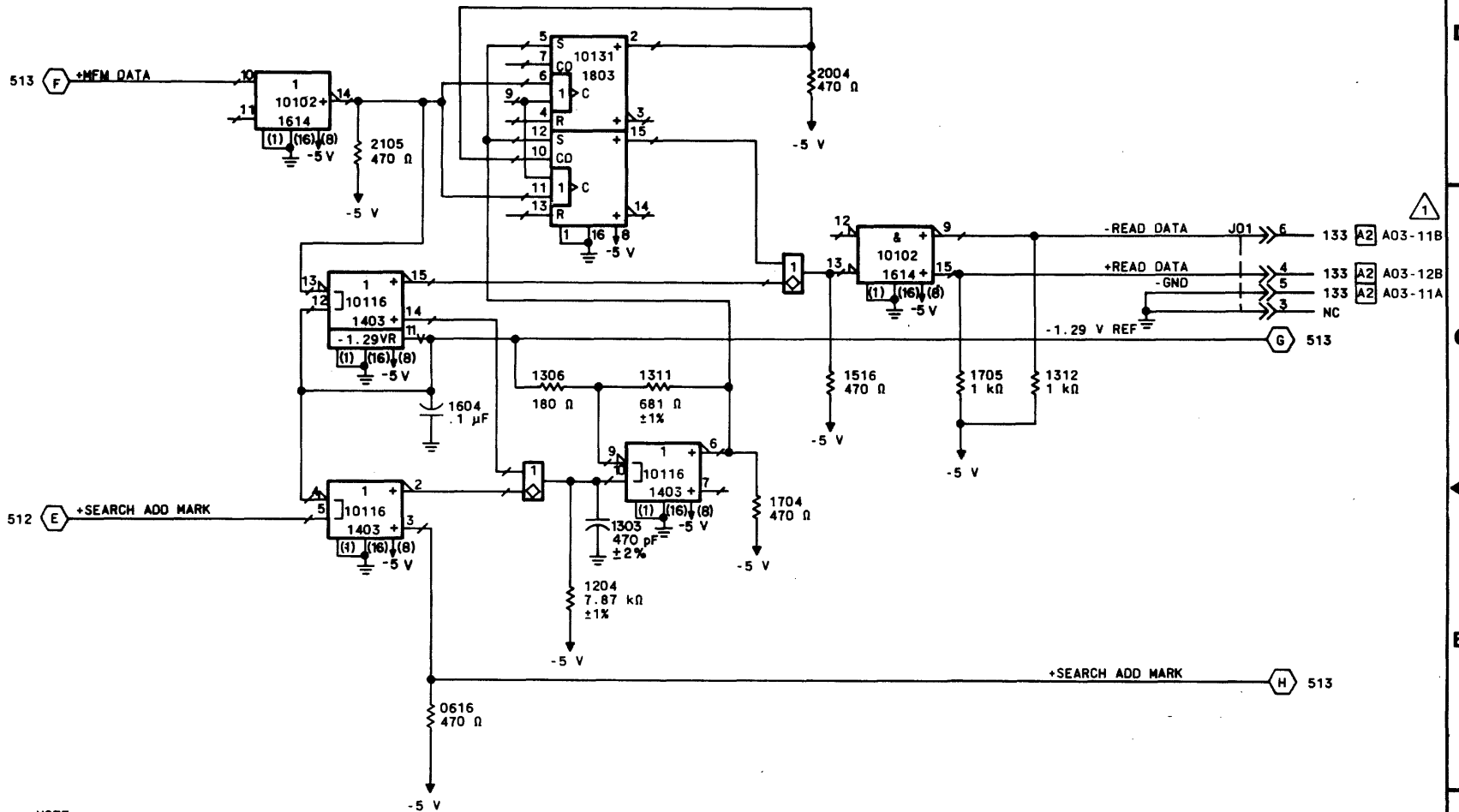




|   |                     |                  |                       |          |            |   |   |
|---|---------------------|------------------|-----------------------|----------|------------|---|---|
| MAGNETIC PERIPHERALS INC.<br><small>a subsidiary of</small><br>CONTROL DATA CORPORATION | DIGITAL READ PART I |                  | NORMANDALE OPERATIONS | <b>C</b> | 83323150   | N | A |
|   | LOC: A4 A1          | CODE IDENT 19333 | CROSS REF NO 512      | SHEET 2  | PAGE 3-158 |   |   |



NOTE:  
 ⚠ DELAY PRESET IN CARD TEST.



NOTE:

1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

MAGNETIC PERIPHERALS INC.  
a subsidiary of  
Control Data Corporation

DIGITAL READ  
PART 3

NORMANDEALE  
OPERATIONS

C

83323150

N

A

LOC: A4 AI

CODE IDENT  
19333

CROSS  
REF NO

514

SHEET 4

PAGE 3-160

4

3

2

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### REVISION STATUS OF SHEETS

|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| A | A | A | A | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B | A | A | B | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| C | C | A | B | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| D | D | D | D | D |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| E | D | D | E | D |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| F | F | D | E | D |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| G | F | G | E | D |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

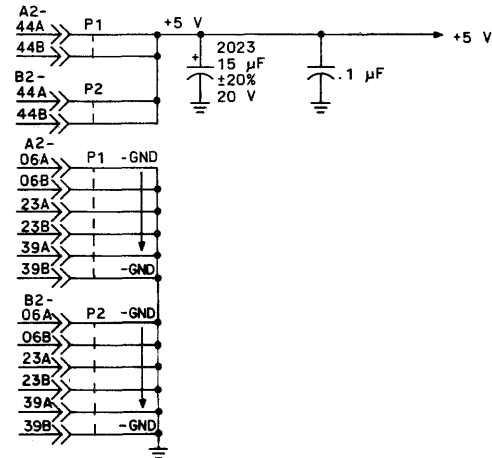
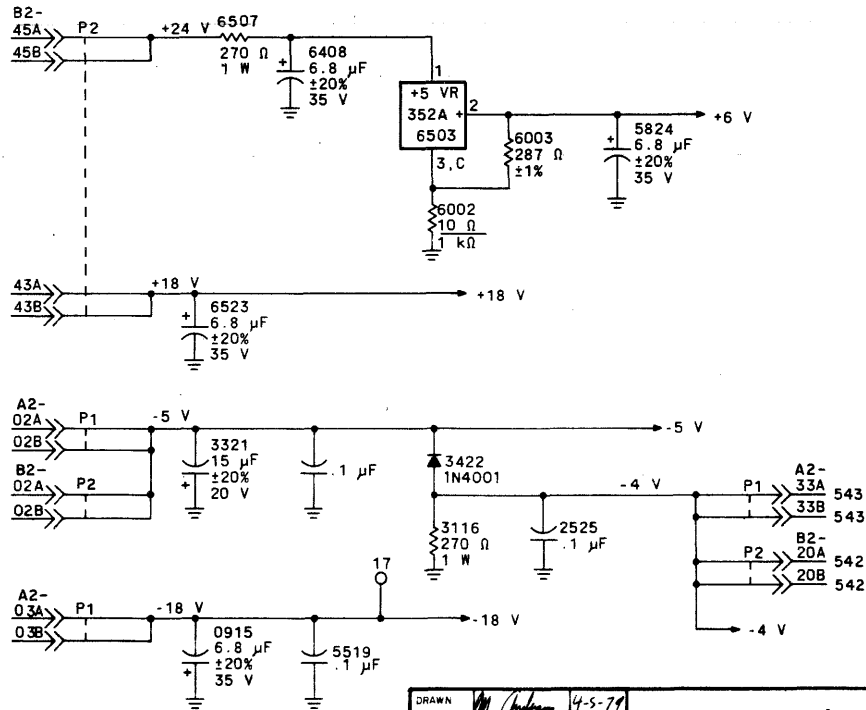
.1 μF FILTER CAPS

|      |      |
|------|------|
| +5 V | -5 V |
| 0415 | 1002 |
| 1511 | 1103 |
| 1910 | 1708 |
| 1912 |      |
| 2314 |      |

UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 10131   | 5904     | 2,3           |
| 10116   | 5916     | 6,7,14,15     |

| REVISIONS |         |                      |      |         |       |
|-----------|---------|----------------------|------|---------|-------|
| REV       | ECO     | DESCRIPTION          | DRFT | DATE    | CHK'D |
| A         | PE23000 | RELEASED             |      |         |       |
| B         | PE49146 | CORRECT LOGIC DIA    | TH   | 7-25-79 |       |
| C         | PE50685 | CHANGE RESISTOR      | CB   | 1-3-80  |       |
| D         | PE50844 | CHANGE TRANSISTORS   | MF   | 7-1-80  |       |
| E         | DJ02042 | GNQN TO KNQN         | DLM  | 9/30/81 |       |
| F         | DJ02088 | CORRECTIONS          | DLM  | 9/30/81 |       |
| G         | DJ02167 | REPLACE CHIP AT 4716 | DLM  | 9/30/81 |       |



DRAWN *[Signature]* 4-5-79  
 CHECKED *[Signature]*  
 ENGINEER *[Signature]* 5-6-79  
 APPROVED

**MAGNETIC PERIPHERALS INC.**  
 A subsidiary of  
 CONTROL DATA CORPORATION

WRITER AND SELECT  
 DIAGRAMS

TYPE:GNQN/KNQN

LOC: A4/A2/B2

NORMANDALE  
 OPERATIONS

**C**

83323150

T G

CODE IDENT  
 19333

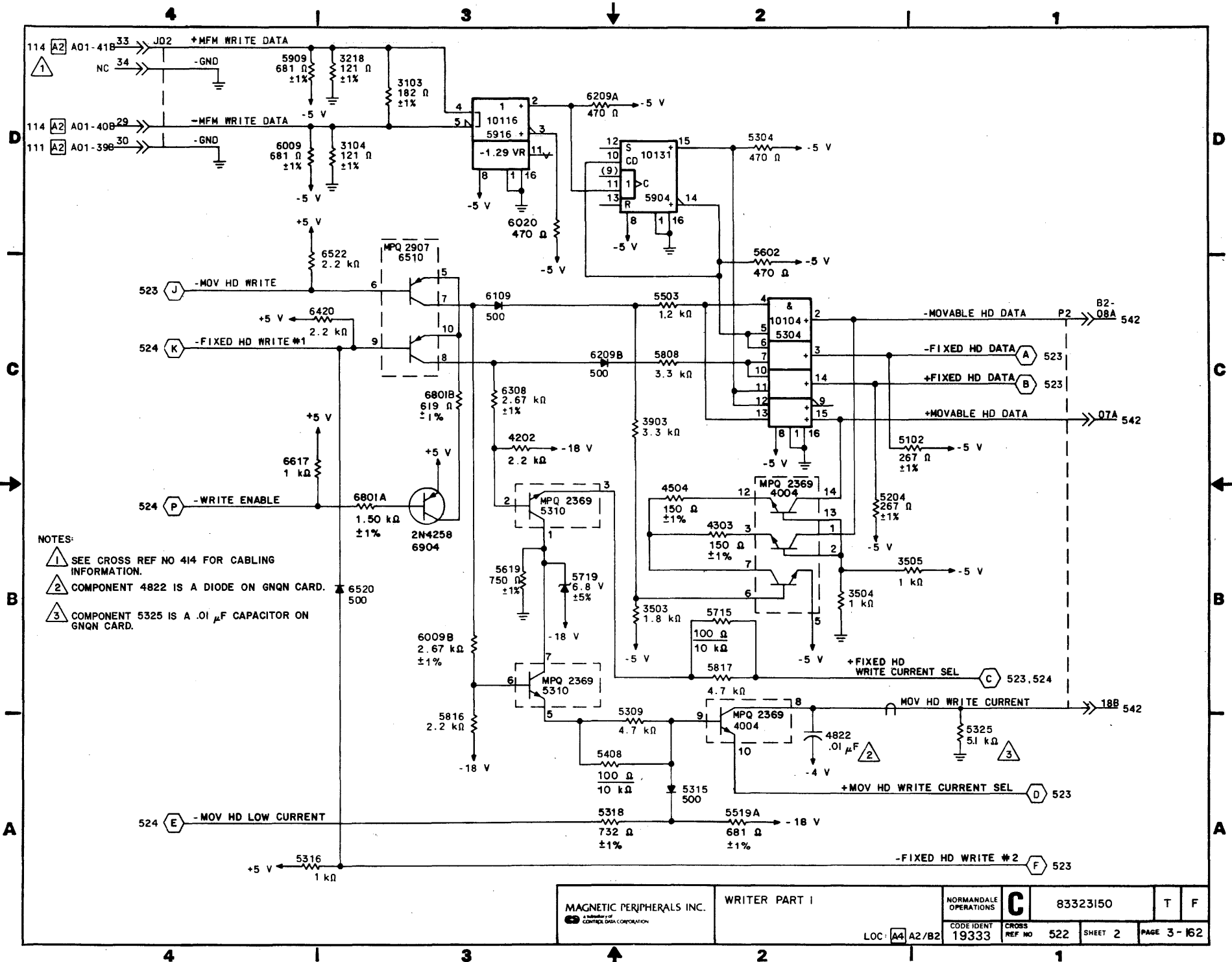
CROSS  
 REF. NO. 521

SHEET

1 of 5

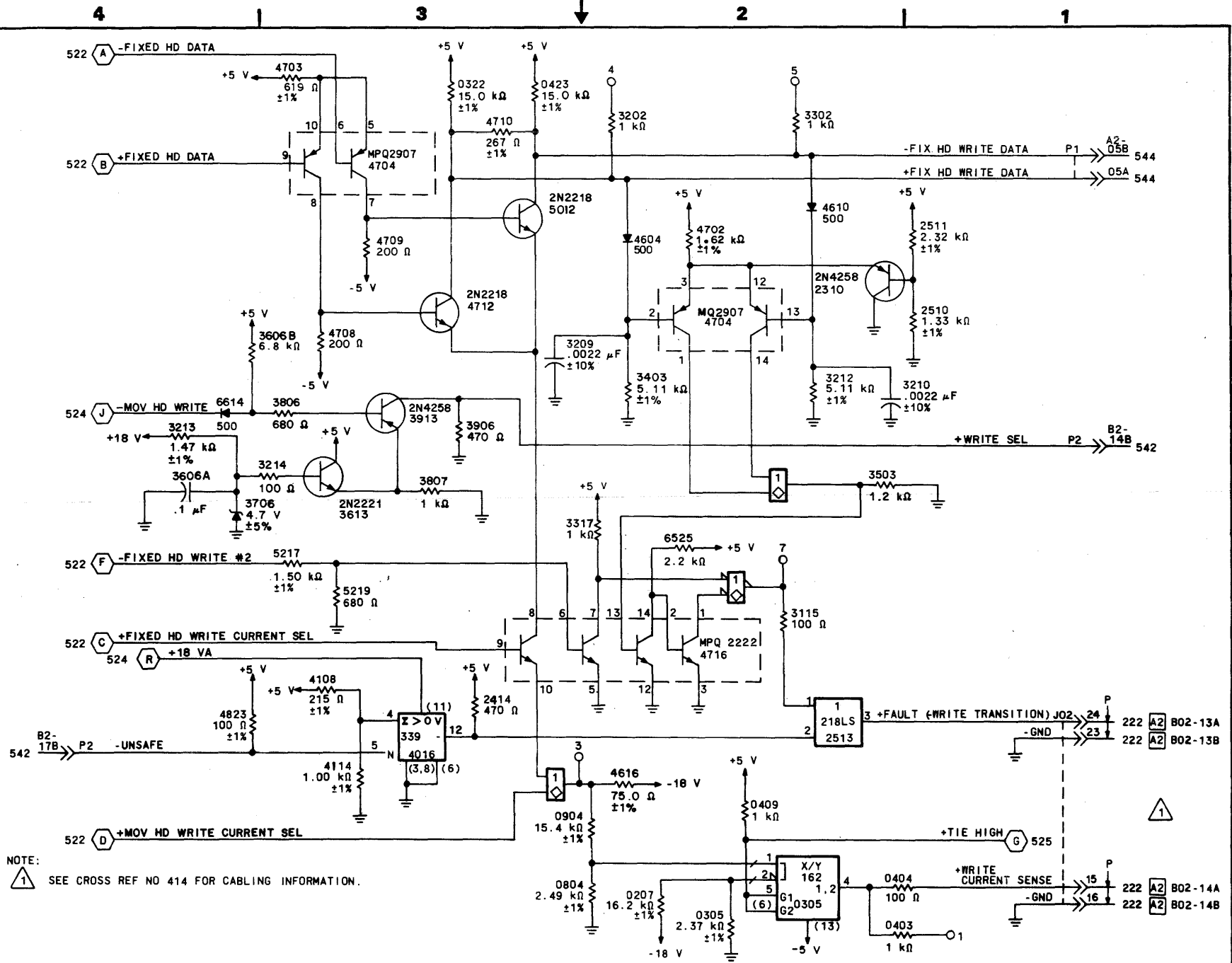
PAGE  
 3-161

REF 75121617

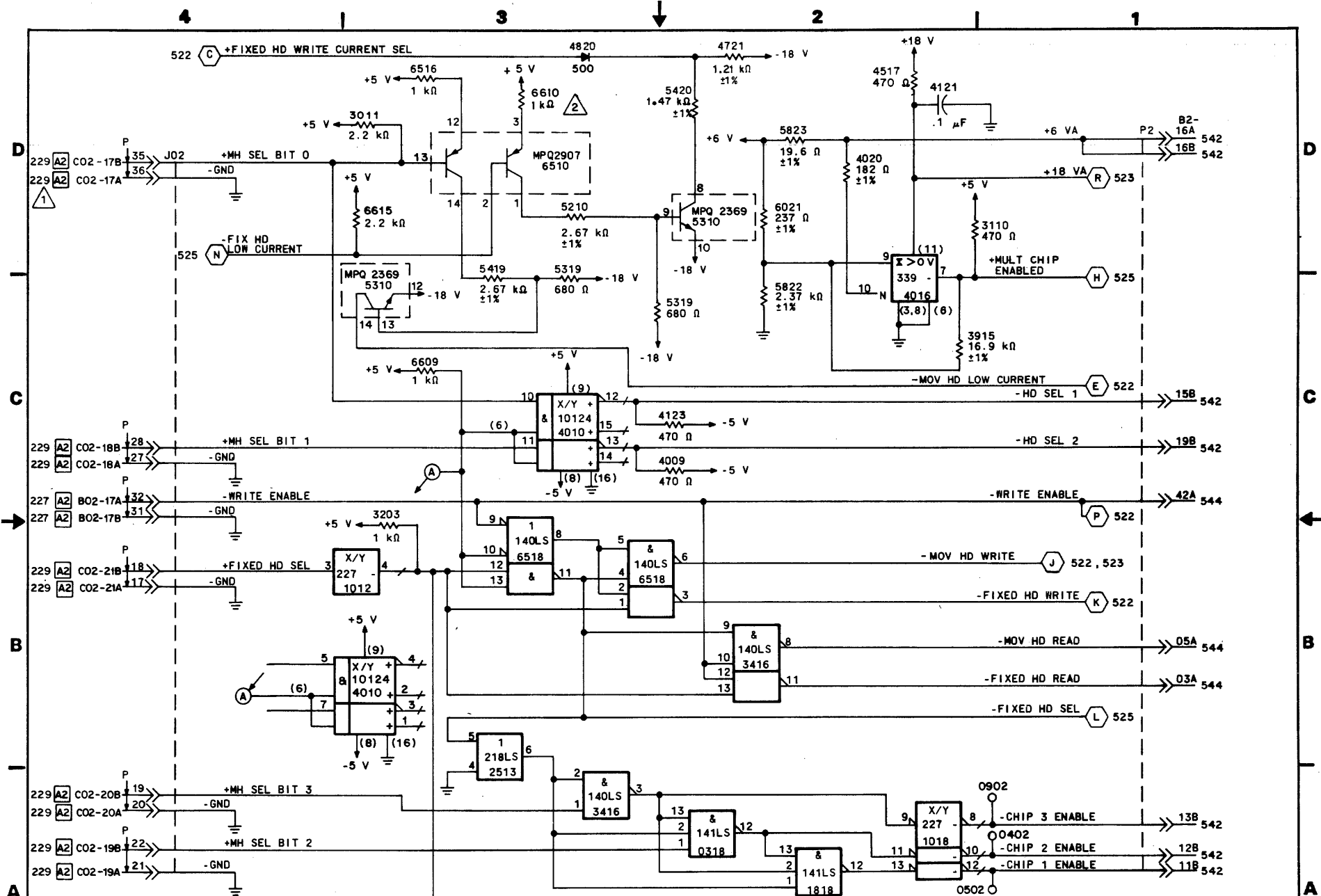


- NOTES:
- 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.
  - 2 COMPONENT 4822 IS A DIODE ON GNQN CARD.
  - 3 COMPONENT 5325 IS A .01 μF CAPACITOR ON GNQN CARD.

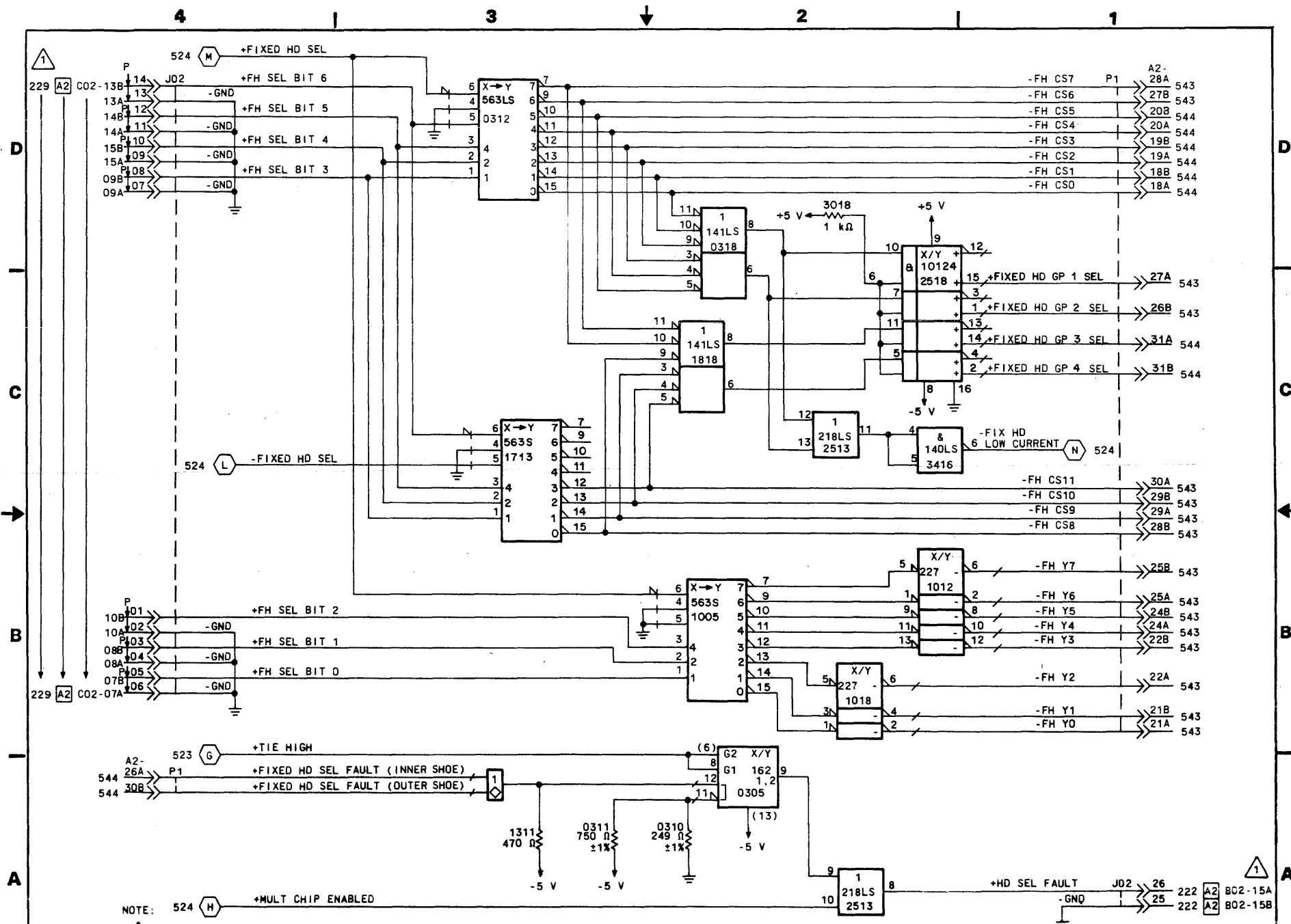




NOTE: 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.



NOTE:  
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.  
 2 ON GNON CARD, TRANSISTOR 6510 PIN 3 OUTPUT GOES TO RESISTOR 6516 AND RESISTOR 6610 IS NON-EXISTENT.



NOTE: 524 (H) +MULT CHIP ENABLED

1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

REVISION STATUS OF SHEETS

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| A | A | A | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B | B | A | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| C | B | C | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

REVISIONS

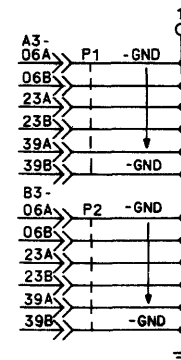
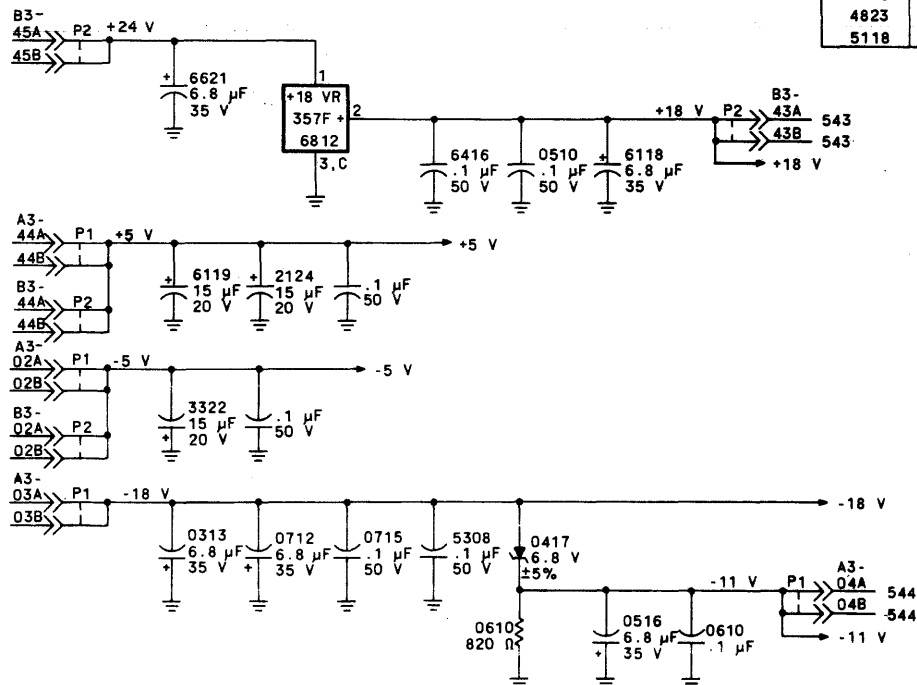
| REV | ECO.     | DESCRIPTION      | DRFT. | DATE     | CHK'D |
|-----|----------|------------------|-------|----------|-------|
| A   | PE23000  | RELEASED         |       |          |       |
| B   | PE 491B8 | CHG RES AT 2418  | MF    | 11-17-80 |       |
| C   | PE62277  | DELETE CAPACITOR | MF    | 6-1-81   |       |

UNUSED DIODE ARRAY

| LOCATION | PINS               |
|----------|--------------------|
| 1718     | 5,6,7,8,9,10,11,12 |

.1 μF FILTER CAPS

| +5 V  | -5 V |
|-------|------|
| .2023 | 4810 |
| 3419  | 4910 |
| 4823  | 6906 |
| 5118  |      |



APPLICABLE ONLY TO 80 MB UNITS

|          |                       |
|----------|-----------------------|
| DRAWN    | ML (Signature) 4-5-79 |
| CHECKED  |                       |
| ENGINEER |                       |
| APPROVED |                       |

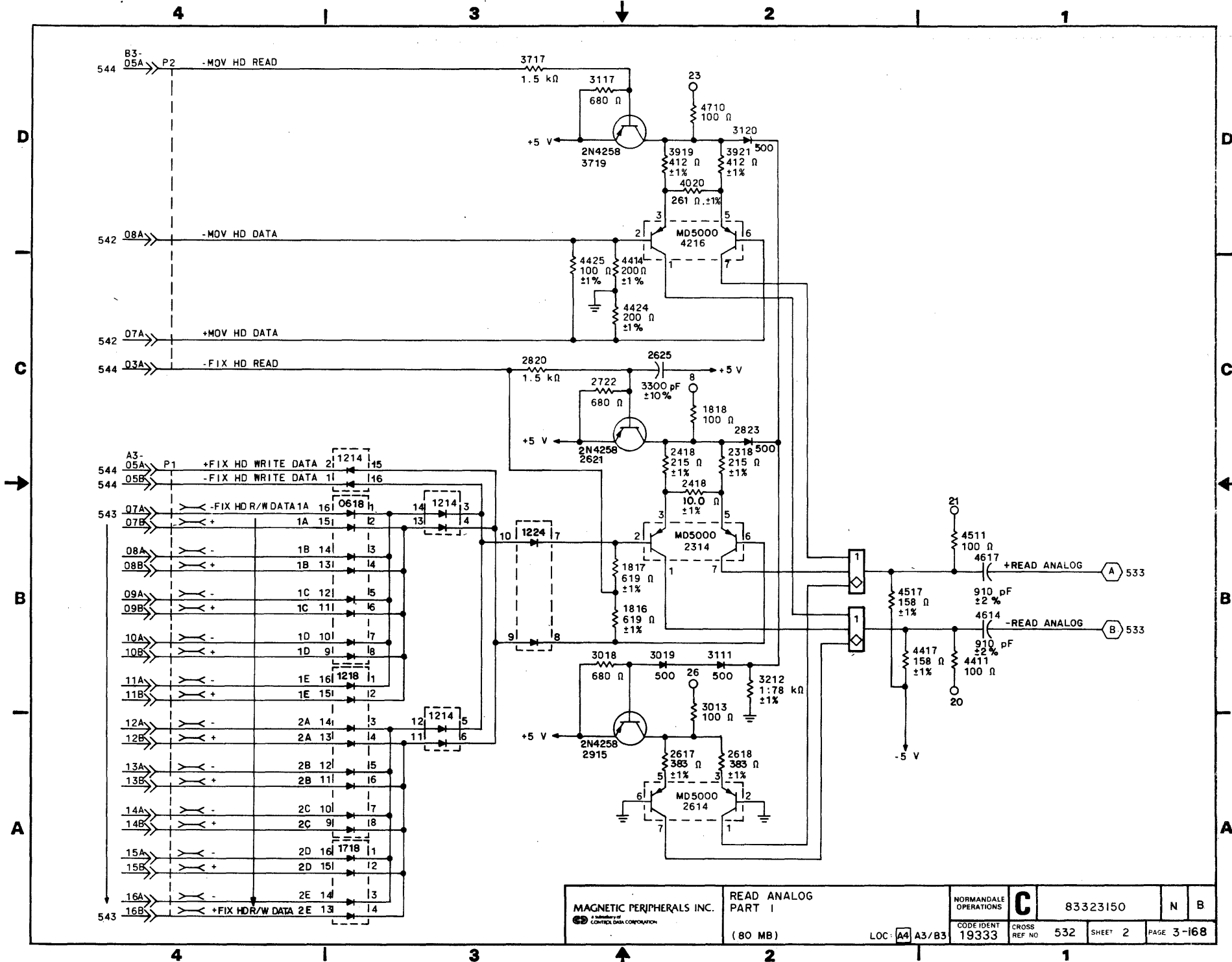
MAGNETIC PERIPHERALS INC.  
a subsidiary of  
 General Dynamics Corporation

READ ANALOG DIAGRAMS

TYPE ENRN

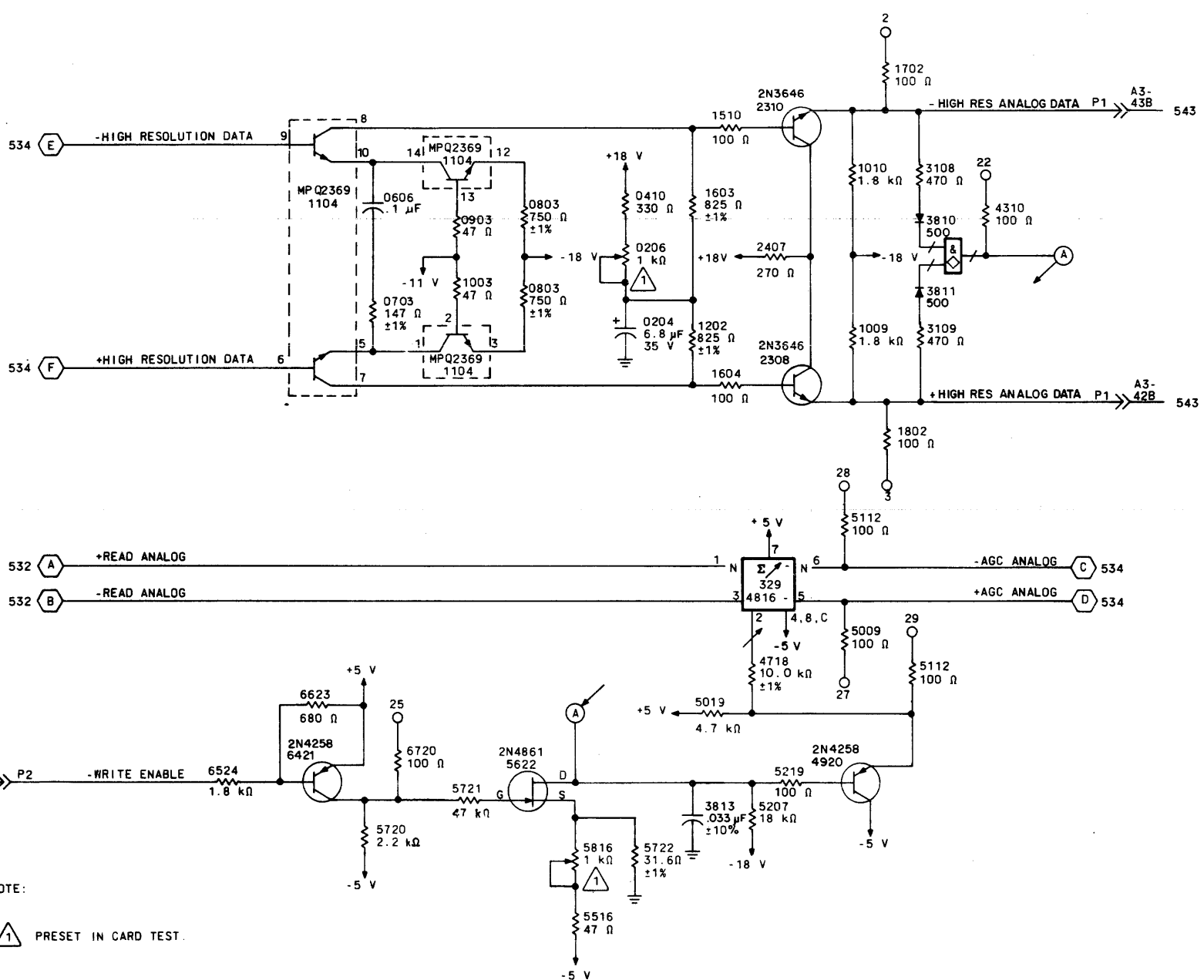
LOC: 44 A3/B3


|                       |          |              |      |              |
|-----------------------|----------|--------------|------|--------------|
| NCRMANDALE OPERATIONS | <b>C</b> | 83323150     | R    | C            |
| CODE IDENT            | 19333    | CROSS REF NO | 531  | SHEET 1 of 4 |
|                       |          |              | DATE | 3-167        |

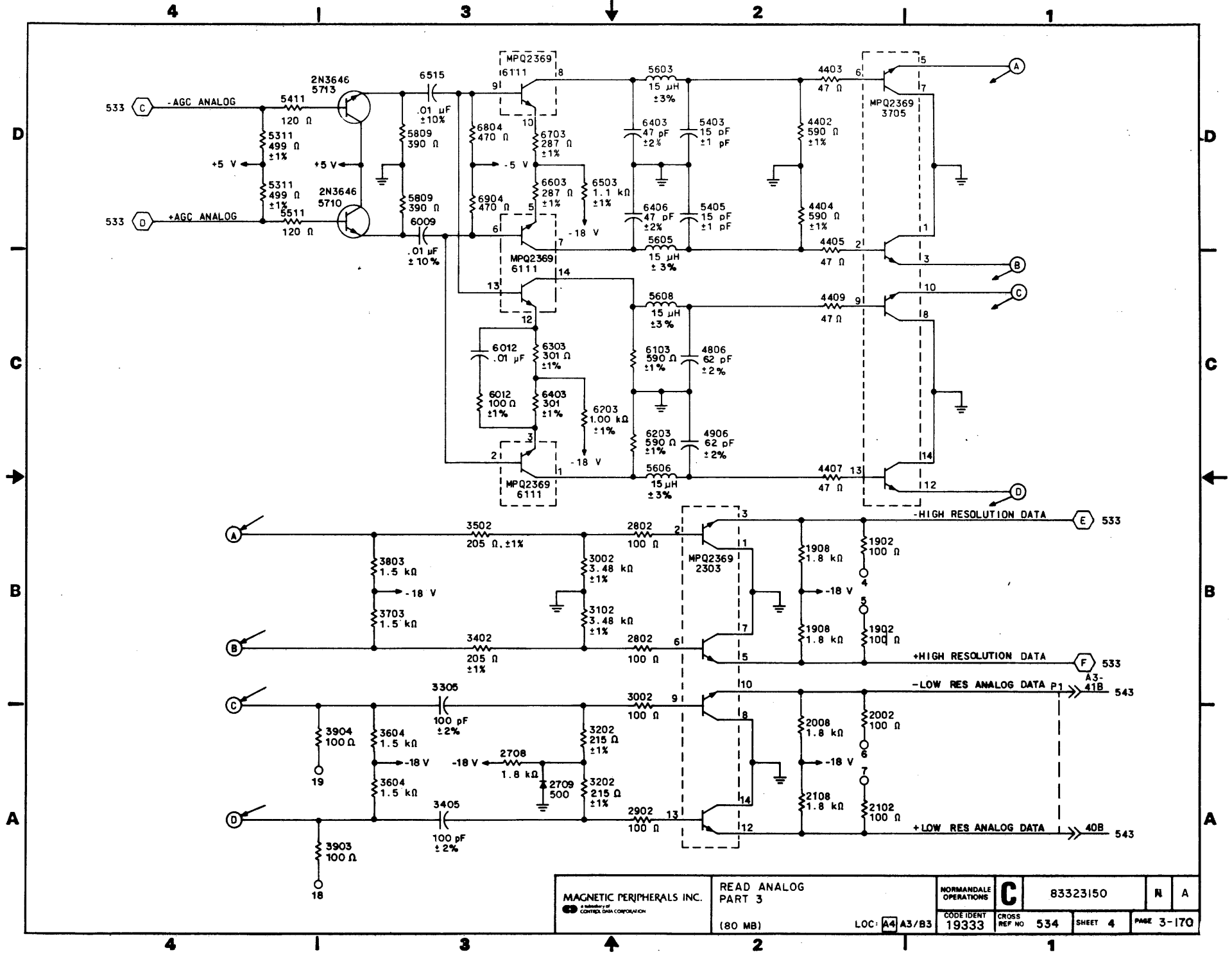


|   |                       |                          |                 |          |         |            |
|---|-----------------------|--------------------------|-----------------|----------|---------|------------|
| MAGNETIC PERIPHERALS INC.<br><small>A subsidiary of</small><br>CONTROL DATA CORPORATION | READ ANALOG<br>PART 1 | NORMANDALE<br>OPERATIONS | <b>C</b>        | 83323150 | N       | B          |
|   | (80 MB)               | CODE IDENT<br>19333      | CROSS<br>REF NO | 532      | SHEET 2 | PAGE 3-168 |

LOC: A4 A3/B3



NOTE:  
 PRESET IN CARD TEST.



|   |                                  |                                    |                     |         |            |
|---|----------------------------------|------------------------------------|---------------------|---------|------------|
| MAGNETIC PERIPHERALS INC.<br><small>A subsidiary of</small><br>CONTROL DATA CORPORATION | READ ANALOG<br>PART 3<br>(80 MB) | NORMANDEALE OPERATIONS<br><b>C</b> | 83323150            | N       | A          |
|   | LOC: A4 A3/B3                    | CODE IDENT<br>19333                | CROSS REF NO<br>534 | SHEET 4 | PAGE 3-170 |

REVISION STATUS OF SHEETS

|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A | A | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | B | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | C | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D | C | D | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E | C | E | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

REVISIONS

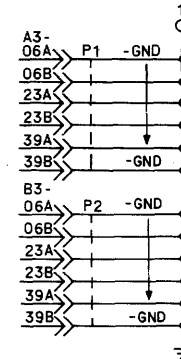
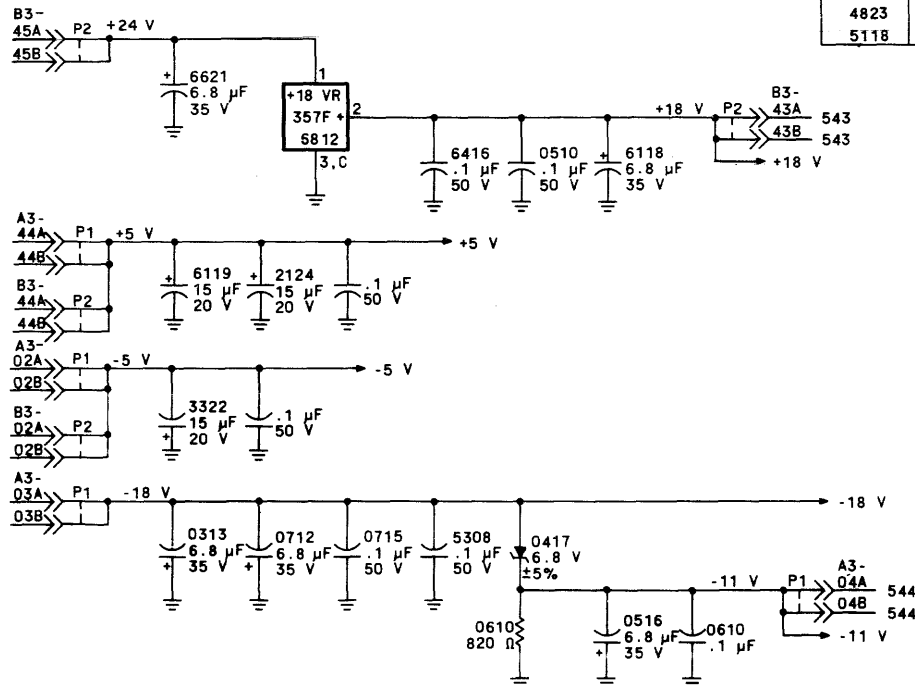
| REV. | ECO.    | DESCRIPTION      | DRFT. | DATE     | CHK'D |
|------|---------|------------------|-------|----------|-------|
| A    | PE23000 | RELEASED         |       |          |       |
| B    | PE50632 | FNRN TO GNRN     | TH    | 12-27-79 |       |
| C    | PE49188 | CHG RES AT 2418  | MF    | 11-17-80 |       |
| D    | PE62155 | GNRN TO HNRN     | MF    | 6-3-81   |       |
| E    | PE62269 | REMOVE CAPACITOR | MF    | 6-3-81   |       |

UNUSED DIODE ARRAY

| LOCATION | PINS               |
|----------|--------------------|
| 1718     | 5,6,7,8,9,10,11,12 |

.1 μF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 2023 | 4810 |
| 3419 | 4910 |
| 4823 | 7006 |
| 5118 |      |



APPLICABLE ONLY TO 160 MB UNITS

|          |                     |         |
|----------|---------------------|---------|
| DRAWN    | <i>M. Anderson</i>  | 4-10-78 |
| CHECKED  | <i>S.K. Johnson</i> | 4/19/79 |
| ENGINEER | <i>G. Gold</i>      | 5/2/79  |
| APPROVED |                     |         |

MAGNETIC PERIPHERALS INC.  
A Division of Compaq Computer Corporation

READ ANALOG DIAGRAMS

TYPE: GNRN/HNRN

NORMANDALE OPERATIONS

CODE IDENT 19333

83323150

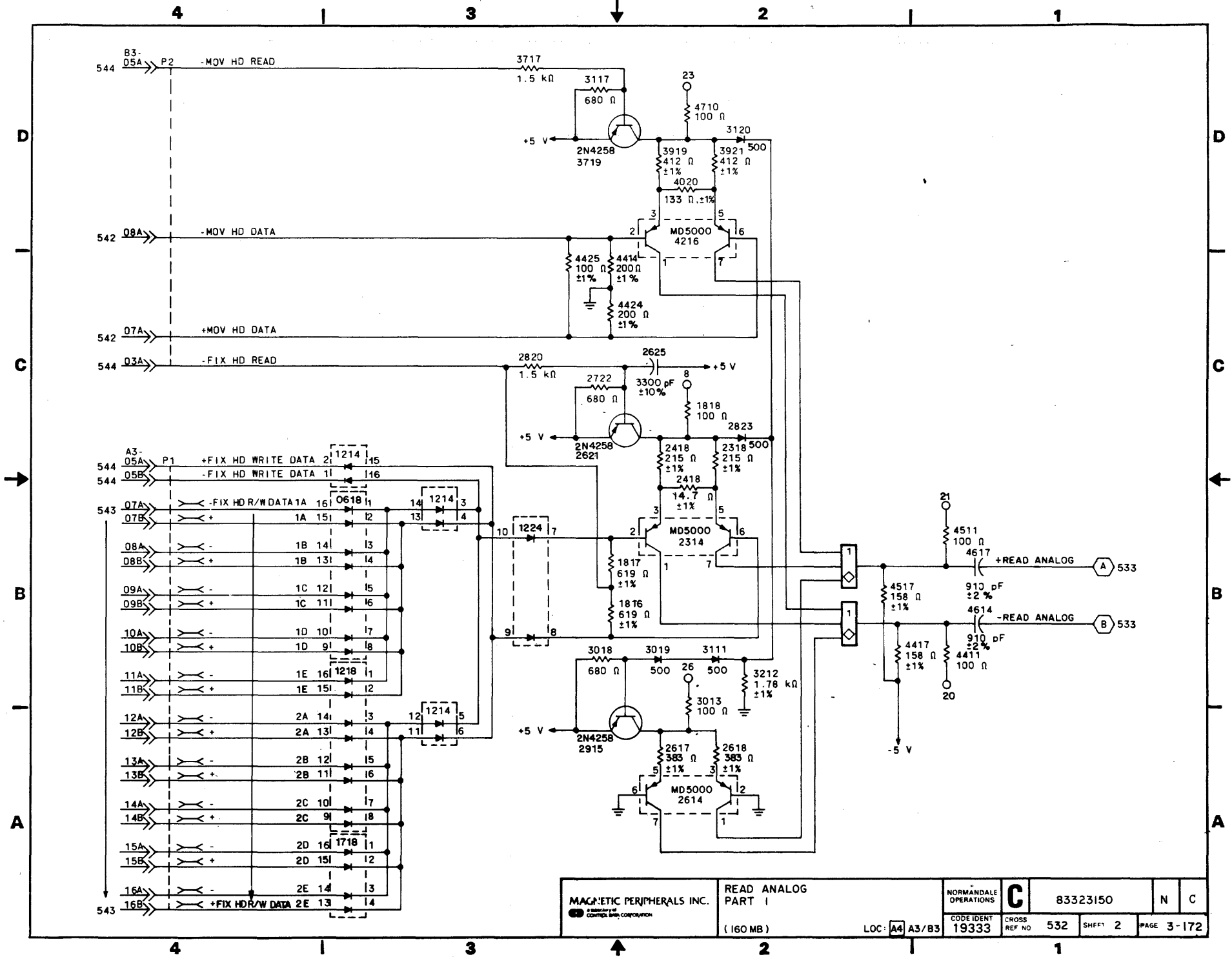
REF NO 531

SHEET 1 OF 4

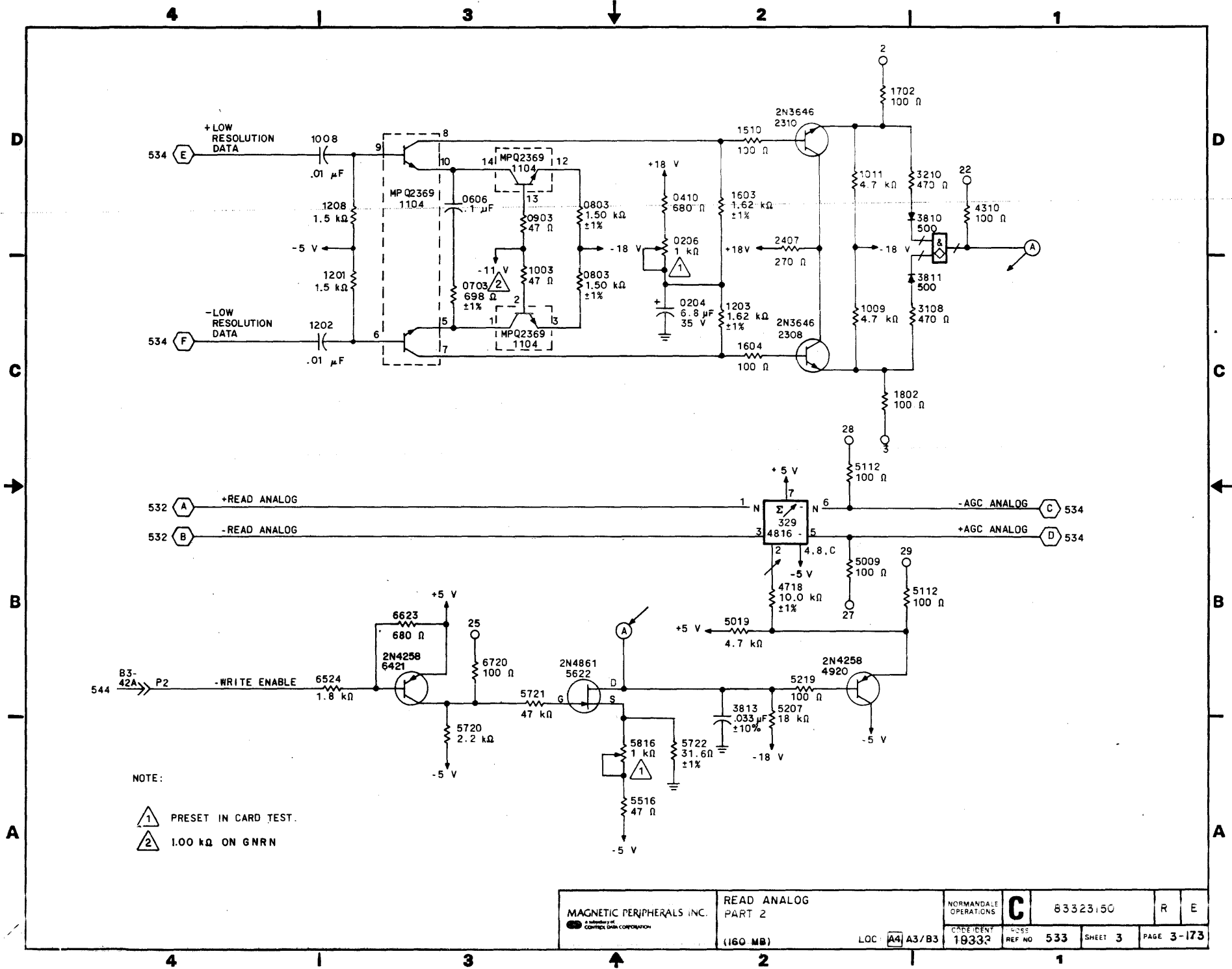
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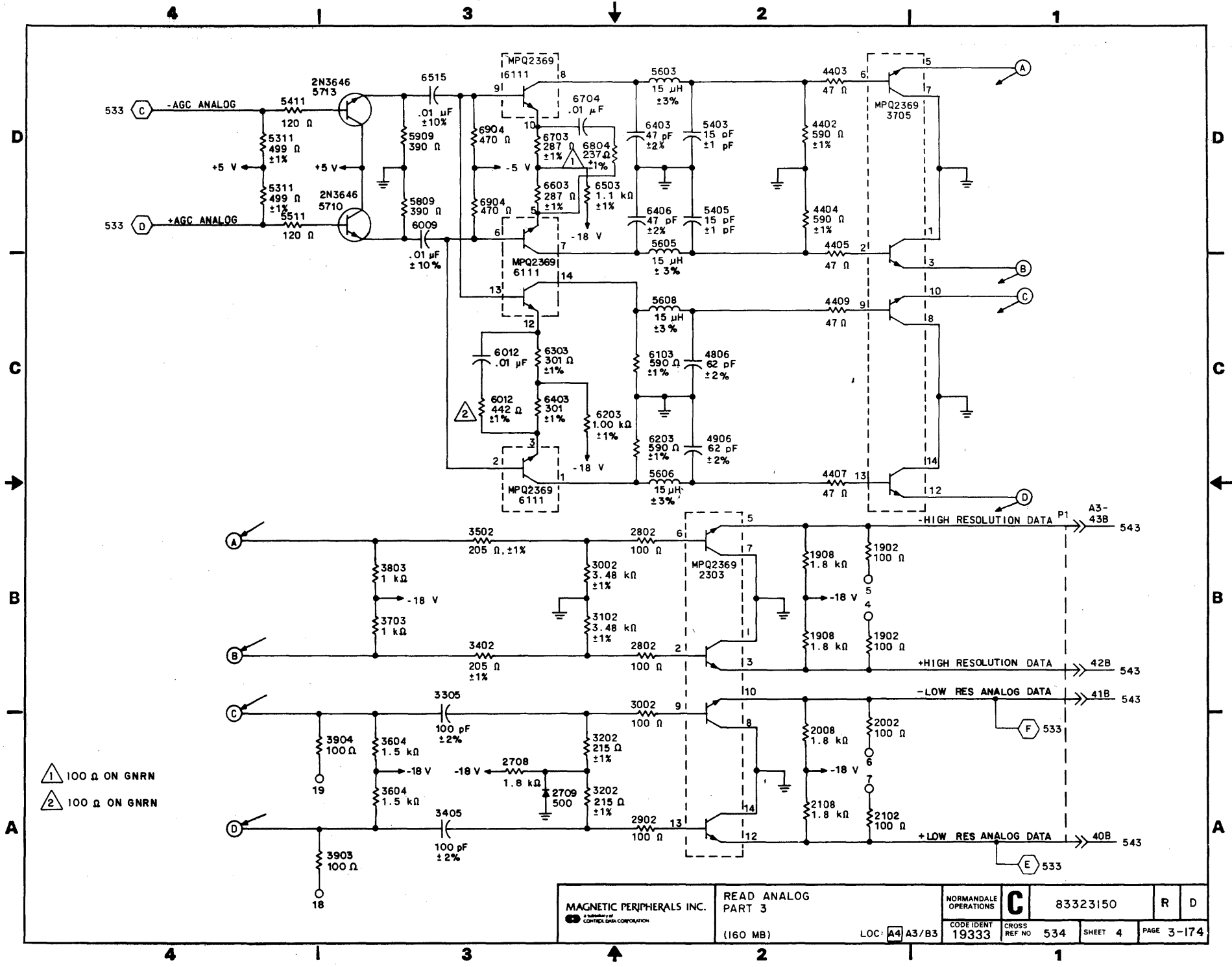
PAGE 3-171





|  |   |  |  |                              |
|--|---|--|--|------------------------------|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>a subsidiary of</small><br><small>COMPTON DATA COMMUNICATIONS</small> | <b>READ ANALOG</b><br><b>PART 1</b><br>(160 MB) | NORMANDEALE OPERATIONS<br><b>C</b><br>CODE IDENT<br><b>19333</b> | 83323150<br>CROSS REF NO<br><b>532</b> | N C<br>SHEET 2<br>PAGE 3-172 |
|  | LOC: <b>A4</b> A3/B3                            | REF NO<br><b>532</b>   | SHEET 2                                | PAGE 3-172                   |

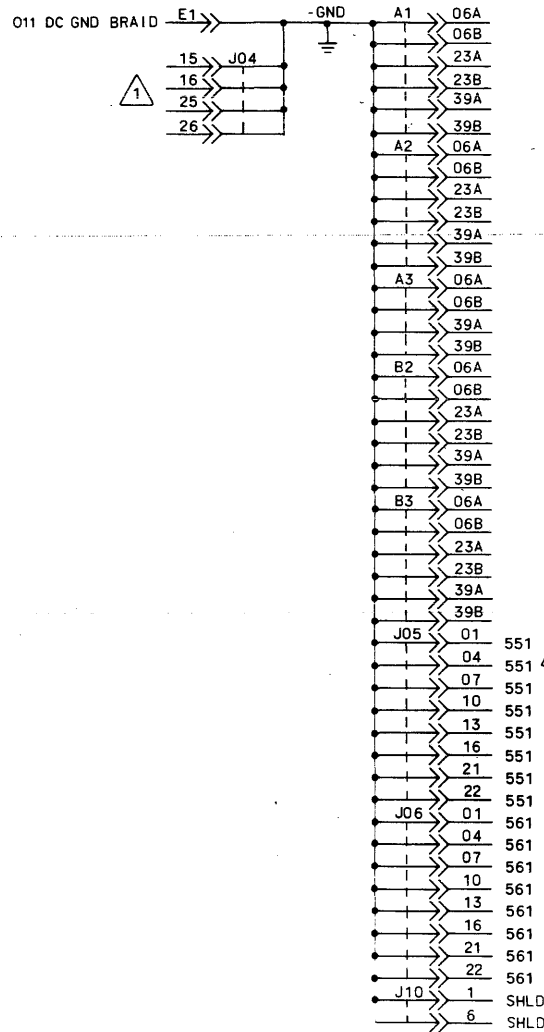




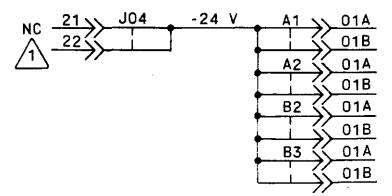
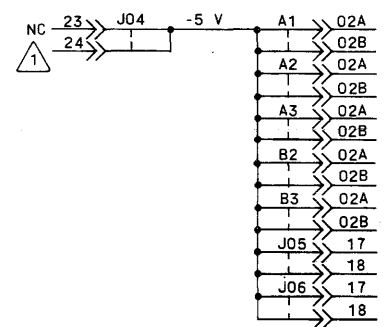
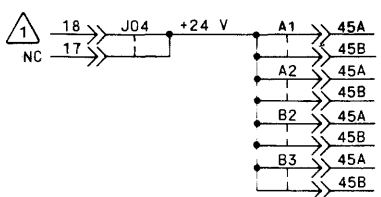
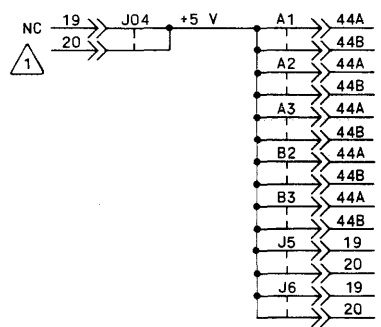
|   |   |                                   |                     |            |               |
|---|---|-----------------------------------|---------------------|------------|---------------|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>A MEMBER OF</small><br><b>CONTROL DATA CORPORATION</b> | <b>READ ANALOG</b><br><b>PART 3</b><br>(160 MB) | NORMANDALE OPERATIONS<br><b>C</b> | 83323150            | R          | D             |
|   | LOC: A4 A3/B3                                   | CODE IDENT<br>19333               | CROSS REF NO<br>534 | SHEET<br>4 | PAGE<br>3-174 |

REVISION STATUS OF SHEETS

|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A | A | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B | A | A | B |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C | A | C | B |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |



| REVISIONS |         |             |      |          |       |
|-----------|---------|-------------|------|----------|-------|
| REV       | ECO     | DESCRIPTION | DRFT | DATE     | CHK'D |
| A         | PE23000 | RELEASED    |      |          |       |
| B         | PE50705 | CORRECTIONS | TH   | 12-27-79 |       |
| C         | PE62165 | CORRECTIONS | MF   | 12-81    |       |



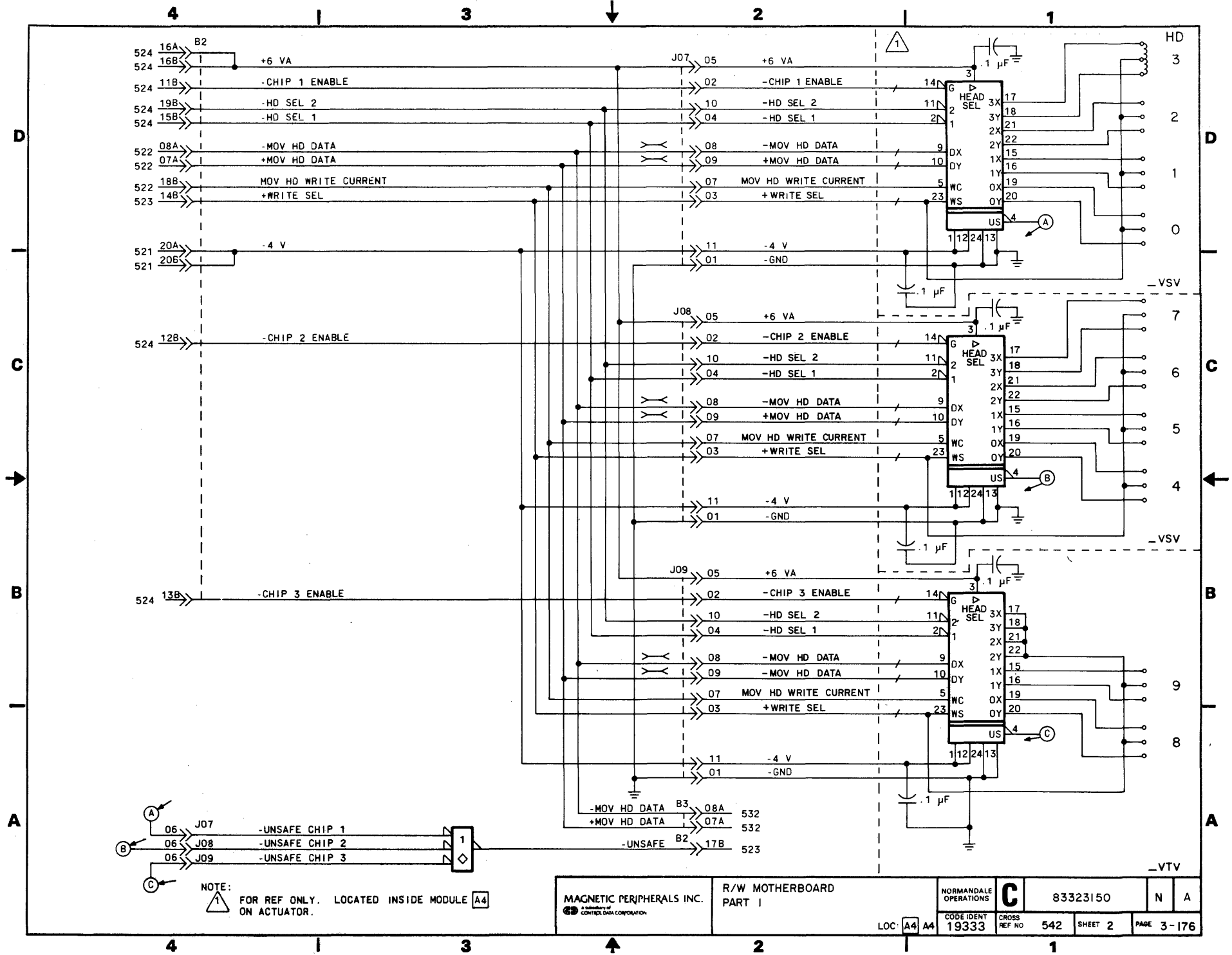
- NOTES:
- 1 POWER AND GROUND CABLED FROM BACKPANEL A2 FASTONS. SEE CROSS REF NO 413 FOR CABLING INFORMATION.
  - 2 ALL J05 AND J06 OUTPUTS GO TO FIXED HD SHOES. (OPTIONS)

|          |           |       |
|----------|-----------|-------|
| DESIGN   | C. RABINE | 4-479 |
| CHECKED  |           |       |
| ENGINEER |           |       |
| DATE     |           |       |

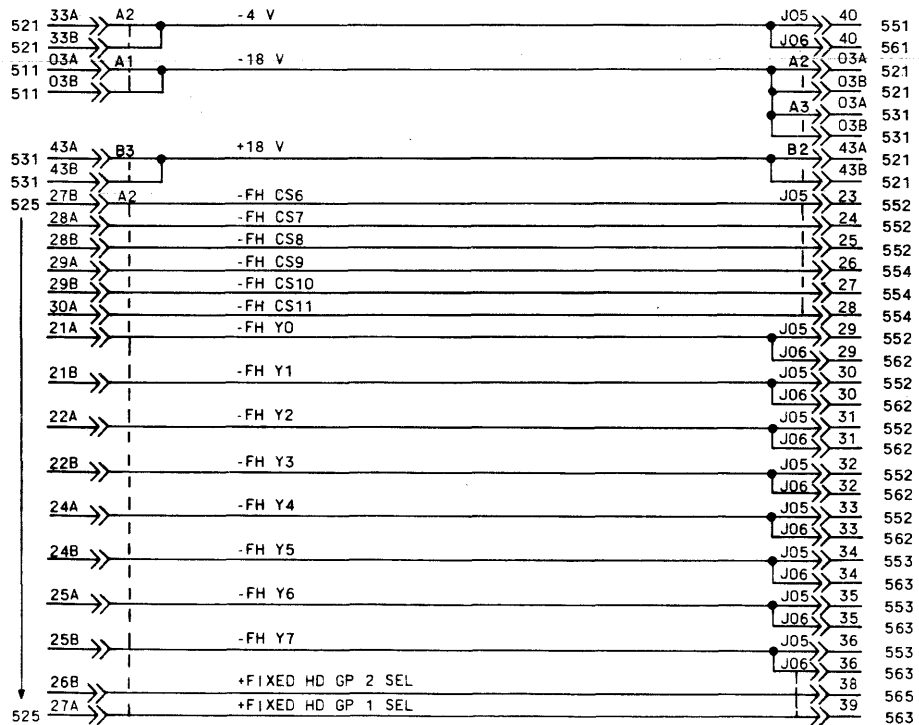
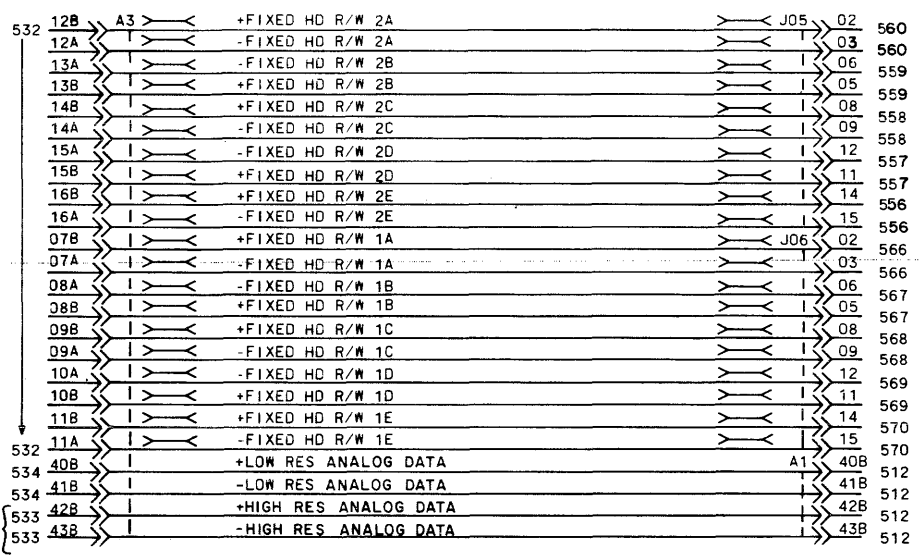
MAGNETIC PERIPHERALS INC.  
A DIVISION OF CONTROL DATA CORPORATION

READ/WRITE MOTHERBOARD DIAGRAMS  
 TYPE: AWJN

|                                 |       |              |     |       |   |      |       |
|---------------------------------|-------|--------------|-----|-------|---|------|-------|
| NO. OF MANUFACTURING OPERATIONS | C     | 83323150     | N   | C     |   |      |       |
| PROJ IDENT                      | 19333 | CROSS REF NO | 541 | SHEET | 4 | PAGE | 3-175 |



4 | 3 | 2 | 1

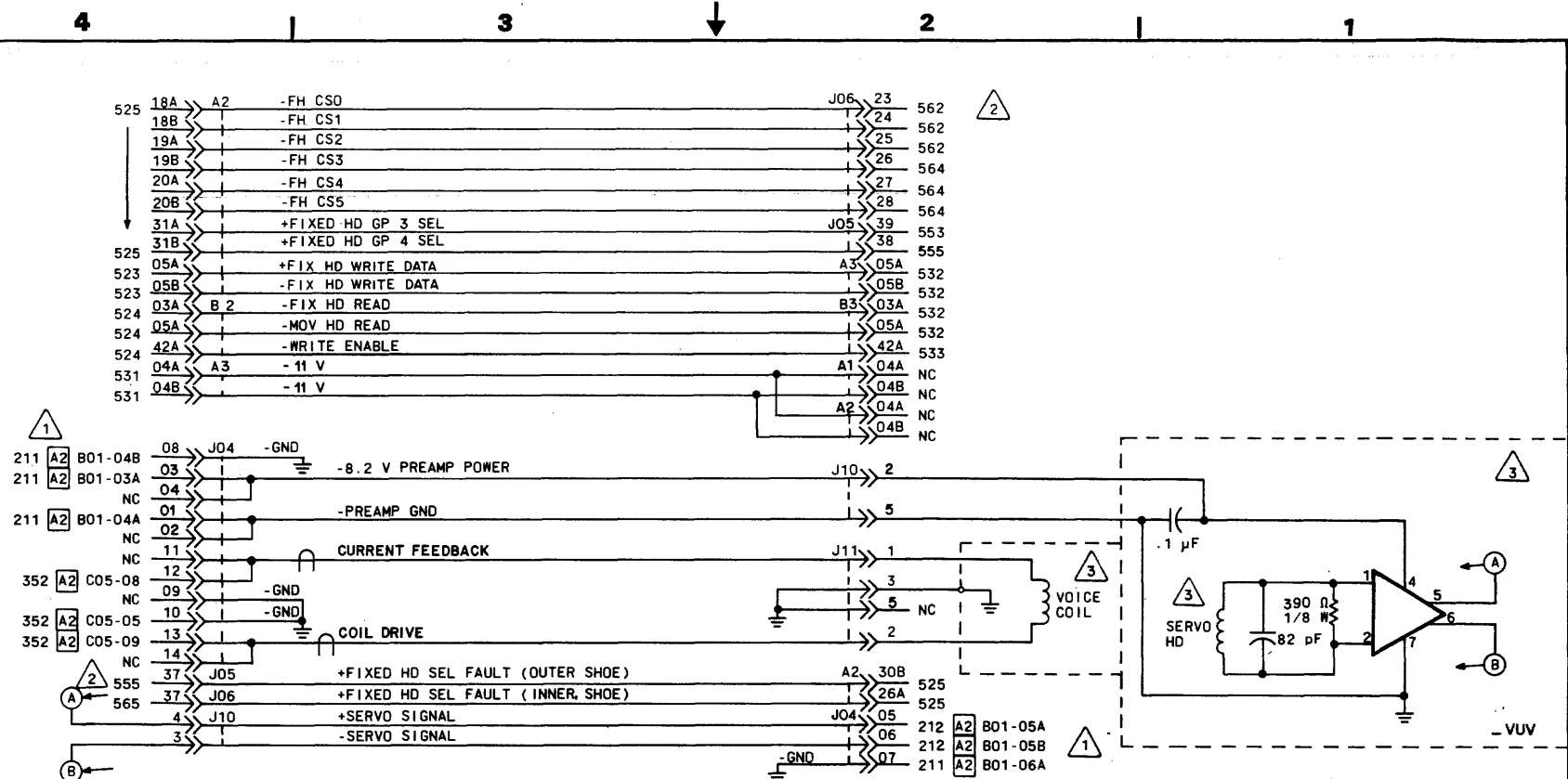


NOTE:

1 ALL J05 AND J06 OUTPUTS GO TO FIXED HD SHOES. (OPTIONS)  
 2 AS SHOWN FOR 80MB 534 ON 160 MB.

|  |                           |                                      |          |         |            |
|--|---------------------------|--------------------------------------|----------|---------|------------|
| MAGNETIC PERIPHERALS INC.<br>A subsidiary of<br>CONTROL DATA CORPORATION | R/W MOTHERBOARD<br>PART 2 | NORMANDALE<br>OPERATIONS<br><b>C</b> | 83323150 | N       | C          |
| LOC: A4, A4  | CODE IDENT<br>19333       | CROSS<br>REF NO                      | 543      | SHEET 3 | PAGE 3-177 |

4 | 3 | 2 | 1



- NOTES:
- 1 SEE CROSS REF NO 413 AND 414 FOR CABLING INFORMATION.
  - 2 ALL J05 AND J06 OUTPUTS GO TO FIXED HD SHOES. (OPTIONS)
  - 3 FOR REF ONLY. LOCATED INSIDE MODULE A4 ON ACTUATOR.

|  |                           |                           |                 |          |         |              |
|--|---------------------------|---------------------------|-----------------|----------|---------|--------------|
| MAGNETIC PERIPHERALS INC.<br><small>a subsidiary of<br/>CONTROL DATA CORPORATION</small> | R/W MOTHERBOARD<br>PART 3 | NORMANDEALE<br>OPERATIONS | <b>C</b>        | 83323150 | N       | B            |
|  |                           | CODE IDENT<br>19333       | CROSS<br>REF NO | 544      | SHEET 4 | PAGE 3 - 178 |

LOC: A4 A4

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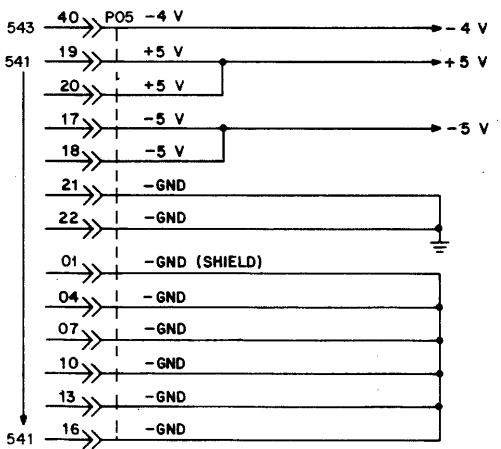
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REVISION STATUS OF SHEETS

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A | A | A | A | A  |    |    |    |    |    |    |    |    |    |    |
| B | A | A | A | A | A | A | A | A | B  |    |    |    |    |    |    |    |    |    |    |
| C | C | C | C | C | C | C | C | C | C  |    |    |    |    |    |    |    |    |    |    |
| D | C | C | C | C | D | D | C | D | D  |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |                   |       |         |       |
|-----------|---------|-------------------|-------|---------|-------|
| REV.      | ECO.    | DESCRIPTION       | DRFT. | DATE    | CHK'D |
| A         | PE23000 | RELEASED          |       |         |       |
| B         | PE49146 | CORRECT LOGIC DIA | TH    | 7-24-79 |       |
| C         | PE30843 | CORRECTIONS       | CB    | 3-27-80 |       |
| D         | PE62165 | CORRECTIONS       | MF    | 11-2-81 |       |
|           |         |                   |       |         |       |
|           |         |                   |       |         |       |
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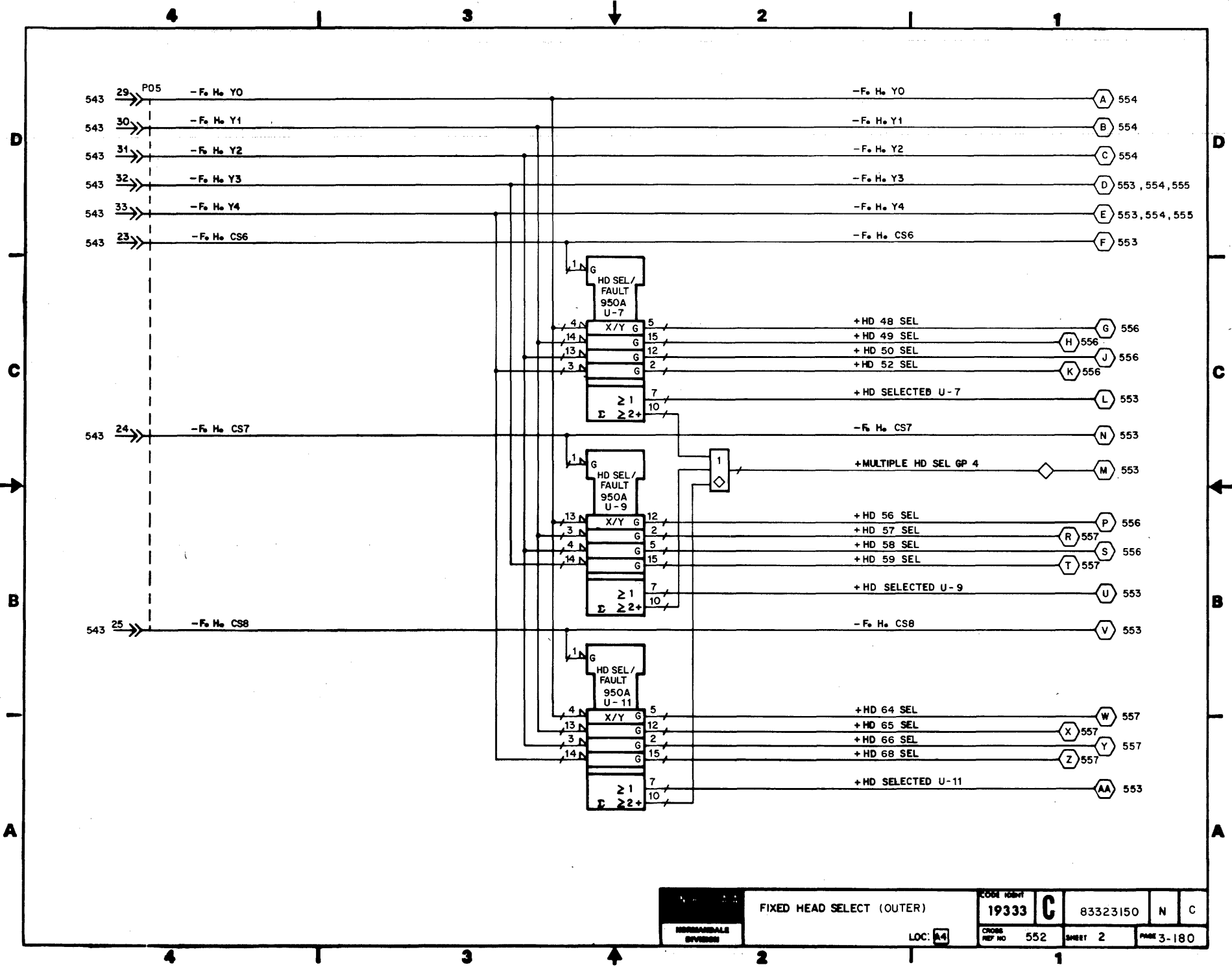


NOTE:  
 1. ALL 950A IC'S HAVE PINS 6 AND 16 CONNECTED TO +5 V, PIN 9 CONNECTED TO -5 V, AND PIN 8 CONNECTED TO GND.

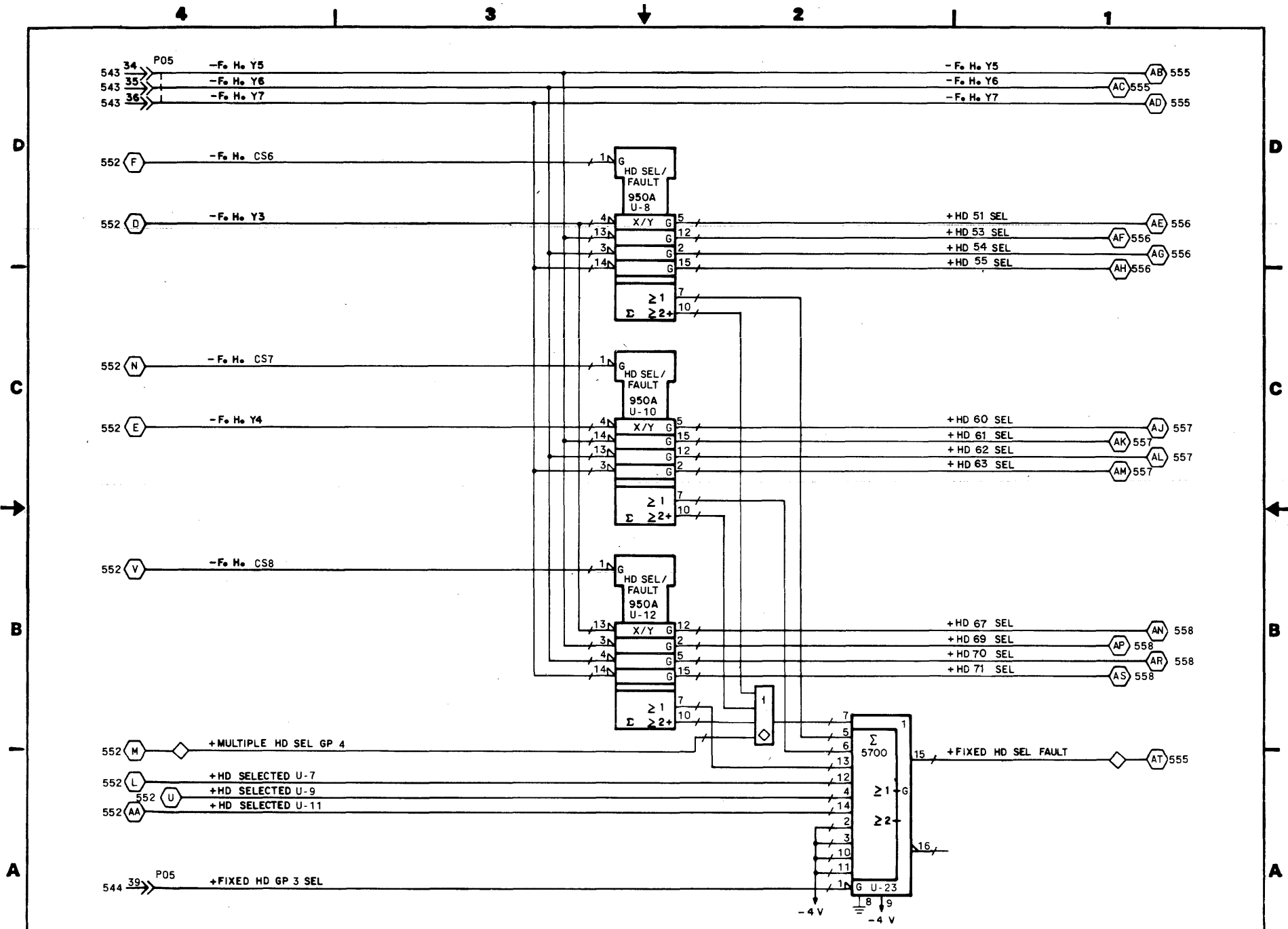
APPLICABLE ONLY TO UNITS WITH FIXED HD SHOE OPTION (96 HEADS ONLY)

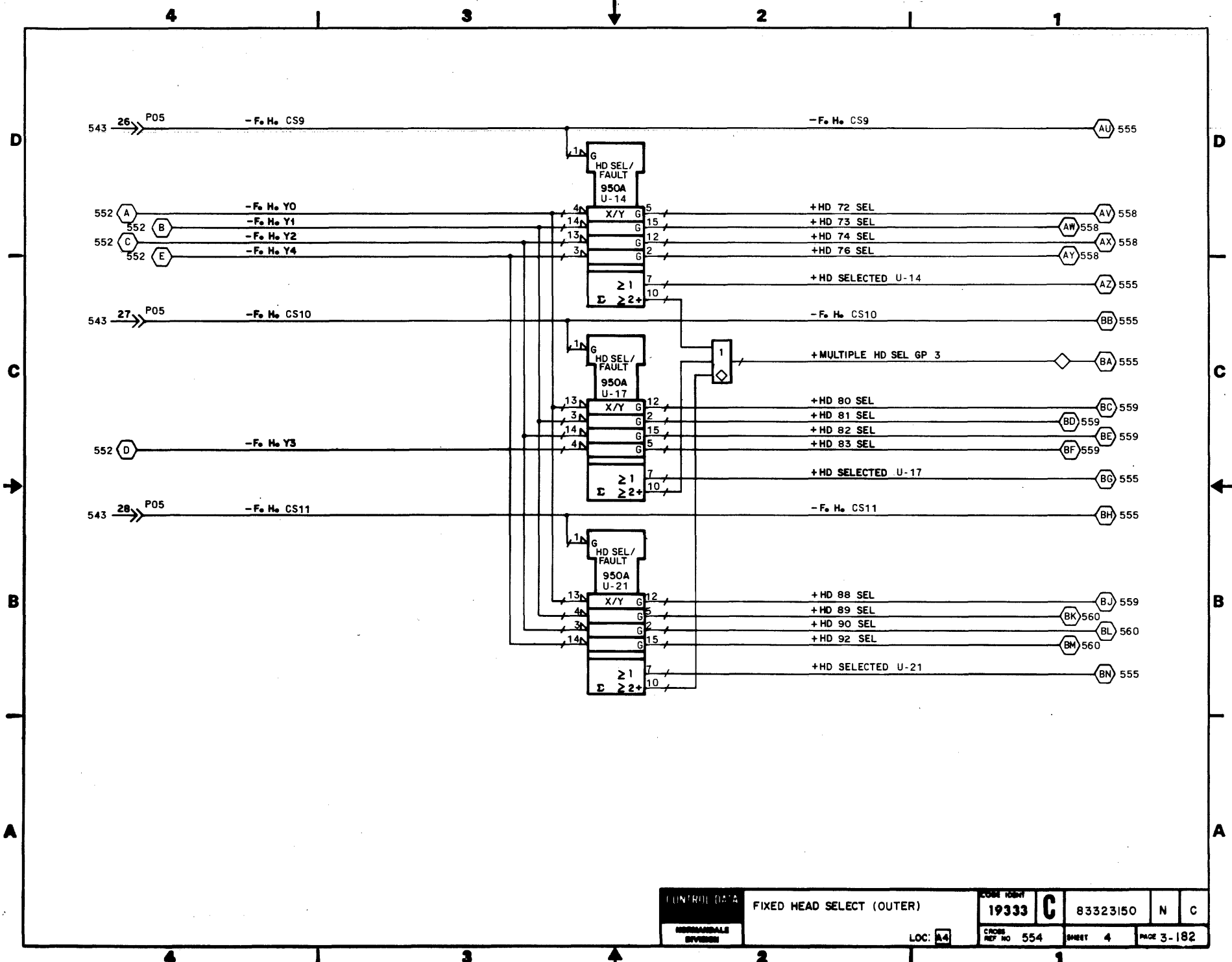
|          |                        |                      |                                |              |         |          |         |      |          |
|----------|------------------------|----------------------|--------------------------------|--------------|---------|----------|---------|------|----------|
| DRAWN    | <i>C. Ragan</i> 4-4-79 | CONTROL DATA         | FIXED HD SHOE (OUTER) DIAGRAMS | CODE IDENT   | 19333 C | 83323150 | N       | D    |          |
| CHECKED  | <i>SV</i>              | ENGINEER             | <i>Pe da</i>                   | CROSS REF NO | 551     | SHEET    | 1 of 10 | PAGE | 3 of 179 |
| APPROVED |                        | NORMAN DALE DIVISION | TYPE: AYC                      | LOC          | A4      |          |         |      |          |



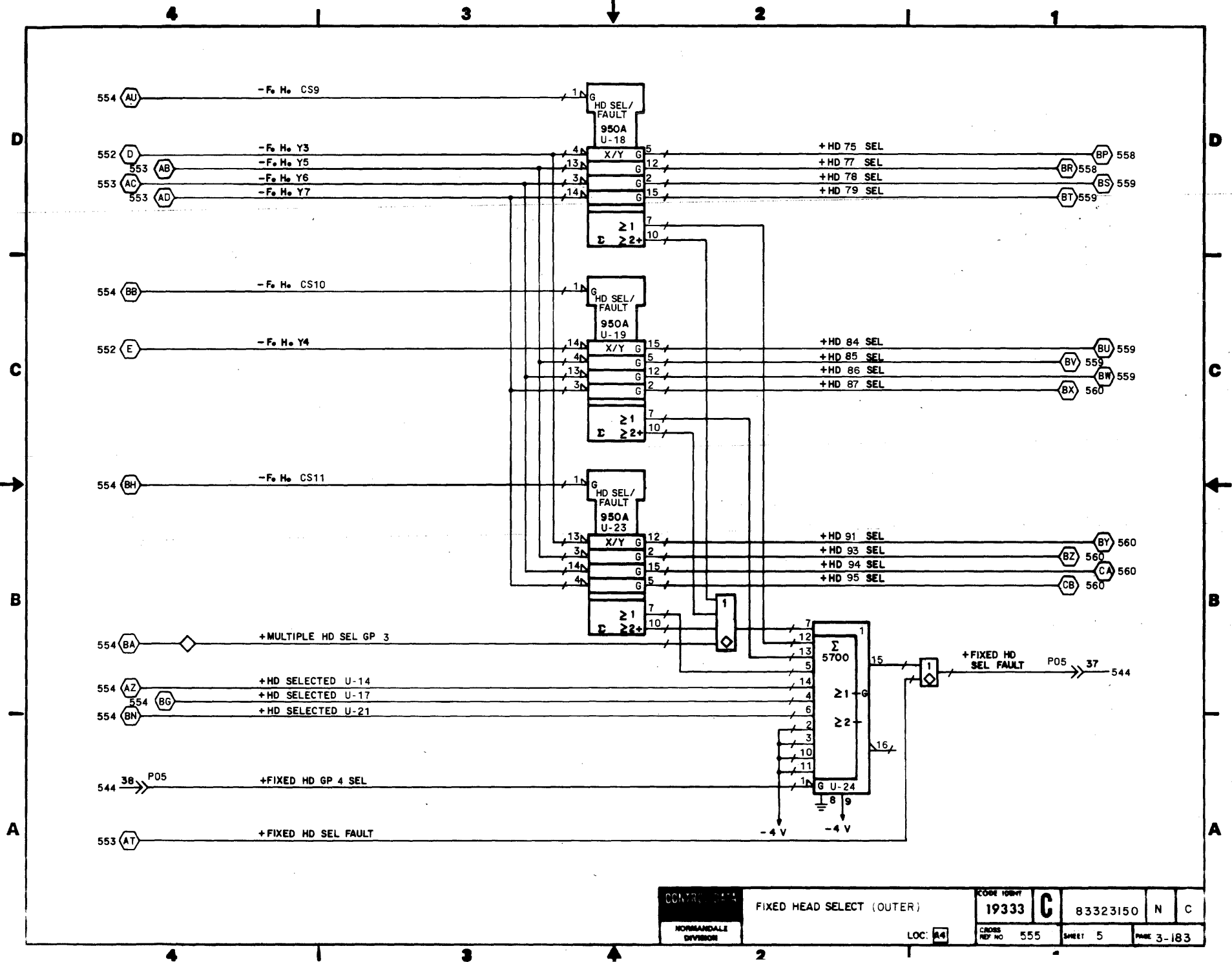


|                                    |                           |                     |                            |            |          |   |   |
|------------------------------------|---------------------------|---------------------|----------------------------|------------|----------|---|---|
| RESEARCH & DEVELOPMENT<br>DIVISION | FIXED HEAD SELECT (OUTER) |                     | CORE IDENT<br><b>19333</b> | <b>C</b>   | 83323150 | N | C |
|                                    | LOC: <b>A4</b>            | CROSS REF NO<br>552 | SHEET<br>2                 | PAGE 3-180 |          |   |   |





LOC: A4



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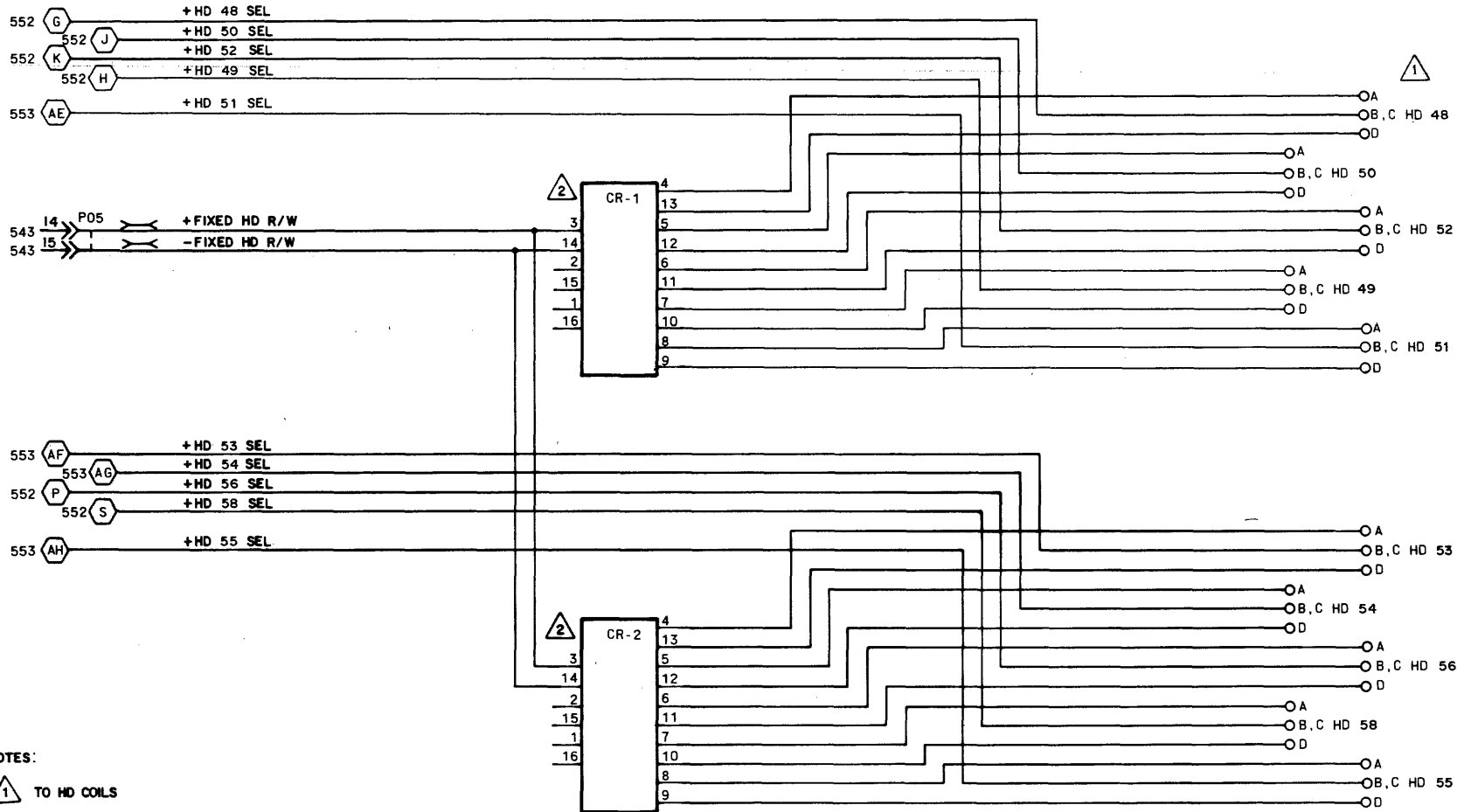
C

B

B

A

A

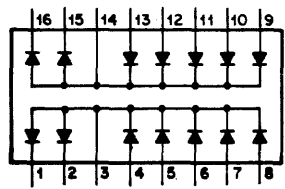


NOTES:

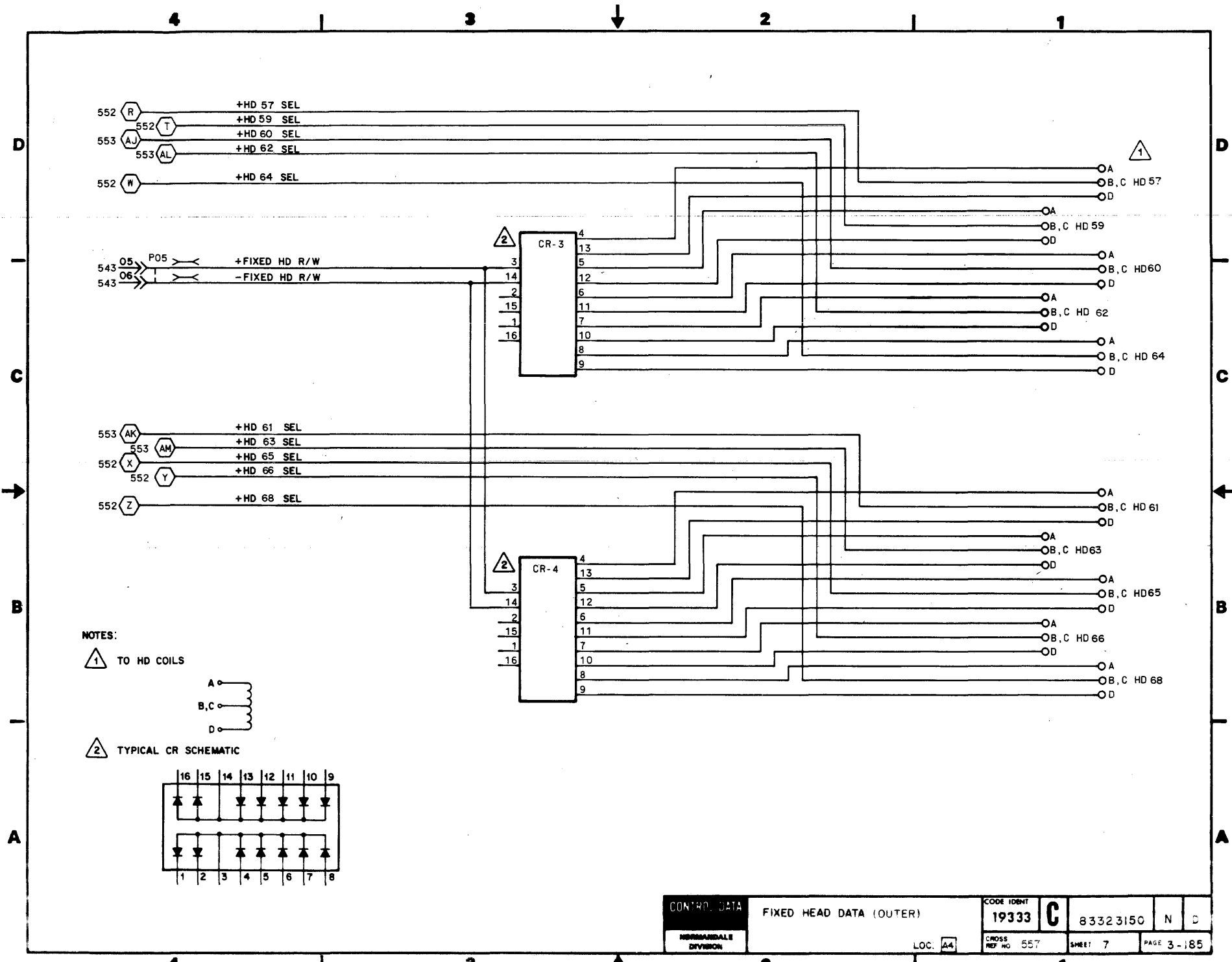
1 TO HD COILS



2 TYPICAL CR SCHEMATIC

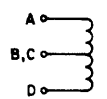


|                     |                         |         |                  |         |            |   |   |
|---------------------|-------------------------|---------|------------------|---------|------------|---|---|
| CONTROL DATA        | FIXED HEAD DATA (OUTER) |         | CODE IDENT       | C       | 83323150   | N | D |
|                     |                         |         | 19333            |         |            |   |   |
| NORMANDALE DIVISION |                         | LOC: A4 | CROSS REF NO 556 | SHEET 6 | PAGE 3-184 |   |   |

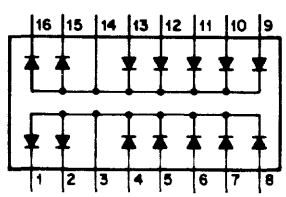


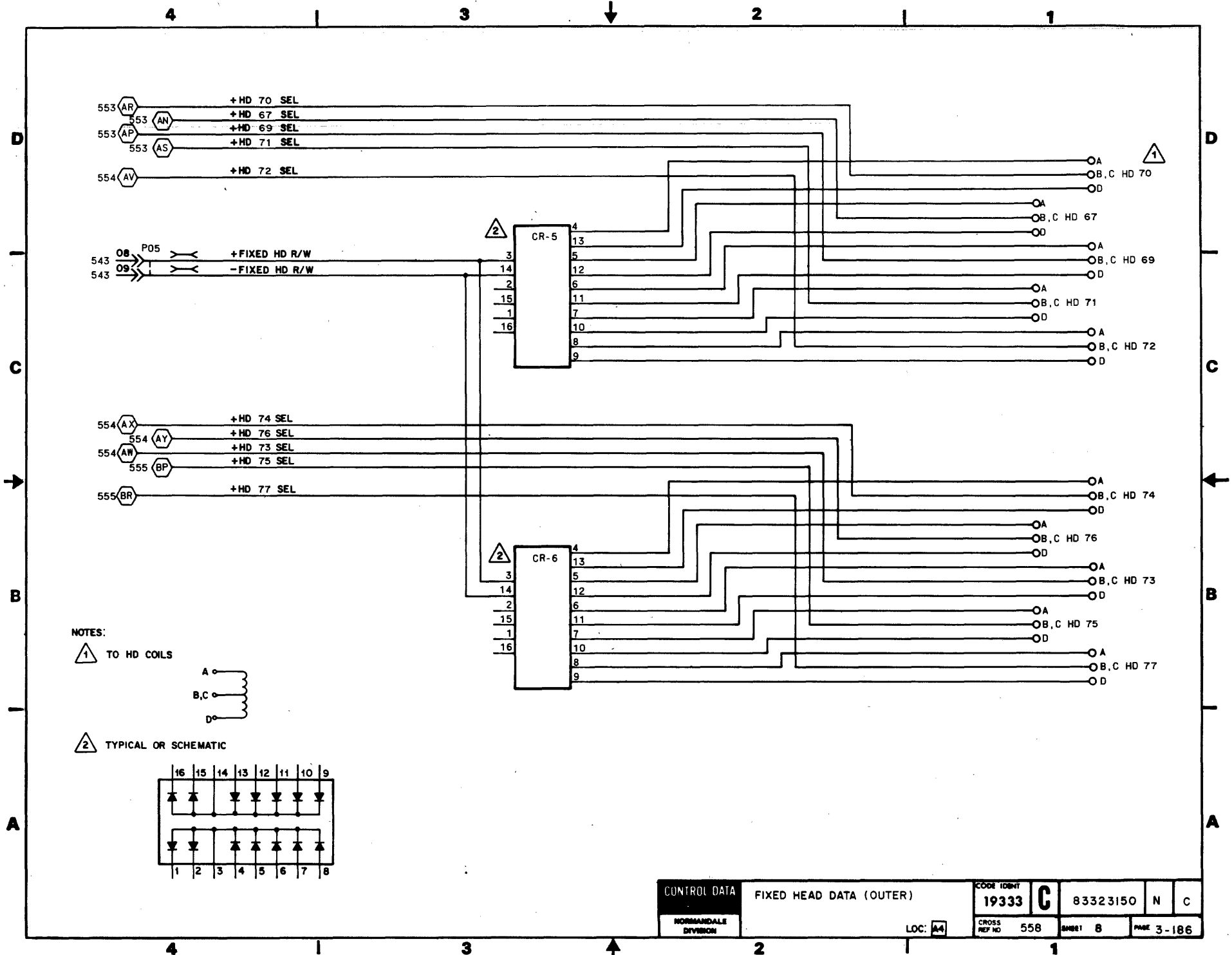
NOTES:

1 TO HD COILS



2 TYPICAL CR SCHEMATIC



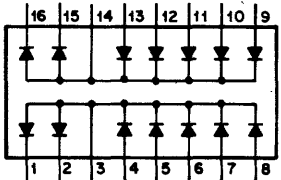


NOTES:

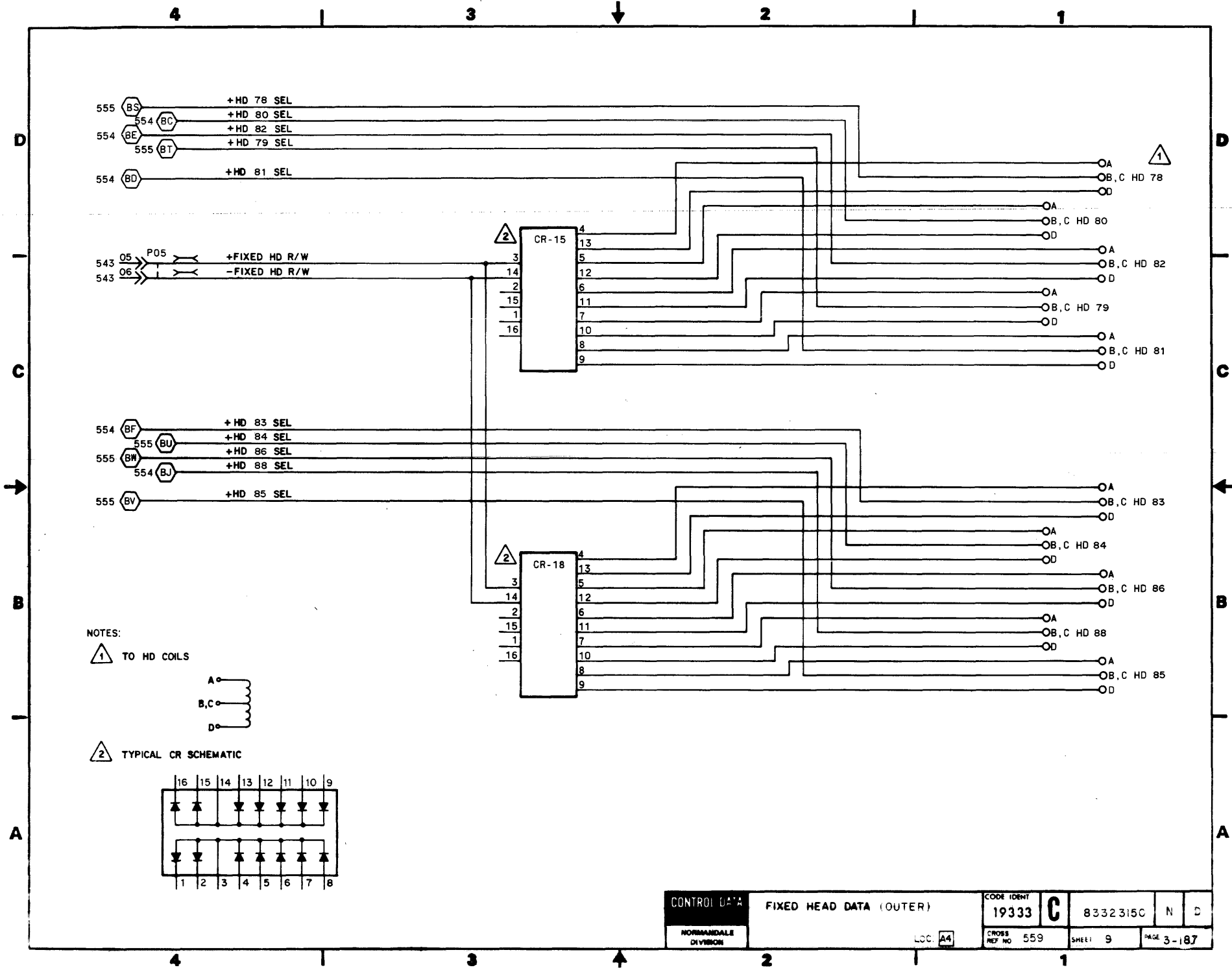
△ 1 TO HD COLS



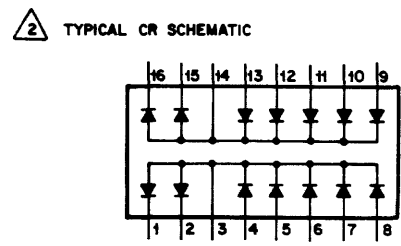
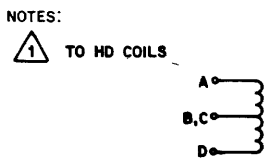
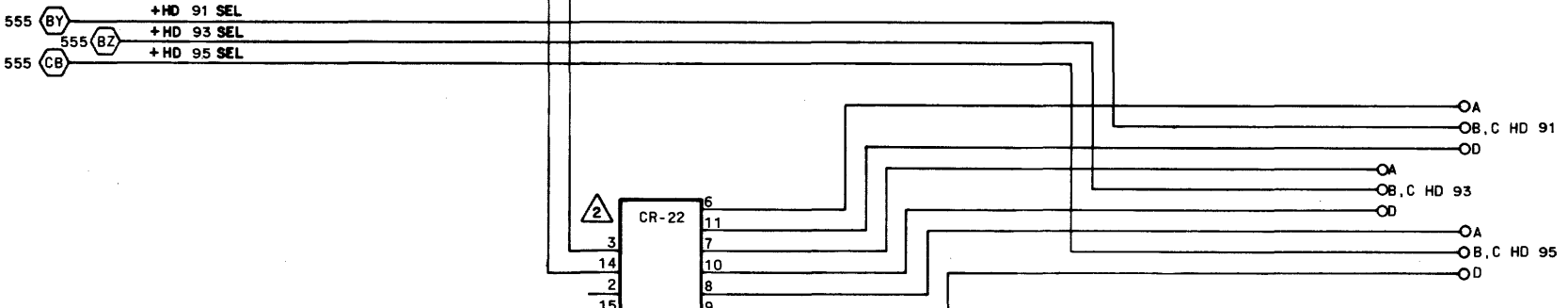
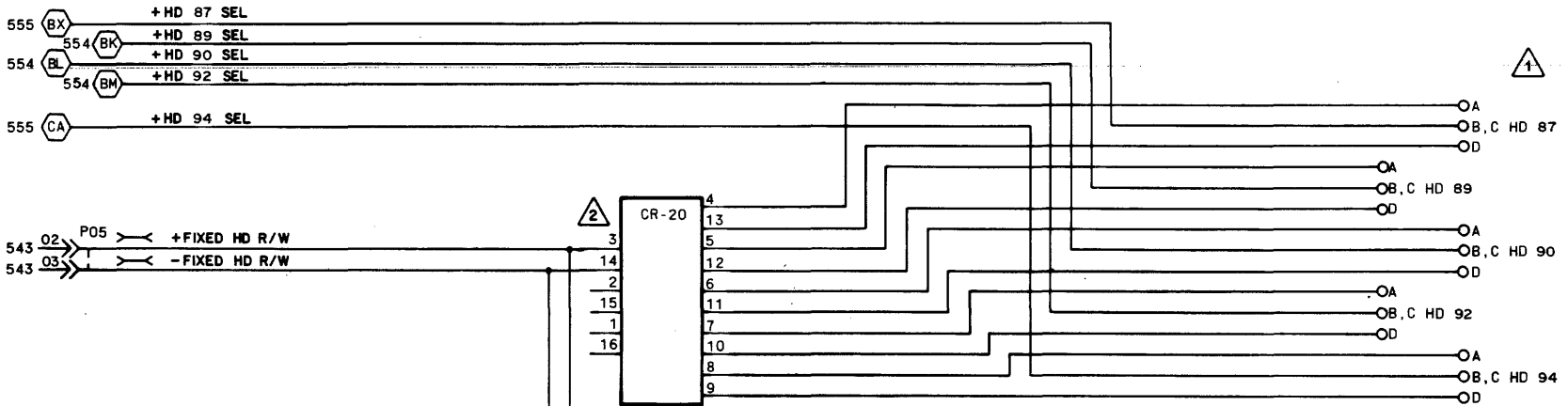
△ 2 TYPICAL OR SCHEMATIC



|                     |                         |              |     |          |   |      |
|---------------------|-------------------------|--------------|-----|----------|---|------|
| CONTROL DATA        | FIXED HEAD DATA (OUTER) | CODE IDENT   | C   | 83323150 | N | C    |
|                     |                         | CROSS REF NO | 558 | SHEET    | B | PAGE |
| NORMANDALE DIVISION | LOC: A4                 |              |     |          |   |      |







|                     |                         |              |       |       |          |            |   |
|---------------------|-------------------------|--------------|-------|-------|----------|------------|---|
| CONTROL DATA        | FIXED HEAD DATA (OUTER) | CODE IDENT   | 19333 | C     | 83323150 | N          | D |
|                     |                         | CROSS REF NO | 560   | SHEET | 10       | PAGE 3-188 |   |
| NORMANDALE DIVISION |                         | LOC:         | A4    |       |          |            |   |

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REVISION STATUS OF SHEETS

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| A | A | A | A | A | A | A | A | A | A | A  |    |    |    |    |    |    |    |    |    |    |
| B | B | B | B | B | B | B | B | B | B | B  |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |             |       |         |       |
|-----------|---------|-------------|-------|---------|-------|
| REV.      | ECO.    | DESCRIPTION | DRFT. | DATE    | CHK'D |
| A         | PE23000 | RELEASED    |       |         |       |
| B         | PE50643 | CORRECTIONS | CB    | 3-21-80 |       |
|           |         |             |       |         |       |
|           |         |             |       |         |       |
|           |         |             |       |         |       |
|           |         |             |       |         |       |
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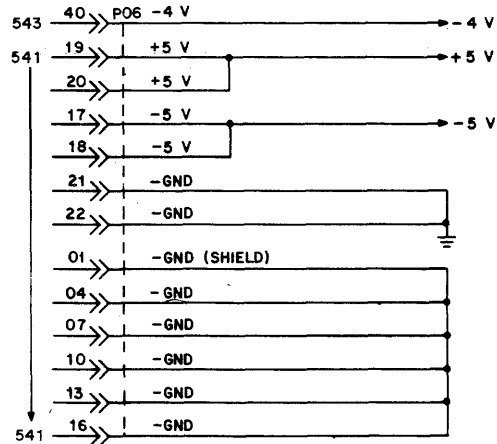
D

C

B

B

A



NOTE:  
1. ALL 950A IC'S HAVE PINS 6 AND 16 CONNECTED TO +5 V,  
PIN 9 CONNECTED TO -5 V, AND PIN 8 CONNECTED TO GND.

APPLICABLE ONLY TO UNITS WITH FIXED HD SHOE OPTION (48 OR 96 HEADS)

|                            |                         |                                   |                       |                  |               |   |
|----------------------------|-------------------------|-----------------------------------|-----------------------|------------------|---------------|---|
| DRAWN<br>G. RAJSE 4-9-78   | CONTROL DATA            | FIXED HD SHOE (INNER)<br>DIAGRAMS | CODE IDENT<br>19333 C | 83323150         | N             | B |
| CHECKED<br>S. ... 4/19/78  |                         |                                   | CROSS REF<br>NO 561   | SHEET<br>1 OF 10 | PAGE<br>3-189 |   |
| ENGINEER<br>C. ... 4/11/78 | NORMAN DALE<br>DIVISION | TYPE: BYCN                        | LOC: A4               | REF: 75121622    |               |   |
| APPROVED                   |                         |                                   |                       |                  |               |   |

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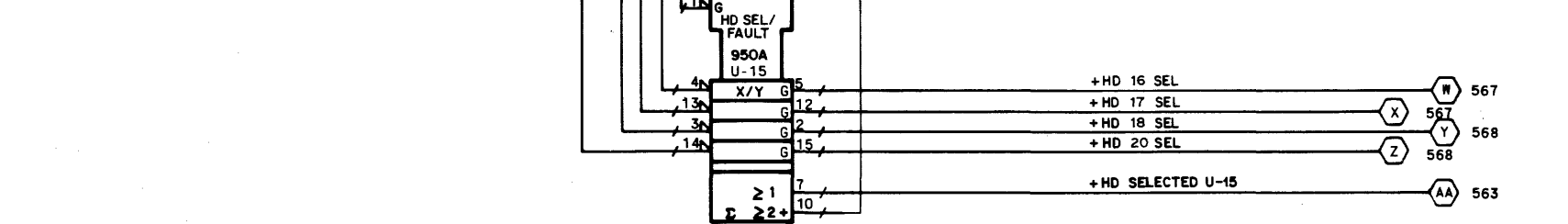
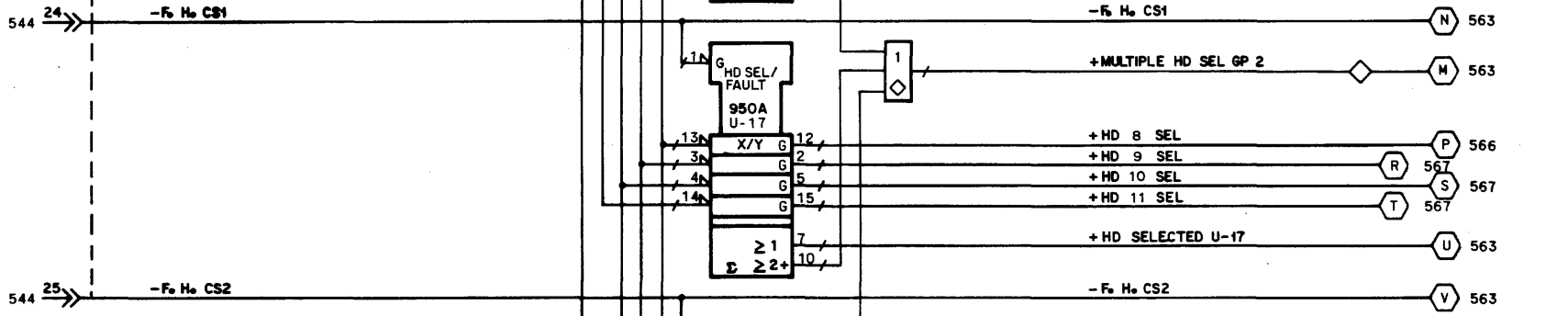
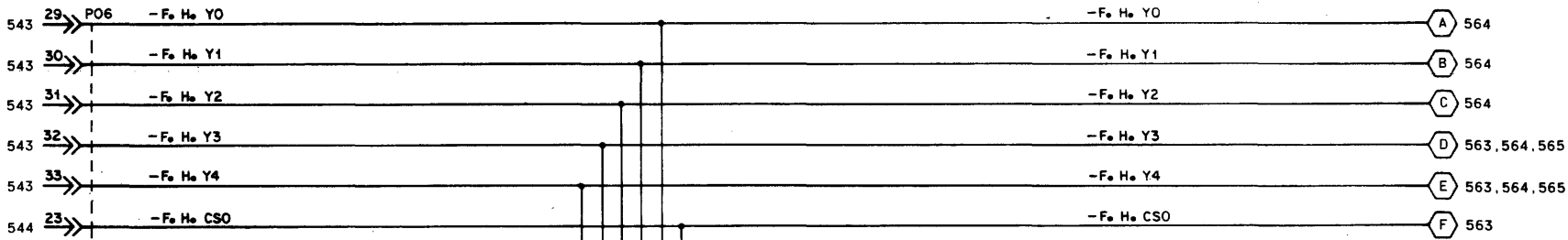
C

C

B

B

A



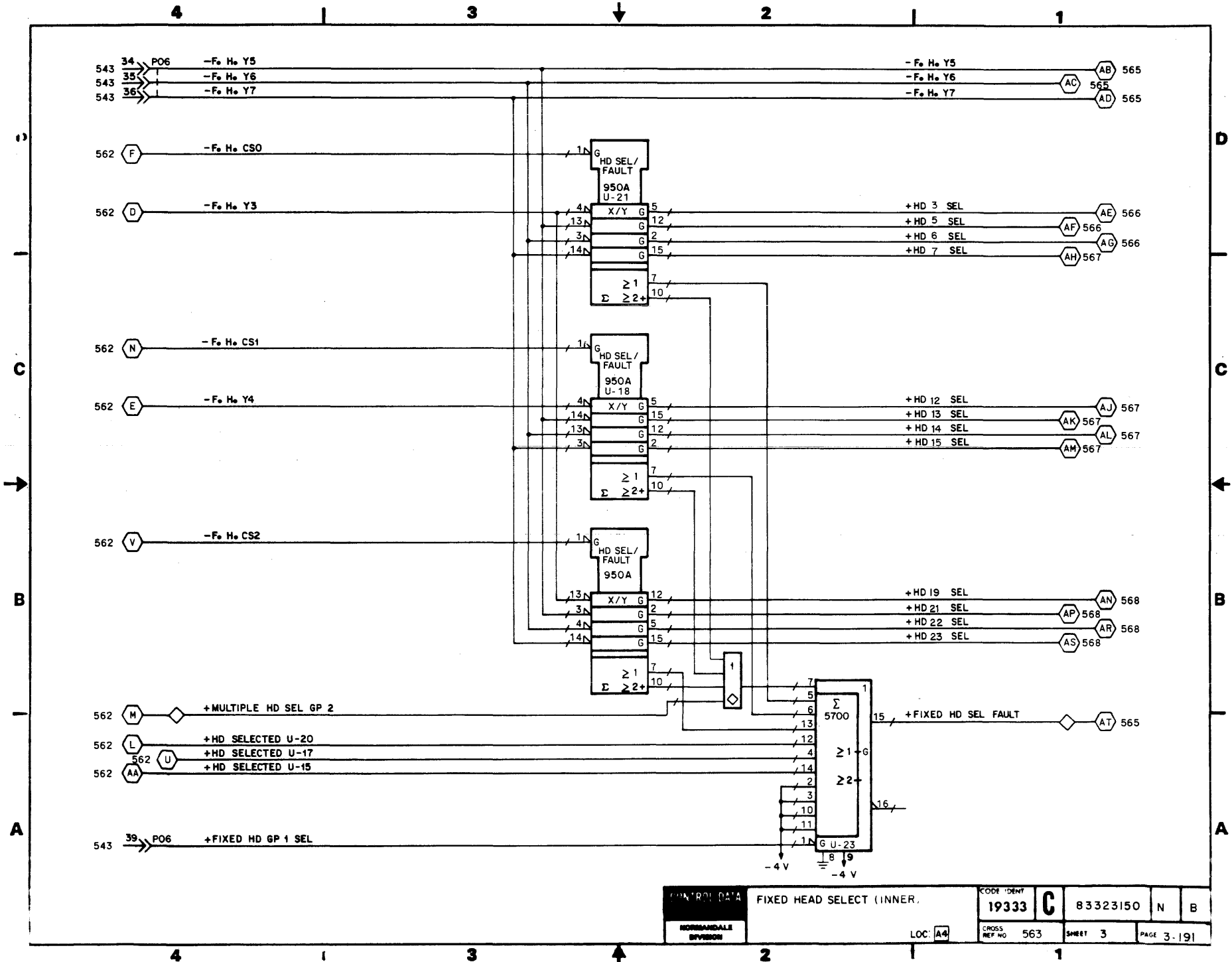
|   |                                  |                     |                            |            |          |   |   |
|---|----------------------------------|---------------------|----------------------------|------------|----------|---|---|
| <b>19333</b><br>NORMANDEALE<br>DIVISION | <b>FIXED HEAD SELECT (INNER)</b> |                     | CODE IDENT<br><b>19333</b> | <b>C</b>   | 83323150 | N | B |
|   | LOC: <b>A4</b>                   | CROSS REF NO<br>562 | SHEET<br>2                 | PAGE 3-190 |          |   |   |

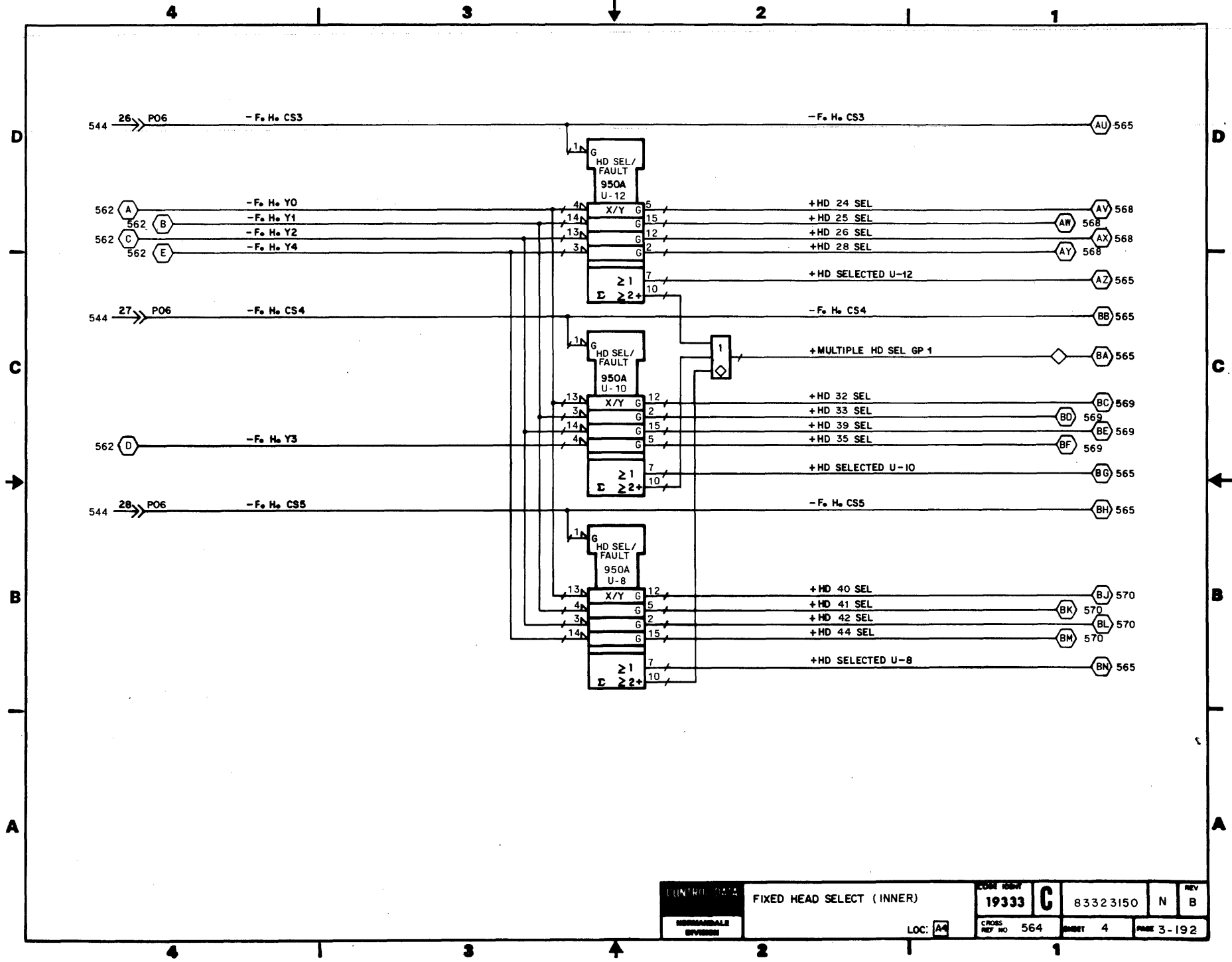
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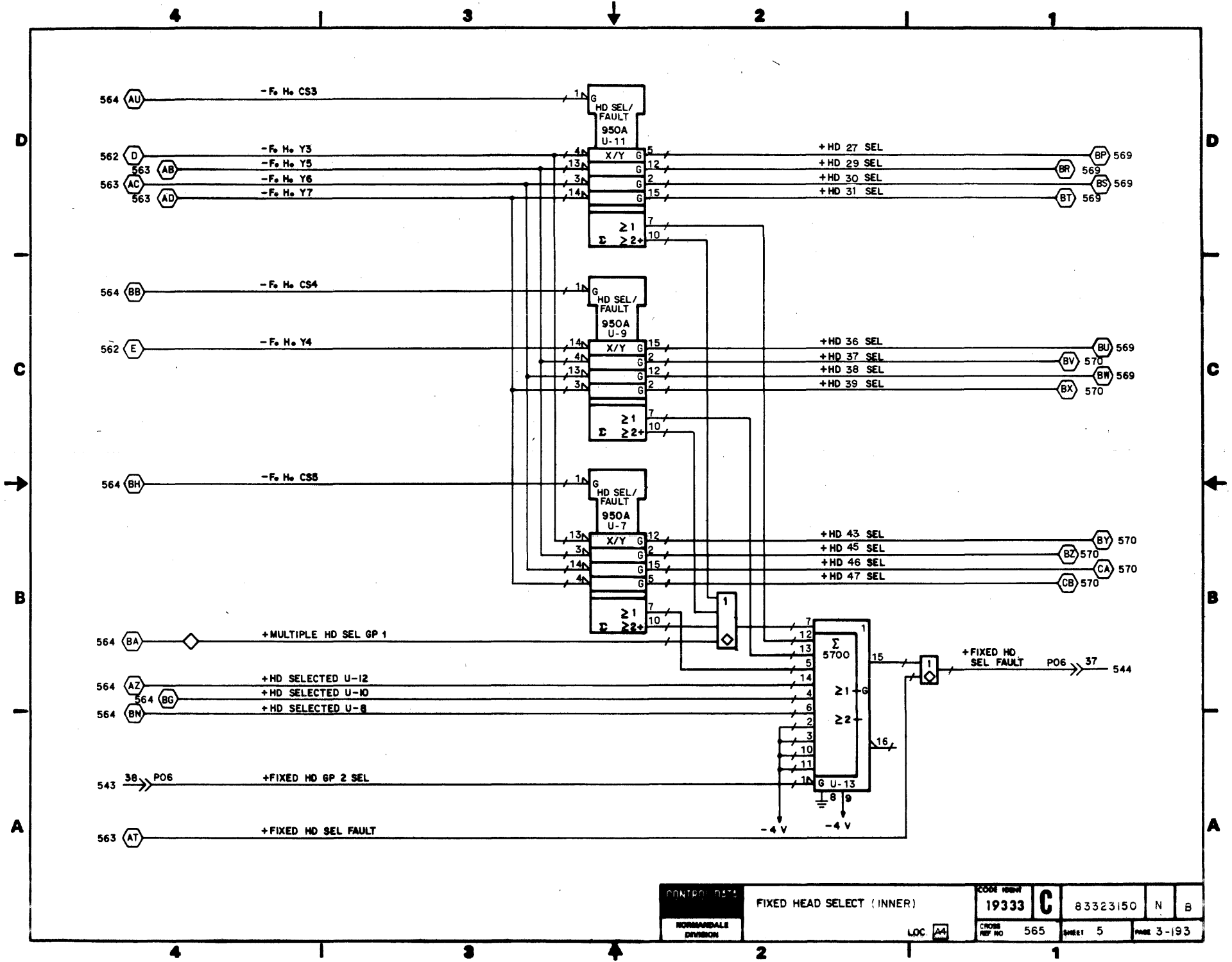
3

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1







562 G +HD 0 SEL  
 562 J +HD 2 SEL  
 562 K +HD 4 SEL

543 02 PO6 +FIXED HD R/W  
 543 03 -FIXED HD R/W

562 H +HD 1 SEL  
 563 AE +HD 3 SEL  
 563 AF +HD 5 SEL  
 563 AG +HD 6 SEL  
 562 P +HD 8 SEL

△ 2



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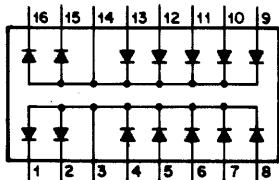
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NOTES:

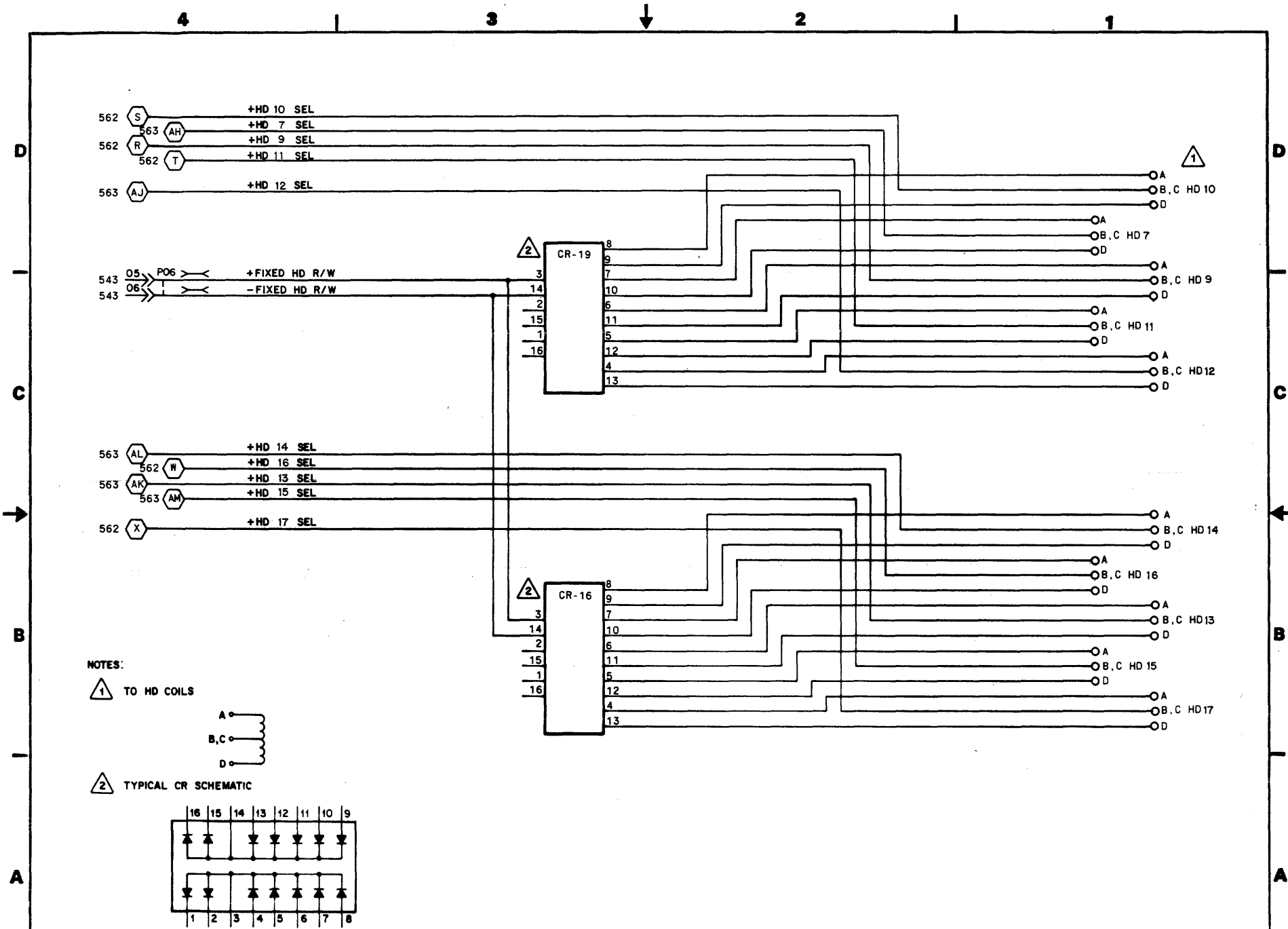
△ 1 TO HD COILS



△ 2 TYPICAL CR SCHEMATIC



|  |                         |              |       |       |          |      |       |
|--|-------------------------|--------------|-------|-------|----------|------|-------|
| CONTROL DATA<br>NORMANDALE<br>DIVISION | FIXED HEAD DATA (INNER) | CODE IDENT   | 19333 | C     | 83323150 | N    | B     |
|  |                         | CROSS REF NO | 566   | SHEET | 6        | PAGE | 3-194 |
| LOC: A4                                |                         |              |       |       |          |      |       |

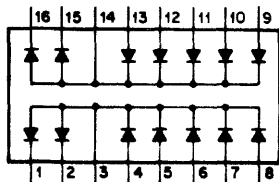


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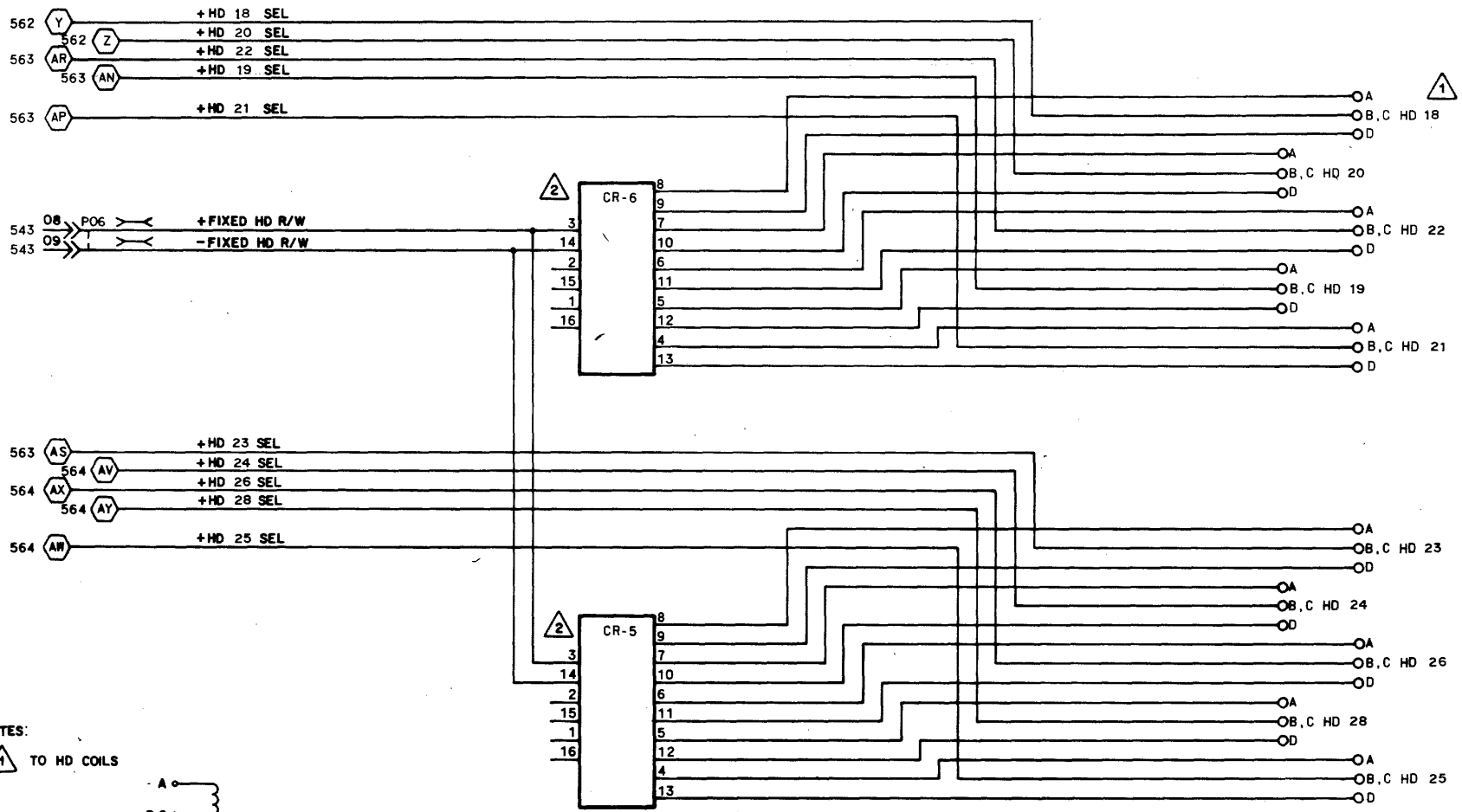
1 TO HD COILS



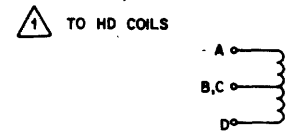
2 TYPICAL CR SCHEMATIC



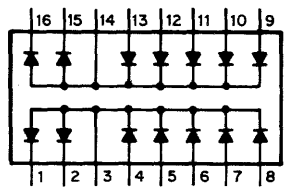




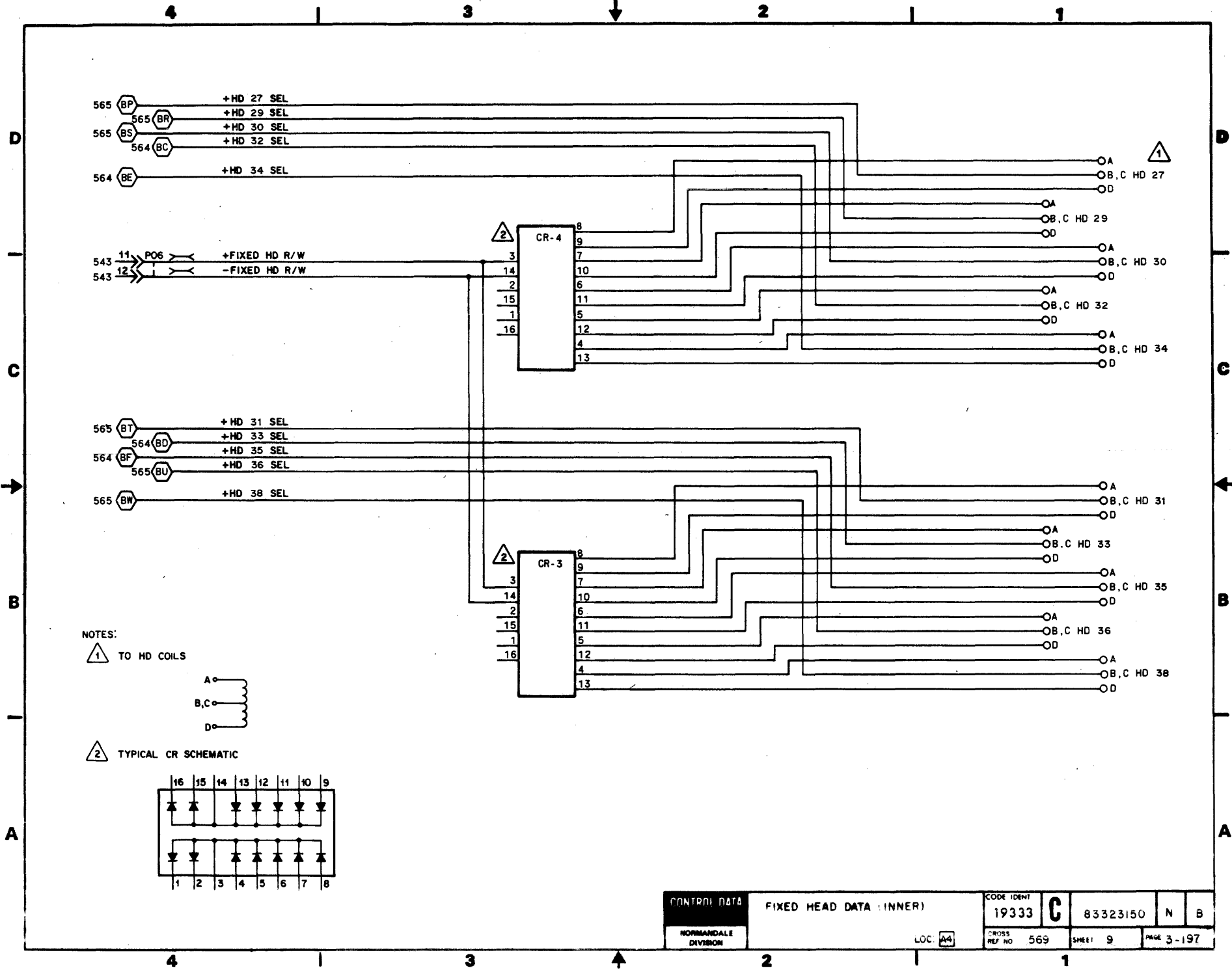
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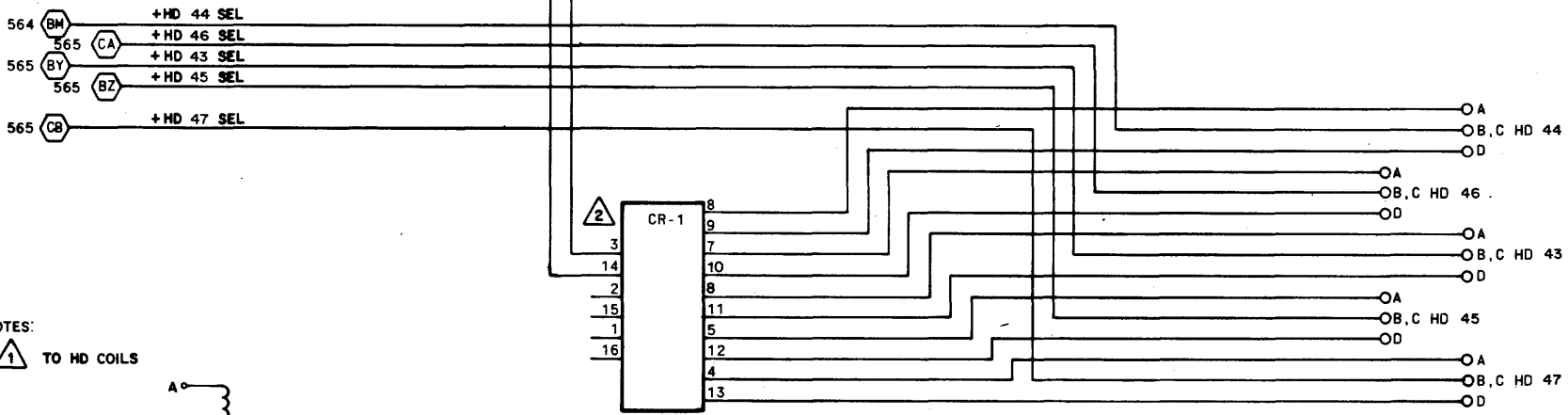
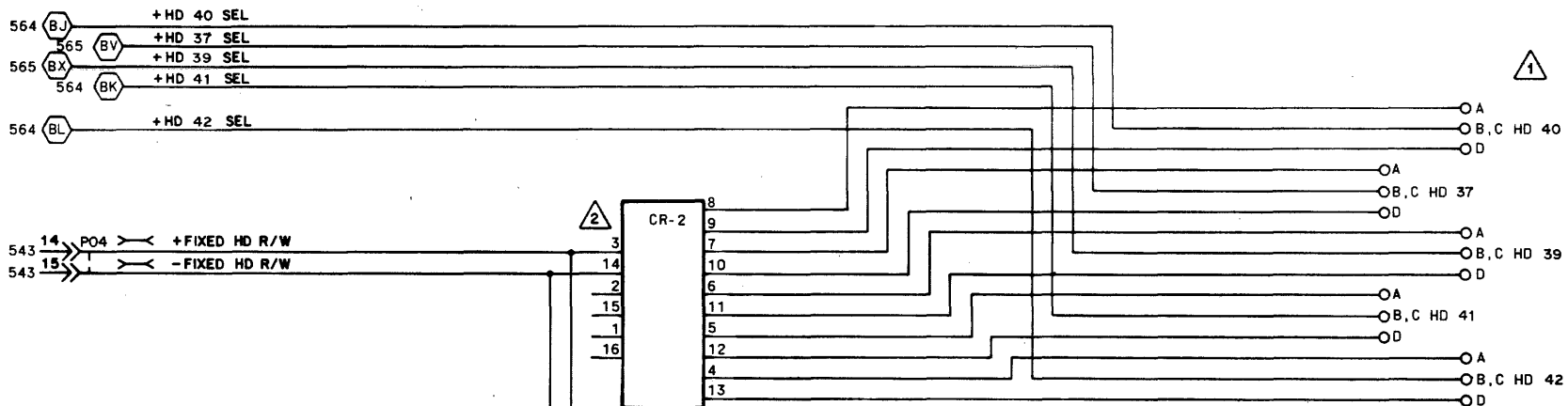


2 TYPICAL OR SCHEMATIC



|   |                         |                  |          |            |   |
|---|-------------------------|------------------|----------|------------|---|
| CONTROL DATA<br>NORMANDEALE<br>DIVISION | FIXED HEAD DATA (INNER) | CODE IDENT       | 83323150 | N          | B |
|   |                         | 19333            |          |            |   |
| LOC: A4                                 |                         | CROSS REF NO 558 | SHEET 8  | PAGE 3-196 |   |

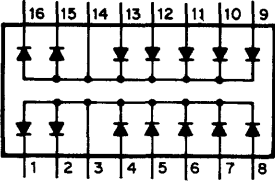




NOTES:

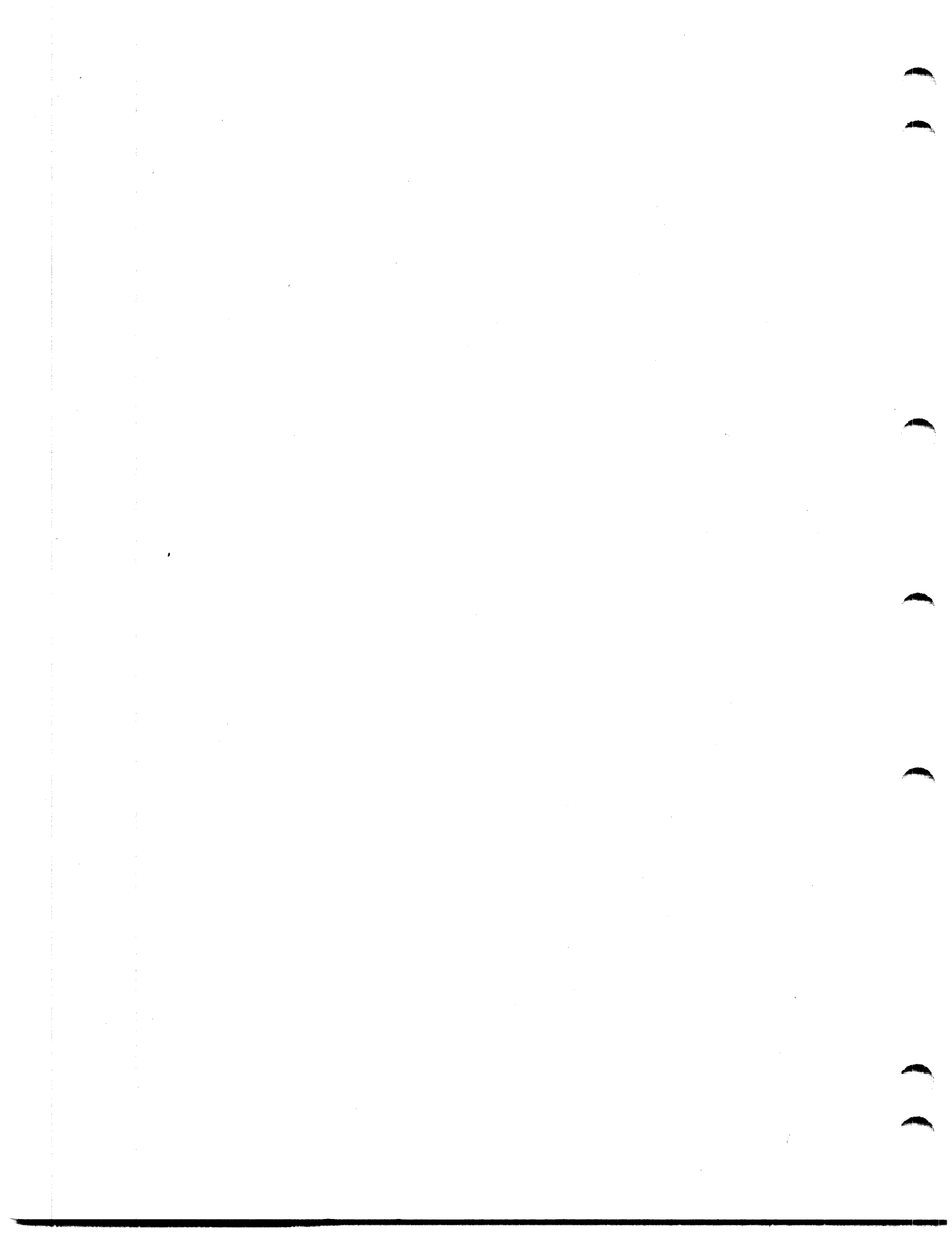
1 TO HD COILS

2 TYPICAL CR SCHEMATIC



**SECTION 4**

**WIRE LISTS**



# WIRE LIST

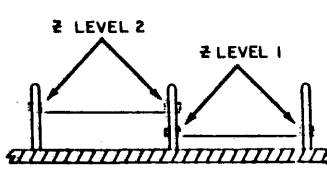
## INTRODUCTION

The wire list section is presented in two parts. The first part of the section explains how to use the wire lists and provides an explanation of the columns present on the lists. The second part of the section contains the actual wire lists for the backpanel and harnessing.

## READING OF WIRE LIST

The wire lists for the logic chassis wire wrap panel shows the origin, destination, and Z level of all wire wrap connections. The wires are listed by both origin and destination in the order of card location and pin number. See the example under the Origin/Destination paragraph. The following is an explanation of the columns used on the wirelist (refer to figure 4-1).

| TITLE<br>WIREWRAP LIST                     |        | WL               | DOCUMENT NO.<br>LOGIC W/W | SHEET NO.<br>1 of 12 | REV.<br>A |
|--|--------|------------------|---------------------------|----------------------|-----------|
| SIGNAL NAME<br>OR NUMBER<br>IDENTIFICATION | ORIGIN | DESTI-<br>NATION | Z<br>LEVEL                | NOTES                |           |
|  | A0101B | A0102A           | 1                         |                      |           |
|  | A0102A | A0101B           | 1                         |                      |           |
|  | A0102B | A1708A           | 1                         |                      |           |
|  | A0103A | A0231A           | 1                         |                      |           |
|  | A0230A | A1712A           | 1                         |                      |           |
|  | A0230B | A0612B           | 1                         |                      |           |
|  | A0231A | A1326B           | 2                         |                      |           |
|  | A0231A | A0103A           | 1                         |                      |           |



9T211

Figure 4-1. Example of Logic Wirewrap List

## ORIGIN/DESTINATION

Both origin and destination columns contain a six character number. The origin column identifies where the wire begins. The destination column identifies where the wire ends. The first three characters of the six character number in each column represents the card location. The second three characters represent the pin number to which the wire is attached.



## Z LEVEL

The Z level identifies the position of the wire wrap on the pin. There are two Z levels assigned to each pin (refer to figure 4-1). Z level 1 is that level closest to the wire wrap panel surface, while Z level 2 is the farthest. Pins may hold one or two wire wraps; but the Z level must be maintained at both ends of the wire wrap connections.

## NOTES

The notes column is the last column on the wire list. Signal names, history, or other pertinent information is shown in the notes column.

TITLE

Wire Wrap Assembly (Ref: 47230137/47230139/47230140)

| SIGNAL NAME OR NUMBER<br>IDENTIFICATION | ORIGIN | DESTINATION | Z<br>LEVEL | NOTES |
|---|--------|-------------|------------|-------|
|   | AJ103R | CJ236A      | 1          |       |
|   | A0104A | C0241A      | 1          |       |
|   | AJ104R | CJ237A      | 1          |       |
|   | A0105A | C0241R      | 1          |       |
|   | A0105R | C0240R      | 1          |       |
|   | AJ105R | CJ239A      | 2          |       |
|   | A0107R | C0235A      | 2          |       |
|   | AJ107R | AJ308A      | 1          |       |
|   | AJ108R | C0435A      | 1          |       |
|   | A0111R | C0433R      | 1          |       |
|   | AJ114R | CJ238A      | 1          |       |
|   | A0118R | A0443A      | 1          |       |
|   | A0120R | A0404A      | 1          |       |
|   | AJ120R | RJ205A      | 2          |       |
|   | A0121R | R0131A      | 1          |       |
|   | AJ123R | RJ123R      | 1          |       |
|   | A0143R | A0332A      | 2          |       |
|   | A0307A | A0405A      | 1          |       |
|   | A0308A | A0107R      | 1          |       |
|   | A0309A | A0410A      | 1          |       |
|   | AJ315A | AJ404A      | 1          |       |
|   | A0315A | R0231R      | 2          |       |
|   | A0316R | AJ334A      | 1          |       |
|   | A0327A | A0437A      | 1          |       |
|   | AJ328A | AJ437R      | 1          |       |
|   | A0332A | A0409A      | 1          |       |
|   | A0332A | A0143R      | 2          |       |
|   | A0333A | R0212A      | 1          |       |
|   | A0334A | A0316R      | 1          |       |
|   | AJ336A | RJ225A      | 1          |       |
|   | A0341A | A0441R      | 1          |       |
|   | AJ403A | RJ224A      | 1          |       |
|   | A0404A | A0120R      | 1          |       |
|   | AJ404R | A0315A      | 1          |       |
|   | AJ405A | A0307A      | 1          |       |
|   | A0408A | R0226R      | 1          |       |
|   | A0408R | RJ243R      | 1          |       |
|   | A0409A | A0332A      | 1          |       |
|   | AJ409R | RJ209A      | 1          |       |
|   | A0410A | A0309A      | 1          |       |
|   | A0410R | C0403R      | 2          |       |
|   | A0410R | A0432A      | 1          |       |
|   | A0412A | C0430A      | 1          |       |
|   | A0413A | RJ413A      | 2          |       |
|   | A0413R | R0413R      | 2          |       |
|   | A0414A | RJ414A      | 2          |       |
|   | A0415A | R0415A      | 1          |       |
|   | A0415R | RJ415R      | 2          |       |

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| TITLE<br>Wire Wrap Assembly             |        |             |            |                             |
|---|--------|-------------|------------|-----------------------------|
| SIGNAL NAME OR NUMBER<br>IDENTIFICATION | ORIGIN | DESTINATION | Z<br>LEVEL | NOTES                       |
|   | A0416B | B0415B      | 1          |                             |
|   | A0417A | A0419B      | 2          |                             |
|   | A0417B | B0417B      | 2          |                             |
|   | A0418A | B0418A      | 1          |                             |
|   | A0418B | B0418B      | 1          |                             |
|   | A0419A | R0419A      | 1          |                             |
|   | A0419B | C0431B      | 1          |                             |
|   | A0419B | A0417A      | 2          |                             |
|   | A0420A | R0420A      | 1          |                             |
|   | A0420B | R0420B      | 1          |                             |
|   | A0421A | B0421A      | 1          |                             |
|   | A0421B | B0421B      | 1          |                             |
|   | A0422A | R0422A      | 1          |                             |
|   | A0422B | B0422B      | 1          |                             |
|   | A0424A | B0424A      | 1          |                             |
|   | A0424B | B0424B      | 1          |                             |
|   | A0428A | C0433A      | 1          |                             |
|   | A0428B | C0436A      | 1          |                             |
|   | A0429A | C0405B      | 1          |                             |
|   | A0431B | C0430B      | 1          |                             |
|   | A0432A | A0438A      | 2          |                             |
|   | A0432A | A0410B      | 1          |                             |
|   | A0432B | R0432B      | 2          |                             |
|   | A0433A | C0422B      | 1          |                             |
|   | A0433B | B0319A      | 1          |                             |
|   | A0434B | R0434B      | 2          |                             |
|   | A0435A | R0435A      | 1          |                             |
|   | A0436A | B0436A      | 2          |                             |
|   | A0436B | R0436B      | 2          |                             |
|   | A0436A | C0340A      | 1          |                             |
|   | A0437A | A0327A      | 1          |                             |
|   | A0437B | B0437B      | 2          |                             |
|   | A0437B | A0328A      | 1          |                             |
|   | A04377 | B0437A      | 2          |                             |
|   | A0438A | A0432A      | 2          |                             |
|   | A0438B | C0415B      | 1          |                             |
|   | A0440A | B0440A      | 1          |                             |
|   | A0440B | C0421A      | 2          |                             |
|   | A0441A | B0441A      | 2          |                             |
|   | A0441B | A0341A      | 1          |                             |
|   | A0441B | B0441B      | 2          |                             |
|   | A0442A | B0442A      | 2          |                             |
|   | A0442B | C0440A      | 2          |                             |
|   | A0443A | A0113P      | 1          |                             |
|   | A0443A | B0443A      | 2          |                             |
|   | A0443B | B0443B      | 2          |                             |
|   | B0123B | A0123B      | 1          |                             |
|   |        |             |            | Applies to BZ9A1J/K<br>only |

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TITLE

## Wire Wrap Assembly

| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES  |
|--------------------------------------|--------|-------------|---------|--|
|                                      | B0124A | B0233A      | 1       |  |
|                                      | R0125A | B0233B      | 1       |  |
|                                      | B0126A | B0234B      | 1       |  |
|                                      | B0127A | B0234A      | 1       |  |
|                                      | B0131A | A0121B      | 1       |  |
|                                      | B0132A | C0237B      | 1       |  |
|                                      | B0133A | B0324B      | 1       |  |
|                                      | B0134A | C0235B      | 1       |  |
|                                      | B0136A | B0325A      | 1       |  |
|                                      | B0137A | B0335A      | 1       |  |
|                                      | B0141A | B0316A      | 1       |  |
|                                      | B0142A | B0322B      | 1       |  |
|                                      | B0143A | B0326A      | 1       |  |
|                                      | B0204A | B0309A      | 1       |  |
|                                      | B0205A | A0120B      | 2       |  |
|                                      | B0207A | B0436B      | 1       |  |
|                                      | B0208B | C0409B      | 1       |  |
|                                      | B0209A | A0409B      | 1       |  |
|                                      | B0210A | B0441A      | 1       |  |
|                                      | B0210B | B0324A      | 1       |  |
|                                      | B0212A | A0333A      | 1       |  |
|                                      | B0216A | B0340A      | 1       |  |
|                                      | B0218A | B0436A      | 1       | Applies only to units without long last sector.. |
|                                      | B0218A | C0330B      | 1       | Applies only to units with long last sector.     |
|                                      | B0218B | B0322A      | 1       |  |
|                                      | B0219A | B0332A      | 1       |  |
|                                      | B0219B | C0420B      | 1       |  |
|                                      | B0220A | B0332B      | 1       |  |
|                                      | B0222A | B0334B      | 1       |  |
|                                      | B0222B | B0327A      | 1       |  |
|                                      | B0224A | A0403A      | 1       |  |
|                                      | B0224A | C0126A      | 2       | BZ5A1V/W, BZ5A5G/H only                          |
|                                      | B0224B | B0333B      | 1       |  |
|                                      | B0225A | A0336A      | 1       |  |
|                                      | B0225B | B0321B      | 1       |  |
|                                      | B0226A | B0338B      | 1       |  |
|                                      | B0226A | C0127A      | 2       | BZ5A1V/W, BZ5A5G/H only                          |
|                                      | B0226B | A0408A      | 1       |  |
|                                      | B0227A | B0331A      | 1       |  |
|                                      | B0228B | B0443B      | 1       |  |
|                                      | B0228B | B0333A      | 2       |  |
|                                      | B0229A | B0329A      | 1       |  |
|                                      | B0229B | B0320B      | 1       |  |
|                                      | B0230A | B0432B      | 1       |  |

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TITLE

## Wire Wrap Assembly

| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES |
|--------------------------------------|--------|-------------|---------|-------|
|                                      | B0231A | R0434B      | 1       |       |
|                                      | B0231B | A0315A      | 2       |       |
|                                      | B0232B | R0239A      | 1       |       |
|                                      | B0233A | R0124A      | 1       |       |
|                                      | B0233B | R0125A      | 1       |       |
|                                      | B0234A | R0127A      | 1       |       |
|                                      | B0234B | R0126A      | 1       |       |
|                                      | B0235A | R0413A      | 1       |       |
|                                      | B0235B | R0435A      | 2       |       |
|                                      | B0236B | R0325B      | 1       |       |
|                                      | B0237A | R0414A      | 1       |       |
|                                      | B0237B | R0415B      | 1       |       |
|                                      | B0238A | R0413B      | 1       |       |
|                                      | B0239A | R0232B      | 1       |       |
|                                      | B0243B | A0408B      | 1       |       |
|                                      | B0303A | C0230A      | 1       |       |
|                                      | B0303A | R0419A      | 2       |       |
|                                      | B0304B | C0225B      | 1       |       |
|                                      | B0304B | R0418A      | 2       |       |
|                                      | B0305A | R0306A      | 1       |       |
|                                      | B0305B | R0420A      | 2       |       |
|                                      | B0305B | C0225A      | 1       |       |
|                                      | B0306A | R0305A      | 1       |       |
|                                      | B0306B | R0310A      | 1       |       |
|                                      | B0307A | R0424A      | 2       |       |
|                                      | B0307A | C0231A      | 1       |       |
|                                      | B0308B | R0422A      | 2       |       |
|                                      | B0308B | C0240A      | 1       |       |
|                                      | B0309A | R0204A      | 1       |       |
|                                      | B0310A | R0306B      | 1       |       |
|                                      | B0311A | C0232B      | 1       |       |
|                                      | B0311A | R0420B      | 2       |       |
|                                      | B0311B | C0413A      | 1       |       |
|                                      | B0311B | R0424B      | 2       |       |
|                                      | B0312A | R0422B      | 2       |       |
|                                      | B0312A | C0203B      | 1       |       |
|                                      | B0313A | C0204B      | 1       |       |
|                                      | B0313A | R0421A      | 2       |       |
|                                      | B0314B | R0421B      | 2       |       |
|                                      | B0314B | C0203A      | 1       |       |
|                                      | B0316A | R0141A      | 1       |       |
|                                      | B0317A | C0137A      | 1       |       |
|                                      | B0317B | C0228A      | 1       |       |
|                                      | B0318A | C0129A      | 1       |       |
|                                      | B0319A | A0433B      | 1       |       |
|                                      | B0319A | R0433B      | 2       |       |

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TITLE Wire Wrap Assembly

| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES |
|--------------------------------------|--------|-------------|---------|-------|
|                                      | B0319R | C0229A      | 1       |       |
|                                      | B0320A | C0104A      | 1       |       |
|                                      | B0320B | B0229R      | 1       |       |
|                                      | B0321R | B0225B      | 1       |       |
|                                      | B0322A | B0218R      | 1       |       |
|                                      | B0322R | B0142A      | 1       |       |
|                                      | B0323B | B0327B      | 1       |       |
|                                      | B0324A | B0210R      | 1       |       |
|                                      | B0324B | B0133A      | 1       |       |
|                                      | B0325A | B0136A      | 1       |       |
|                                      | B0325B | B0236B      | 1       |       |
|                                      | B0326A | B0143A      | 1       |       |
|                                      | B0326B | C0222A      | 1       |       |
|                                      | B0327A | B0222B      | 1       |       |
|                                      | B0327B | B0323R      | 1       |       |
|                                      | B0328A | C0242A      | 1       |       |
|                                      | B0328B | C0242B      | 1       |       |
|                                      | B0329A | B0229A      | 1       |       |
|                                      | B0329B | C0142A      | 1       |       |
|                                      | B0330R | C0226A      | 1       |       |
|                                      | B0331A | B0440A      | 2       |       |
|                                      | B0331A | B0227A      | 1       |       |
|                                      | B0332A | B0219A      | 1       |       |
|                                      | B0332B | B0220A      | 1       |       |
|                                      | B0333A | B0228R      | 2       |       |
|                                      | B0333B | B0224R      | 1       |       |
|                                      | B0334B | B0222A      | 1       |       |
|                                      | B0335A | B0137A      | 1       |       |
|                                      | B0335B | B0339B      | 2       |       |
|                                      | B0336A | C0238B      | 1       |       |
|                                      | B0337R | B0339B      | 1       |       |
|                                      | B0338B | B0226A      | 1       |       |
|                                      | B0339B | B0335B      | 2       |       |
|                                      | B0339B | B0337B      | 1       |       |
|                                      | B0340A | B0216A      | 1       |       |
|                                      | B0340B | C0138A      | 1       |       |
|                                      | B0410R | B0432A      | 1       |       |
|                                      | B0410B | C0410B      | 2       |       |
|                                      | B0413A | A0413A      | 2       |       |
|                                      | B0413A | B0235A      | 1       |       |
|                                      | B0413B | A0413B      | 2       |       |
|                                      | B0413B | B0238A      | 1       |       |
|                                      | B0414A | B0237A      | 1       |       |
|                                      | B0414A | A0414A      | 2       |       |
|                                      | B0415A | A0415A      | 1       |       |
|                                      | B0415A | C0226B      | 2       |       |

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TITLE

## Wire Wrap Assembly

| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES |
|--------------------------------------|--------|-------------|---------|-------|
|                                      | B0415B | A0415B      | 2       |       |
|                                      | B0415B | B0237B      | 1       |       |
|                                      | B0416B | C0211B      | 2       |       |
|                                      | B0416B | A0416B      | 1       |       |
|                                      | B0417A | B0419B      | 2       |       |
|                                      | B0417B | C0231B      | 1       |       |
|                                      | B0417B | A0417B      | 2       |       |
|                                      | B0418A | B0304B      | 2       |       |
|                                      | B0418A | A0418A      | 1       |       |
|                                      | B0418B | A0418B      | 1       |       |
|                                      | B0418B | C0417B      | 2       |       |
|                                      | B0419A | A0419A      | 1       |       |
|                                      | B0419A | B0303A      | 2       |       |
|                                      | B0419B | C0432B      | 1       |       |
|                                      | B0419B | B0417A      | 2       |       |
|                                      | B0420A | B0305B      | 2       |       |
|                                      | B0420A | A0420A      | 1       |       |
|                                      | B0420B | B0311A      | 2       |       |
|                                      | B0420B | A0420B      | 1       |       |
|                                      | B0421A | A0421A      | 1       |       |
|                                      | B0421A | B0313A      | 2       |       |
|                                      | B0421B | A0421B      | 1       |       |
|                                      | B0421B | B0314B      | 2       |       |
|                                      | B0422A | B0308B      | 2       |       |
|                                      | B0422A | A0422A      | 1       |       |
|                                      | B0422B | B0312A      | 2       |       |
|                                      | B0422B | A0422B      | 1       |       |
|                                      | B0424A | B0307A      | 2       |       |
|                                      | B0424A | A0424A      | 1       |       |
|                                      | B0424B | A0424B      | 1       |       |
|                                      | B0424B | B0311B      | 2       |       |
|                                      | B0428A | C0434B      | 1       |       |
|                                      | B0428B | C0438A      | 1       |       |
|                                      | B0429A | C0403A      | 1       |       |
|                                      | B0431B | C0435B      | 1       |       |
|                                      | B0432A | B0410B      | 1       |       |
|                                      | B0432A | B0438A      | 2       |       |
|                                      | B0432B | B0230A      | 1       |       |
|                                      | B0432B | A0432B      | 2       |       |
|                                      | B0433A | C0404B      | 1       |       |
|                                      | B0433B | B0319A      | 2       |       |
|                                      | B0434B | A0434B      | 2       |       |
|                                      | B0434B | B0231A      | 1       |       |
|                                      | B0435A | B0235B      | 2       |       |
|                                      | B0435A | A0435A      | 1       |       |
|                                      | B0436A | B0218A      | 1       |       |

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| TITLE<br>Wire Wrap Assembly          |        |             |         |                         |
|--------------------------------------|--------|-------------|---------|-------------------------|
| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES                   |
|                                      | B0436A | A0436A      | 2       |                         |
|                                      | B0436R | A0436R      | 2       |                         |
|                                      | R0436R | R0207A      | 1       |                         |
|                                      | B0437A | A04377      | 2       |                         |
|                                      | B0437R | A0437R      | 2       |                         |
|                                      | B0438A | B0432A      | 2       |                         |
|                                      | B0438R | C0414R      | 1       |                         |
|                                      | B0440A | B0331A      | 2       |                         |
|                                      | B0440R | A0440A      | 1       |                         |
|                                      | B0440R | C0413R      | 2       |                         |
|                                      | B0441A | A0441A      | 2       |                         |
|                                      | B0441A | B0210A      | 1       |                         |
|                                      | B0441B | A0441B      | 2       |                         |
|                                      | B0442A | C0216R      | 1       |                         |
|                                      | B0442A | A0442A      | 2       |                         |
|                                      | B0442B | C0424B      | 2       |                         |
|                                      | B0443A | A0443A      | 2       |                         |
|                                      | B0443B | B0228B      | 1       |                         |
|                                      | B0443R | A0443R      | 2       |                         |
|                                      | C0104A | B0320A      | 1       |                         |
|                                      | C0112A | C0205R      | 1       |                         |
|                                      | C0126A | B0224A      | 2       | BZ5A1V/W, BZ5A5G/H only |
|                                      | C0127A | B0226B      | 2       | BZ5A1V/W, BZ5A5G/H only |
|                                      | C0129A | B0318A      | 1       |                         |
|                                      | C0137A | R0317A      | 1       |                         |
|                                      | C0138A | R0340R      | 1       |                         |
|                                      | C0139B | C0205A      | 1       |                         |
|                                      | C0142A | B0329B      | 1       |                         |
|                                      | C0203A | B0314R      | 1       |                         |
|                                      | C0203B | B0312A      | 1       |                         |
|                                      | C0204B | B0313A      | 1       |                         |
|                                      | C0205A | C0139R      | 1       |                         |
|                                      | C0205B | C0112A      | 1       |                         |
|                                      | C0211B | B0416R      | 2       |                         |
|                                      | C0216R | B0442A      | 1       |                         |
|                                      | C0216B | C0311B      | 2       | ⚠                       |
|                                      | C0222A | R0326R      | 1       |                         |
|                                      | C0225A | R0305R      | 1       |                         |
|                                      | C0225B | B0304R      | 1       |                         |
|                                      | C0226A | R0330R      | 1       |                         |
|                                      | C0226B | B0415A      | 2       |                         |
|                                      | C0228A | B0317B      | 1       |                         |
|                                      | C0229A | B0319R      | 1       |                         |
|                                      | C0230A | B0303A      | 1       |                         |
|                                      | C0231A | B0307A      | 1       |                         |
|                                      | C0231B | B0417B      | 1       |                         |

BZ5A1V/W, BZ5A5G/H only  
BZ5A1V/W, BZ5A5G/H only



⚠ Applies only to units with long last sector

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TITLE

## Wire Wrap Assembly

| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES |
|--------------------------------------|--------|-------------|---------|-------|
|                                      | C0232B | B0311A      | 1       |       |
|                                      | C0233B | C0419B      | 1       |       |
|                                      | C0235A | A0107B      | 2       |       |
|                                      | C0235A | A0107B      | 2       |       |
|                                      | C0235B | B0134A      | 1       |       |
|                                      | C0236A | A0103B      | 1       |       |
|                                      | C0237A | A0104B      | 1       |       |
|                                      | C0237B | B0132A      | 1       |       |
|                                      | C0238A | A0114B      | 1       |       |
|                                      | C0238B | B0336A      | 1       |       |
|                                      | C0239A | A0106B      | 2       |       |
|                                      | C0240A | B0308B      | 1       |       |
|                                      | C0240B | A0105B      | 1       |       |
|                                      | C0241A | A0104A      | 1       |       |
|                                      | C0241B | A0105A      | 1       |       |
|                                      | C0242A | B0328A      | 1       |       |
|                                      | C0242B | B0328B      | 1       |       |
|                                      | C0308B | C0316B      | 1       |       |
|                                      | C0311B | C0216B      | 2       |       |
|                                      | C0315A | C0316A      | 2       |       |
|                                      | C0315A | C0323A      | 1       |       |
|                                      | C0315B | C0316A      | 1       |       |
|                                      | C0315B | C0333A      | 2       |       |
|                                      | C0316A | C0315A      | 2       |       |
|                                      | C0316A | C0315B      | 1       |       |
|                                      | C0316B | C0308B      | 1       |       |
|                                      | C0316B | C0331A      | 2       |       |
|                                      | C0323A | C0315A      | 1       |       |
|                                      | C0330B | B0218A      | 1       |       |
|                                      | C0331A | C0316B      | 2       |       |
|                                      | C0332B | C0333A      | 1       |       |
|                                      | C0333A | C0315B      | 2       |       |
|                                      | C0333A | C0332B      | 1       |       |
|                                      | C0340A | A0436A      | 1       |       |
|                                      | C0403A | B0429A      | 1       |       |
|                                      | C0403B | A0410B      | 2       |       |
|                                      | C0403B | C0417A      | 1       |       |
|                                      | C0404B | B0433A      | 1       |       |
|                                      | C0405A | C0410B      | 1       |       |
|                                      | C0405B | A0429A      | 1       |       |
|                                      | C0408A | C0417B      | 1       |       |
|                                      | C0409A | C0413B      | 1       |       |
|                                      | C0409B | C0421B      | 2       |       |
|                                      | C0409B | B0208B      | 1       |       |
|                                      | C0410B | C0405A      | 1       |       |



⚠ Applies only to units with long last sector

KØR0710A

| TITLE                                |        |             |         |       |
|--------------------------------------|--------|-------------|---------|-------|
| Wire Wrap Assembly                   |        |             |         |       |
| SIGNAL NAME OR NUMBER IDENTIFICATION | ORIGIN | DESTINATION | Z LEVEL | NOTES |
|                                      | C0410B | B0410B      | 2       |       |
|                                      | C0412A | C0421A      | 1       |       |
|                                      | C0413A | C0419B      | 2       |       |
|                                      | C0413A | B0311B      | 1       |       |
|                                      | C0413B | B0440B      | 2       |       |
|                                      | C0413B | C0409A      | 1       |       |
|                                      | C0414B | B0438B      | 1       |       |
|                                      | C0415A | C0424B      | 1       |       |
|                                      | C0415B | A0438B      | 1       |       |
|                                      | C0416B | C0427B      | 1       |       |
|                                      | C0417A | C0403B      | 1       |       |
|                                      | C0417B | B0418B      | 2       |       |
|                                      | C0417B | C0408A      | 1       |       |
|                                      | C0418A | C0432A      | 1       |       |
|                                      | C0418B | C0440A      | 1       |       |
|                                      | C0419B | C0413A      | 2       |       |
|                                      | C0419B | C0233B      | 1       |       |
|                                      | C0420B | B0219B      | 1       |       |
|                                      | C0421A | C0412A      | 1       |       |
|                                      | C0421A | A0440B      | 2       |       |
|                                      | C0421B | C0409B      | 2       |       |
|                                      | C0422B | A0433A      | 1       |       |
|                                      | C0424B | B0442B      | 2       |       |
|                                      | C0424B | C0415A      | 1       |       |
|                                      | C0427B | C0416B      | 1       |       |
|                                      | C0430A | A0412A      | 1       |       |
|                                      | C0430B | A0431B      | 1       |       |
|                                      | C0431B | A0419B      | 1       |       |
|                                      | C0432A | C0418A      | 1       |       |
|                                      | C0432B | B0419B      | 1       |       |
|                                      | C0433A | A0428A      | 1       |       |
|                                      | C0433B | A0111B      | 1       |       |
|                                      | C0434B | B0428A      | 1       |       |
|                                      | C0435A | A0108B      | 1       |       |
|                                      | C0435B | B0431B      | 1       |       |
|                                      | C0436A | A0428B      | 1       |       |
|                                      | C0438A | B0428B      | 1       |       |
|                                      | C0440A | C0418B      | 1       |       |
|                                      | C0440A | A0442B      | 2       |       |

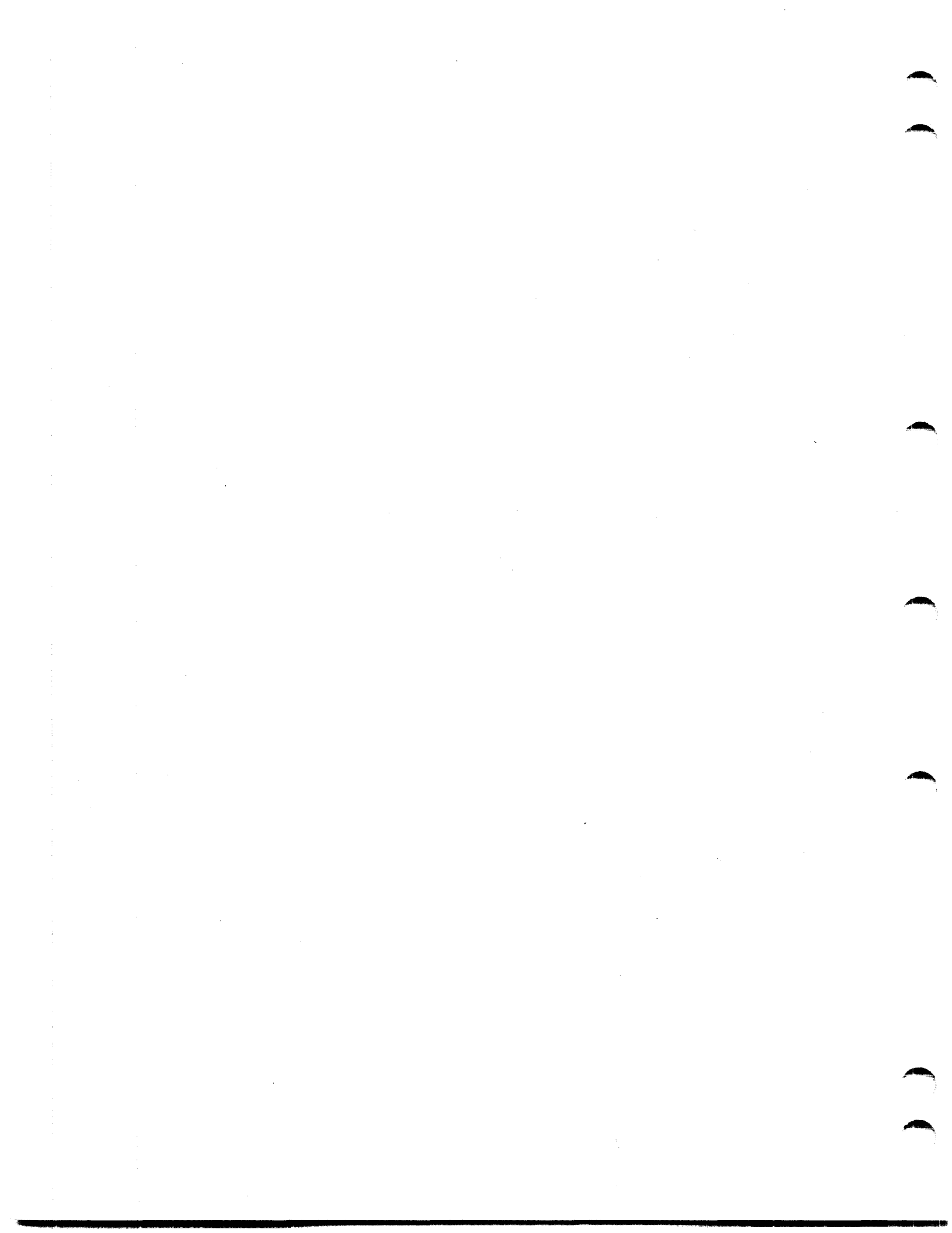
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**SECTION 5**

**PARTS DATA**



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## INTRODUCTION

This section provides an Illustrated Parts Breakdown and a Spare Parts List for all the mini module drives (MMDs) listed in the configuration chart in the front of this manual.

Information in this section is divided into two major categories as follows:

- Illustrated Parts Breakdown -- This breakdown provides part number information for all field replaceable items except cables and harnesses.
- Spare Parts List -- This is a list of recommended spare parts.

### NOTE

Parts listed in the illustrated parts breakdown, but not in the spare parts list, may be long lead time items subject to significant delays in supplying of parts.



**SECTION 5A**

**ILLUSTRATED PARTS BREAKDOWN**



---

**GENERAL**

The Illustrated Parts Breakdown (IPB) provides the information needed to order field replaceable parts. This information is presented in assembly illustrations and parts lists.

The symbols used in this section are explained in the following paragraphs along with a definition of some of the abbreviations used. Refer to the front of this manual for a complete list of abbreviations.

The illustrated parts breakdown is structured as follows: Each major assembly is shown in an exploded view and assigned a figure number. More than one illustration per figure number may be required for a complex assembly. In this case, the illustrations are titled figure X (sheet 1); figure X (sheet 2), etc. The parts shown on the illustrations are numbered. A parts list for each illustration begins on the page facing the illustration. The numbers on the figure correspond to the index numbers on the associated parts list. In some cases, the parts list will have more than one page for the corresponding sheet of the figure.

The Illustrated Parts Breakdown is divided into four columns:

**Index Number Column** -- The numbers given in this column correspond to the numbers shown on the illustration. When more than one entry is given for a particular index number, the application of each part is defined in the Notes column. Items not shown on an illustration are listed without index numbers.

**Part Number Column** -- This column provides the eight digit number by which a part may be ordered. There are several conditions when there will be an incomplete number or no number at all:

- The last two digits (referred to as tab numbers) are shown as XX. Used when an assembly changes tab numbers rapidly in the course of normal factory build. If it is





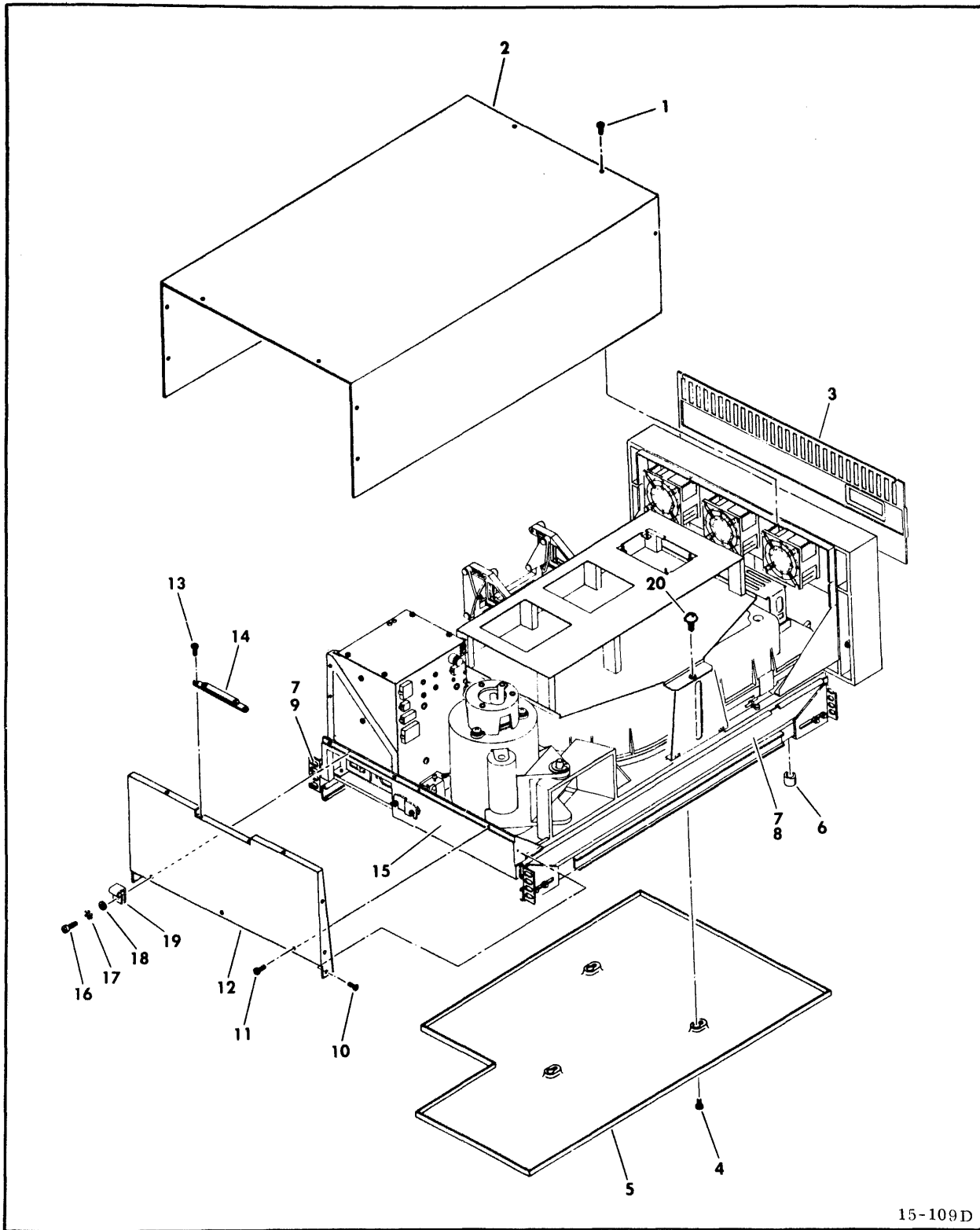
necessary to order these assemblies, the actual part number is found on the assembly identification label attached to the assembly. If the actual part number cannot be determined, include on the order the series code of the machine along with a list of all the change orders installed.

- NFR in the part number column. Used to indicate that an assembly is not field replaceable. If repair of the NFR item is necessary, refer to the maintenance section of this manual for further information.
- ## in the part number column. Indicates that the item is a recommended spare part and that the part number is located in the Spare Parts List (section 5B).

Description Column -- This column gives the name and a brief description of each part and assembly. The relationship of parts and assemblies is shown within the column by means of indentation. When an item is indented more than the previous item, it is part of the previous item.

When necessary, items are identified as being right or left side. Right and left are determined by facing the front panel of the drive.

Notes Column -- This column defines any multiple part number entries for a single index number. Multiple entries may be necessary to identify differences such as machine configuration (for example, whether the part is for a 50 Hz or 60 Hz machine) or to track history (for example, the part number differs between older and newer units).



15-109D

Figure 5-1. Top Level Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                      | NOTE   |
|----------|----------|---------------------------------------|--|
| 5-1      | 730367XX | TOP LEVEL ASSEMBLY                    |  |
| 5-1      | 730368XX | TOP LEVEL ASSEMBLY                    |  |
| 5-1      | 823998XX | TOP LEVEL ASSEMBLY                    |  |
| 1        | 92727202 | SCREW, Sch Btn, 6-32 x 1/2            |  |
| 2        | 73011300 | COVER, Top                            |  |
| 3        |          | PANEL, Color                          | See Configuration Chart in front of manual for part number |
| 4        | 93660079 | SCREW, Phillips, 8-32 x 1/2           |  |
| 5        | 73022700 | COVER, Bottom                         |  |
| 6        | 95796512 | CLOSURE, Vinyl                        |  |
| 7        | 10125724 | SCREW, Flat Hd, 8-32 x 3/8            | All except BZ9A1J/K/L/M, BZ9A5E/F                          |
| 7        | 10127122 | SCREW, PHH PNH Mach, 8-32 x 3/8       | BZ9A1J/K/L/M, BZ9A5E/F only                                |
| 8        | 94391905 | SLIDE, Quick Disconnect               | All except BZ9A1J/K/L/M, BZ9A5E/F                          |
| 8        | 73043500 | PLATE, Retainer                       | BZ9A1J/K/L/M, BZ9A5E/F only                                |
| 9        | 94391904 | SLIDE, Quick Disconnect               | All except BZ9A1J/K/L/M, BZ9A5E/F                          |
| 9        | 73043500 | PLATE, Retainer                       | BZ9A1J/K/L/M, BZ9A5E/F only                                |
| 10       | 10125722 | SCREW, Flat Hd, 8-32 x 1/4            |  |
| 11       | 93660073 | SCREW, PHH PNH Mach, 8-32 x 1/4       |  |
| 12       | 73019500 | COVER, Rear                           |  |
| 13       | 10127112 | SCREW, PHH PNH Mach, 6-32 x 5/16      |  |
| 14       | 94386407 | MOUNT, Cable                          |  |
| 15       |          | DRIVE FINAL ASSEMBLY (See Figure 5-2) |  |
| 16       | 93660074 | SCREW, PHH PNH Mach, 8-32 x 5/16      |  |
| 17       | 10126402 | LOCKWASHER, #8                        |  |
| 18       | 10125606 | WASHER, #8                            |  |
| 19       | 92602004 | CABLE CLAMP                           |  |
| 20       | 93660107 | SCREW, PHH PNH W/ Lockwasher          | S/C 21 & Abv only  |



| INDEX NO | PART NO  | PART DESCRIPTION           | NOTE  |
|----------|----------|----------------------------|---|
| 5-1      |          | TOP LEVEL ASSEMBLY (Contd) |   |
|          | 92006812 | PLATE, Equip Ident         |   |
|          | 94397000 | EMBLEM, Product Ident      | BZ5A1B/C/D/H/L,<br>BZ5A2A/B/J,<br>BZ5A3A/B,<br>BZ5A4A/B,<br>BZ5A5A/B/D/F/K/L,<br>BZ5A6A/B,<br>BZ5A9E/F/N/P,<br>BZ9A1A/B/W/Y/Z,<br>BZ9A2A/B,<br>BZ9A3A/B<br>BZ9A4A/B,<br>BZ9A5A/B,<br>BZ9A6A/B/E/F,<br>BZ9A7L only |
|          | 75778701 | POWER CORD (60 Hz)         | All except<br>BZ5A1L,BZ9A7L   |
|          | 82392310 | POWER CORD (60 Hz)         | BZ5A1L,BZ9A7L   |
|          | 75778710 | POWER CORD (50 Hz)         |   |
|          | 92034702 | PANEL, Front, Matched Set  | BZ5A5K only   |
|          | 92034700 | PANEL, Front, Matched Set  | BZ5A5L only   |
|          | 77563300 | BALLAST                    | BZ5A5K/L only   |
|          | 76846300 | HARDWARE KIT*              | All except<br>BZ5A5D/F,<br>BZ9A7C/D   |
|          | 76846305 | HARDWARE KIT*              | BZ9A7C/D  |
|          | 92555238 | HARDWARE KIT*              | BZ5A5D/F  |

\* Refer to table 5-1 for listing of kit piece parts.

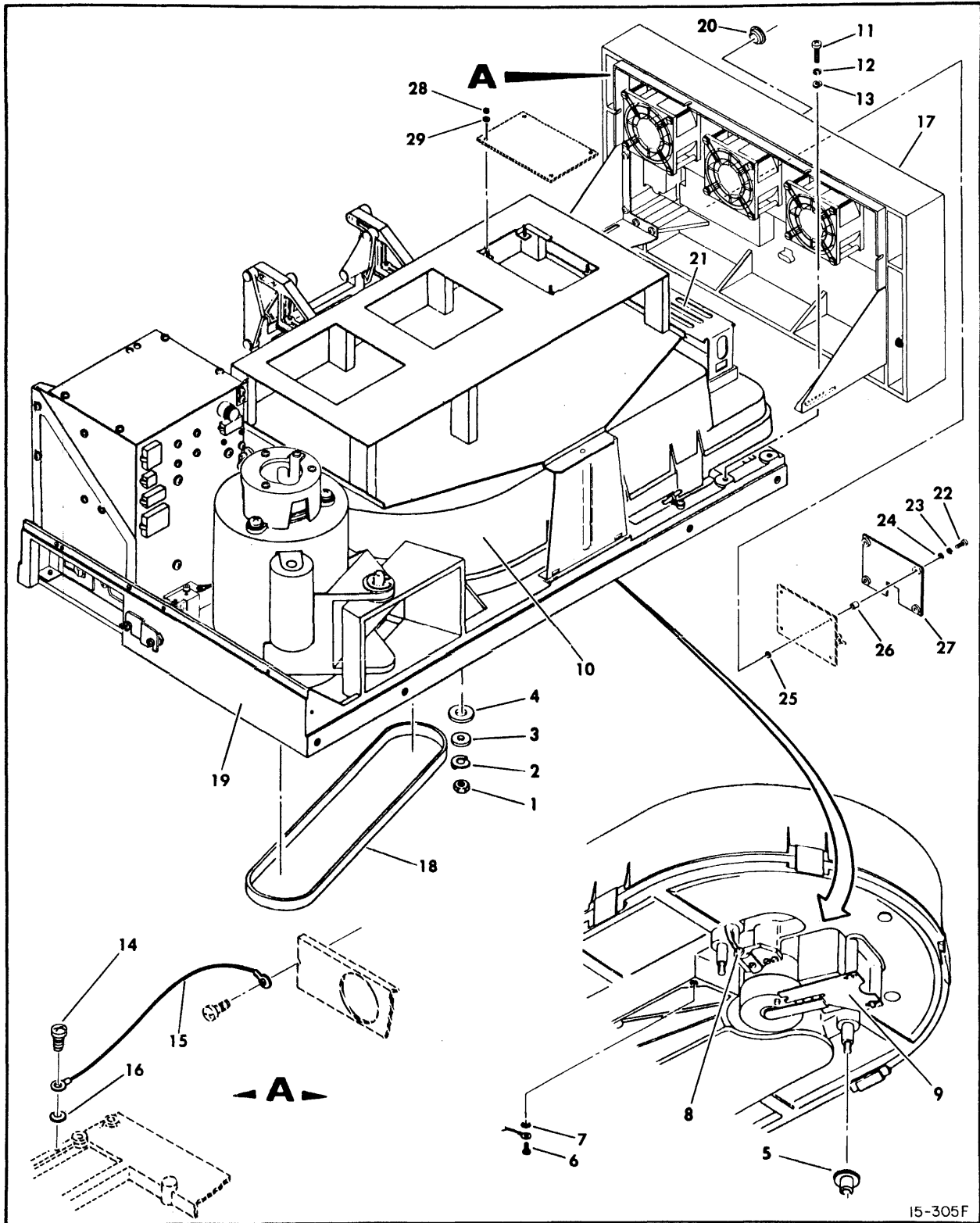
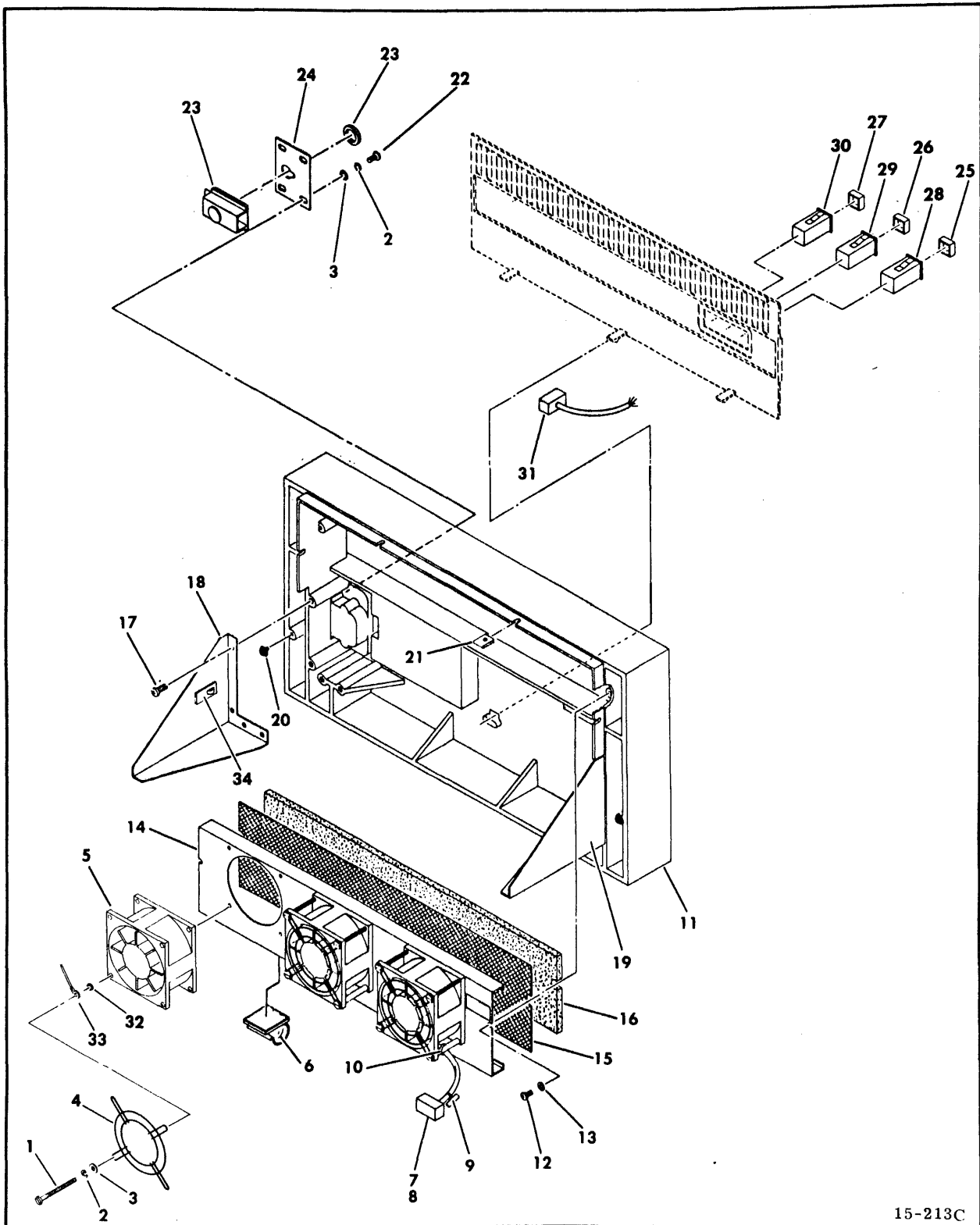


Figure 5-2. Drive Final Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                                    | NOTE  |
|----------|----------|---|---|
| 5-2      | 730355XX | DRIVE FINAL ASSEMBLY                                | All except<br>BZ5A1J/K/R/S, BZ5A2<br>C/D/G/H, BZ5A9N/P,<br>BZ9A7C/D/E/F/G |
| 5-2      | 823994XX | DRIVE FINAL ASSEMBLY                                | BZ5A9N/P, BZ9A7C/D/<br>E/F/G  |
| 5-2      | 730639XX | DRIVE FINAL ASSEMBLY                                | BZ5A1J/K/R/S,<br>BZ5A2C/D/G/H   |
| 1        | 10125301 | NUT, Hex, 1/4-20                                    |   |
| 2        | 94388900 | LOCKWASHER, Special                                 |   |
| 3        | 73005600 | WASHER, Special Flat                                |   |
| 4        | 73020800 | WASHER, Insulator                                   |   |
| 5        | 73020900 | BUSHING, Insulator                                  |   |
| 6        | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8                  |   |
| 7        | 10126402 | LOCKWASHER, #8                                      |   |
| 8        | ##       | SPEED TRANSDUCER ASSEMBLY                           |   |
| 9        | ##       | GROUND SPRING                                       |   |
| 10       | ##       | MINI MODULE ASSEMBLY                                |   |
| 11       | 10127132 | SCREW, PHH PNH Mach,<br>10-24 x 1/2                 |   |
| 12       | 10125805 | LOCKWASHER, #10                                     |   |
| 13       | 73045100 | WASHER, Special                                     |   |
| 14       | 93660077 | SCREW, PHH PNH, 8-32 x 3/8                          | S/C 15 & Abv  |
| 15       | 94369553 | GROUND CABLE  | S/C 15-19 only  |
| 16       | 10125804 | LOCKWASHER, #8                                      | S/C 15 & Abv  |
| 17       |          | FRONT PANEL ASSEMBLY (See<br>Figures 5-3, 5-4, 5-5) |   |
| 18       | ##       | BELT, Flat Drive                                    |   |
| 19       |          | BASE FRAME ASSEMBLY (See<br>Figures 5-6, 5-7)       |   |
| 20       | 94305532 | BUSHING   | BZ5A1E/G/T/U,<br>BZ9A1C/E/F/N<br>only                                     |
| 21       | 73040600 | CARD CLAMP ASSEMBLY                                 |   |
|          | 82355115 | I/O CABLE ASSEMBLY                                  | BZ5A2E/F,<br>BZ5A6C/D,<br>BZ9A2C/D,<br>BZ9A6C/D only                      |
| 22       | 10127114 | SCREW, PHH PNH Mach, 6-32 x 1/2                     |   |
| 23       | 10125803 | LOCKWASHER, #6                                      |   |
| 24       | 10125605 | WASHER, #6  |   |
| 25       | 93564055 | WASHER, Nylon                                       |   |
| 26       |          | NOT USED  |   |
| 27       |          | NOT USED  |   |
| 28       | 10125105 | NUT, Hex, 6-32                                      |   |
| 29       | 93564032 | WASHER, Nylon                                       |   |





15-213C

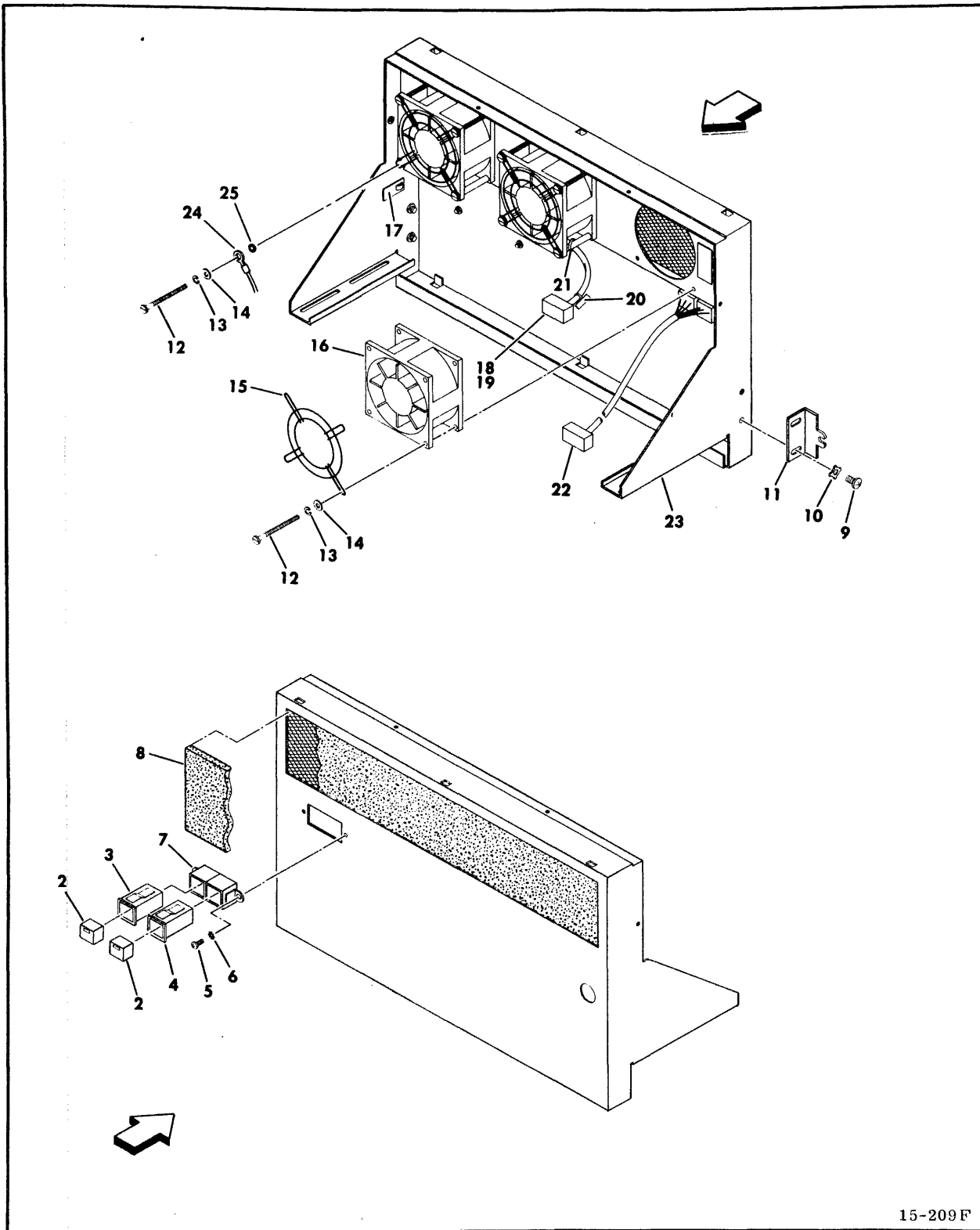
Figure 5-3. Front Panel Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                       | NOTE   |
|----------|----------|--|--|
| 5-3      | 730365XX | FRONT PANEL ASSEMBLY                   | See Note 1   |
| 5-3      | 823977XX | FRONT PANEL ASSEMBLY                   | See Note 2   |
| 1        | 10127343 | SCREW, PHH PNH Mach,<br>6-32 x 2       |  |
| 2        | 10125803 | LOCKWASHER, #6                         |  |
| 3        | 10125605 | WASHER, #6                             |  |
| 4        | 94222501 | FINGER GUARD                           |  |
| 5        | ##       | FAN ASSEMBLY                           |  |
| 6        | 94241018 | CLIP, Cable                            |  |
| 7        | 51906003 | CONNECTOR, Plug                        |  |
| 8        | 51906207 | CONTACT, Socket                        |  |
| 9        | 94277409 | CABLE TIE                              |  |
| 10       | 94277400 | CABLE TIE                              |  |
| 11       |          | PANEL, Control                         | See Configura-<br>tion Chart in<br>front of manual<br>for part number. |
| 12       | 93660077 | SCREW, PHH PNH, 8-32 x 3/8             |  |
| 13       | 10125606 | WASHER, #8                             |  |
| 14       | 73045500 | PLATE, Fan Mounting                    |  |
| 15       | 73045600 | SCREEN, RFI                            |  |
| 16       | ##       | AIR FILTER, Foam                       |  |
| 17       | 93660113 | SCREW, PHH PNH, 10-32 x 1/2            |  |
| 18       | 73012501 | GUSSET PANEL                           |  |
| 19       | 73012500 | GUSSET PANEL                           |  |
| 20       | 93623000 | BUMPER, Rubber                         |  |
| 21       | 94100381 | FASTENER, U Type                       |  |
| 22       | 10127112 | SCREW, PHH PNH Machine,<br>6-32 x 5/16 |  |
| 23       | 92010402 | LATCH, Slam                            |  |
| 24       | 73040400 | PLATE, Latch                           |  |
| 25       | 94394305 | LENS, Blank                            | See Note 3   |
| 25       | 94394311 | LENS, Blank                            | See Note 4   |
| 25       | 94394200 | LENS, Lettered (Write<br>Protect)      | See Note 5   |
| 25       | 94394250 | LENS, Lettered (Write<br>Protect)      | See Note 6   |
| 26       | 94394305 | LENS, Blank                            | See Note 3   |
| 26       | 94394311 | LENS, Blank                            | See Note 4   |



| INDEX NO | PART NO  | PART DESCRIPTION             | NOTE              |
|----------|----------|------------------------------|-------------------|
| 5-3      |          | FRONT PANEL ASSEMBLY (Contd) |                   |
| 26       | 94394201 | LENS, Lettered (Fault Clear) | See Note 5        |
| 26       | 94394253 | LENS, Lettered (Fault Clear) | See Note 6        |
| 27       | 94394305 | LENS, Blank                  | See Note 3        |
| 27       | 94394311 | LENS, Blank                  | See Note 4        |
| 27       | 94394230 | LENS, Lettered (Ready)       | See Note 5        |
| 27       | 94394257 | LENS, Lettered (Ready)       | See Note 6        |
| 28       | ##       | INDICATOR, LED               | See Note 7        |
| 29       | ##       | SWITCH, P.B. W/LED Indicator |                   |
| 30       | 94394007 | SWITCH, P.B. W/LED Indicator | See Note 8        |
| 30       | 94394030 | SWITCH, P.B. W/LED Indicator | See Note 9        |
| 31       | 73035100 | HARNES ASSEMBLY              | See Note 7        |
| 32       | 10126103 | LOCKWASHER, #6               | S/C 20 & Abv only |
| 33       | 73067200 | GROUND WIRE ASSEMBLY         | S/C 20 & Abv only |
| 34       | 94277503 | MOUNT, Cable                 |                   |

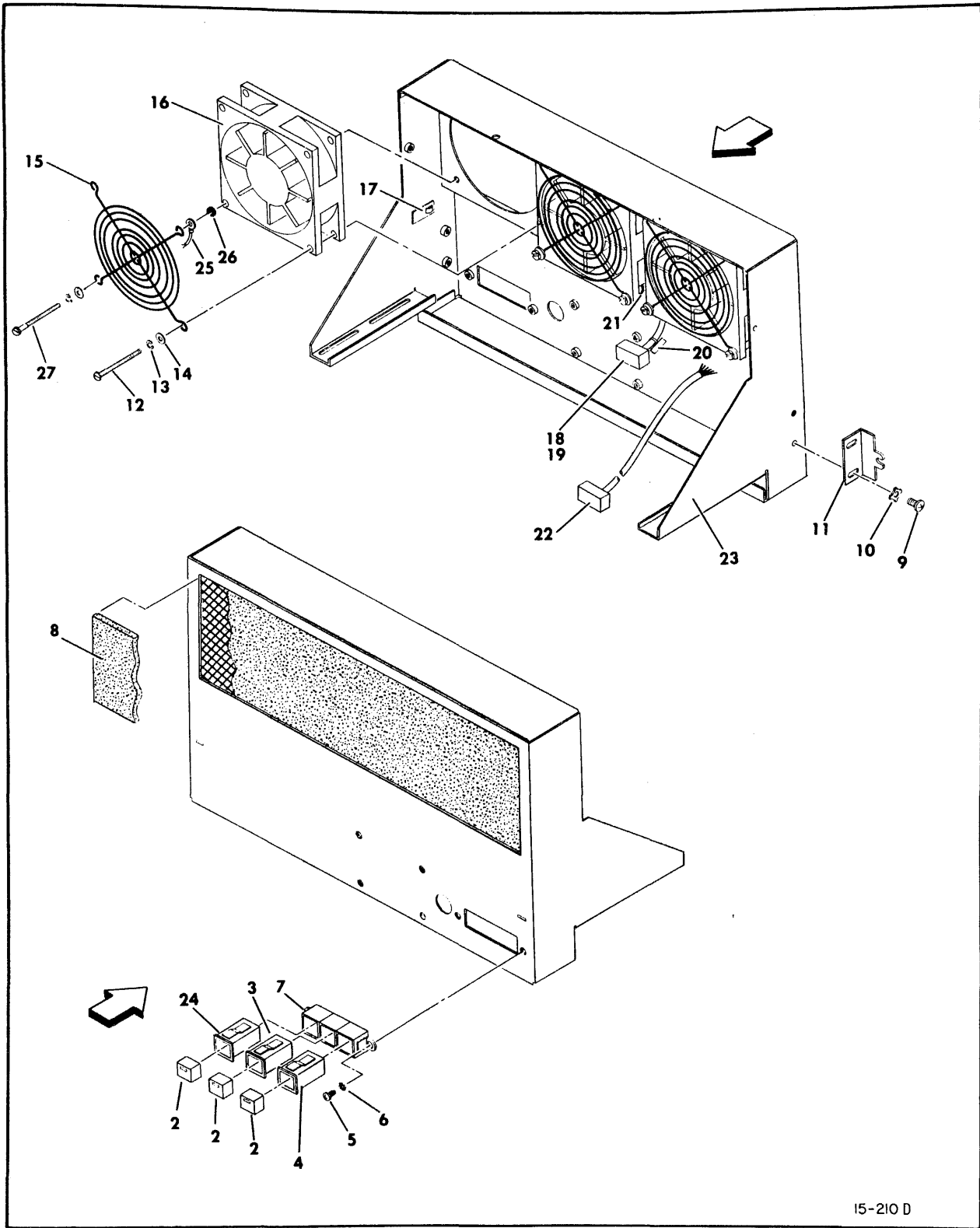
- NOTE 1: S/C 25 & Blw all except BZ5A1E/G/T/U, BZ9A1C/E/F/N.
- NOTE 2: S/C 26 & Abv all except BZ5A1E/G/T/U, BZ9A1C/E/F/N.
- NOTE 3: S/C 25 & below all except BZ5A2E/F, BZ5A5J, BZ5A6C/D, BZ9A1J/K, BZ9A2C/D, BZ9A6C/D.
- NOTE 4: S/C 26 & Abv all except BZ5A2E/F, BZ5A5J, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 5: S/C 25 & Blw BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 6: S/C 26 & Abv BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 7: All except BZ5A1F.
- NOTE 8: S/C 25 & Blw all except BZ5A5J, BZ9A1J/K.
- NOTE 9: S/C 26 & Abv all except BZ5A5J. S/C 01 & Abv BZ9A1J/K.



15-209F

Figure 5-4. Front Panel Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                    | NOTE                          |
|----------|----------|-------------------------------------|-------------------------------|
| 5-4      | 73043902 | FRONT PANEL ASSEMBLY                | S/C 25 & Blw<br>BZ5A1E,BZ9A1C |
| 5-4      | 73043903 | FRONT PANEL ASSEMBLY                | S/C 26 & Abv<br>BZ5A1E,BZ9A1C |
| 1        |          | NOT USED                            |                               |
| 2        | 94394305 | LENS, Blank                         | S/C 25 & Blw                  |
| 2        | 94394311 | LENS, Blank                         | S/C 26 & Abv                  |
| 3        | ##       | INDICATOR, LED                      |                               |
| 4        | ##       | SWITCH, P.B. W/LED Indicator        |                               |
| 5        | 10127112 | SCREW, PHH PNH Mach,<br>6-32 x 5/16 |                               |
| 6        | 10126401 | LOCKWASHER, #6                      |                               |
| 7        | 94398701 | BRACKET, Mounting                   |                               |
| 8        | ##       | AIR FILTER, Foam                    |                               |
| 9        | 10127142 | SCREW, PHH PNH Mach,<br>10-32 x 3/8 |                               |
| 10       | 09040204 | LOCKWASHER                          |                               |
| 11       | 73043400 | BRACKET                             |                               |
| 12       | 10127343 | SCREW, PHH PNH Mach,<br>6-32 x 2    |                               |
| 13       | 10125803 | LOCKWASHER, #6                      |                               |
| 14       | 10125605 | WASHER, #6                          |                               |
| 15       | 94222501 | FINGER GUARD                        |                               |
| 16       | ##       | FAN ASSEMBLY                        |                               |
| 17       | 94277503 | BASE, Mounting                      |                               |
| 18       | 51906003 | CONNECTOR, Plug                     |                               |
| 19       | 51906207 | CONTACT, Socket                     |                               |
| 20       | 94277409 | CABLE TIE                           |                               |
| 21       | 94277400 | CABLE TIE                           |                               |
| 22       | 73035102 | HARNESS ASSEMBLY                    |                               |
| 23       | 73043800 | PANEL, CONTROL                      |                               |
| 24       | 73067200 | GROUND WIRE ASSEMBLY                | S/C 20 & Abv<br>only          |
| 25       | 10126103 | LOCKWASHER, #6                      | S/C 20 & Abv<br>only          |

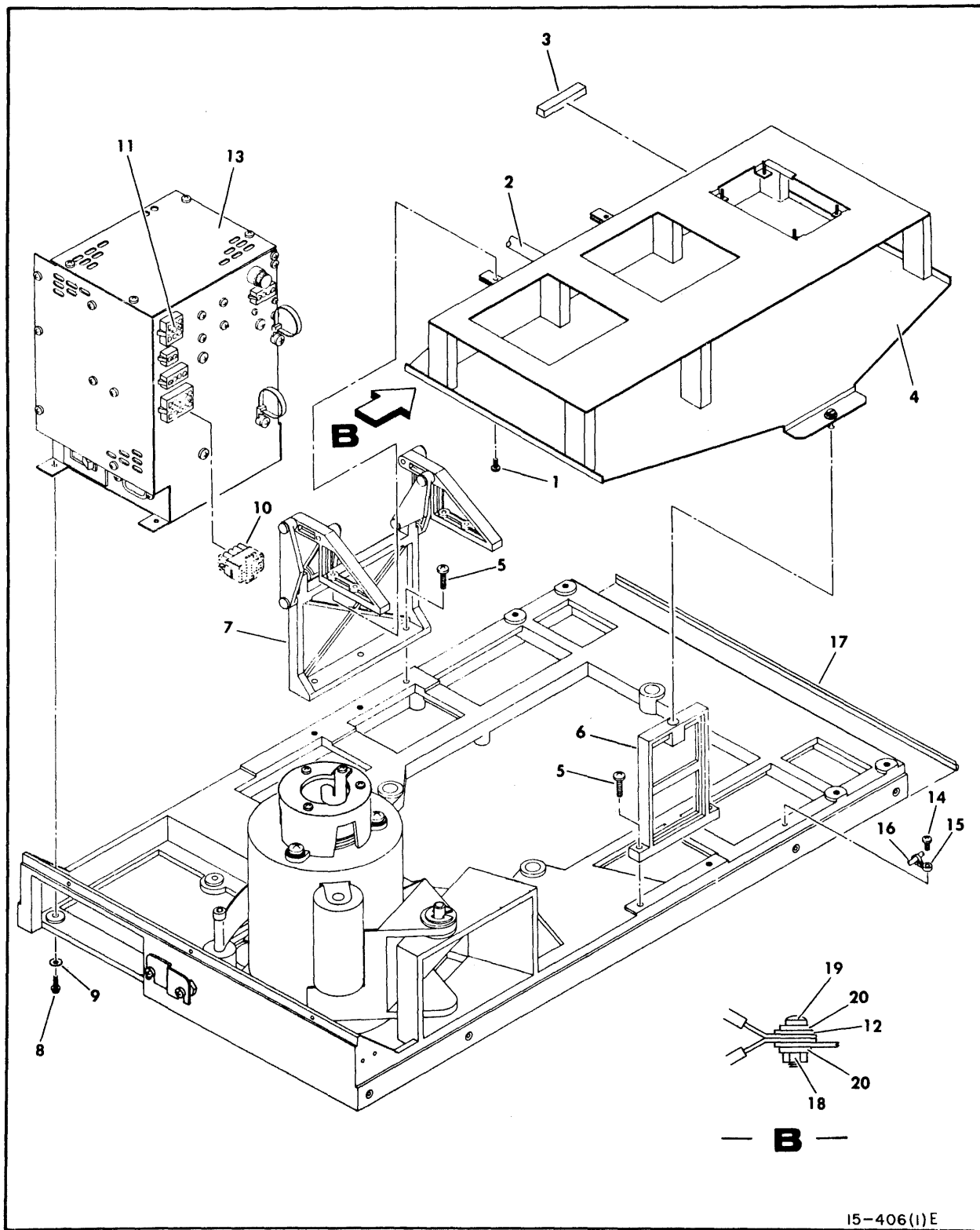


15-210 D

Figure 5-5. Front Panel Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                    | NOTE                                      |
|----------|----------|-------------------------------------|---|
| 5-5      | 73067300 | FRONT PANEL ASSEMBLY                | S/C 25 & Blw<br>BZ5A1G/T/U,<br>BZ9A1E/F/N |
| 5-5      | 73067301 | FRONT PANEL ASSEMBLY                | S/C 26 & Abv<br>BZ5A1G/T/U,<br>BZ9A1E/F/N |
| 1        |          | NOT USED                            |   |
| 2        | 94394305 | LENS, Blank                         | S/C 25 & Blw                              |
| 2        | 94394311 | LENS, Blank                         | S/C 26 & Abv                              |
| 3        | ##       | SWITCH, P.B. W/LED Indicator        |   |
| 4        | 94394007 | SWITCH, P.B. W/LED Indicator        | S/C 25 & Blw                              |
| 4        | 94394030 | SWITCH, P.B. W/LED Indicator        | S/C 26 & Abv                              |
| 5        | 10127112 | SCREW, PHH PNH Mach,<br>6-32 x 5/16 |   |
| 6        | 10126401 | LOCKWASHER, #6                      |   |
| 7        | 94398702 | BRACKET, Mounting                   |   |
| 8        | ##       | AIR FILTER, Foam                    |   |
| 9        | 10127142 | SCREW, PHH PNH Mach,<br>10-32 x 3/8 |   |
| 10       | 09040204 | LOCKWASHER                          |   |
| 11       | 73043400 | BRACKET                             |   |
| 12       | 93724162 | SCREW, PHH Mach,<br>6-32 x 1 7/8    |   |
| 13       | 10125803 | LOCKWASHER, #6                      |   |
| 14       | 10125605 | WASHER, #6                          |   |
| 15       | 94375401 | FINGER GUARD                        |   |
| 16       | ##       | FAN ASSEMBLY                        |   |
| 17       | 94277503 | BASE, Mounting                      |   |
| 18       | 51906003 | CONNECTOR, Plug                     |   |
| 19       | 51906200 | CONTACT, Socket                     |   |
| 20       | 94277409 | CABLE TIE                           |   |
| 21       | 94277400 | CABLE TIE                           |   |
| 22       | 73035100 | HARNESS ASSEMBLY                    |   |
| 23       | 73062401 | PANEL, Control                      |   |
| 24       | ##       | INDICATOR, LED                      |   |
| 25       | 73067200 | GROUND WIRE ASSEMBLY, Fan           |   |
| 26       | 10126103 | LOCKWASHER, #6                      |   |
| 27       | 10127343 | SCREW, PHH PNH Mach,<br>6-32 x 2    |   |





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Figure 5-6. Base Frame Assembly (Sheet 1 of 2)  
Series Code 20 and Below

| INDEX NO | PART NO  | PART DESCRIPTION                           | NOTE         |
|----------|----------|--|--------------|
| 5-6      | 730354XX | BASE FRAME ASSEMBLY (Sheet 1 of 2)         | S/C 20 & Blw |
| 1        | 94375824 | SCREW, TF, 8-16 x 3/8                      |              |
| 2        | 73054301 | MAIN HARNESS ASSEMBLY                      | S/C 19 & Blw |
| 2        | 73054302 | MAIN HARNESS ASSEMBLY                      | S/C 20       |
| 3        | 77612623 | CONNECTOR, Jumper                          | 80 MB units  |
| 4        |          | LOGIC CHASSIS ASSEMBLY<br>(See Figure 5-8) |              |
| 5        | 10127134 | SCREW, PHH PNH Mach,<br>10-24 x 3/4        |              |
| 6        | 73017400 | SUPPORT, Frame                             |              |
| 7        | 73020100 | CHASSIS HINGE ASSEMBLY                     |              |
| 8        | 17901517 | SCREW, PHH, 8-32 x 1/2                     |              |
| 9        | 10126402 | LOCKWASHER, #8                             |              |
| 10       | 70117600 | POWER SELECTOR PLUG                        | 60 Hz units  |
| 10       | 70117605 | POWER SELECTOR PLUG                        | 50 Hz units  |
| 11       | 73055500 | LOGIC DC CABLE ASSEMBLY                    | S/C 15 & Blw |
| 11       | 73055501 | LOGIC DC CABLE ASSEMBLY                    | S/C 16-19    |
| 11       | 73055502 | LOGIC DC CABLE ASSEMBLY                    | S/C 20       |
| 12       | 10125605 | WASHER #6                                  | S/C 20 only  |
| 13       |          | POWER SUPPLY ASSEMBLY (See<br>Figure 5-10) |              |
| 14       | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8         |              |
| 15       | 94277406 | CABLE TIE                                  |              |
| 16       | 73034100 | CABLE, Fan                                 | S/C 19 & Blw |
| 16       | 73047001 | CABLE, Fan                                 | S/C 20       |
| 17       | 94374902 | CONTACT STRIP                              |              |
| 18       | 10125105 | NUT, Hex, 6-32                             | S/C 20 only  |
| 19       | 10127113 | SCREW, PHH PNH, Mach,<br>6-32 x 3/8        | S/C 20 only  |
| 20       | 10126103 | LOCKWASHER, #6                             | S/C 20 only  |

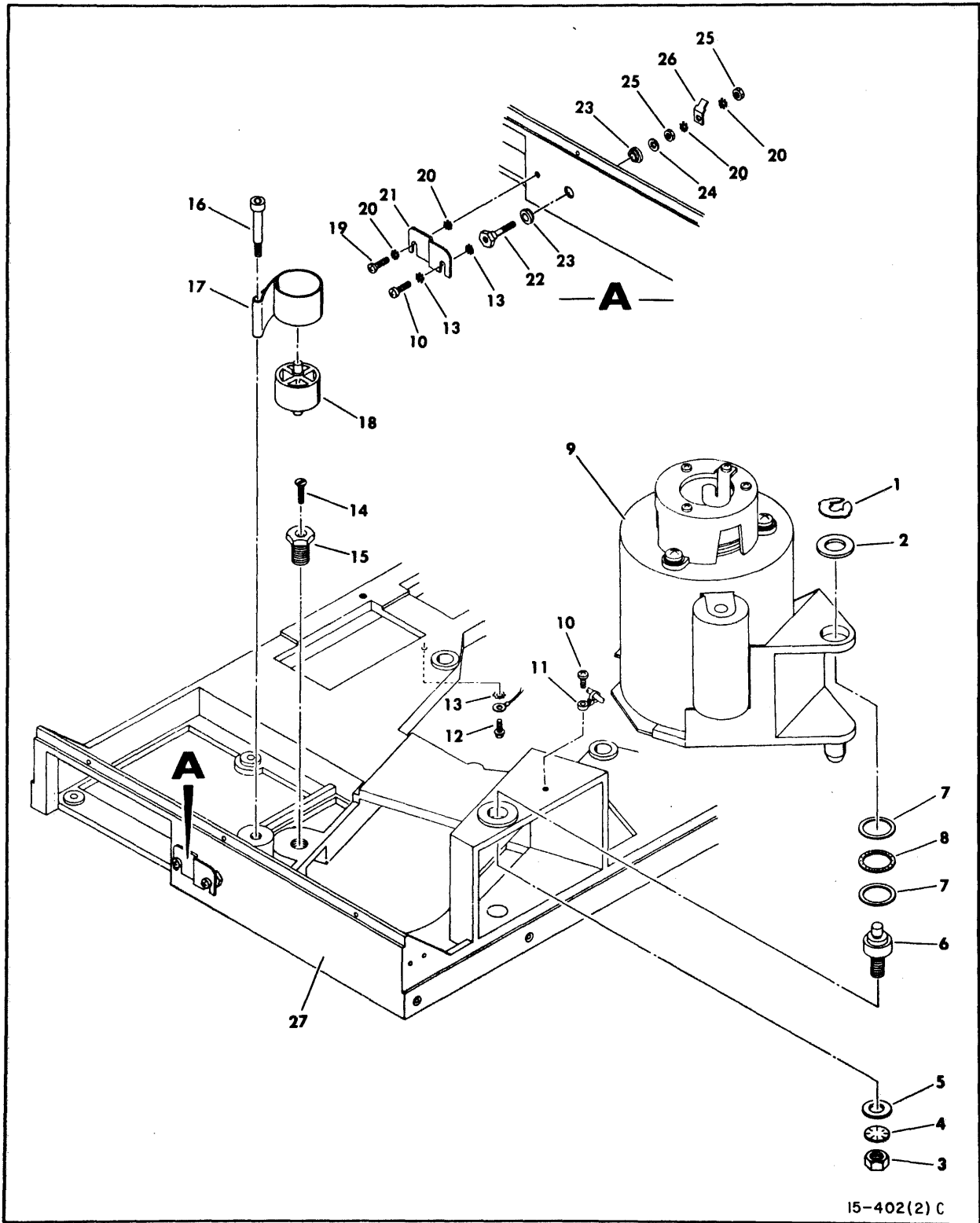
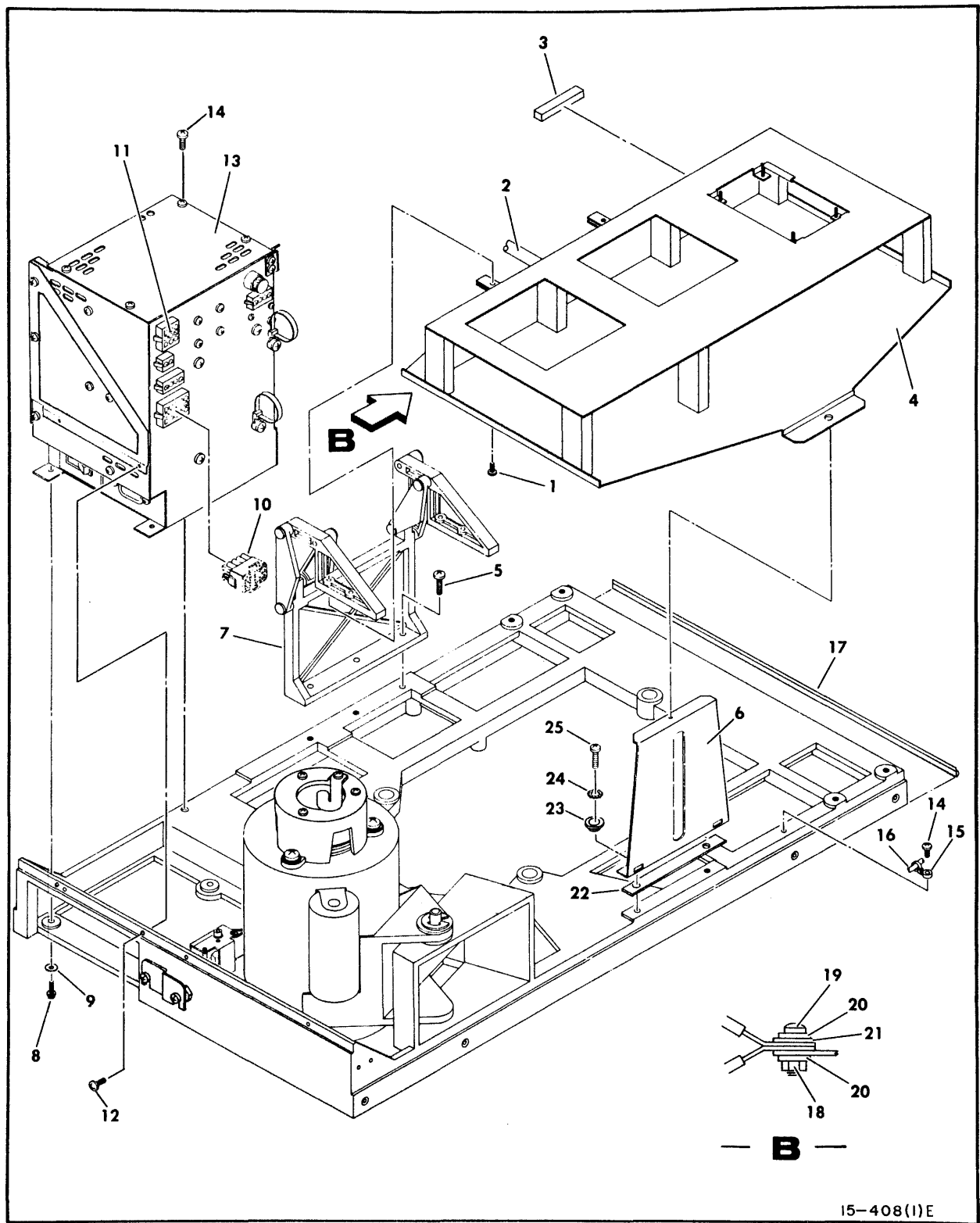


Figure 5-6. Base Frame Assembly (Sheet 2)  
Series Code 20 and Below

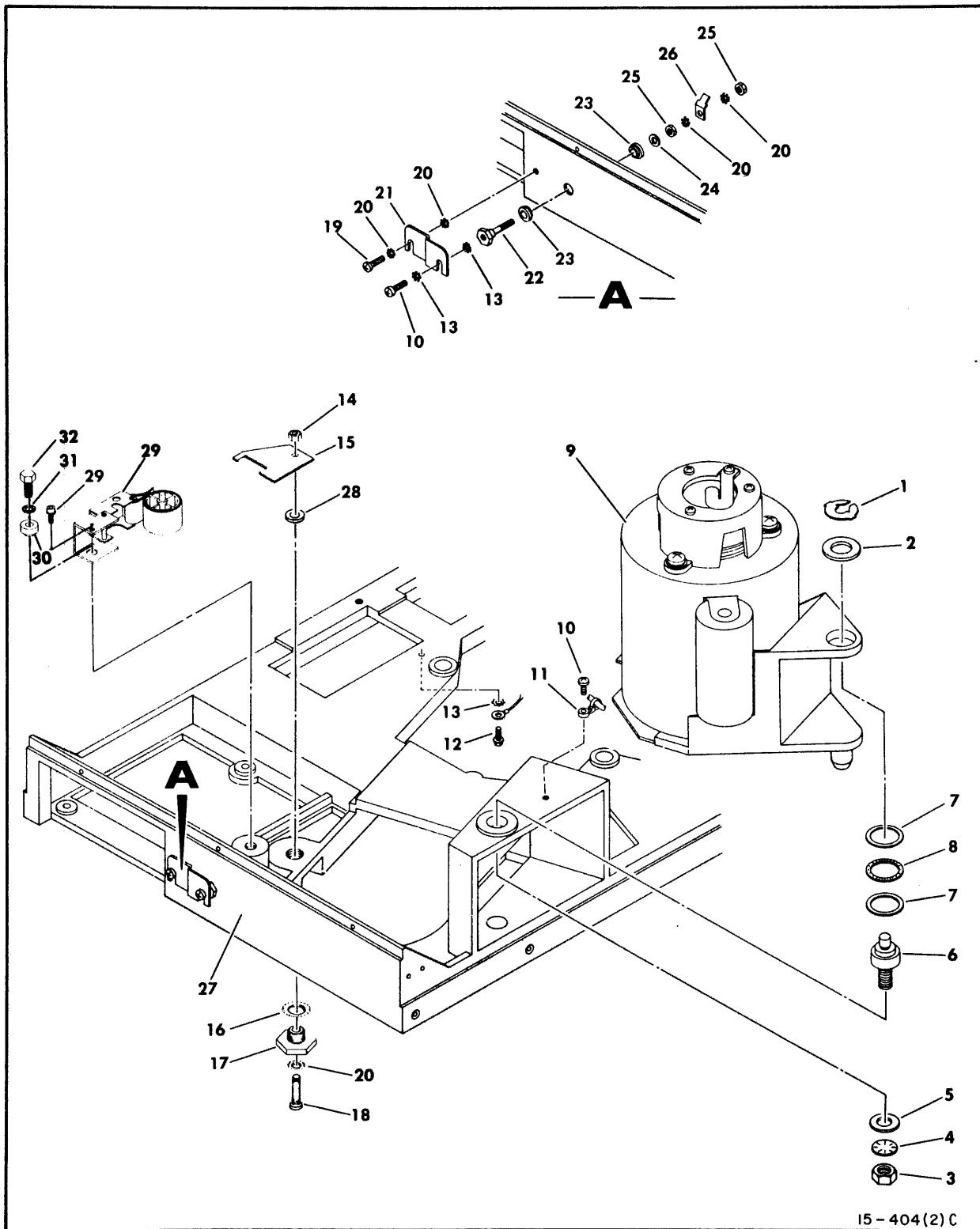
| INDEX NO | PART NO  | PART DESCRIPTION                             | NOTE         |
|----------|----------|--|--------------|
| 5-6      |          | BASE FRAME ASSEMBLY (Sheet 2)                | S/C 20 & Blw |
| 1        | 92033326 | RING, Retaining                              |              |
| 2        | 73010400 | WASHER                                       |              |
| 3        | 10125303 | NUT, Hex, 3/8-16                             |              |
| 4        | 10126108 | LOCKWASHER, 3/8                              |              |
| 5        | 10125610 | WASHER, 3/8                                  |              |
| 6        | 73010500 | PIN, Pivot                                   |              |
| 7        | 89258100 | WASHER, Thrust                               |              |
| 8        | 94291039 | BEARING, Thrust                              |              |
| 9        |          | MOTOR AND BRAKE ASSEMBLY<br>(See Figure 5-9) |              |
| 10       | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8           |              |
| 11       | 94277406 | CABLE TIE                                    |              |
| 12       | 93592200 | SCREW, Slftpg, 8-32 x 3/8                    |              |
| 13       | 10126402 | LOCKWASHER, #8                               |              |
| 14       | 10125727 | SCREW, Flat Hd, 8-32 x 3/4                   |              |
| 15       | 73012600 | SCREW, Motor Lock                            |              |
| 16       | 93707052 | SCREW, Sch Shldr, 3/8 x 1 1/4                |              |
| 17       | 94390403 | SPRING, Constant Force                       |              |
| 18       | 73010900 | SPOOL, Spring                                |              |
| 19       | 10127134 | SCREW, PHH PNH Mach,<br>10-24 x 3/4          |              |
| 20       | 10126403 | LOCKWASHER, #10                              |              |
| 21       | 75164900 | BAR, Ground                                  |              |
| 22       | 75164800 | STUD, Hex Hd                                 |              |
| 23       | 92615008 | WASHER, Shoulder                             |              |
| 24       | 10125607 | WASHER, #10                                  |              |
| 25       | 10125107 | NUT, Hex, 10-24                              |              |
| 26       | 94274140 | TERMINAL, Quick Connect                      |              |
| 27       | 73023901 | FRAME, Base                                  |              |
|          | 94277400 | CABLE TIE                                    |              |



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Figure 5-7. Base Frame Assembly (Sheet 1 of 2)  
Series Code 21 and Above

| INDEX NO | PART NO  | PART DESCRIPTION                           | NOTE                 |
|----------|----------|--|----------------------|
| 5-7      | 730354XX | BASE FRAME ASSEMBLY (Sheet 1 of 2)         | S/C 21 & Abv         |
| 1        | 94375824 | SCREW, TF, 8-16 x 3/8                      |                      |
| 2        | 73054302 | MAIN HARNESS ASSEMBLY                      |                      |
| 3        | 77612623 | CONNECTOR, Jumper                          | 80 MB units          |
| 4        |          | LOGIC CHASSIS ASSEMBLY<br>(See Figure 5-8) |                      |
| 5        | 10127134 | SCREW, PHH PNH Mach,<br>10-24 x 3/4        |                      |
| 6        | 73069500 | SUPPORT, Frame                             |                      |
| 7        | 73020100 | CHASSIS HINGE ASSEMBLY                     |                      |
| 8        | 17901517 | SCREW, PHH, 8-32 x 1/2                     |                      |
| 9        | 10126402 | LOCKWASHER, #8                             |                      |
| 10       | 70117600 | POWER SELECTOR PLUG                        | 120V-60 Hz units     |
| 10       | 70117605 | POWER SELECTOR PLUG                        | 220V-50 Hz units     |
| 10       | 70117606 | POWER SELECTOR PLUG                        | 240V-50 Hz units     |
| 10       | 70117609 | POWER SELECTOR PLUG                        | 240V-60 Hz units     |
| 11       | 73055502 | LOGIC DC CABLE ASSEMBLY                    |                      |
| 12       | 10125712 | SCREW, Flat Hd, 6-32 x 1/4                 | S/C 23 & Abv<br>only |
| 13       |          | POWER SUPPLY ASSEMBLY (See<br>Figure 5-10) |                      |
| 14       | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8         |                      |
| 15       | 94277406 | CABLE TIE                                  |                      |
| 16       | 73067003 | CABLE, Fan                                 |                      |
| 17       | 94374902 | CONTACT STRIP                              |                      |
| 18       | 10125105 | NUT, Hex, 6-32                             |                      |
| 19       | 10127113 | SCREW, PHH PNH, Mach,<br>6-32 x 3/8        |                      |
| 20       | 10126103 | LOCKWASHER, #6                             |                      |
| 21       | 10125605 | WASHER, #6                                 |                      |
| 22       | 92001404 | INSULATOR                                  |                      |
| 23       | 94347110 | WASHER, Shoulder                           |                      |
| 24       | 10126403 | LOCKWASHER, #10                            |                      |
| 25       | 10127132 | SCREW, PHH PNH Mach,<br>10-24 x 1/2        |                      |



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Figure 5-7. Base Frame Assembly (Sheet 2 of 2)  
Series Code 21 and Above

| INDEX NO | PART NO  | PART DESCRIPTION                             | NOTE         |
|----------|----------|--|--------------|
| 5-7      |          | BASE FRAME ASSEMBLY (Sheet 2)                | S/C 21 & Abv |
| 1        | 92033326 | RING, Retaining                              |              |
| 2        | 73010400 | WASHER                                       |              |
| 3        | 10125303 | NUT, Hex, 3/8-16                             |              |
| 4        | 10126108 | LOCKWASHER, 3/8                              |              |
| 5        | 10125610 | WASHER, 3/8                                  |              |
| 6        | 73010500 | PIN, Pivot                                   |              |
| 7        | 89258100 | WASHER, Thrust                               |              |
| 8        | 94291039 | BEARING, Thrust                              |              |
| 9        |          | MOTOR AND BRAKE ASSEMBLY<br>(See Figure 5-9) |              |
| 10       | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8           |              |
| 11       | 94277406 | CABLE TIE                                    |              |
| 12       | 93592200 | SCREW, Slftpg, 8-32 x 3/8                    |              |
| 13       | 10126402 | LOCKWASHER, #8                               |              |
| 14       | 94218005 | NUT, Slflkg, 10-32                           |              |
| 15       | 73071000 | MOTOR LOCK PLATE                             |              |
| 16       | 10126408 | LOCKWASHER, 1/2                              |              |
| 17       | 73071100 | MOTOR LOCK SCREW                             |              |
| 18       | 10126248 | SCREW, SCH, 10-32 x 1                        |              |
| 19       | 10127134 | SCREW, PHH PNH Mach,<br>10-24 x 3/4          |              |
| 20       | 10126403 | LOCKWASHER, #10                              |              |
| 21       | 75164900 | BAR, Ground                                  |              |
| 22       | 75164800 | STUD, Hex Hd                                 |              |
| 23       | 92615008 | WASHER, Shoulder                             |              |
| 24       | 10125607 | WASHER, #10                                  |              |
| 25       | 10125107 | NUT, Hex, 10-24                              |              |
| 26       | 94274140 | TERMINAL, Quick Connect                      |              |
| 27       | 73023901 | FRAME, Base                                  | S/C 21-22    |
| 27       | 73023902 | FRAME, Base                                  | S/C 23 & Abv |
| 28       | 93564060 | WASHER, Nylon                                |              |
| 29       | 73070300 | SPRING ASSEMBLY                              |              |
| 30       | 73069300 | BUSHING                                      |              |
| 31       | 10126405 | LOCKWASHER, 5/16                             |              |
| 32       | 10126515 | SCREW, Hex Hd, 5/16-18 x 3/4                 |              |
|          | 94277400 | CABLE TIE                                    |              |



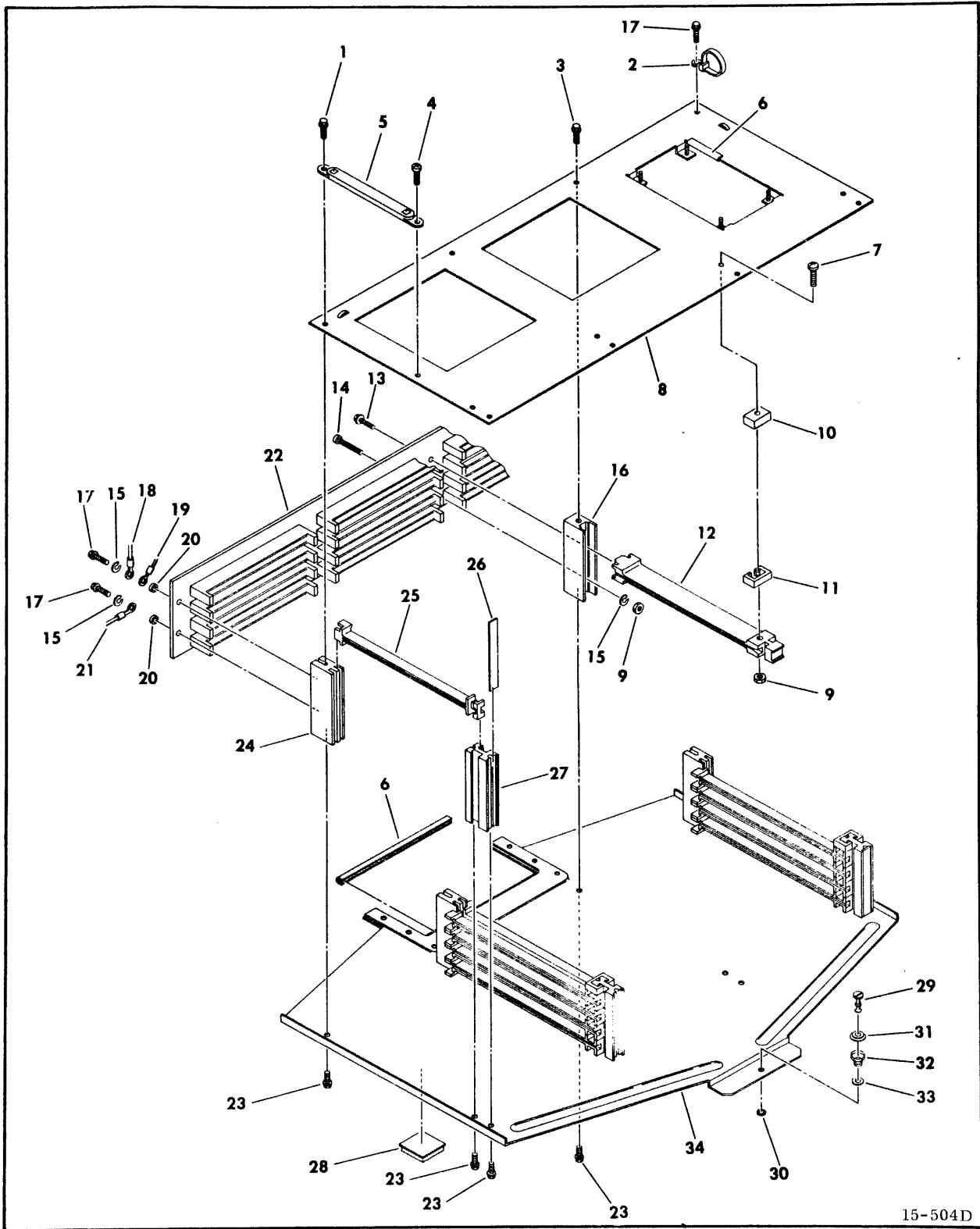


Figure 5-8. Logic Chassis Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                             | NOTE   |
|----------|----------|--|--|
| 5-8      | 730329XX | LOGIC CHASSIS ASSEMBLY                       |  |
| 1        | 93592202 | SCREW, Slftpg, 8-32 x 1/2                    |  |
| 2        | 94277406 | CABLE TIE                                    |  |
| 3        | 93592200 | SCREW, Slftpg, 8-32 x 3/8                    |  |
| 4        | 10127121 | SCREW, PHH PNH Mach,<br>8-32 x 5/16          |  |
| 5        | 94386407 | CABLE MOUNT                                  |  |
| 6        | 94385500 | GROMMET, Extruded                            |  |
| 7        | 92742213 | SCREW, PNH Mach, 8-32 x 1 3/8                |  |
| 8        | 73033800 | PLATE  |  |
| 9        | 10125106 | NUT, Hex, 8-32                               |  |
| 10       | 73053601 | SPACER                                       |  |
| 11       | 82316701 | SPACER                                       |  |
| 12       | 82314500 | GUIDE, Card                                  |  |
| 13       | 92002837 | SCREW, Hex Washer Hd Sh Met,<br>8-18 x 1 1/4 |  |
| 14       | 10127127 | SCREW, PHH PNH Mach, 8-32 x 1                |  |
| 15       | 10125804 | LOCKWASHER, #8                               |  |
| 16       | 82319801 | BAR, Mounting                                |  |
| 17       | 93592204 | SCREW, Slftpg, 8-32 x 1/2                    |  |
| 18       | 94369543 | GROUND CABLE                                 |  |
| 19       | 94281404 | GROUND CABLE                                 |  |
| 20       | 93109121 | SPACER                                       |  |
| 21       | 94369538 | GROUND CABLE                                 |  |
| 22       | 73052921 | WIRE WRAP ASSEMBLY                           | All except<br>BZ5A1V/W,<br>BZ5A2E/F,<br>BZ5A5G/H,<br>BZ5A6C/D,<br>BZ9A1J/K/L/M,<br>BZ9A2C/D,<br>BZ9A5E/F,<br>BZ9A6C/D/E/F, |
| 22       | 73052922 | WIRE WRAP ASSEMBLY                           | BZ5A2E/F,<br>BZ5A6C/D,<br>BZ9A2C/D,<br>BZ9A6C/D/E/F  |
| 22       | 73052923 | WIRE WRAP ASSEMBLY                           | BZ5A1V/W, BZ5A5G/H   |
| 22       | 73052924 | WIRE WRAP ASSEMBLY                           | BZ9A1J/K/L/M,<br>BZ9A5E/F  |
| 23       | 18862722 | SCREW, Hex Hd, 8-32 x 3/8                    |  |
| 24       | 82316501 | BAR, Support                                 |  |
| 25       | 82311701 | GUIDE, Card                                  |  |



| INDEX NO | PART NO  | PART DESCRIPTION               | NOTE                 |
|----------|----------|--------------------------------|----------------------|
| 5-8      |          | LOGIC CHASSIS ASSEMBLY (Contd) |                      |
| 26       | 82311806 | STRIP, Card Location           |                      |
| 27       | 82316601 | BAR, Mounting                  |                      |
| 28       | 51805800 | BUMPER, Self-Stick             |                      |
| 29       | 95635729 | FASTENER, 1/4 Turn             | S/C 20 & Blw<br>only |
| 30       | 94317900 | RING, Retaining                | S/C 20 & Blw<br>only |
| 31       | 94379800 | FERRULE                        | S/C 20 & Blw<br>only |
| 32       | 94379801 | SPRING                         | S/C 20 & Blw<br>only |
| 33       | 94379802 | WASHER                         | S/C 20 & Blw<br>only |
| 34       | 73017300 | PLATE, Support                 | S/C 20 & Blw         |
| 34       | 82394100 | PLATE, Support                 | S/C 21 & Abv         |

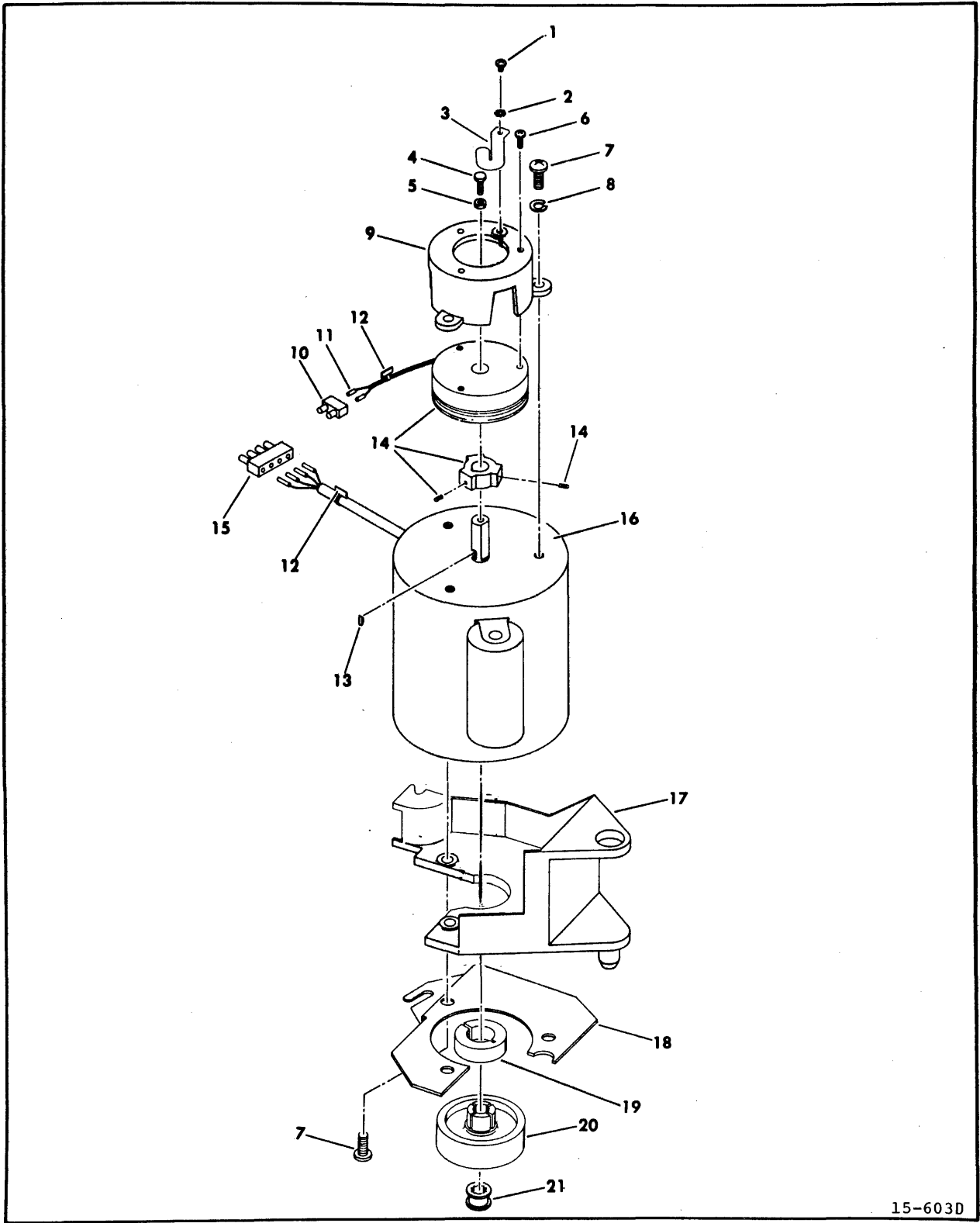


Figure 5-9. Motor and Brake Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                     | NOTE                   |
|----------|----------|--------------------------------------|------------------------|
| 5-9      | ##       | MOTOR AND BRAKE ASSEMBLY             |                        |
| 1        | 10127120 | SCREW, PHH PNH Mach,<br>8-32 x 1/4   |                        |
| 2        | 10126402 | LOCKWASHER, #8                       |                        |
| 3        | ##       | SPRING, Antistatic                   |                        |
| 4        | 73010700 | SCREW, Antistatic                    |                        |
| 5        | 10125108 | NUT, Hex, 10-32                      |                        |
| 6        | 93660079 | SCREW, PHH, 8-32 x 1/2               |                        |
| 7        | 10127155 | SCREW, PHH PNH Mach,<br>1/4-20 x 3/4 |                        |
| 8        | 10125806 | LOCKWASHER, 1/4                      |                        |
| 9        | 73032100 | BRAKE HOUSING                        |                        |
| 10       | 51906000 | CONNECTOR, Plug                      |                        |
| 11       | 51905807 | CONTACT PIN                          |                        |
| 12       | 94277409 | CABLE TIE                            |                        |
| 13       | 94006030 | KEY                                  |                        |
| 14       | ##       | KIT, Friction Brake                  |                        |
| 15       | 51906002 | CONNECTOR, Receptacle                |                        |
| 16       | 94398605 | DRIVE MOTOR                          | 120V Units             |
| 16       | 94398607 | DRIVE MOTOR                          | 220V/240V Units        |
| 17       | 47361400 | BRACKET, Motor                       |                        |
| 18       | 73054100 | PLATE, Motor Mounting                | S/C 20 & Blw           |
| 18       | 73070600 | PLATE, Motor Mounting                | S/C 21 & Abv           |
| 19       | 93287013 | COLLAR, Shaft                        | S/C 17 & Abv           |
| 20       | 73005703 | PULLEY                               | 60 Hz,<br>S/C 16 & Blw |
| 20       | 73005704 | PULLEY                               | 50 Hz,<br>S/C 16 & Blw |
| 20       | 75166700 | PULLEY                               | 60 Hz,<br>S/C 17 & Abv |
| 20       | 75166701 | PULLEY                               | 50 Hz,<br>S/C 17 & Abv |
| 21       | 94250602 | RING, Tolerance                      | S/C 16 & Blw           |

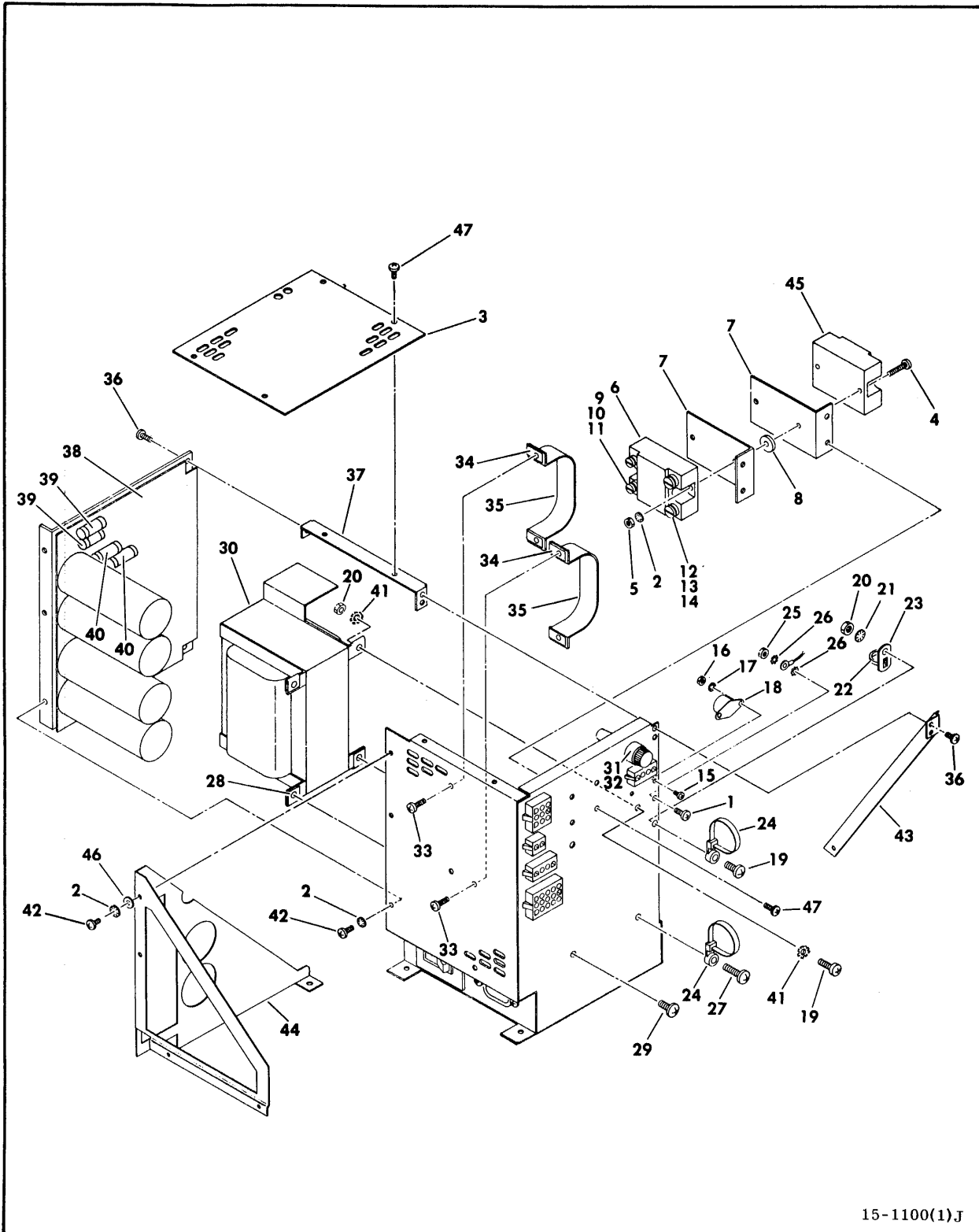


Figure 5-10. Power Supply Assembly (Sheet 1 of 2)

| INDEX NO | PART NO  | PART DESCRIPTION                     | NOTE                        |
|----------|----------|--------------------------------------|-----------------------------|
| 5-10     | ##       | POWER SUPPLY ASSEMBLY (Sheet 1 of 2) |                             |
| 1        | 10127113 | SCREW, PHH PNH Mach,<br>6-32 x 3/8   |                             |
| 2        | 10126103 | LOCKWASHER, #6                       |                             |
| 3        | 70111700 | COVER                                |                             |
| 4        | 10127116 | SCREW, PHH PNH Mach,<br>6-32 x 3/4   |                             |
| 5        | 10125105 | NUT, Hex, 6-32                       |                             |
| 6        | 95689304 | RELAY (K1)                           | All except<br>BZ5A1L,BZ9A7L |
| 6        | 95689305 | RELAY (K1)                           | BZ5A1L,BZ9A7L               |
| 7        | 70111900 | BRACKET                              |                             |
| 8        | 95797300 | WASHER, Phenolic                     |                             |
| 9        | 92751158 | SCREW, PHH PNH Mach,<br>6-32 x 1/4   |                             |
| 10       | 95524401 | LOCKWASHER, #6                       |                             |
| 11       | 94047078 | WASHER, Special                      |                             |
| 12       | 92751196 | SCREW, PHH PNH Mach,<br>8-32 x 1/4   |                             |
| 13       | 95524409 | LOCKWASHER, #8                       |                             |
| 14       | 94047079 | WASHER, Special                      |                             |
| 15       | 10127102 | SCREW, PHH PNH Mach,<br>4-40 x 1/4   |                             |
| 16       | 95510024 | NUT, Hex, 4-40                       |                             |
| 17       | 10126101 | LOCKWASHER, #4                       |                             |
| 18       | 95673205 | THERMOSTAT (S1)                      |                             |
| 19       | 10127143 | SCREW, PHH PNH Mach,<br>10-32 x 1/2  |                             |
| 20       | 10125108 | NUT, Hex, 10-32                      |                             |
| 21       | 95524408 | LOCKWASHER, #10                      |                             |
| 22       | 94277400 | CABLE TIE                            |                             |
| 23       | 94277503 | BASE, Mounting                       |                             |
| 24       | 94277406 | CABLE TIE                            |                             |
| 25       | 95510026 | NUT, Hex, 6-32                       |                             |
| 26       | 10126401 | LOCKWASHER, #6                       |                             |
| 27       | 95655545 | SCREW, Sh Met, 10-16 x 3/4           |                             |
| 28       | 95634805 | SPEEDNUT                             |                             |
| 29       | 95655543 | SCREW, Sh Met, 10-16 x 1/2           |                             |
| 30       | 76878100 | TRANSFORMER (T1)                     |                             |
| 31       | ##       | FUSE, 5A, 250 V (F1)                 |                             |





| INDEX NO | PART NO | PART DESCRIPTION | NOTE |
|----------|---------|------------------|------|
|----------|---------|------------------|------|

|      |          |   |  |
|------|----------|---|--|
| 5-10 |          | POWER SUPPLY ASSEMBLY (Sheet 2<br>of 2)         |  |
| 32   | 24513502 | FUSEHOLDER                                      |  |
| 33   | 95655517 | SCREW, Sh Met, 6-20 x 1/2                       |  |
| 34   | 95634801 | SPEEDNUT  |  |
| 35   | 47069601 | CLAMP, Capacitor                                |  |
| 36   | 17901509 | SCREW, PHH, 6-32 x 3/8                          |  |
| 37   | 70111800 | BRACE   |  |
| 38   | ##       | DZYV COMPONENT ASSEMBLY                         |  |
| 39   | 95647604 | FUSE, Fast-Blow, 5A (F2,F5)                     |  |
| 40   | 51650226 | FUSE, Slow-Blow, 5A (F3,F4)                     |  |
| 41   | 10126403 | LOCKWASHER, #10                                 |  |
| 42   | 10127114 | SCREW, PHH PNH Mach,<br>6-32 x 1/2              |  |
| 43   | 73140800 | BRACKET, Support                                |  |
| 44   | 73075000 | BRACKET, Support                                |  |
| 45   | 95689304 | RELAY (K2)                                      |  |
| 46   | 10125613 | WASHER, #6                                      |  |
| 47   | 93749162 | SCREW, PHH PNH Mach<br>W/Lockwasher, 6-32 x 3/8 |  |

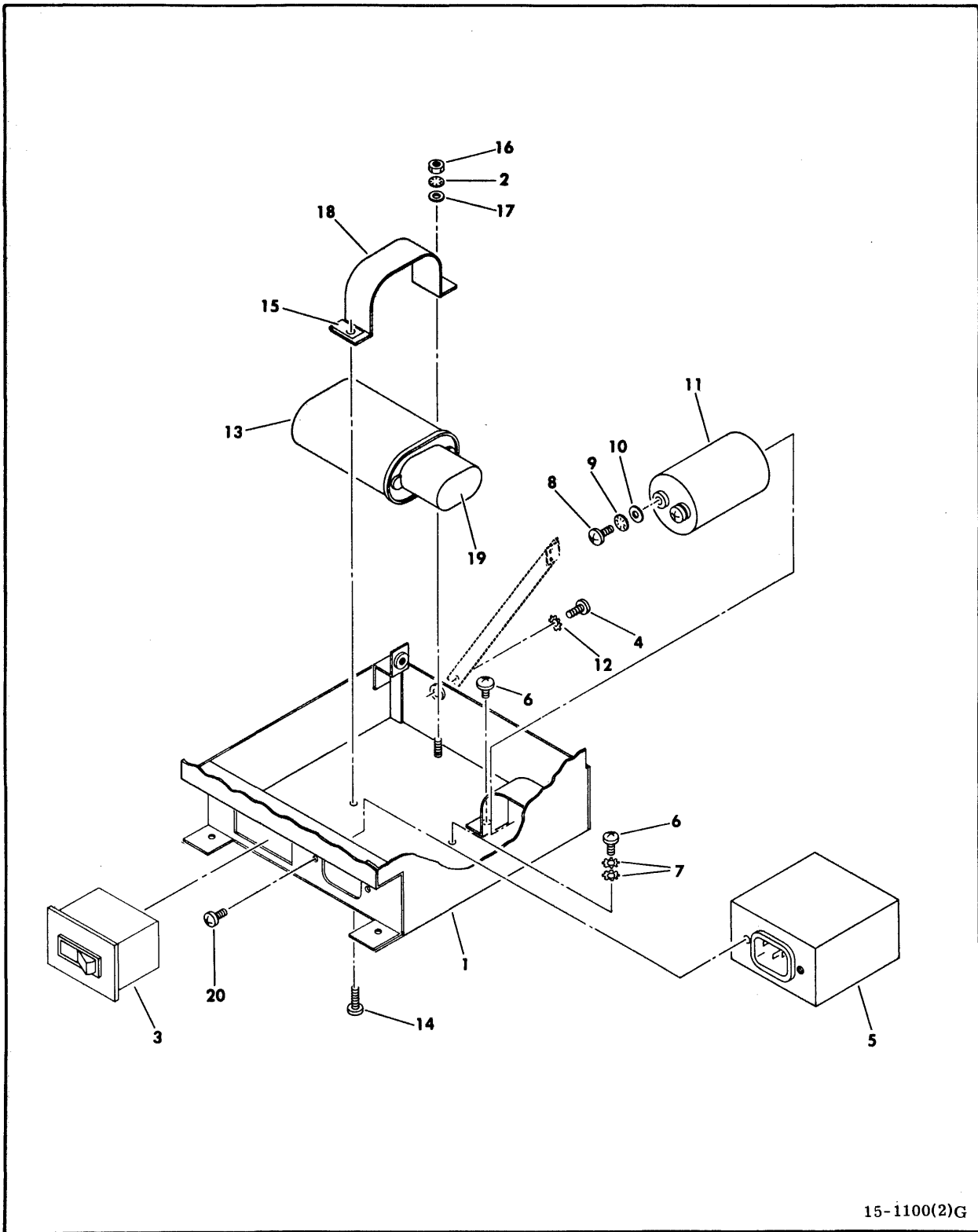


Figure 5-10. Power Supply Assembly (Sheet 2)

| INDEX NO | PART NO  | PART DESCRIPTION                             | NOTE              |
|----------|----------|--|-------------------|
| 5-10     |          | POWER SUPPLY ASSEMBLY (Sheet 2 of 2)         |                   |
| 1        | 76877701 | CHASSIS                                      | All except BZ9A7L |
| 1        | 76877703 | CHASSIS                                      | BZ9A7L            |
| 2        | 10126103 | LOCKWASHER, #6                               |                   |
| 3        | 96837908 | CIRCUIT BREAKER, 250 V (C1)                  |                   |
| 4        | 10127113 | SCREW, PHH PNH Mach, 6-32 x 3/8              |                   |
| 5        | 70118701 | RFI FILTER ASSEMBLY (LF1)                    |                   |
| 6        | 17901515 | SCREW, PHH, 8-32 x 1/4                       |                   |
| 7        | 10126402 | LOCKWASHER, #8                               |                   |
| 8        | 93234236 | SCREW, PNH Mach, 10-32 x 5/16                |                   |
| 9        | 95524408 | LOCKWASHER, #10                              |                   |
| 10       | 94047081 | WASHER, Special                              |                   |
| 11       | 95645626 | CAPACITOR, 40 V, 4700 $\mu$ F (C2)           |                   |
| 12       | 10126401 | LOCKWASHER, #6                               |                   |
| 13       | 95686705 | CAPACITOR, 660 V, 3 $\mu$ F (C1)             |                   |
| 14       | 95655516 | SCREW, Sh Met, 6-20 x 3/8                    |                   |
| 15       | 95634801 | SPEEDNUT                                     |                   |
| 16       | 95510026 | NUT, Hex, 6-32                               |                   |
| 17       | 10125613 | WASHER, #6                                   |                   |
| 18       | 95643600 | CLAMP, Capacitor                             |                   |
| 19       | 95582500 | BOOT   |                   |
| 20       | 93749162 | SCREW, PHH PNH Mach W/Lockwasher, 6-32 x 3/8 |                   |
|          | 92015100 | COVER, Insulating                            |                   |
|          | 92006905 | PLATE, Warning, Fuse                         |                   |
|          | 92006900 | PLATE, Warning, High Voltage                 |                   |

TABLE 5-1. HARDWARE KIT PIECE PARTS

| Part Number | Part Description                 | Kit P/N                              |                                      |                                      |
|-------------|----------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
|             |                                  | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>0 | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>5 | 9<br>2<br>5<br>5<br>5<br>2<br>3<br>8 |
| 94386402    | MOUNT, Cable                     | x                                    | x                                    | -                                    |
| 94277425    | CABLE TIE                        | x                                    | x                                    | -                                    |
| 73040500    | KEEPER, Latch                    | x                                    | x                                    | -                                    |
| 10125805    | LOCKWASHER, #10                  | x                                    | x                                    | -                                    |
| 10127143    | SCREW, PHH PNH Mach, 10-32 x 1/2 | x                                    | x                                    | x                                    |
| 10125108    | NUT, Hex, 10-32                  | x                                    | x                                    | x                                    |
| ##          | TERMINATOR ASSEMBLY, AYDV CARD   | -                                    | x                                    | -                                    |
| 73040501    | KEEPER, Latch                    | -                                    | -                                    | x                                    |
| 10126502    | SCREW, Hex Hd, 1/4-20 x 3/4      | -                                    | -                                    | x                                    |
| 10125806    | LOCKWASHER, 1/4                  | -                                    | -                                    | x                                    |
| 10125608    | WASHER, 1/4                      | -                                    | -                                    | x                                    |
| 10126105    | LOCKWASHER, #10                  | -                                    | -                                    | x                                    |
| 10126244    | SCREW, SCH, 10-32 x 1/2          | -                                    | -                                    | x                                    |
| 92602002    | CLAMP, Cable                     | -                                    | -                                    | x                                    |
| 10125606    | WASHER, #8                       | -                                    | -                                    | x                                    |
| 10126402    | LOCKWASHER, #8                   | -                                    | -                                    | x                                    |
| 10125106    | NUT, Hex, 8-32                   | -                                    | -                                    | x                                    |
| 10127122    | SCREW, PHH PNH Mach, 8-32 x 3/8  | -                                    | -                                    | x                                    |
| 10125607    | WASHER, #10                      | -                                    | -                                    | x                                    |
| 73069600    | BRACKET, Slide                   | -                                    | -                                    | x                                    |
| 73069601    | BRACKET, Slide                   | -                                    | -                                    | x                                    |

NOTE: "x" SIGNIFIES PART IS IN THAT KIT.

**SECTION 5B**

**SPARE PARTS LIST**



## SPARE PARTS LIST

5B

### GENERAL

The Spare Parts List serves as an aid in determining the interchangeability of assemblies and parts to be spared. An example of the columns used in the Spare Parts List is shown on the next page.

#### NOTE

The spare parts list establishes the support service level of the unit. Individual parts, assemblies, or components not on this list may be long lead time items subject to significant delays.

The Spare Parts List is divided into four columns:

Items Appear On - This column cross-references the part number in the spare

parts list to the associated figure number, page number, and index number in the illustrated parts breakdown.

Description - This column gives the name and a brief description of the part or assembly. This column also tracks series code history information.

Part Number and Replacement Part Number - These columns provide an eight-digit number. The difference between the two columns is that the Part Number column gives all the possible part numbers used for a particular part or assembly, while the Replacement Part Number column gives the interchangeable spare part number.

Notes - This column provides additional information such as Field Change Order (FCO), Special Purchase Order (SPO), serial number, and machine configuration.



EXAMPLE OF SPARE PARTS LIST

| ENGINEERING RECOMMENDED SPARE PARTS LIST |          |           |                        |             |                              |             |
|--|----------|-----------|------------------------|-------------|------------------------------|-------------|
| ITEMS APPEAR ON                          |          |           | DESCRIPTION            | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES       |
| Fig. No.                                 | Page No. | Index No. |                        |             |                              |             |
| 3-11                                     | 3-37     | 25        | CONTROL PANEL ASSEMBLY |             |                              |             |
|  |          |           | Used S/C 14 and above  | WWWW        | XXXX                         | 60 Hz units |
|  |          |           | Used S/C 14 and above  | YYYY        | ZZZZ                         | 50 Hz units |

In the example above, the control panel assembly is referenced as index 25 on figure 3-11, which appears on page

3-37. The original part number for single-channel units was WWWW; order part number XXXX if it must be replaced.

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON                 |          |           | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES  |
|---------------------------------|----------|-----------|-------------------------------|-------------|------------------------------|--|
| Fig. No.                        | Page No. | Index No. |                               |             |                              |  |
| _FFX COMP ASSY, Loc A2A01       |          |           |                               |             |                              |  |
|                                 |          |           | BFFX - Used on S/C 09 & above | 76935102    | 76935102                     |  |
| _FEX COMP ASSY, Loc A2A03       |          |           |                               |             |                              |  |
|                                 |          |           | AFEX - Used on S/C 09-11      | 76934700    | 76934705                     |  |
|                                 |          |           | BFEX - Used on S/C 12-16      | 76934702    | 76934705                     |  |
|                                 |          |           | EFEX - Used on S/C 17 & above | 76934705    | 76934705                     |  |
| _FAX COMP ASSY, Loc A2A04/A2B04 |          |           |                               |             |                              | BZ5A1C/D/E/F/<br>G/T/U/Z,<br>BZ5A9B/C/D/J/K/R,<br>BZ9A1C/E/F/J/K/L/<br>M/N/P/R/U/V/W,<br>BZ9A5E/F/G/H  |
|                                 |          |           | CFAX - Used on S/C 09 & above | 76933107    | 76933107                     |  |
| _FAX COMP ASSY, Loc A2A04/A2B04 |          |           |                               |             |                              | BZ5A1A/B/L, BZ5A2A/<br>B, BZ5A3A/B, BZ5A4A/<br>B, BZ5A5A/B/D/F/K/<br>L, BZ5A6A/B, BZ5A9N/<br>P, BZ9A1A/B, BZ9A2A/<br>B, BZ9A3A/B, BZ9A4A/<br>B, BZ9A5A/B, BZ9A6A/<br>B, BZ9A7C/D/E/F/L/<br>M |
|                                 |          |           | CFAX - Used on S/C 09-23      | 76933107    | 76933120                     |  |
|                                 |          |           | MFAX - Used on S/C 24 & above | 76933120    | 76933120                     |  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION                     | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES  |
|-----------------|----------|-----------|---------------------------------|-------------|------------------------------|--|
| Fig. No.        | Page No. | Index No. |                                 |             |                              |  |
|                 |          |           | _FAX COMP ASSY, Loc A2A04/A2B04 |             |                              | BZ5A1H/V/W, BZ5A2J,<br>BZ5A5G/H, BZ5A9E/F/<br>G/H/L/M, BZ9A1G/H/S/<br>T/Y/Z, BZ9A5C/D,<br>BZ9A7A/B/G |
|                 |          |           | DFAX - Used on S/C 14 & above   | 76933108    | 76933108                     |  |
|                 |          |           | _FAX COMP ASSY, Loc A2A04/A2B04 |             |                              | BZ5A2E/F, BZ5A6C/D,<br>BZ9A2C/D, BZ9A6C/D  |
|                 |          |           | JFAX - Used on S/C 14 & above   | 76933112    | 76933112                     |  |
|                 |          |           | _FAX COMP ASSY, Loc A2A04/A2B04 |             |                              | BZ9A6E/F   |
|                 |          |           | RFAX - Used on S/C 24 & above   | 76933126    | 76933126                     |  |
|                 |          |           | _FAX COMP ASSY, Loc A2A04/A2B04 |             |                              | BZ5A1J/K/R/S, BZ5A2<br>C/D/G/H, BZ5A5J   |
|                 |          |           | LFAX - Used on S/C 15 & above   | 76933116    | 76933116                     |  |
|                 |          |           | _KBX COMP ASSY, Loc A2B01/A2C01 |             |                              | 80 MB units all<br>except BZ5A1V/W,<br>BZ5A5G/H  |
|                 |          |           | AJFX - Used on S/C 09-12        | 76963900    | 76971905                     | To EKBX-FCO 50659  |
|                 |          |           | AKBX - Used on S/C 13           | 76971900    | 76971905                     | To EKBX-FCO 50659  |
|                 |          |           | DKBX - Used on S/C 14           | 76971904    | 76911905                     | To EKBX-FCO 50659  |
|                 |          |           | EKBX - Used on S/C 15 & above   | 76971905    | 76971905                     |  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |             |              | DESCRIPTION                           | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES              |
|-----------------|-------------|--------------|---------------------------------------|-------------|---------------------------------|--------------------|
| Fig.<br>No.     | Page<br>No. | Index<br>No. |                                       |             |                                 |                    |
|                 |             |              | <u>KBX COMP ASSY, Loc A2B01/A2C01</u> |             |                                 | BZ5A1V/W, BZ5A5G/H |
|                 |             |              | - AKBX - Used on S/C 13               | 76971900    | 76971908                        | To HKBX-FCO 50967  |
|                 |             |              | DKBX - Used on S/C 14                 | 76971904    | 76971908                        | To HKBX-FCO 50967  |
|                 |             |              | EKBX - Used on S/C 15-19              | 76971905    | 76971908                        | To HKBX-FCO 50967  |
|                 |             |              | HKBX - Used on S/C 20 & above         | 76971908    | 76971908                        |                    |
|                 |             |              | <u>KBX COMP ASSY, Loc A2B01/A2C01</u> |             |                                 | 160 MB units       |
|                 |             |              | - AJFX - Used on S/C 09-12            | 76963900    | 76971911                        |                    |
|                 |             |              | AKBX - Used on S/C 13                 | 76971900    | 76971911                        |                    |
|                 |             |              | CKBX - Used on S/C 14-18              | 76971903    | 76971911                        |                    |
|                 |             |              | GKBX - Used on S/C 19-24              | 76971907    | 76971911                        |                    |
|                 |             |              | LKBX - Used on S/C 25 & above         | 76971911    | 76971911                        |                    |
|                 |             |              | <u>FGX COMP ASSY, Loc A2B02/A2C02</u> |             |                                 | 80 MB units        |
|                 |             |              | - BFGX - Used on S/C 09-12            | 76935501    | 76935523                        | To WFGX-FCO 62212  |
|                 |             |              | HFGX - Used on S/C 13-17              | 76935508    | 76935523                        | To WFGX-FCO 62212  |
|                 |             |              | TFGX - Used on S/C 18-21              | 76935518    | 76935523                        | To WFGX-FCO 62212  |
|                 |             |              | WFGX - Used on S/C 22 & above         | 76935523    | 76935523                        |                    |
|                 |             |              | <u>FGX COMP ASSY, Loc A2B02/A2C02</u> |             |                                 | 160 MB units       |
|                 |             |              | - EFGX - Used on S/C 13-17            | 76935505    | 76935524                        | To XFGX-FCO 62213  |
|                 |             |              | SFGX - Used on S/C 18-21              | 76935517    | 76935524                        | To XFGX-FCO 62213  |
|                 |             |              | XFGX - Used on S/C 22 & above         | 76935524    | 76935524                        |                    |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |             |              | DESCRIPTION                         | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES                          |
|-----------------|-------------|--------------|-------------------------------------|-------------|---------------------------------|--------------------------------|
| Fig.<br>No.     | Page<br>No. | Index<br>No. |                                     |             |                                 |                                |
|                 |             |              | <u>JBX COMP ASSY, Loc A2B03</u>     |             |                                 | 80 MB units                    |
|                 |             |              | - CFCX - Used on S/C 09-12          | 76933903    | 76962328                        | To RJBX-FCO 62112              |
|                 |             |              | AJBX - Used on S/C 13-14            | 76962300    | 76962328                        | To RJBX-FCO 62112              |
|                 |             |              | FJBX - Used on S/C 15               | 76962306    | 76962328                        | To RJBX-FCO 62112              |
|                 |             |              | JJBX - Used on S/C 16-21            | 76962309    | 76962328                        | To RJBX-FCO 62112              |
|                 |             |              | RJBX - Used on S/C 22-23            | 76962316    | 76962328                        |                                |
|                 |             |              | YJBX - Used on S/C 24-26            | 76962323    | 76962328                        |                                |
|                 |             |              | ADJBX - Used on S/C 27 & above      | 76962328    | 76962328                        |                                |
|                 |             |              | <u>JBX COMP ASSY, Loc A2B03</u>     |             |                                 | 160 MB units                   |
|                 |             |              | - EFCX - Used on S/C 09-12          | 76933906    | 76962329                        | To VJBX-FCO 62142              |
|                 |             |              | AJBX - Used on S/C 13               | 76962300    | 76962329                        | To VJBX-FCO 62142              |
|                 |             |              | DJBX - Used on S/C 14-16            | 76962303    | 76962329                        | To VJBX-FCO 62142              |
|                 |             |              | MJBX - Used on S/C 17-22            | 76962312    | 76962329                        | To VJBX-FCO 62142              |
|                 |             |              | VJBX - Used on S/C 23               | 76962320    | 76962329                        |                                |
|                 |             |              | ZJBX - Used on S/C 24-26            | 76962324    | 76962329                        |                                |
|                 |             |              | AEJBX - Used on S/C 27 & above      | 76962329    | 76962329                        |                                |
|                 |             |              | <u>HNX COMP ASSY, Loc A2C03</u>     |             |                                 | BZ9A1J/K/L/M,<br>BZ9A5E/F only |
|                 |             |              | EHNX - Used on S/C 09 & above       | 76957106    | 76957106                        |                                |
|                 |             |              | <u>JUMPER PLUG ASSEMBLY (A2C04)</u> |             |                                 | Single Chan units              |
|                 |             |              | Used on S/C 09 & above              | 47203102    | 47203102                        |                                |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION                     | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES  |
|-----------------|----------|-----------|---------------------------------|-------------|------------------------------|--|
| Fig. No.        | Page No. | Index No. |                                 |             |                              |  |
|                 |          |           | <u>FBX COMP ASSY, Loc A2C04</u> |             |                              |  |
|                 |          |           | - AFBX - Used on S/C 09 & above | 76933500    | 76933500                     | Dual Chan units<br>All except<br>BZ5A2C/D/E/F/G/H,<br>BZ5A6C/D,BZ9A2C/D,<br>BZ9A6C/D |
|                 |          |           | CFBX - Used on S/C 14-20        | 76933504    | 76933508                     | BZ5A2E/F,BZ5A6C/D,<br>BZ9A2C/D,BZ9A6C/D  |
|                 |          |           | DFBX - Used on S/C 15 & above   | 76933505    | 76933505                     | BZ5A2C/D/G/H   |
|                 |          |           | FFBX - Used on S/C 21 & above   | 76933508    | 76933508                     | BZ5A2E/F,BZ5A6C/D,<br>BZ9A2C/D,BZ9A6C/D/<br>E/F                                      |
|                 |          |           | <u>ZSV COMP ASSY, Loc A2C05</u> |             |                              |  |
|                 |          |           | - AZSV - Used on S/C 09-12      | 54286500    | 54286502                     | To BZSV-FCO 50591  |
|                 |          |           | BZSV - Used on S/C 13-18        | 54286501    | 54286502                     |  |
|                 |          |           | CZSV - Used on S/C 19 & above   | 54286502    | 54286502                     |  |
|                 |          |           | <u>DZV COMP ASSY, Loc A3A1</u>  |             |                              |  |
|                 |          |           | - ADZV - Used on S/C 09 & above | 54209300    | 54209300                     |  |
|                 |          |           | <u>NSN COMP ASSY, Loc A4A1</u>  |             |                              |  |
|                 |          |           | - BNSN - Used on S/C 09 & above | 54086501    | 54086501                     |  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION   | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES             |
|-----------------|----------|-----------|---|-------------|------------------------------|-------------------|
| Fig. No.        | Page No. | Index No. |   |             |                              |                   |
|                 |          |           | <u>NQN COMP ASSY, Loc A4A2/A4B2</u>                 |             |                              |                   |
|                 |          |           | ANQN - Used on S/C 09-11                            | 54085700    | 54085709                     | To GNQN-FCO 50535 |
|                 |          |           | BNQN - Used on S/C 12                               | 54085701    | 54085709                     | To GNQN-FCO 50535 |
|                 |          |           | GNQN - Used on S/C 13-25                            | 54085706    | 54085709                     |                   |
|                 |          |           | KNQN - Used on S/C 26 & above                       | 54085709    | 54085709                     |                   |
|                 |          |           | <u>NRN COMP ASSY, Loc A4A3/A4B3</u>                 |             |                              | 80 MB Units       |
|                 |          |           | ANRN - Used on S/C 09-12                            | 54086100    | 54086104                     | To ENRN-FCO 50534 |
|                 |          |           | ENRN - Used on S/C 13 & above                       | 54086104    | 54086104                     |                   |
| 5-2             | 5-11     |           | <u>NRN COMP ASSY, Loc A4A3/A4B3</u>                 |             |                              | 160 MB Units      |
|                 |          |           | BNRN - Used on S/C 09-12                            | 54086101    | 54086107                     | To FNRN-FCO 50534 |
|                 |          |           | FNRN - Used on S/C 13-14                            | 54086105    | 54086107                     | To GNRN-FCO 50632 |
|                 |          |           | GNRN - Used on S/C 15-23                            | 54086106    | 54086107                     |                   |
|                 |          |           | HNRN - Used on S/C 24 & above                       | 54086107    | 54086107                     |                   |
| 5-2             | 5-11     | 8         | SPEED TRANSDUCER ASSEMBLY<br>Used on S/C 09 & above | 47444800    | 47444800                     |                   |
| 5-2             | 5-11     | 9         | GROUND SPRING<br>Used on S/C 09 & above             | 82391100    | 82391100                     |                   |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION                  | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES  |
|-----------------|----------|-----------|------------------------------|-------------|---------------------------------|--|
| Fig. No.        | Page No. | Index No. |                              |             |                                 |  |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (80 MB) |             |                                 | Moveable Heads<br>except BZ5A9C/D                            |
|                 |          |           | Used on S/C 09-22            | 73034601    | 82397104                        |  |
|                 |          |           | Used on S/C 23-24            | 73034616    | 82397104                        |  |
|                 |          |           | Used on S/C 25 & above       | 82397104    | 82397104                        |  |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (80 MB) |             |                                 | BZ5A9C/D   |
|                 |          |           | Used on S/C 09-22            | 73034601    | 82397114                        |  |
|                 |          |           | Used on S/C 23-24            | 73034616    | 82397114                        |  |
|                 |          |           | Used on S/C 25               | 82397104    | 82397114                        |  |
|                 |          |           | Used on S/C 26 & above       | 82397114    | 82397114                        |  |
| 5-2             | 11       |           | MINI MODULE ASSEMBLY (80 MB) |             |                                 | Moveable + 48<br>Fixed Heads                                 |
|                 |          |           | Used on S/C 09-22            | 73034602    | 82397105                        |  |
|                 |          |           | Used on S/C 23-24            | 73034617    | 82397105                        |  |
|                 |          |           | Used on S/C 25 & above       | 82397105    | 82397105                        |  |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (80 MB) |             |                                 | Moveable + 96<br>Fixed Heads<br>except BZ5A5G/H,<br>BZ5A9E/F |
|                 |          |           | Used on S/C 09-22            | 73034603    | 82397106                        |  |
|                 |          |           | Used on S/C 23-24            | 73034618    | 82397106                        |  |
|                 |          |           | Used on S/C 25 & above       | 82397106    | 82397106                        |  |



ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |             |              | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES  |
|-----------------|-------------|--------------|-------------------------------|-------------|---------------------------------|--|
| Fig.<br>No.     | Page<br>No. | Index<br>No. |                               |             |                                 |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (80 MB)  |             |                                 | BZ5A5G/H   |
|                 |             |              | Used on S/C 09-22             | 73034603    | 82397103                        |  |
|                 |             |              | Used on S/C 23-24             | 73034618    | 82397103                        |  |
|                 |             |              | Used on S/C 25 & above        | 82397103    | 82397103                        |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (80 MB)  |             |                                 | BZ5A9E/F   |
|                 |             |              | Used on S/C 09-22             | 73034603    | 82397101                        |  |
|                 |             |              | Used on S/C 23-24             | 73034618    | 82397101                        |  |
|                 |             |              | Used on S/C 25 & above        | 82397101    | 82397101                        |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | Moveable Heads<br>except BZ9A1J/K/P/R<br>Y/Z, BZ9A7G |
|                 |             |              | Used on S/C 09-16             | 73034604    | 82395200                        | Replacement re-<br>quires LKBX card                  |
|                 |             |              | Used on S/C 17-22             | 73034607    | 82395200                        | Replacement re-<br>quires LKBX card                  |
|                 |             |              | Used on S/C 23-24             | 73034613    | 82395200                        | Replacement re-<br>quires LKBX card                  |
|                 |             |              | Used on S/C 25 & above        | 82395200    | 82395200                        |  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES                                |
|-----------------|----------|-----------|-------------------------------|-------------|------------------------------|--------------------------------------|
| Fig. No.        | Page No. | Index No. |                               |             |                              |                                      |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                              | BZ9A1J/K                             |
|                 |          |           | Used on S/C 18-22             | 73034607    | 82395210                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395210                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 25 & above        | 82395210    | 82395210                     |                                      |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                              | BZ9A1P/R                             |
|                 |          |           | Used on S/C 09-16             | 73034604    | 82395215                     | Replacement<br>requires LKBX<br>card |
|                 |          |           | Used on S/C 17-22             | 73034607    | 82395215                     | Replacement<br>requires LKBX<br>card |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395215                     | Replacement<br>requires LKBX<br>card |
|                 |          |           | Used on S/C 25                | 82395200    | 82395200                     |                                      |
|                 |          |           | Used on S/C 26 & above        | 82395215    | 82395215                     |                                      |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                              | BZ9A1Y                               |
|                 |          |           | Used on S/C 22                | 73034607    | 82395213                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395213                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 25 & above        | 82395213    | 82395213                     |                                      |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |      |       | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES  |
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| Fig.            | Page | Index |                               |             |                                 |  |
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| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB) |             |                                 | BZ9A1Z, BZ9A7G   |
|                 |      |       | Used on S/C 22                | 73034607    | 82395208                        | Replacement re-<br>quires LKBX card                    |
|                 |      |       | Used on S/C 23-24             | 73034613    | 82395208                        | Replacement re-<br>quires LKBX card                    |
|                 |      |       | Used on S/C 25 & above        | 82395208    | 82395208                        |  |
| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB) |             |                                 | Moveable + 48<br>Fixed Heads                           |
|                 |      |       | Used on S/C 09-16             | 73034605    | 82395201                        | except BZ9A1L/M<br>Replacement re-<br>quires LKBX card |
|                 |      |       | Used on S/C 17-22             | 73034608    | 82395201                        | Replacement re-<br>quires LKBX card                    |
|                 |      |       | Used on S/C 23-24             | 73034615    | 82395201                        | Replacement re-<br>quires LKBX card                    |
|                 |      |       | Used on S/C 25 & above        | 82395201    | 82395201                        |  |
| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB) |             |                                 | BZ9A1L/M   |
|                 |      |       | Used on S/C 20-22             | 73034608    | 82395211                        | Replacement re-<br>quires LKBX card                    |
|                 |      |       | Used on S/C 23-24             | 73034615    | 82395211                        | Replacement re-<br>quires LKBX card                    |
|                 |      |       | Used on S/C 25 & above        | 82395211    | 82395211                        |  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |             |              | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES  |
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| Fig.<br>No.     | Page<br>No. | Index<br>No. |                               |             |                                 |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | Moveable + 96<br>Fixed Heads                           |
|                 |             |              | Used on S/C 09-16             | 73034606    | 82395202                        | except BZ9A5E/F<br>Replacement re-<br>quires LKBX card |
|                 |             |              | Used on S/C 17-22             | 73034609    | 82395202                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 23-24             | 73034614    | 82395202                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 25 & above        | 82395202    | 82395202                        | Replacement re-<br>quires LKBX card                    |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | BZ9A5E/F   |
|                 |             |              | Used on S/C 20-22             | 73034609    | 82395212                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 23-24             | 73034614    | 82395212                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 25 & above        | 82396212    | 82395212                        |  |
| 5-2             | 5-11        | 18           | BELT, Flat Drive              |             |                                 |  |
|                 |             |              | Used on S/C 09 & above        | 92314125    | 92314125                        | 60 Hz  |
| 5-2             | 5-11        | 18           | BELT, Flat Drive              |             |                                 |  |
|                 |             |              | Used on S/C 09 & above        | 92314126    | 92314126                        | 50 Hz  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION  | PART NUMBER                          | REPLACE-<br>MENT PART<br>NUMBER      | NOTES                              |
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| 5-3             | 5-13     | 5         | FAN ASSEMBLY<br>Used on S/C 09 & above   | 73019800                             | 73019800                             |                                    |
| 5-3             | 5-13     | 16        | AIR FILTER, Foam<br>Used on S/C 09-11<br>Used on S/C 12 & above  | 94364904<br>73045700                 | 73045700<br>73045700                 |                                    |
| 5-3             | 5-15     | 28        | INDICATOR, LED<br>Used on S/C 09-25<br><br>Used on S/C 09-25<br>Used on S/D 26 & above                   | 94394101<br><br>94394114<br>94394114 | 94394101<br><br>94394114<br>94394114 | All except<br>BZ9A1J/K<br>BZ9A1J/K |
| 5-3             | 5-15     | 29        | SWITCH P.B PANEL W/LED Indicator<br>Used on S/C 09-25<br><br>Used on S/C 09-25<br>Used on S/C 26 & above | 94394000<br><br>94394028<br>94394028 | 94394000<br><br>94394028<br>94394028 | All except<br>BZ9A1J/K<br>BZ9A1J/K |
| 5-4             | 5-17     | 3         | INDICATOR, LED<br>Used on S/C 17-25<br>Used on S/C 26 & above  | 94394101<br>94394114                 | 94394101<br>94394114                 | BZ5A1E, BZ9A1C                     |

ENGINEERING RECOMMENDED SPARE PARTS LIST

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| 5-4             | 5-17     | 4         | SWITCH, P.B. W/LED Indicator<br>Used on S/C 17-25<br>Used on S/C 26 & above | 94394000<br>94394028 | 94394000<br>94394028            | BZ5A1E, BZ9A1C             |
| 5-4             | 5-17     | 8         | AIR FILTER, Foam<br>Used on S/C 17 & above                                  | 73045702             | 73045702                        | BZ5A1E, BZ9A1C             |
| 5-4             | 5-17     | 16        | FAN ASSEMBLY<br>Used on S/C 17 & above                                      | 73019800             | 73019800                        | BZ5A1E, BZ9A1C             |
| 5-5             | 5-19     | 3         | SWITCH, P.B. W/LED Indicator<br>Used on S/C 17-25<br>Used on S/C 26 & above | 94394000<br>94394028 | 94394000<br>94394028            | BZ5A1G/T/U, BZ9A1E/<br>F/N |
| 5-5             | 5-19     | 8         | AIR FILTER, Foam<br>Used on S/C 17 & above                                  | 73045701             | 73045701                        | BZ5A1G/T/U,<br>BZ9A1E/F/N  |
| 5-5             | 5-19     | 16        | FAN ASSEMBLY<br>Used on S/C 17 & above                                      | 73019800             | 73019800                        | BZ5A1G/T/U,<br>BZ9A1E/F/N  |

ENGINEERING RECOMMENDED SPARE PARTS LIST

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| 5-5             | 5-19     | 24        | INDICATOR, LED         |             |                              | BZ5A1G/T/U,<br>BZ9A1E/F/N |
|                 |          |           | Used on S/C 17-25      | 94394101    | 94394101                     |                           |
|                 |          |           | Used on S/C 26 & above | 94394114    | 94394114                     |                           |
| 5-9             | 5-33     |           | MOTOR & BRAKE ASSEMBLY |             |                              | 80 MB, 60 Hz<br>Units     |
|                 |          |           | Used on S/C 09-16      | 73035301    | 73035315                     |                           |
|                 |          |           | Used on S/C 17-20      | 73035306    | 73035315                     |                           |
|                 |          |           | Used on S/C 21 & above | 73035315    | 73035315                     | Except BZ5A1E/L           |
|                 |          |           | Used on S/C 21 & above | 73035324    | 73035324                     | BZ5A1E                    |
|                 |          |           | Used on S/C 28 & above | 73035326    | 73035326                     | BZ5A1L                    |
| 5-9             | 5-33     |           | MOTOR & BRAKE ASSEMBLY |             |                              | 80 MB, 50 Hz<br>Units     |
|                 |          |           | Used on S/C 09-16      | 73035302    | 73035307                     |                           |
|                 |          |           | Used on S/C 17-20      | 73035307    | 73035307                     |                           |
|                 |          |           | Used on S/C 21 & above | 73035316    | 73035316                     |                           |
| 5-9             | 5-33     |           | MOTOR & BRAKE ASSEMBLY |             |                              | 160 MB, 60 Hz<br>Units    |
|                 |          |           | Used on S/C 09-12      | 73035303    | 73035306                     |                           |
|                 |          |           | Used on S/C 13-16      | 73035301    | 73035306                     |                           |
|                 |          |           | Used on S/C 17-20      | 73035306    | 73035306                     |                           |
|                 |          |           | Used on S/C 21 & above | 73035315    | 73035315                     | Except BZ9A1C,<br>BZ9A7L  |
|                 |          |           | Used on S/C 21 & above | 73035324    | 73035324                     | BZ9A1C                    |
|                 |          |           | Used on S/C 21 & above | 73035326    | 73035326                     | BZ9A7L                    |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION  | PART NUMBER  | REPLACE-<br>MENT PART NUMBER                                 | NOTES                                     |
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| 5-9             | 5-33     |           | MOTOR & BRAKE ASSEMBLY<br>Used on S/C 09-12<br>Used on S/C 13-16<br>Used on S/C 17-20<br>Used on S/C 21 & above                              | 73035304<br>73035302<br>73035307<br>73035316                 | 73035307<br>73035307<br>73035307<br>73035316                 | 160 MB, 50 Hz<br>Units                    |
| 5-9             | 5-33     | 3         | SPRING, Antistatic<br>Used on S/C 09 & above   | 73010600   | 73010600   |   |
| 5-9             | 5-33     | 14        | KIT, Friction Brake<br>Used on S/C 09 & above  | 73065700   | 73065700   |   |
| 5-10            | 5-36.1   |           | POWER SUPPLY ASSEMBLY<br>Used on S/C 09-15<br>Used on S/C 16-19<br>Used on S/C 20-22<br>Used on S/C 23 & above<br><br>Used on S/C 23 & above | 70107400<br>70107401<br>70107403<br>70107405<br><br>70107407 | 70107405<br>70107405<br>70107405<br>70107405<br><br>70107407 | Except BZ5A1L,<br>BZ9A7L<br>BZ5A1L,BZ9A7L |
| 5-10            | 5-36.1   | 31        | FUSE, 5 A, 250 V (F1)<br>Used on S/C 09 & above  | 93418333   | 93418333   |   |
| 5-10            | 5-37     | 38        | DZYV COMPONENT ASSEMBLY<br>Used on S/C 09 & above  | 54288903   | 54288903   |   |
| Table<br>5-1    | 5-40     |           | TERMINATOR ASSEMBLY, AYDV Card<br>Used on S/C 23 & above   | 75841300   | 75841300   | BZ9A7C/D only                             |





# COMMENT SHEET

MANUAL TITLE: \_\_\_\_\_

PUBLICATION NO.: \_\_\_\_\_

REVISION: \_\_\_\_\_

NAME: \_\_\_\_\_

COMPANY: \_\_\_\_\_

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## REVISION RECORD (Contd)

| REVISION   | DESCRIPTION   |
|--|---|
| <p style="text-align: center;">H<br/>(3-18-80)</p> | <p>Manual revised to incorporate Series Code 17 changes, which includes ECOs 42238A, 49168, 50672, 50691A, 50721, 50734, 50743A, 50757, 50771, 50795, 50800, 50807, 50808A, 50809, 50814, 50824, 50835, 50838, 50843, 50848, 50853, 50860, 56604A, 58205.</p>             |
| <p style="text-align: center;">J<br/>(5-15-80)</p> | <p>Manual revised to incorporate Series Code 18 changes, which includes ECO's 50855, 50870, 50904, 50900, 50911, 50778A, and also technical and editorial changes.</p>  |
| <p style="text-align: center;">K<br/>(7-10-80)</p> | <p>Manual revised to incorporate Series Code 19 changes, which includes ECO's 50844, 50879, 50896A, 50920, 50916A, 50937, 50951A, 50935, 50977, 50976, and also technical and editorial changes.</p>  |
| <p style="text-align: center;">L<br/>(9-12-80)</p> | <p>Manual revised to incorporate Series Code 20 changes: ECO's 50897B, 50928, 50967A, 50973A, technical changes, and editorial changes.</p>   |
| <p style="text-align: center;">M<br/>(11-4-80)</p> | <p>Manual revised to incorporate Series Code 21 changes: ECO's 62003, 62004, 62014, 62029, 62028, 62043, 62044, 62071, technical changes, and editorial changes.</p>  |
| <p style="text-align: center;">N<br/>(2-12-81)</p> | <p>Manual revised to incorporate Series Code 22 changes: ECO's 62072, 62084, 62112, 62070, FCO's 62072, 62112, 62070, technical changes, and editorial changes. Also incorporated Series Code 23 change: ECO/FCO 62127. This edition obsoletes all previous editions.</p> |
| <p style="text-align: center;">P<br/>(3-10-81)</p> | <p>Manual revised to incorporate Series Code 23 changes: ECO's 62073, 62142, 49195, 49196, FCO's 62142, 62212, 62213, technical and editorial changes.</p>  |
| <p style="text-align: center;">R<br/>(5-1-81)</p>  | <p>Manual revised to incorporate the following Series Code 24 changes: ECO's 62140, 62182, 62199, 62224, 62225, technical changes, and editorial changes.</p>   |

## REVISION RECORD (Contd)

| REVISION        | DESCRIPTION  |
|-----------------|--|
| S<br>(7-23-81)  | Manual revised to incorporate the following Series Code 25 changes: ECO's 62226, 62253, 62266, 62309, technical changes, and editorial changes. Also incorporated FCO 02015.       |
| T<br>(9-23-81)  | Manual revised to incorporate the following Series Code 26 changes: ECO's 02028, 02042, FCO's 02028, 02042, technical changes, and editorial changes. Also incorporated FCO 02099. |
| U<br>(12-4-81)  | Manual revised to incorporate the following Series Code 27 changes: ECO's 02085, 02044, technical changes, and editorial changes.  |
| V<br>(2-17-82)  | Manual revised to incorporate Series Code 28 technical and editorial changes.  |
| W<br>(5-14-82)  | Manual revised to incorporate the following Series Code 29 changes: ECO's 02169, 02239, 02240, FCO 02240, technical changes, and editorial changes.                                |
| Y<br>(7-9-82)   | Manual revised to incorporate the following Series Code 30 changes: ECO's 02267, 02309, technical changes, and editorial changes.  |
| Z<br>(9-7-82)   | Manual revised to incorporate the following Series Code 31 changes: ECO's 02338, 02341, 02342, 02353, 02354, FCO 02354, technical changes, and editorial changes.                  |
| AA<br>(1-21-83) | Series Code 32 changes: ECO's 02323, 02379, 02380, 02394, FCO 02379, technical and editorial changes.  |
| AB<br>(5-6-83)  | Series Code 33 changes: ECO's 02422, 02436, 02450, technical and editorial changes.  |
| AC<br>(6-27-83) | Series Code 34 and 35 changes: ECO's 02479, 02504, 02527, 02544, technical and editorial changes.  |

# MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

**EXPLANATION:** Locate the equipment type and series code number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series code number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

This correlation sheet also applies to the following related manuals:

Publication No. 83323160 Rev. M

Publication No. \_\_\_\_\_ Rev. \_\_\_\_\_

| EQUIPMENT TYPE | SERIES CODE | WITH FCOs | COMMENTS                                 |
|----------------|-------------|-----------|--|
| BZ5XX/BZ9XX    | 09          | None      |  |
|                | 10          | None      |  |
|                | 11          | None      |  |
|                | 12          | 50476     | Incorporates new front panel.            |
|                | 13          | 50534     | Read Recovery.                           |
|                |             | 50535     | Write Fault Volt Marg.                   |
|                |             | 50505     | Incorporates microprocessor servo.       |
|                |             | 50603     | Incorporates twisted pair wires.         |
|                | 14          | 50591     | Random seek errors.                      |
|                |             | 50632     | Eliminates data errors on FNRN.          |
|                | 15          | 50659     | Corrects Servo Seek error.               |
|                |             | 16        | None                                     |
|                | 17          | None      |  |
|                | 18          | None      |  |
|                | 19          | 50967A    | 50967A applies to BZ5A1V/W, BZ5AG/H only |



## MANUAL TO EQUIPMENT LEVEL CORRELATION (Contd)

| EQUIPMENT<br>TYPE | SERIES<br>CODE | WITH<br>FCOs  | COMMENTS  |
|-------------------|----------------|---|---|
| BZ5XX/BZ9XX       | 20             | 62072   | FCO 62072 applies to BZ9A1J/K only                            |
|                   | 21             | 62112   | FCO 62112 applies to 80 MB units only                         |
|                   |                | 62070   | FCO 62070 applies to BZ5A1V/W, BZ5A5G/H only.                 |
|                   |                | 62212   | FCO 62212 applies to 80 MB units only.                        |
|                   |                | 62213   | FCO 62213 applies to 160 MB units only.                       |
|                   | 22             | 62127   | FCO 62142 applies to 160 MB units only.                       |
|                   |                | 62142   | FCO 02015 applies to BZ5A1E/F/V/W/Z, BZ5A5G/H, BZ9A1C/W only. |
|                   |                | 02015   | FCO 02099 applies to BZ9A1J/K only.                           |
|                   | 23             | 02099   | FCO 02099 applies to BZ9A1J/K only.                           |
|                   | 24             | None  |   |
|                   | 25             | 02028   | FCO 02028 applies to BZ9A1J/K Series Codes 23/24 only.        |
|                   |                | 02042   | FCO 02042 applies to BZ5A1B only.                             |
|                   | 26             | 02141   | Applies to BZ9A7A/B only.                                     |
|                   | 27             | None  |   |
|                   | 28             | None  |   |
|                   | 29             | 02240   | FCO 02240 applies to BZ5A2E/F, BZ5A6C/D only                  |
| 30                | 02354          | Applies to BZ5A2E/F, BZ5A6C/D only.                                       |   |
| 31                | 02379          | FCO 02379 applies to BZ5A3A/B, BZ5A5A/B/G/H/J, BZ5A6C/D, BZ9A3A, BZ9A5A/B |   |
|                   | 32             | None  |   |
|                   | 33             | None  |   |
|                   | 34             | None  |   |

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| xx          | AB         | 1-14.2      | AB         |
| xxi         | AB         | 1-15        | AC         |
| xxii        | AB         | 1-16        | AB         |
| xxiii       | AB         | 1-17        | AC         |
| xxiv        | AB         | 1-18        | R          |
| xxv         | AB         | 1-19        | N          |
| xxvi        | AB         | 1-20        | N          |
| xxvii       | AB         | 1-21        | N          |
| xxviii      | AB         | 1-22        | N          |
| xxix        | AB         | 1-23        | N          |
| xxx         | AC         | 1-24        | N          |
| xxxi        | AB         | 1-25        | N          |
| xxxii       | AB         | 1-26        | N          |

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|-------------|------------|-------------|------------|
| 1-27        | N          | 2-16        | AC         |
| 1-28        | N          | 2-17        | N          |
| 1-29        | Y          | 2-18        | S          |
| 1-30        | N          | 2-18.1      | S          |
| 1-31        | N          | 2-19        | S          |
| 1-32        | N          | 2-20        | S          |
| 1-33        | T          | Blank       | -          |
| 1-34        | Y          | S-2C Div    | -          |
| 1-35        | N          | Blank       | -          |
| 1-36        | N          | 2-21        | N          |
| 1-37        | N          | 2-22        | N          |
| 1-38        | N          | 2-23        | AB         |
| 1-39        | N          | 2-24        | Y          |
| 1-40        | N          | 2-25        | N          |
| 1-41        | N          | 2-26        | Y          |
| 1-42        | T          | 2-27        | N          |
| 1-43        | T          | 2-28        | N          |
| 1-44        | N          | 2-29        | N          |
| 1-45        | N          | 2-30        | N          |
| Blank       | -          | 2-31        | N          |
| S-2 Div     | -          | 2-32        | N          |
| Blank       | -          | 2-33        | N          |
| 2-1         | N          | 2-34        | N          |
| Blank       | -          | 2-35        | Y          |
| S-2A Div    | -          | 2-36        | N          |
| Blank       | -          | 2-37        | Y          |
| 2-3         | W          | 2-38        | N          |
| 2-4         | AA         | 2-39        | N          |
| 2-5         | W          | 2-40        | N          |
| 2-6         | W          | 2-41        | N          |
| 2-7         | W          | 2-42        | N          |
| 2-8         | W          | 2-43        | N          |
| 2-9         | W          | 2-44        | N          |
| 2-10        | AB         | 2-45        | N          |
| 2-11        | W          | 2-46        | N          |
| 2-12        | AB         | 2-47        | Y          |
| S-2B Div    | -          | 2-48        | N          |
| Blank       | -          | 2-49        | N          |
| 2-13        | N          | 2-50        | N          |
| 2-14        | N          | 2-51        | N          |
| 2-15        | AB         | 2-52        | N          |

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| <u>PAGE</u> | <u>REV</u> | <u>PAGE</u> | <u>REV</u> |
|-------------|------------|-------------|------------|
| 2-53        | N          | 2-92        | AB         |
| 2-54        | N          | 2-93        | AB         |
| 2-55        | N          | 2-94        | AB         |
| 2-56        | N          | 2-95        | AB         |
| 2-57        | N          | 2-96        | AB         |
| 2-58        | N          | 2-97        | AB         |
| 2-59        | N          | 2-98        | AB         |
| 2-60        | N          | 2-99        | AB         |
| 2-61        | N          | 2-100       | AB         |
| 2-62        | N          | 2-101       | AB         |
| S-2D Div    | -          | Blank       | -          |
| Blank       | -          | S-3 Div     | -          |
| 2-63        | N          | Blank       | -          |
| 2-64        | N          | 3-1         | W          |
| 2-65        | N          | 3-2         | W          |
| 2-66        | N          | 3-3         | W          |
| 2-67        | N          | 3-4         | W          |
| 2-68        | AC         | 3-5         | W          |
| 2-69        | V          | 3-6         | W          |
| 2-70        | N          | 3-7         | W          |
| 2-71        | AB         | 3-8         | W          |
| 2-72        | N          | 3-9         | W          |
| 2-73        | N          | 3-10        | AA         |
| 2-74        | N          | 3-11        | W          |
| 2-75        | AB         | Blank       | -          |
| 2-76        | AC         | 3-13        | W          |
| 2-77        | AB         | 3-14        | N          |
| 2-78        | T          | 3-15        | AB         |
| 2-79        | R          | 3-16        | AB         |
| 2-80        | N          | 3-17        | N          |
| 2-81        | N          | 3-18        | K          |
| 2-82        | N          | 3-19        | K          |
| 2-83        | R          | Blank       | -          |
| 2-84        | W          | 3-21        | N          |
| 2-85        | AB         | 3-22        | N          |
| 2-86        | AB         | 3-23        | N          |
| 2-87        | AB         | Blank       | -          |
| 2-88        | AB         | 3-25        | N          |
| 2-89        | AB         | 3-26        | N          |
| 2-90        | AB         | 3-27        | N          |
| 2-91        | AB         | 3-28        | N          |

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| <u>PAGE</u> | <u>REV</u> | <u>PAGE</u> | <u>REV</u> |
|-------------|------------|-------------|------------|
| 3-29        | N          | 3-62.4      | R          |
| 3-30        | N          | 3-62.5      | U          |
| 3-31        | N          | 3-62.6      | Z          |
| 3-32        | N          | 3-62.7      | AC         |
| 3-32.1      | Z          | 3-62.8      | Z          |
| 3-32.2      | Z          | 3-62.9      | AC         |
| 3-32.3      | Z          | 3-62.10     | Z          |
| 3-32.4      | Z          | 3-62.11     | Z          |
| 3-33        | AA         | 3-62.12     | Z          |
| 3-34        | N          | 3-63        | Z          |
| 3-35        | AA         | 3-64        | Z          |
| 3-36        | N          | 3-65        | Z          |
| 3-37        | N          | 3-66        | N          |
| Blank       | -          | 3-67        | N          |
| 3-39        | AC         | 3-68        | Z          |
| 3-40        | AC         | 3-69        | Z          |
| 3-41        | AC         | Blank       | -          |
| 3-42        | AC         | 3-71        | AB         |
| 3-43        | Z          | 3-72        | Z          |
| 3-44        | Z          | 3-73        | N          |
| 3-45        | Z          | 3-74        | AB         |
| 3-46        | S          | 3-75        | N          |
| 3-47        | S          | 3-76        | Z          |
| 3-48        | S          | 3-77        | P          |
| 3-49        | Z          | Blank       | -          |
| Blank       | -          | 3-89        | V          |
| 3-51        | Z          | 3-90        | N          |
| 3-52        | Z          | 3-91        | N          |
| 3-53        | Z          | 3-92        | N          |
| 3-54        | S          | 3-93        | N          |
| 3-55        | S          | 3-94        | N          |
| 3-56        | Z          | 3-95        | N          |
| 3-57        | Z          | 3-96        | N          |
| 3-58        | Z          | 3-97        | V          |
| 3-59        | Z          | Blank       | -          |
| 3-60        | N          | 3-111       | Y          |
| 3-61        | P          | 3-112       | U          |
| 3-62        | Z          | 3-113       | U          |
| 3-62.1      | Z          | 3-114       | N          |
| 3-62.2      | Z          | 3-115       | N          |
| 3-62.3      | Z          | 3-116       | N          |

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| <u>PAGE</u> | <u>REV</u> | <u>PAGE</u> | <u>REV</u> |
|-------------|------------|-------------|------------|
| 3-117       | N          | 3-140       | Z          |
| 3-118       | N          | 3-140.1     | Z          |
| 3-119       | N          | 3-140.2     | Z          |
| 3-120       | N          | 3-140.3     | Z          |
| 3-121       | S          | 3-140.4     | R          |
| 3-122       | N          | 3-140.5     | U          |
| 3-123       | N          | 3-140.6     | Z          |
| 3-124       | N          | 3-140.7     | AC         |
| 3-125       | N          | 3-140.8     | Z          |
| 3-126       | N          | 3-140.9     | AC         |
| 3-126.1     | R          | 3-140.10    | Z          |
| 3-126.2     | R          | 3-140.11    | Z          |
| 3-126.3     | R          | 3-140.12    | Z          |
| 3-126.4     | R          | 3-141       | N          |
| 3-126.5     | R          | 3-142       | N          |
| 3-126.6     | R          | 3-143       | N          |
| 3-126.7     | AB         | Blank       | -          |
| 3-126.8     | U          | 3-145       | AC         |
| 3-126.9     | U          | 3-146       | AC         |
| 3-126.10    | U          | 3-147       | AC         |
| 3-126.11    | U          | 3-148       | N          |
| 3-126.12    | U          | 3-149       | N          |
| 3-126.13    | AB         | 3-150       | N          |
| 3-126.14    | AB         | 3-151       | U          |
| 3-126.15    | AB         | 3-152       | N          |
| 3-126.16    | AB         | 3-153       | U          |
| 3-126.17    | AB         | 3-154       | N          |
| 3-126.18    | AB         | 3-155       | S          |
| 3-127       | Z          | 3-156       | N          |
| 3-128       | Z          | 3-157       | W          |
| 3-129       | Z          | 3-158       | N          |
| 3-130       | S          | 3-159       | W          |
| 3-131       | S          | 3-160       | N          |
| 3-132       | S          | 3-161       | AA         |
| 3-133       | Z          | 3-162       | AA         |
| Blank       | -          | 3-163       | T          |
| 3-135       | Z          | 3-164       | AA         |
| 3-136       | Z          | 3-165       | N          |
| 3-137       | Z          | Blank       | -          |
| 3-138       | S          | 3-167       | AC         |
| 3-139       | S          | 3-168       | N          |

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| <u>PAGE</u> | <u>REV</u> | <u>PAGE</u> | <u>REV</u> |
|-------------|------------|-------------|------------|
| 3-169       | R          | 4-2         | N          |
| 3-170       | N          | 4-3         | N          |
| 3-170.1     | AC         | 4-4         | AA         |
| 3-170.2     | AC         | 4-5         | AA         |
| 3-170.3     | AC         | 4-6         | N          |
| 3-171       | AC         | 4-7         | AA         |
| 3-172       | N          | 4-8         | N          |
| 3-173       | R          | 4-9         | AA         |
| 3-174       | R          | 4-10        | N          |
| 3-174.1     | AC         | 4-11        | N          |
| 3-174.2     | AC         | Blank       | -          |
| 3-174.3     | AC         | S-5 Div     | -          |
| 3-174.4     | AC         | Blank       | -          |
| 3-175       | N          | 5-1         | P          |
| 3-176       | N          | Blank       | -          |
| 3-177       | N          | S-5A Div    | -          |
| 3-178       | N          | Blank       | -          |
| 3-179       | N          | 5-3         | H          |
| 3-180       | N          | Blank       | -          |
| 3-181       | N          | 5-5         | J          |
| 3-182       | N          | 5-6         | AC         |
| 3-183       | N          | 5-7         | AC         |
| 3-184       | N          | 5-8         | AC         |
| 3-185       | N          | 5-9         | AC         |
| 3-186       | N          | 5-10        | AB         |
| 3-187       | N          | 5-11        | AC         |
| 3-188       | N          | 5-12        | AC         |
| 3-189       | N          | 5-13        | W          |
| 3-190       | N          | Blank       | -          |
| 3-191       | N          | 5-15        | AC         |
| 3-192       | N          | 5-16        | V          |
| 3-193       | N          | 5-17        | W          |
| 3-194       | N          | 5-18        | AB         |
| 3-195       | N          | 5-19        | AB         |
| 3-196       | N          | 5-20        | AB         |
| 3-197       | N          | 5-21        | V          |
| 3-198       | N          | 5-22        | T          |
| S-4 Div     | -          | 5-23        | Y          |
| Blank       | -          | 5-24        | AB         |
| 4-1         | N          | 5-25        | AB         |
|             |            | 5-26        | AB         |

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| <u>PAGE</u> | <u>REV</u> | <u>PAGE</u> | <u>REV</u> |
|-------------|------------|-------------|------------|
| 5-26.1      | AB         | 5-41        | M          |
| 5-26.2      | AB         | 5-42        | M          |
| 5-26.3      | AB         | 5-43        | Z          |
| 5-26.4      | AB         | 5-44        | Z          |
| 5-27        | AB         | 5-45        | AC         |
| 5-28        | V          | 5-46        | Z          |
| 5-29        | Z          | 5-47        | AC         |
| Blank       | -          | 5-48        | AC         |
| 5-31        | V          | 5-49        | AB         |
| 5-32        | AB         | 5-50        | Z          |
| 5-32.1      | AB         | 5-51        | AC         |
| 5-32.2      | AB         | 5-52        | Z          |
| 5-33        | AB         | 5-53        | AC         |
| 5-34        | AB         | 5-54        | AC         |
| 5-35        | AA         | 5-55        | AC         |
| Blank       | -          | 5-56        | AC         |
| 5-37        | AB         | 5-57        | AB         |
| 5-38        | V          | 5-58        | AB         |
| 5-39        | V          | Cmt Sht     | -          |
| 5-40        | AC         | Rtn Env     | -          |
| S-5B Div    | -          | Blank       | -          |
| Blank       | -          | Cover       | -          |





## CONFIGURATION CHART (Contd)

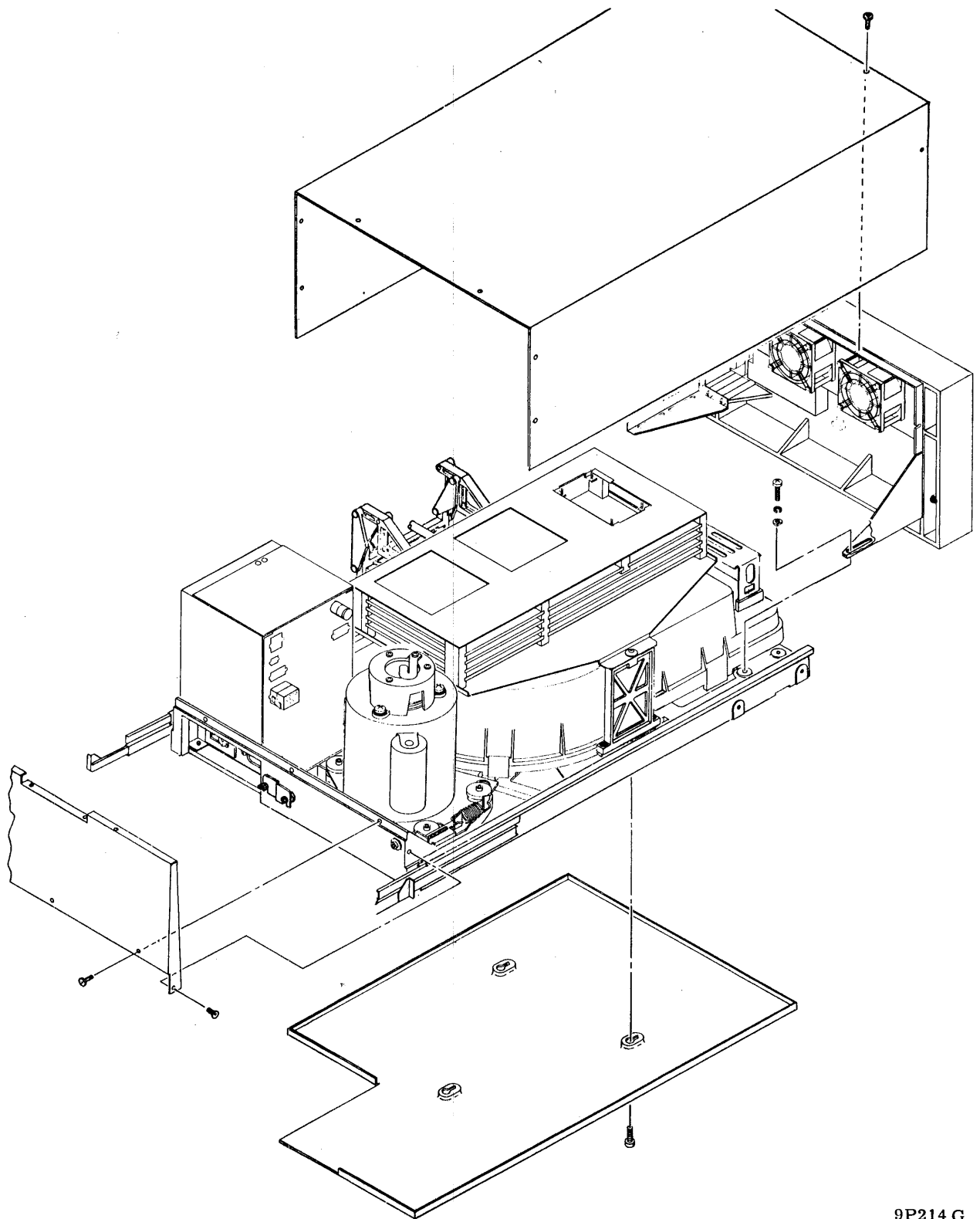
| Equip<br>No.<br>(BZ) | Part<br>Number | Power<br>Volts/Hz/W | Data<br>Cap<br>(MB) | Dual<br>Ch | Fxd<br>Hds | Long<br>Last<br>Sctr | Crg<br>Ofs | Part No. for<br>Painted Parts |                  |
|----------------------|----------------|---------------------|---------------------|------------|------------|----------------------|------------|-------------------------------|------------------|
|                      |                |                     |                     |            |            |                      |            | Color<br>Panel                | Control<br>Panel |
| 5W1H*                | 82399712       | 240/50/420          | 80                  | No         | No         | No                   | No         | Not used                      | 73062401         |
| 511A                 | 82399716       | 120/60/480          | 80                  | No         | No         | No                   | No         | Not used                      | 73083700         |
| 511B                 | 82399717       | 220/50/420          | 80                  | No         | No         | No                   | No         | Not used                      | 73083700         |
| 9A1A                 | 73036802       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A1B                 | 73036803       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A1C                 | 73036845       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 73043800         |
| 9A1E                 | 73036853       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 73062401         |
| 9A1F                 | 73036854       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 73062401         |
| 9A1G                 | 73036855       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036446                      | 82395945         |
| 9A1H                 | 73036856       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036446                      | 82395945         |
| 9A1J                 | 73036867       | 120/60/480          | 160                 | No         | No         | Yes                  | No         | 73036437                      | 82395949         |
| 9A1K                 | 73036868       | 220/50/420          | 160                 | No         | No         | Yes                  | No         | 73036437                      | 82395949         |
| 9A1L                 | 73036869       | 120/60/480          | 160                 | No         | 48         | Yes                  | No         | 73036437                      | 82395949         |
| 9A1M                 | 73036870       | 220/50/420          | 160                 | No         | 48         | Yes                  | No         | 73036437                      | 82395949         |
| 9A1N                 | 73036873       | 120/60/480          | 160                 | No         | No         | No                   | No         | Not used                      | 73062401         |
| 9A1P                 | 73036874       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036411                      | 82395944         |
| 9A1R                 | 73036875       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036411                      | 82395944         |
| 9A1S                 | 73036876       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036443                      | 82395942         |
| 9A1T                 | 73036877       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036443                      | 82395942         |
| 99A1U                | 73036878       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036446                      | 82395945         |
| 9A1V                 | 73036879       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036446                      | 82395945         |
| 9A1W                 | 73036886       | 240/50/420          | 160                 | No         | No         | No                   | No         | 73036417                      | 82395918         |
| 9A1Y                 | 73036893       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A1Z                 | 73036887       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A2A                 | 73036808       | 120/60/480          | 160                 | Yes        | No         | No                   | No         | 47365522                      | 82395902         |
| 9A2B                 | 73036809       | 220/50/420          | 160                 | Yes        | No         | No                   | No         | 47365522                      | 82395902         |
| 9A2C*                | 73036882       | 120/60/480          | 160                 | Yes        | No         | No                   | No         | 73036422                      | 82395001         |
| 9A2D*                | 73036883       | 220/50/420          | 160                 | Yes        | No         | No                   | No         | 73036422                      | 82395001         |
| 9A3A                 | 73036804       | 120/60/480          | 160                 | No         | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A3B                 | 73036805       | 220/50/420          | 160                 | No         | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A4A                 | 73036810       | 120/60/480          | 160                 | Yes        | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A4B                 | 73036811       | 220/50/420          | 160                 | Yes        | 48         | No                   | No         | 73036412                      | 82395902         |
| 9A5A                 | 73036806       | 120/60/480          | 160                 | No         | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A5B                 | 73036807       | 220/50/420          | 160                 | No         | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A5C                 | 73036865       | 120/60/480          | 160                 | No         | 96         | No                   | No         | 73036446                      | 82395945         |
| 9A5D                 | 73036866       | 220/50/420          | 160                 | No         | 96         | No                   | No         | 73036446                      | 82395945         |
| 9A5E                 | 73036871       | 120/60/480          | 160                 | No         | 96         | Yes                  | No         | 73036437                      | 82395949         |
| 9A5F                 | 73036872       | 220/50/420          | 160                 | No         | 96         | Yes                  | No         | 73036437                      | 82395949         |
| 9A5G                 | 73036880       | 120/60/480          | 160                 | No         | 96         | No                   | No         | 73036441                      | 82395940         |
| 9A5H                 | 73036881       | 220/50/420          | 160                 | No         | 96         | No                   | No         | 73036441                      | 82395940         |

\* Special Supplement manual used in conjunction with this manual.  
Refer to Preface for publication number.

## CONFIGURATION CHART (Contd)

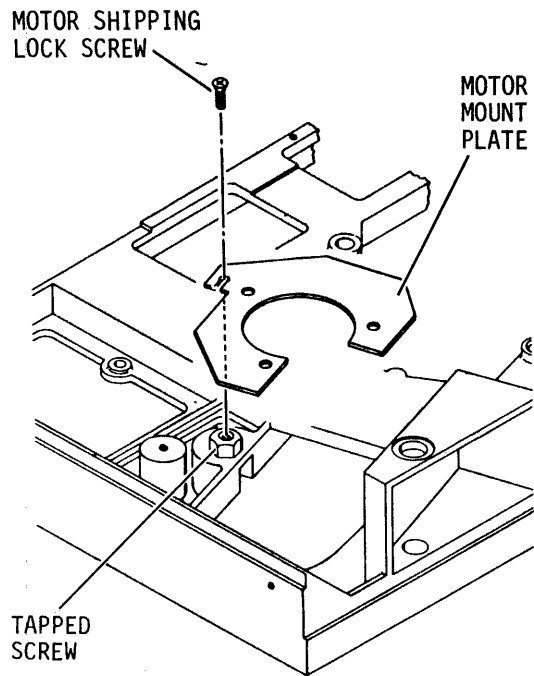
| Equip<br>No.<br>(BZ) | Part<br>Number | Power<br>Volts/Hz/W | Data<br>Cap<br>(MB) | Dual<br>Ch | Fxd<br>Hds | Long<br>Last<br>Sctr | Crg<br>Ofs | Part No. for<br>Painted Parts |                  |
|----------------------|----------------|---------------------|---------------------|------------|------------|----------------------|------------|-------------------------------|------------------|
|                      |                |                     |                     |            |            |                      |            | Color<br>Panel                | Control<br>Panel |
| 9A6A                 | 73036812       | 120/60/480          | 160                 | Yes        | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A6B                 | 73036813       | 220/50/420          | 160                 | Yes        | 96         | No                   | No         | 73036412                      | 82395902         |
| 9A6C*                | 73036884       | 120/60/480          | 160                 | Yes        | 96         | No                   | No         | 47365522                      | 82395001         |
| 9A6D*                | 73036885       | 220/50/420          | 160                 | Yes        | 96         | No                   | No         | 47365522                      | 82395001         |
| 9A6E*                | 82399808       | 120/60/480          | 160                 | Yes        | 96         | No                   | No         | 73036422                      | 82395910         |
| 9A6F*                | 82399809       | 220/50/420          | 160                 | Yes        | 96         | No                   | No         | 73036422                      | 82395910         |
| 9A7A*                | 73036888       | 120/60/480          | 160                 | No         | No         | No                   | No         | Not used                      | 73083700         |
| 9A7B*                | 73036889       | 220/50/420          | 160                 | No         | No         | No                   | No         | Not used                      | 73083700         |
| 9A7C                 | 73036894       | 120/60/480          | 160                 | No         | No         | No                   | No         | 47365539                      | 82395919         |
| 9A7D                 | 73036895       | 220/50/420          | 160                 | No         | No         | No                   | No         | 47365539                      | 82395919         |
| 9A7E                 | 73036896       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036402                      | 82395904         |
| 9A7F                 | 73036897       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036402                      | 82395904         |
| 9A7G                 | 73036898       | 240/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395902         |
| 9A7L                 | 82399806       | 240/60/460          | 160                 | No         | No         | No                   | No         | 73036404                      | 82395902         |
| 9A7M                 | 82399807       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036436                      | 82395935         |
| 9A7N                 | 82399810       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036403                      | 82395909         |
| 9A7P                 | 82399811       | 120/60/480          | 160                 | No         | No         | No                   | No         | 47365505                      | 82395914         |
| 9A7R                 | 82399812       | 220/50/420          | 160                 | No         | No         | No                   | No         | 47365505                      | 82395914         |
| 9A7S                 | 82399813       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036405                      | 82395922         |
| 9A7T                 | 82399814       | 120/60/480          | 160                 | No         | No         | No                   | No         | Not used                      | 73062401         |
| 9A7U                 | 82399815       | 240/50/420          | 160                 | No         | No         | No                   | No         | Not used                      | 73062401         |
| 9A7V                 | 82399816       | 220/50/420          | 160                 | No         | No         | No                   | No         | Not used                      | 73043800         |
| 9A7W                 | 82399819       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036409                      | 82395902         |
| 9A7Y                 | 82399820       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036409                      | 82395902         |
| 9A9A                 | 82399823       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395917         |
| 9A9B                 | 82399824       | 240/50/420          | 160                 | No         | No         | No                   | No         | 73036412                      | 82395917         |
| 9A9C                 | 82399830       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036420                      | 82395924         |
| 9A9D                 | 82399829       | 120/50/420          | 160                 | No         | No         | No                   | No         | 73036420                      | 82395924         |
| 9A9E                 | 82399831       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036421                      | 82395944         |
| 9A9F                 | 82399832       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036421                      | 82395944         |
| 9A9G                 | 82399833       | 120/60/480          | 160                 | No         | No         | No                   | No         | 73036423                      | 82395925         |
| 9A9H                 | 82399834       | 220/50/420          | 160                 | No         | No         | No                   | No         | 73036423                      | 82395925         |
| 911A*                | 82399817       | 120/60/480          | 160                 | No         | No         | No                   | No         | Not used                      | 73083700         |
| 911B*                | 82399818       | 220/50/420          | 160                 | No         | No         | No                   | No         | Not used                      | 73083700         |

\* Special Supplement manual used in conjunction with this manual.  
Refer to Preface for publication number.

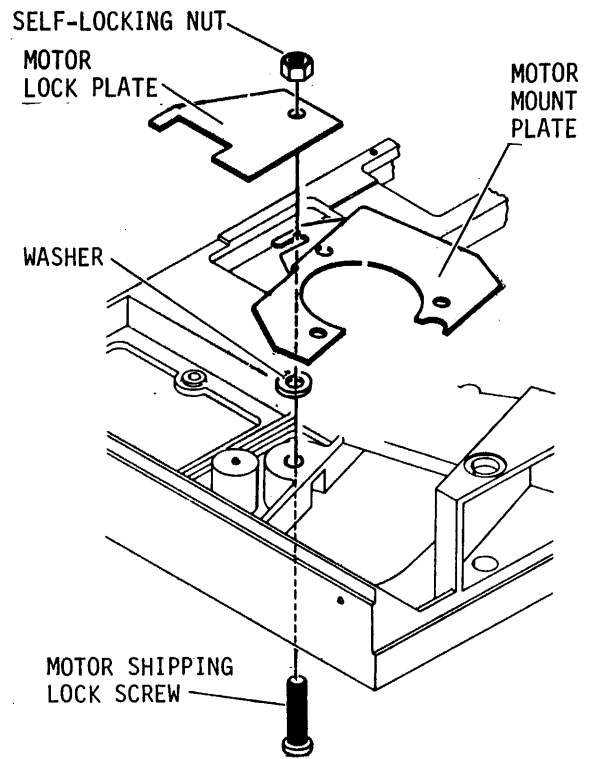


9P214 G

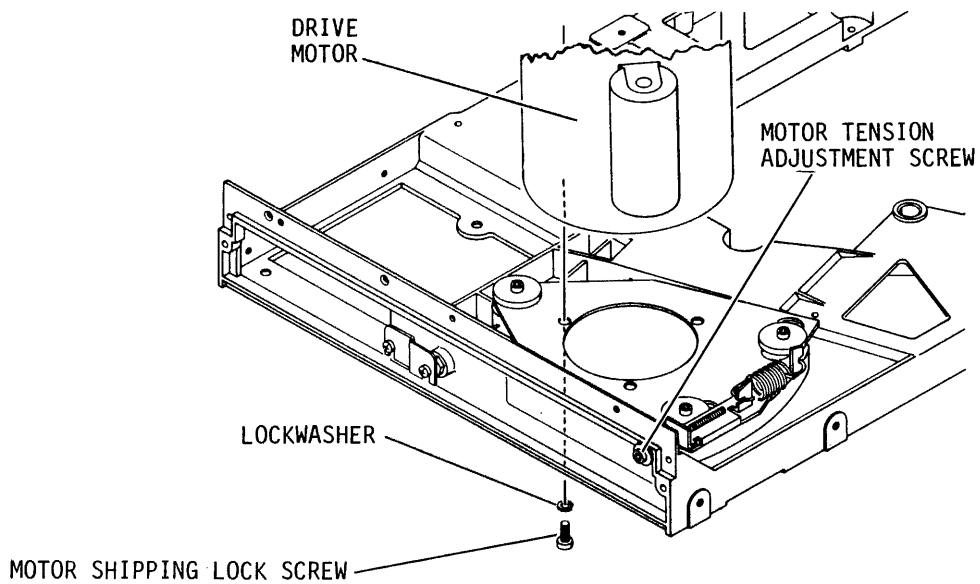
Figure 1-9. Cover Removal



**TYPE A**



**TYPE B**



**TYPE C**

9T351

**Figure 1-9.1 Unlocking Drive Motor**

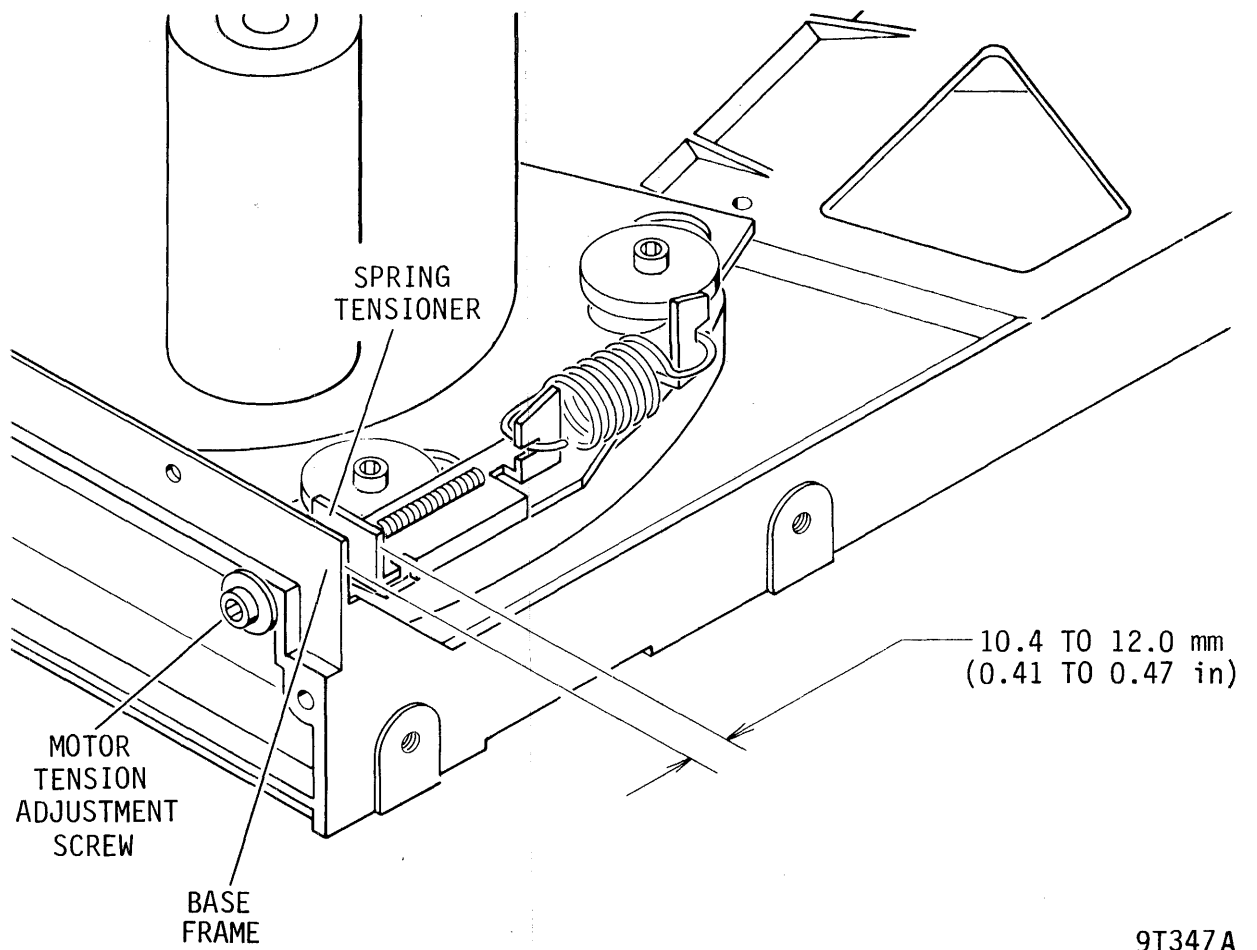


Figure 1-10. Motor Tension Adjustment

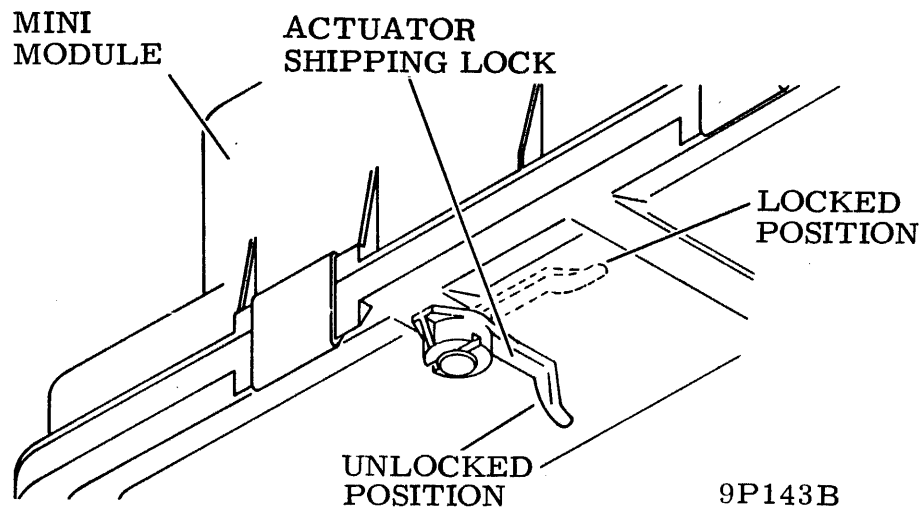


Figure 1-11. Actuator Shipping Lock

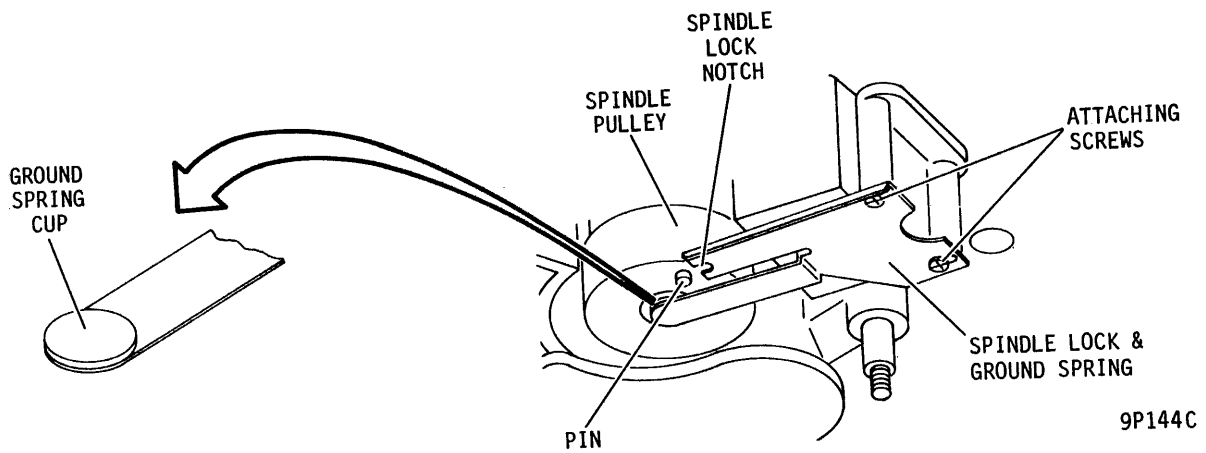
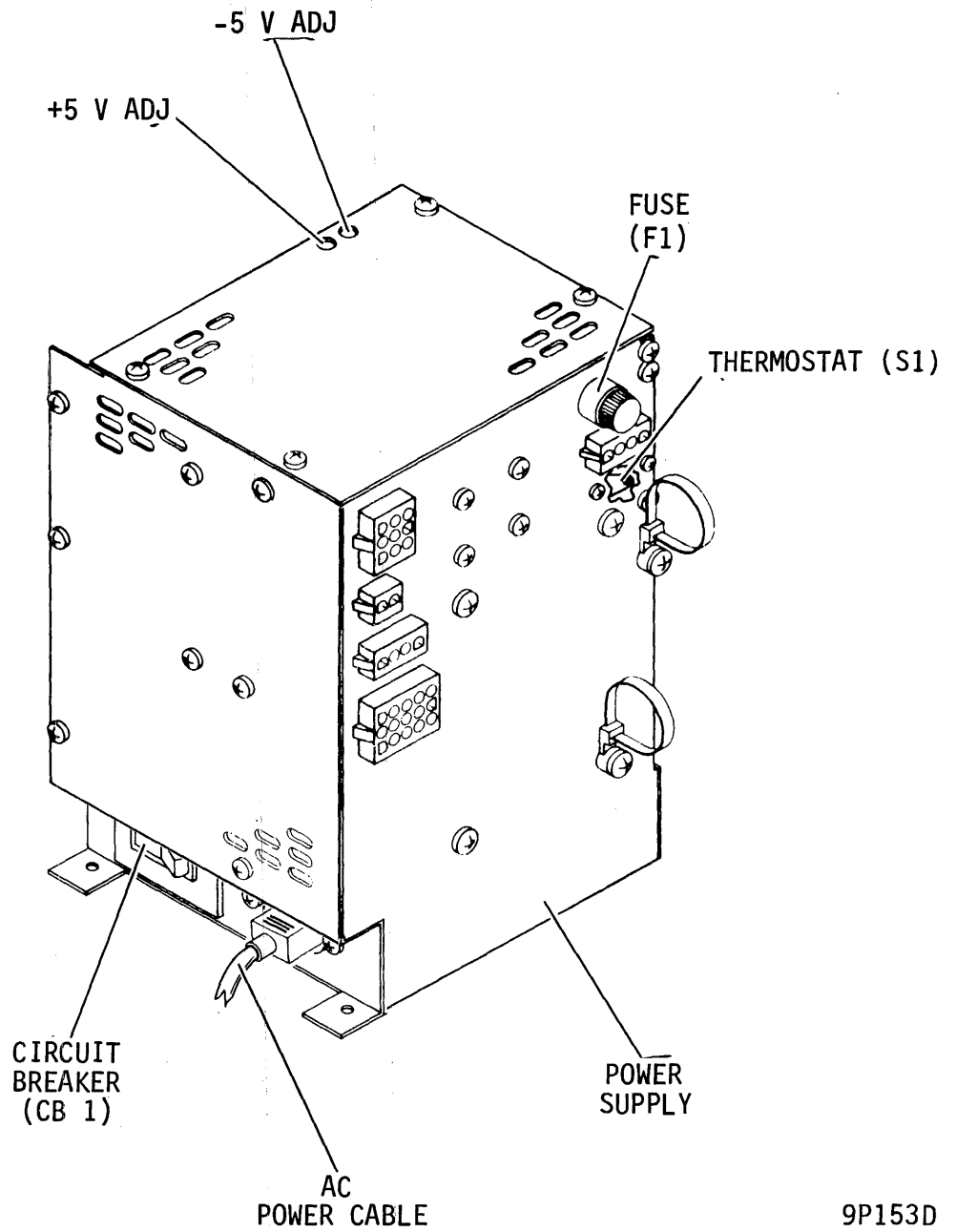


Figure 1-12. Spindle Lock and Ground Spring



9P153D

Figure 2-4. Power Supply



## SERVO GAIN ADJUSTMENT

If the analog card assembly \_KBX or the mini module fails in the field, the following steps must be initiated to make certain that 8 volts peak to peak is available on the servo position signal as in figure 2-5.

1. Before installing replacement card in drive, using a voltohmmeter (VOM), adjust potentiometer SERVO GAIN ADJ (shown in figure 2-6) for the smallest resistance possible. Turn potentiometer counterclockwise.
2. Install \_KBX card assembly into drive.
3. Apply power to drive.
4. Place LOC/REM switch to LOC position enabling disks to spin and unit to load heads.
5. Using the FTU, command 33 track continuous seeks for 160 MB drives or 66 track continuous seeks for 80 MB drives.
6. Connect oscilloscope as shown in figure 2-5.
7. Observe the +Position signal and adjust potentiometer SERVO GAIN ADJ shown in figure 2-6 for a position signal amplitude of 8.0  $\pm$ 0.10 volts peak to peak.

## OVERSHOOT ADJUSTMENT

This procedure contains instructions for minimizing access times by adjusting for optimum overshoot.

### NOTE

Different criteria apply when adjusting different \_KBX Analog Servo cards. Throughout this procedure, refer to Sheet 2 of figure 2-7 for the AJFX and A/C/E/G/H/M/NKBX cards, or to sheet 1 of figure 2-7 for other \_KBX cards.

1. Connect oscilloscope as shown in figure 2-7.
2. Apply power to drive.
3. Command random seeks.
4. Observe +Position signal at TP17 on B01/C01 card assembly as shown in figure 2-7. Scope display shows traces for in and out direction seeks superimposed.

## REPLACEMENT

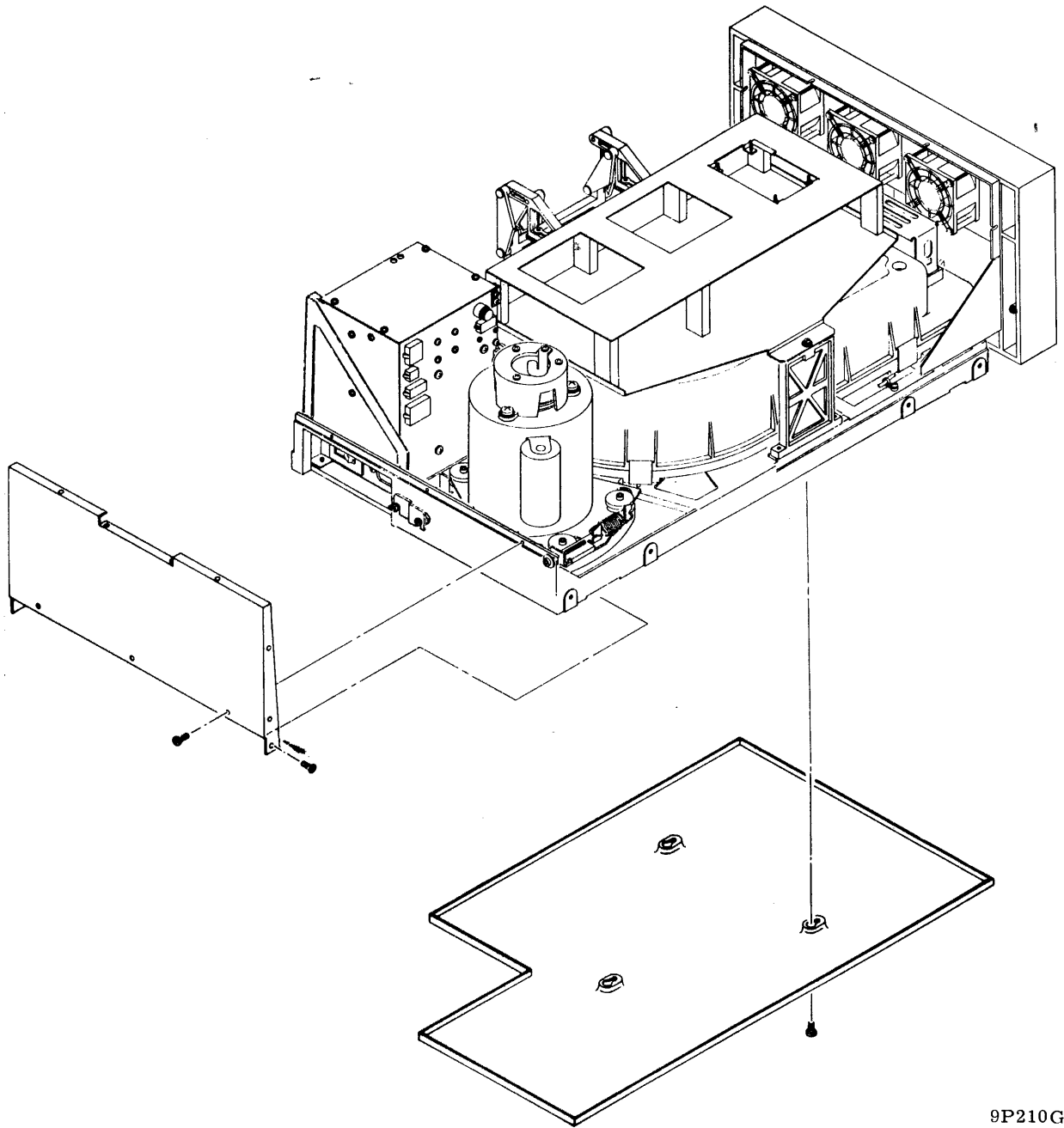
1. Place top cover over drive and align holes in cover with screw holes.
2. Replace screws to hold top cover to base frame.
3. Restore power to drive.
4. Return drive to operating position in mounting rack.
5. Return drive to online operation.

## BOTTOM COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective bottom cover or to temporary removal of the bottom cover to access other components in the drive.

### REMOVAL

1. Extend drive fully to maintenance position.
2. Place circuit breaker CBI in OFF position and disconnect power cord at drive or ac source.
3. Loosen screws securing bottom cover to base frame as shown in figure 2-27.
4. Slide cover toward front of drive until screws align with enlarged holes in cover. Lower cover until cover clears base of unit.
5. Remove bottom cover.



9P210G

Figure 2-27. Bottom Cover

## DRIVE BELT REMOVAL AND REPLACEMENT

This procedure applies either to replacement of the drive belt or to temporary removal of the drive belt to allow removal of other components. On older units (units without motor tension adjustment screw, see figure 2-30.1), two people are needed to install a drive belt; one to position the drive motor and the other to align the belt on the pulleys.

### REMOVAL

1. Perform Top Cover Removal procedure.
2. Perform Bottom Cover Removal procedure.

### CAUTION

Do not allow spindle to rotate during drive belt removal. Rotating the spindle in the wrong direction could damage the mini module.

3. On older units, push drive motor forward until the drive belt falls off as shown in figure 2-30. On newer units, loosen motor tension adjustment screw until drive falls off as shown in figure 2-30.

### REPLACEMENT

#### NOTE

The following step may require two people.

1. On newer units, place and hold drive belt over pulleys on drive motor and spindle. Tighten motor tension adjustment screw until tension holds drive belt on pulleys. On older units, push drive motor forward until drive belt slips over pulleys on spindle and drive motor.

### CAUTION

In the following step, failure to rotate the spindle in the specified direction could damage the mini module.

2. Rotate spindle in direction shown in figure 2-30 until drive belt is centered on pulleys.
3. On newer units, tighten motor tension adjustment screw until gap between spring tensioner and base frame is as specified in figure 2-30.1.

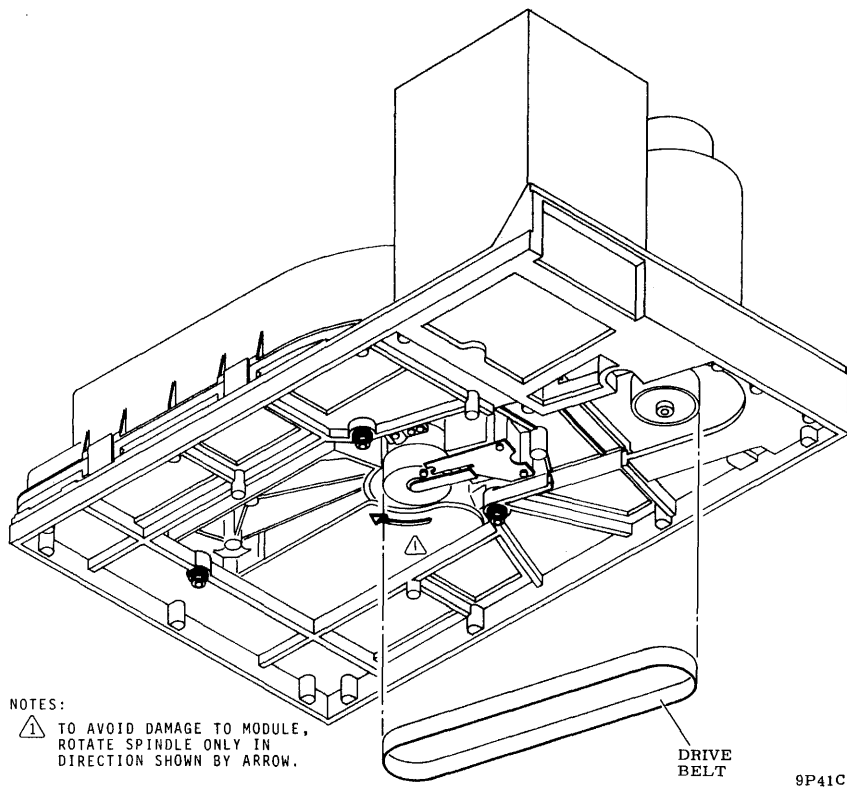


Figure 2-30. Drive Belt Removal and Replacement

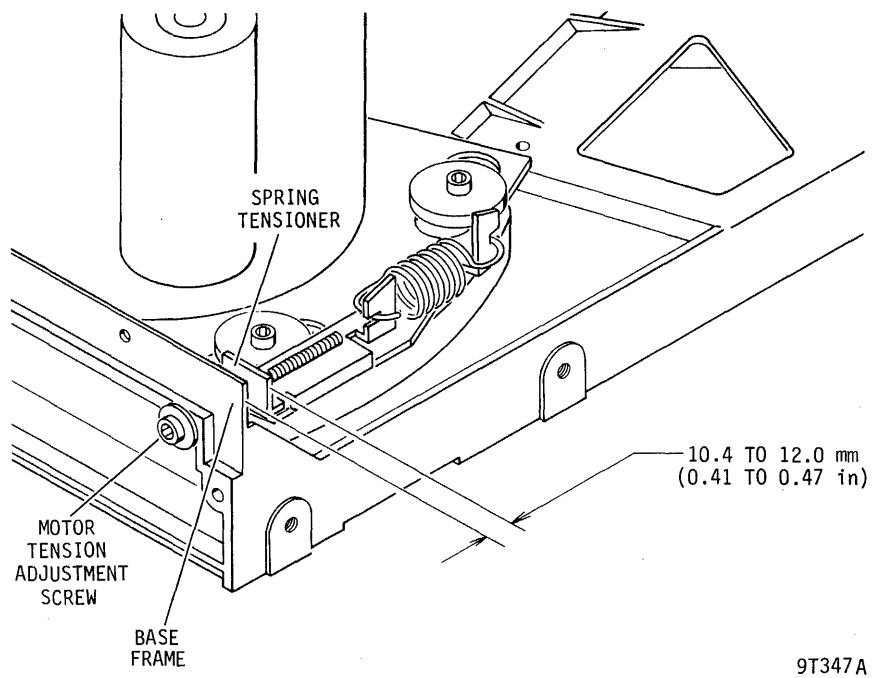


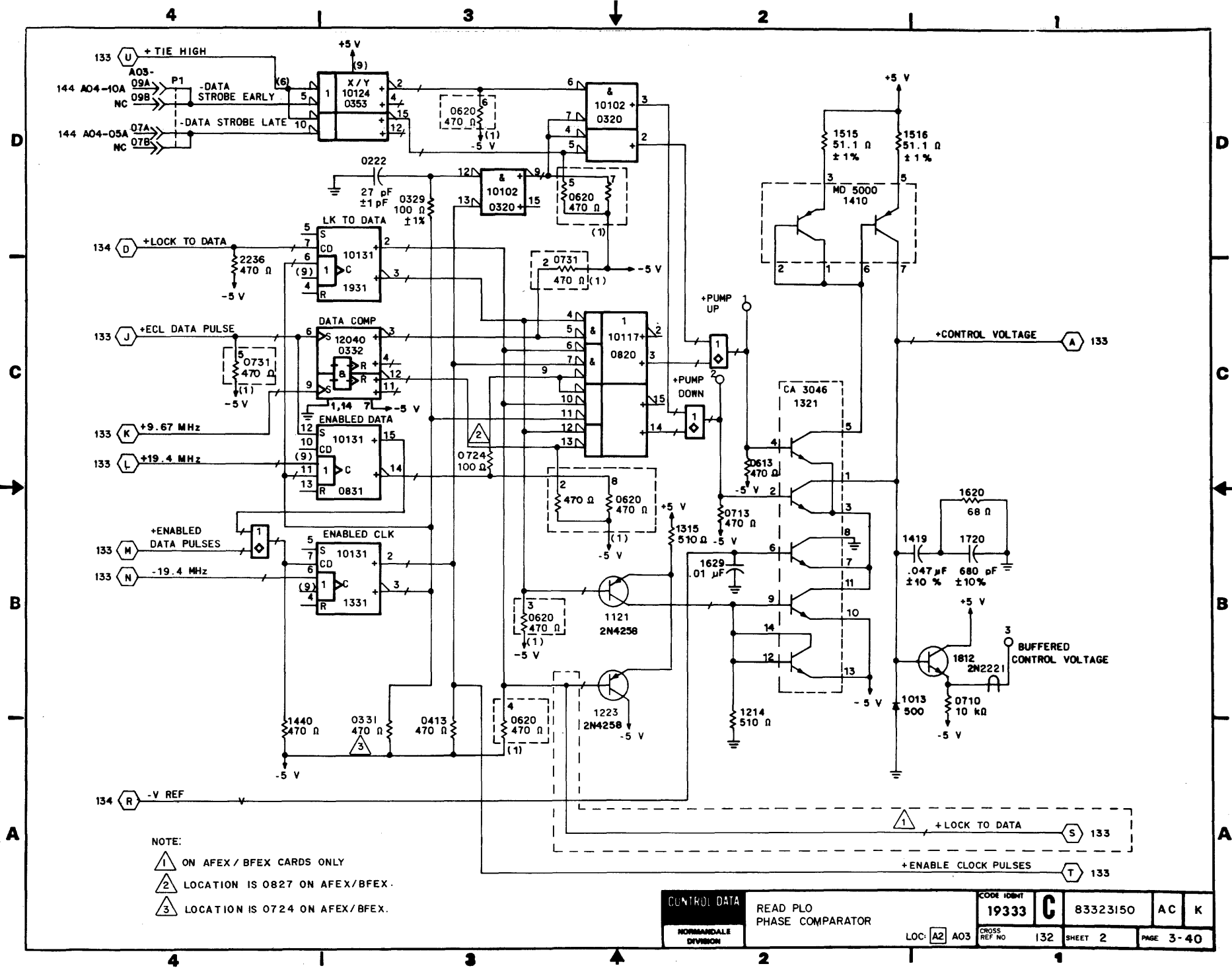
Figure 2-30.1 Motor Tension Adjustment  
Newer Units Only





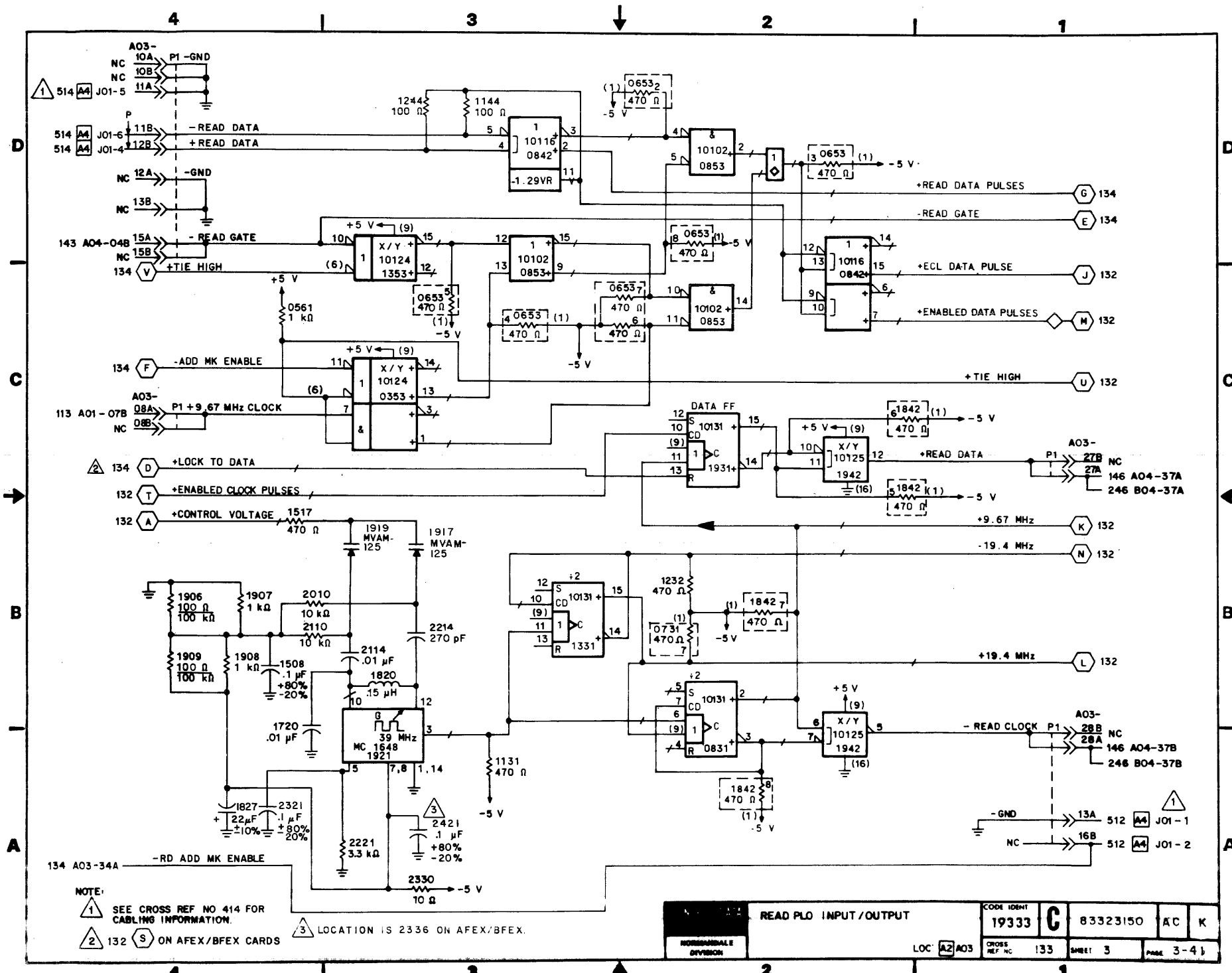






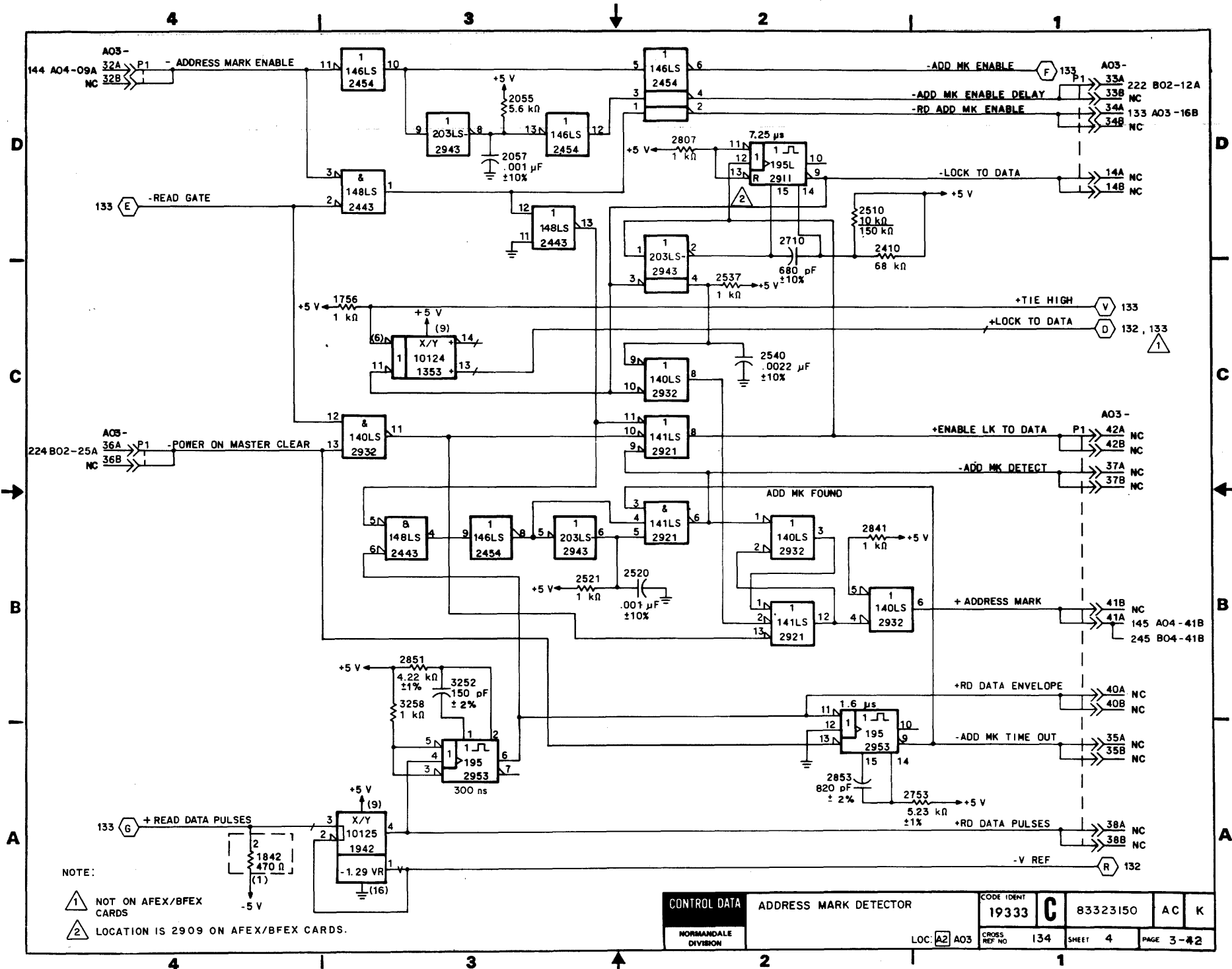
NOTE:  
 1 ON AFEX / BFEX CARDS ONLY  
 2 LOCATION IS 0827 ON AFEX / BFEX.  
 3 LOCATION IS 0724 ON AFEX / BFEX.

|   |                              |                     |         |           |    |   |
|---|------------------------------|---------------------|---------|-----------|----|---|
| CONTROL DATA<br>NORMANDEALE<br>DIVISION | READ PLO<br>PHASE COMPARATOR | CODE IDENT<br>19333 | C       | 83323150  | AC | K |
|   | LOC: A2 A03                  | CROSS<br>REF NO 132 | SHEET 2 | PAGE 3-40 |    |   |



NOTE:  
 ① SEE CROSS REF NO 414 FOR CABLING INFORMATION.  
 ② 132 (S) ON AFEX/BFEX CARDS  
 ③ LOCATION IS 2336 ON AFEX/BFEX.

|            |  |                  |  |          |  |          |  |   |  |
|------------|--|------------------|--|----------|--|----------|--|---|--|
| NO. 19333  |  | CODE IDENT       |  | 83323150 |  | AC       |  | K |  |
| LOC A2 A03 |  | CROSS REF NO 133 |  | SHEET 3  |  | PAGE 3-4 |  |   |  |



NOTE:

- ⚠ NOT ON AFEX/BFEX CARDS
- ⚡ LOCATION IS 2909 ON AFEX/BFEX CARDS.

|                     |  |                       |        |              |       |       |          |           |   |
|---------------------|--|-----------------------|--------|--------------|-------|-------|----------|-----------|---|
| CONTROL DATA        |  | ADDRESS MARK DETECTOR |        | CODE IDENT   | 19333 | C     | 83323150 | AC        | K |
| NORMANDALE DIVISION |  | LOC:                  | A2 A03 | CROSS REF NO | 134   | SHEET | 4        | PAGE 3-42 |   |

| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 1                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A | A | A |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | B | B | A | A | B |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | B | C | A | A | B |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |                    |       |         |       |
|-----------|---------|--------------------|-------|---------|-------|
| REV.      | ECO.    | DESCRIPTION        | DRFT. | DATE    | CHK'D |
| A         | DJ23000 | RELEASED           | M.J.  | 1/7/82  | DJD   |
| B         | DJ02353 | CHG FAX CARD       | FA    | 6/15/82 | DJD   |
| C         | DJ02492 | CHG AFFAX BD BLANK | MJ    | 7-18-82 |       |

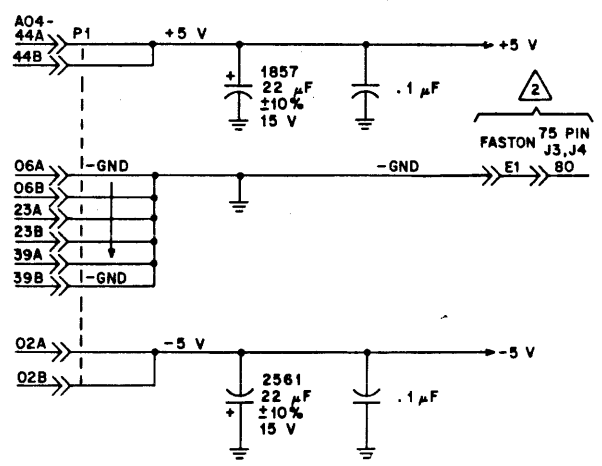
UNUSED RESISTOR PACKS

| LOCATION | PINS  |
|----------|-------|
| 0264     | 4,7   |
| 1014     | 4,7,8 |
| 1044     | 5,7,8 |
| 1054     | 3,7,8 |

UNUSED LOGIC ELEMENTS

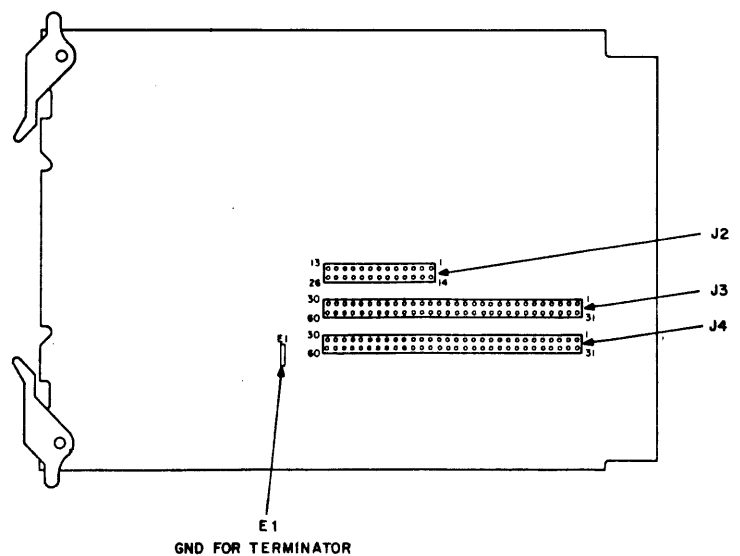
| ELEMENT | LOCATION | OUTPUT PINS(S) |
|---------|----------|----------------|
| 175LS   | 0228     | 5,6            |

NOTES:  
 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



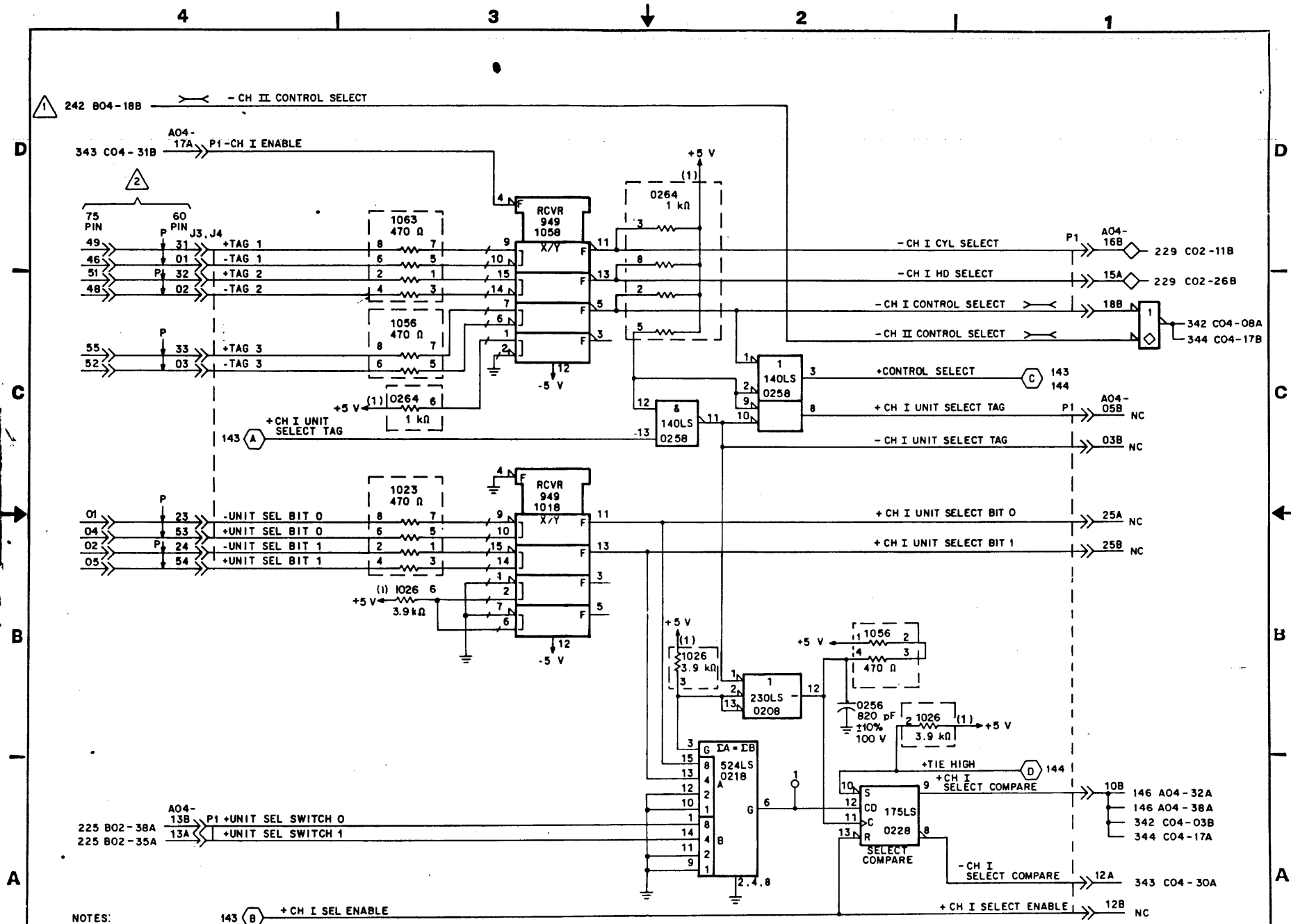
.1 μF FILTER CAPS

| +5 V | -5 V |
|------|------|
| 0214 | 1012 |
| 0226 | 1122 |
| 0235 | 1032 |
| 0245 | 1042 |
| 0255 | 1147 |
| 1015 | 1262 |
| 1025 | 2812 |
| 1035 | 2822 |
| 1145 | 2830 |
| 1155 | 2837 |
| 2814 | 2845 |
| 2823 | 2855 |
| 2831 |      |
| 2838 |      |
| 2846 |      |
| 2854 |      |



APPLICABLE ONLY TO BZ9A7E/F UNITS WITH INDEX AND SECTOR IN THE "A" CABLE

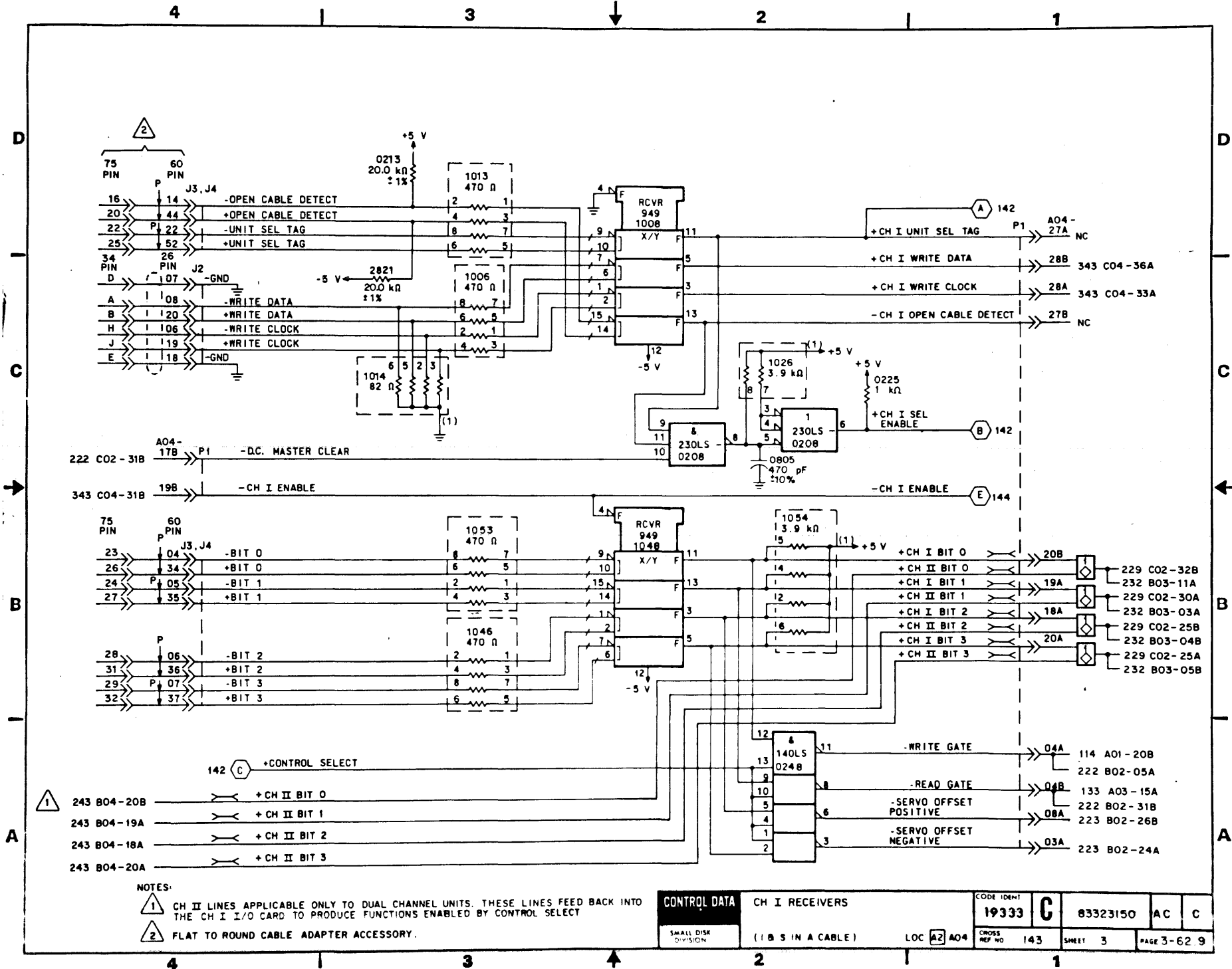
|          |         |         |                     |                      |              |     |          |        |      |
|----------|---------|---------|---------------------|----------------------|--------------|-----|----------|--------|------|
| DRAWN    | M. JAHN | 4-12-82 | CONTROL DATA        | CODE IDENT           | 19333        | C   | 83323150 | AC     | C    |
| CHECKED  | D.P.    | 4-13-82 |                     | CHANNEL I/O DIAGRAMS | CROSS REF NO | 141 | SHEET    | 1 of 6 | PAGE |
| ENGINEER | H. JAHN | 4-13-82 | SMALL DISK DIVISION | TYPE: AFFAX          | LOC: A2      | A04 |          |        |      |
| APPROVED |         |         |                     |                      |              |     |          |        |      |



NOTES: 143 (A) +CH I SEL ENABLE

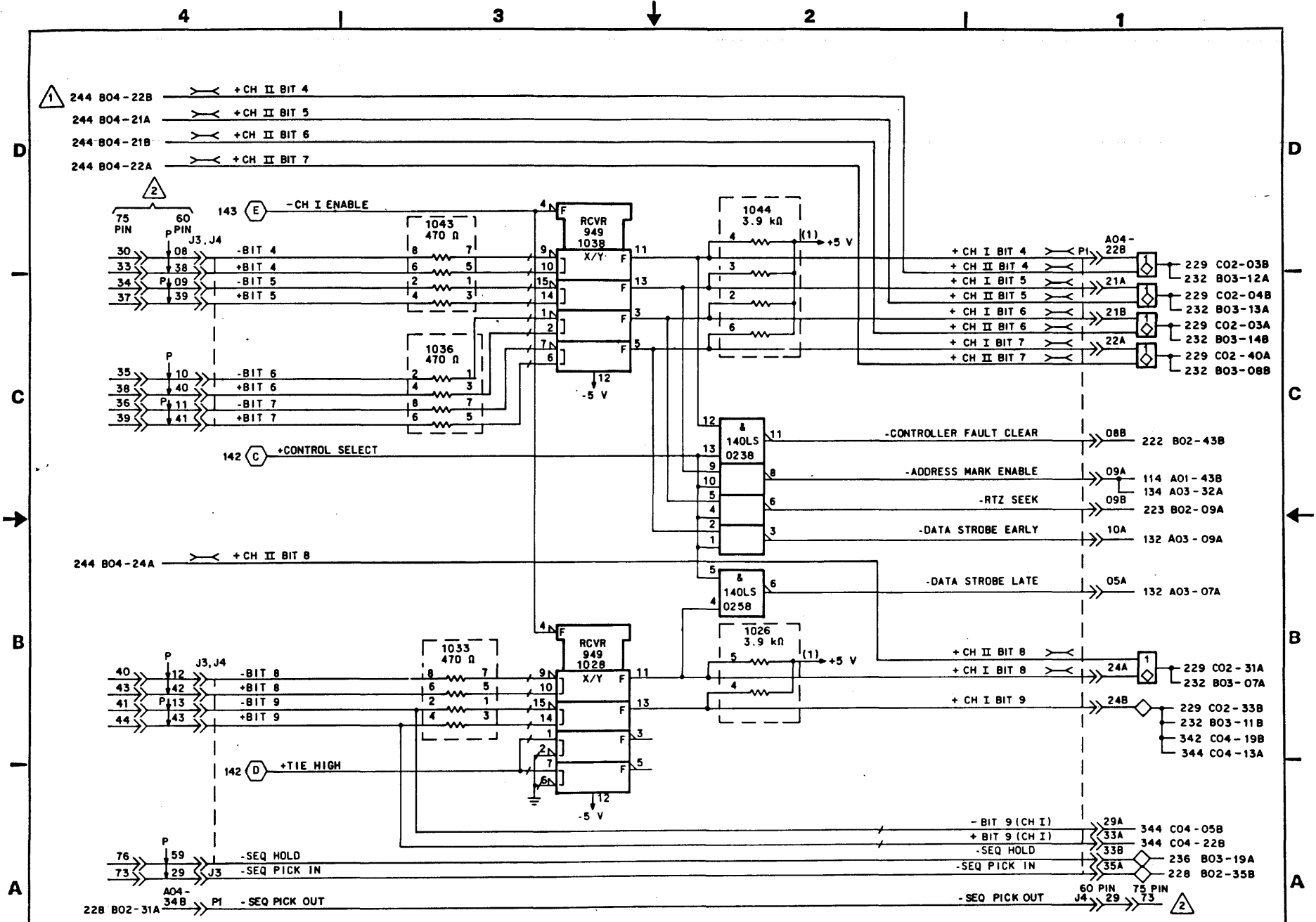
- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|  |                                   |                     |                  |          |         |             |
|--|-----------------------------------|---------------------|------------------|----------|---------|-------------|
| CONTROL DATA<br>SMALL DISK<br>DIVISION | CH I RECEIVERS AND<br>UNIT SELECT | CODE IDENT<br>19333 | C                | 83323150 | Z       | B           |
|  | (1 B S IN A CABLE)                | LOC: A2 A04         | CROSS<br>REF. NO | 142      | SHEET 2 | PAGE 3-62.8 |



NOTES:  
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT  
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |                   |                |  |            |       |     |              |     |         |             |
|---------------------|-------------------|----------------|--|------------|-------|-----|--------------|-----|---------|-------------|
| CONTROL DATA        |                   | CH I RECEIVERS |  | CODE IDENT | 19333 | C   | 83323150     | AC  | C       |             |
| SMALL DISK DIVISION | (18 S IN A CABLE) |                |  | LOC        | A2    | A04 | CROSS REF NO | 143 | SHEET 3 | PAGE 3-62 9 |



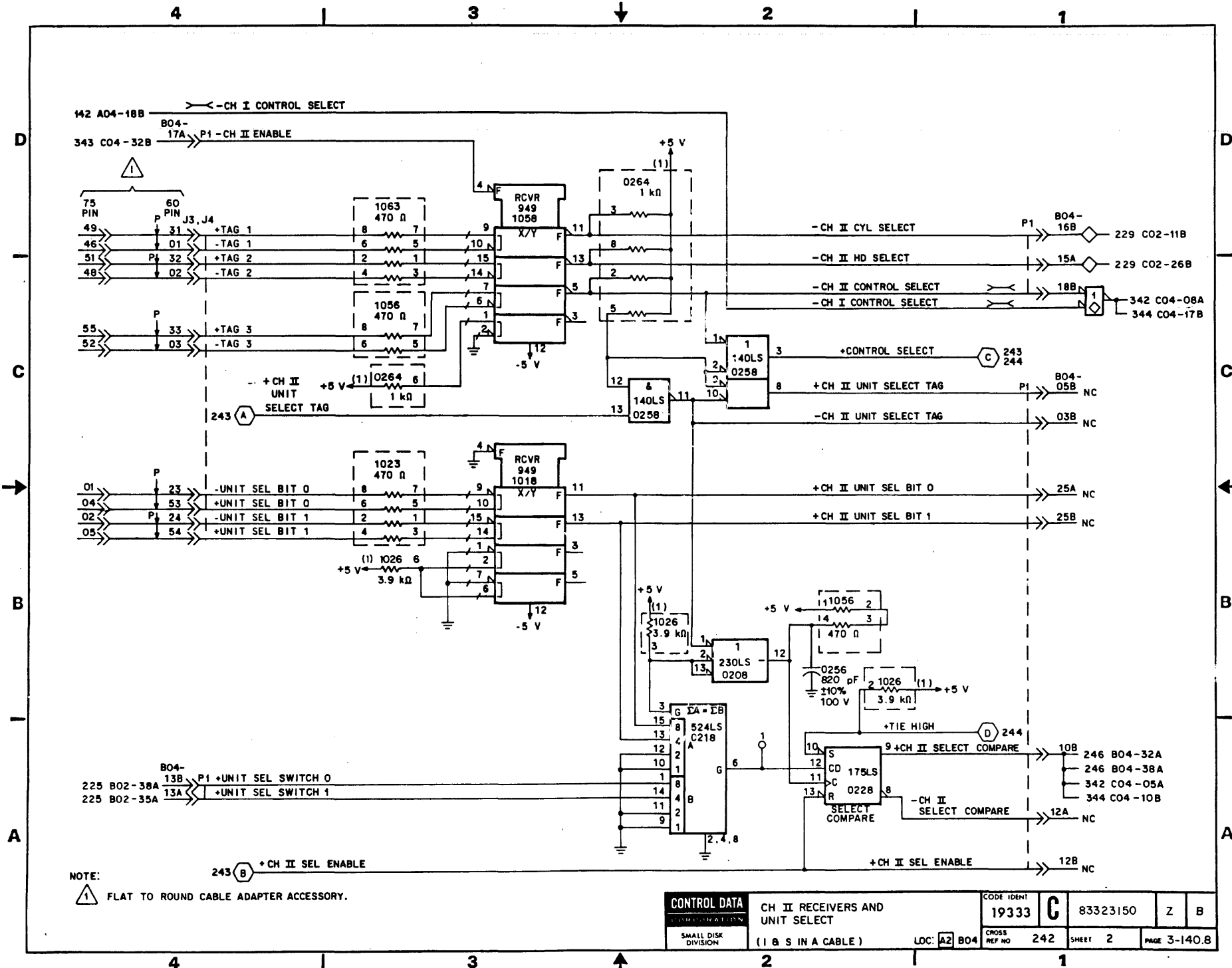
NOTES:

- 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|   |                              |                     |                     |          |              |   |
|---|------------------------------|---------------------|---------------------|----------|--------------|---|
| CONTROL DATA<br>SERIAL NUMBER<br>SMALL DISK<br>DIVISION | CH I RECEIVERS AND SEQ POWER | CODE IDENT<br>19333 | C                   | 83323150 | Z            | A |
|   | (1 & S IN A CABLE)           | LOC. A2 A04         | CROSS<br>REF NO 144 | SHEET 4  | PAGE 3-62.10 |   |

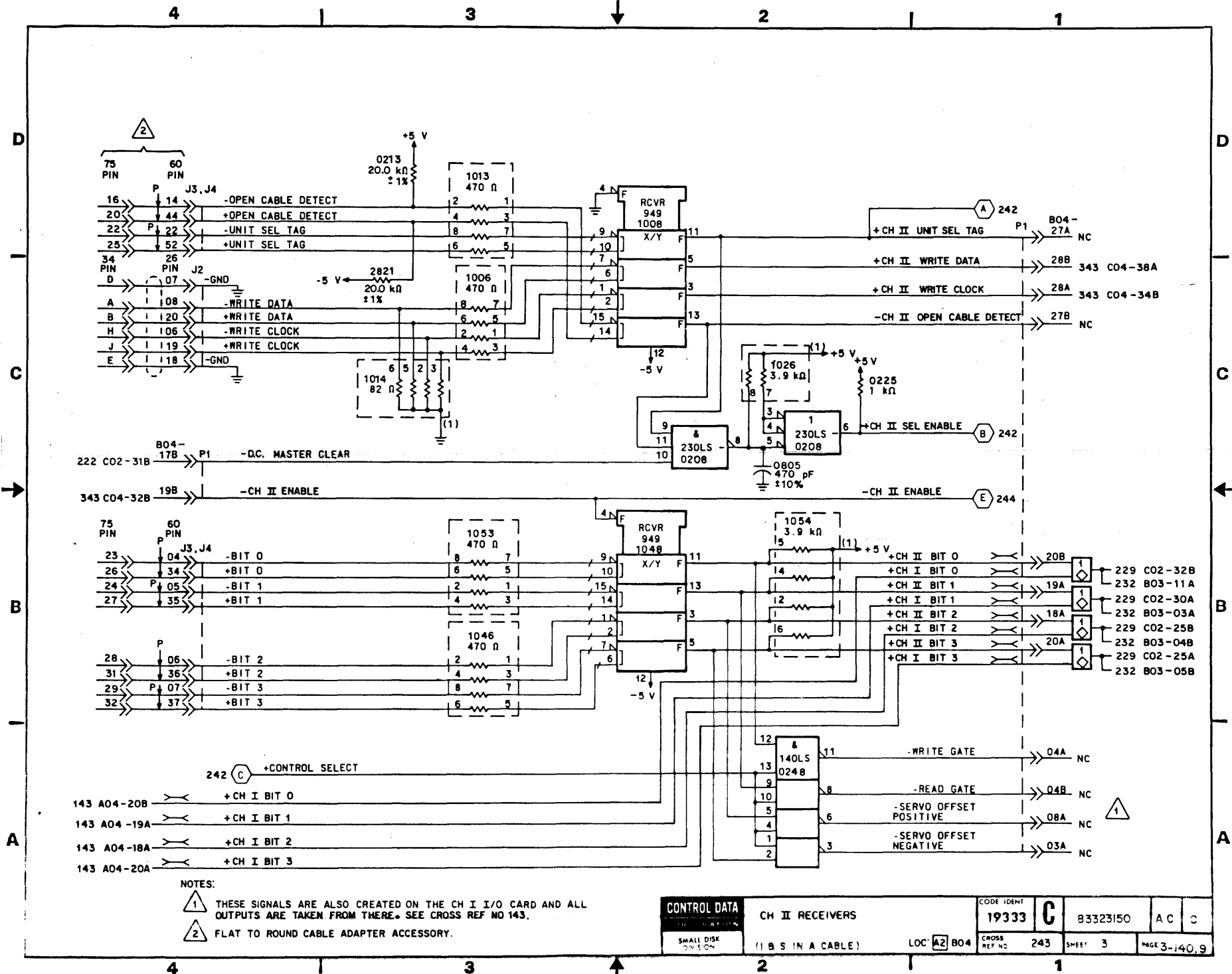






NOTE: ⚠ FLAT TO ROUND CABLE ADAPTER ACCESSORY.

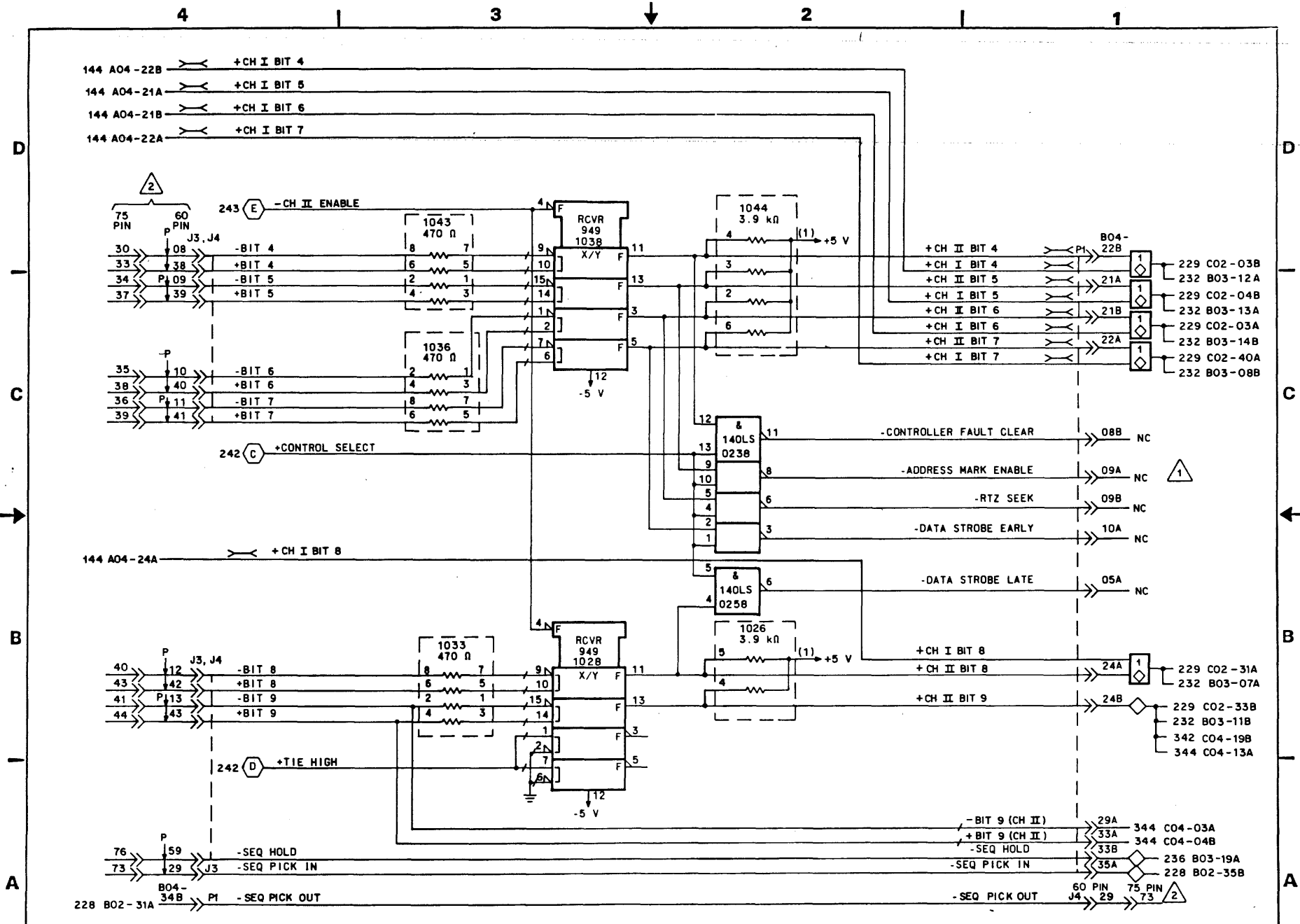
|                             |                                    |                    |                     |         |              |   |   |
|-----------------------------|------------------------------------|--------------------|---------------------|---------|--------------|---|---|
| CONTROL DATA<br>CORPORATION | CH II RECEIVERS AND<br>UNIT SELECT |                    | CODE IDENT          | C       | 83323150     | Z | B |
|                             | SMALL DISK<br>DIVISION             | (1 & S IN A CABLE) | 19333               |         |              |   |   |
| LOC: A2 B04                 |                                    |                    | CROSS<br>REF NO 242 | SHEET 2 | PAGE 3-140.8 |   |   |



NOTES:

- ① THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 143.
- ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                     |                    |              |          |         |
|---------------------|--------------------|--------------|----------|---------|
| <b>CONTROL DATA</b> |                    | CODE IDENT   | C        |         |
| CH II RECEIVERS     |                    | 19333        | B3323150 | ACC     |
| SMALL DISK DIVISION | (1 B S IN A CABLE) | CROSS REF NO | 243      | SHEET 3 |
| LOC: A2 B04         |                    | PAGE         | 3-140,9  |         |



NOTES:

1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144

2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

|                                     |                               |                     |                     |          |               |   |
|-------------------------------------|-------------------------------|---------------------|---------------------|----------|---------------|---|
| CONTROL DATA<br>SMALL DISK DIVISION | CH II RECEIVERS AND SEQ POWER | CODE IDENT<br>19333 | C                   | 83323150 | Z             | A |
|                                     | (1 & S IN A CABLE)            | LOC: A2 B04         | CROSS REF NO<br>244 | SHEET 4  | PAGE 3-140.10 |   |

REVISION STATUS OF SHEETS

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| A | A | A | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B | B | B | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

REVISIONS

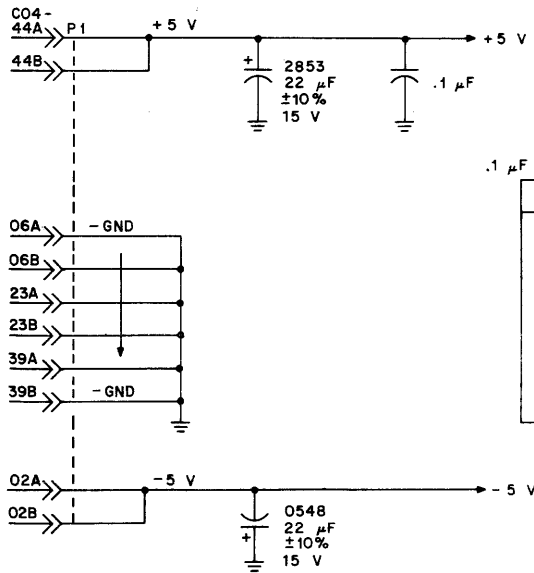
| REV. | NO.     | DESCRIPTION  | DRFT. | DATE    | CHK'D |
|------|---------|--------------|-------|---------|-------|
| A    | FE23000 | RELEASED     |       |         |       |
| B    | DJ02541 | UPDATE LOGIC | MJ    | 7-18-83 |       |

UNUSED LOGIC ELEMENTS

| ELEMENT | LOCATION | OUTPUT PIN(S) |
|---------|----------|---------------|
| 193     | 1842     | 5,12          |
| 146LS   | 2321     | 10            |
| 202LS   | 2814     | 6             |

NOTES:

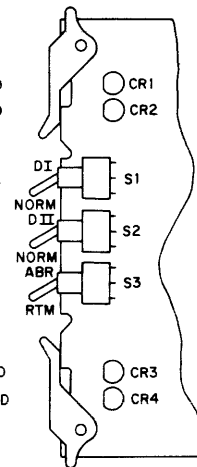
- 1 UNUSUED LOGIC ELEMENT INPUT PINS ARE GROUNDED EXCEPT PINS 9 AND 10 OF 193 ARE OPEN.
  - 2 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG ON THE W/W SIDE OF THE BACKPANEL. THESE LINES ARE JUMPED TOGETHER:  
 344 CO4-15B → 344 CO4-20B  
 344 CO4-17A → 344 CO4-18B  
 GND CO4-23B → 342 CO4-30B  
 343 CO4-30A → 343 CO4-31B  
 343 CO4-33A → 343 CO4-33B  
 343 CO4-35A → 343 CO4-36A
- SEE CROSS REF NO INDICATED FOR SIGNAL ORIGINS AND DESTINATIONS.



.1 µF FILTER CAPS

| +5 V |
|------|
| 0121 |
| 1033 |
| 1042 |
| 1055 |
| 2110 |
| 2122 |
| 2133 |
| 2143 |
| 2154 |

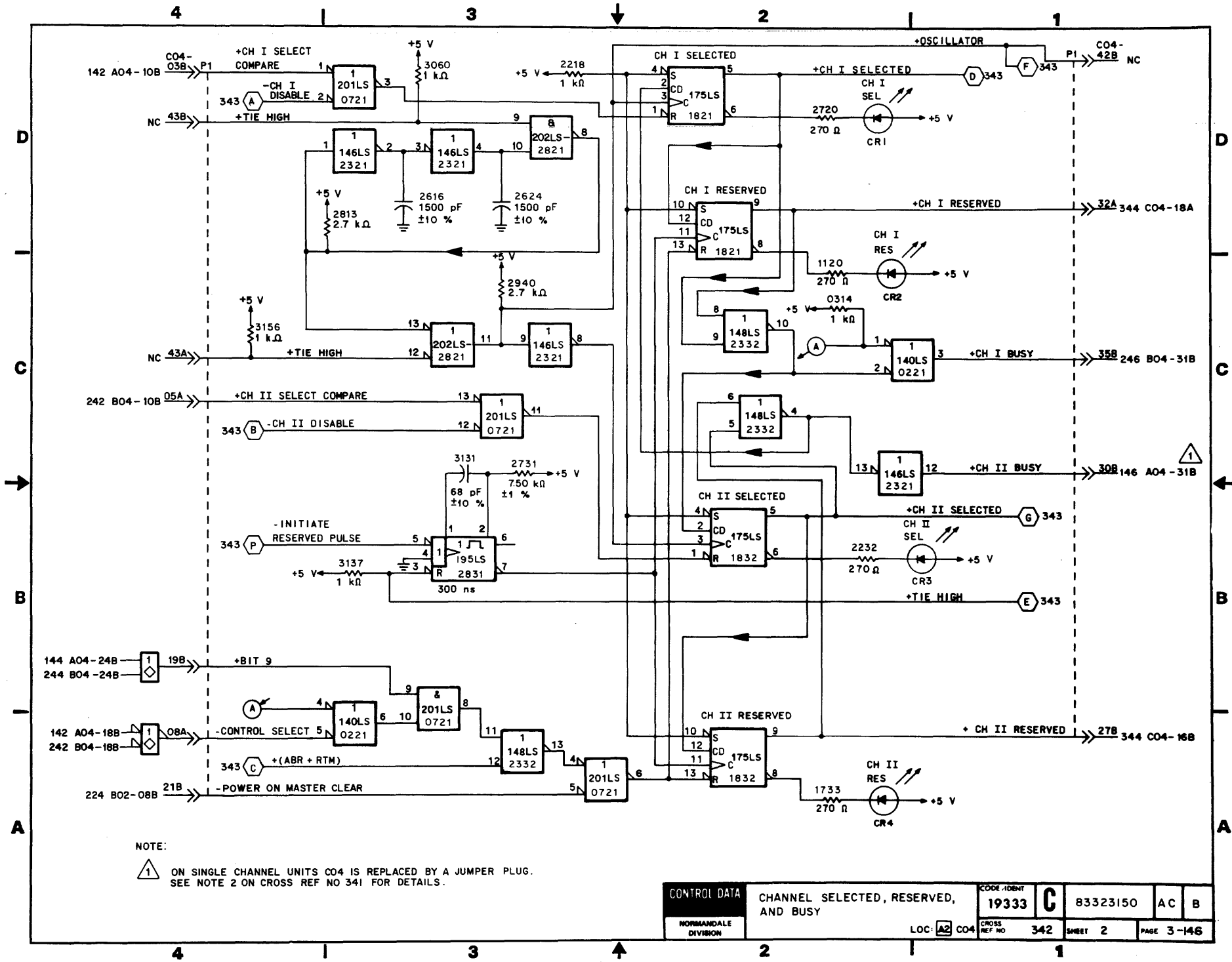
- CH I SELECTED
- CH I RESERVED
- CH I MAINT UNIT DISABLE
- CH II MAINT UNIT DISABLE
- RELEASE TIMER SELECT



- CH II SELECTED
- CH II RESERVED

APPLICABLE ONLY TO DUAL CHANNEL UNITS 2

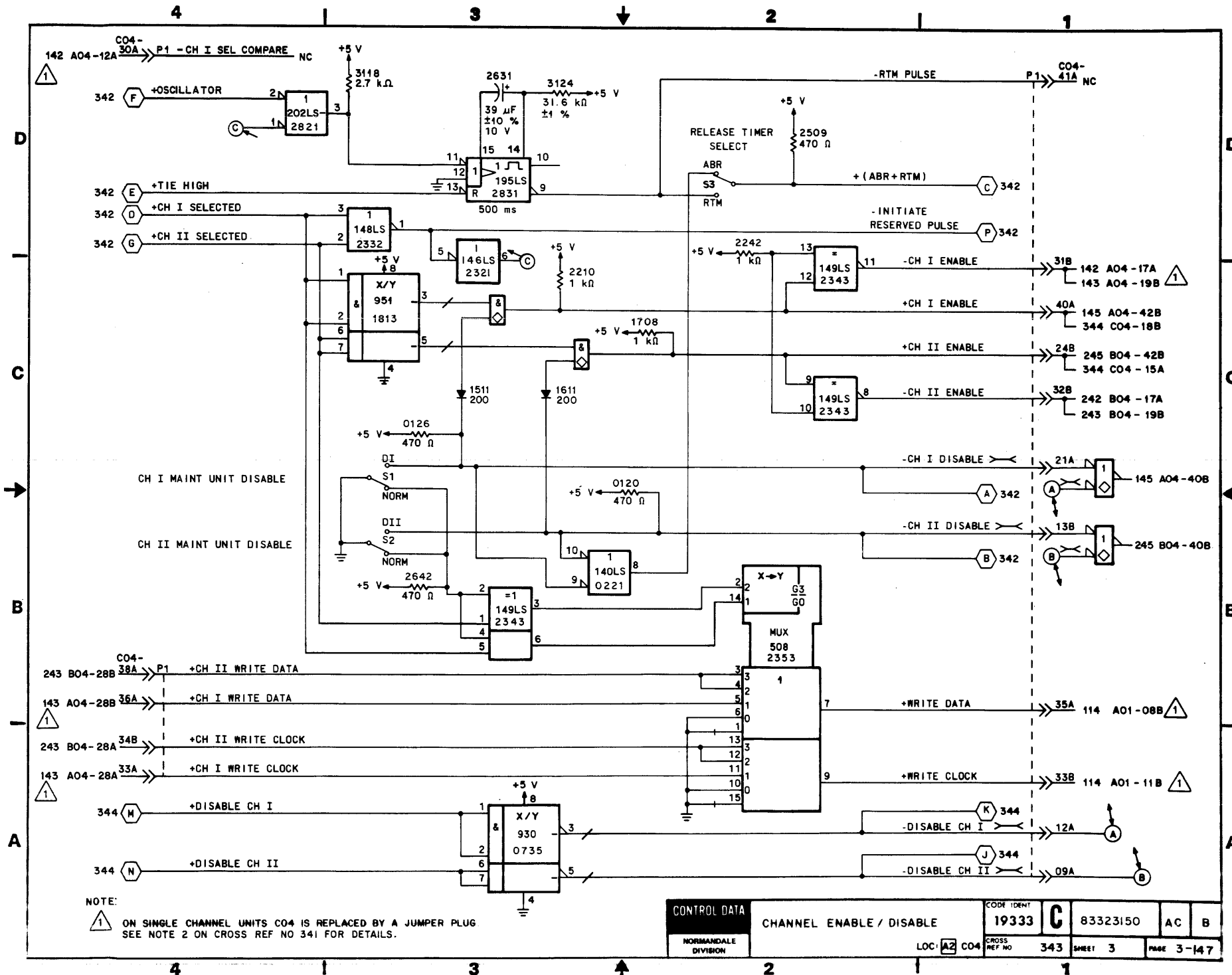
|          |                  |                      |                                |              |        |              |            |   |
|----------|------------------|----------------------|--------------------------------|--------------|--------|--------------|------------|---|
| DRAWN    | G. RADINE 4-4-79 | CONTROL DATA         | CODE IDENT                     | 19333        | C      | 83323150     | AC         | B |
| CHECKED  |                  |                      |                                |              |        |              |            |   |
| ENGINEER |                  | NORMAN DALE DIVISION | DUAL CHANNEL STEERING DIAGRAMS | CROSS REF NO | 341    | SHEET 1 OF 4 | PAGE 3-143 |   |
| APPROVED |                  |                      | TYPE AFBX                      | LOC          | A2 CO4 |              |            |   |



NOTE:

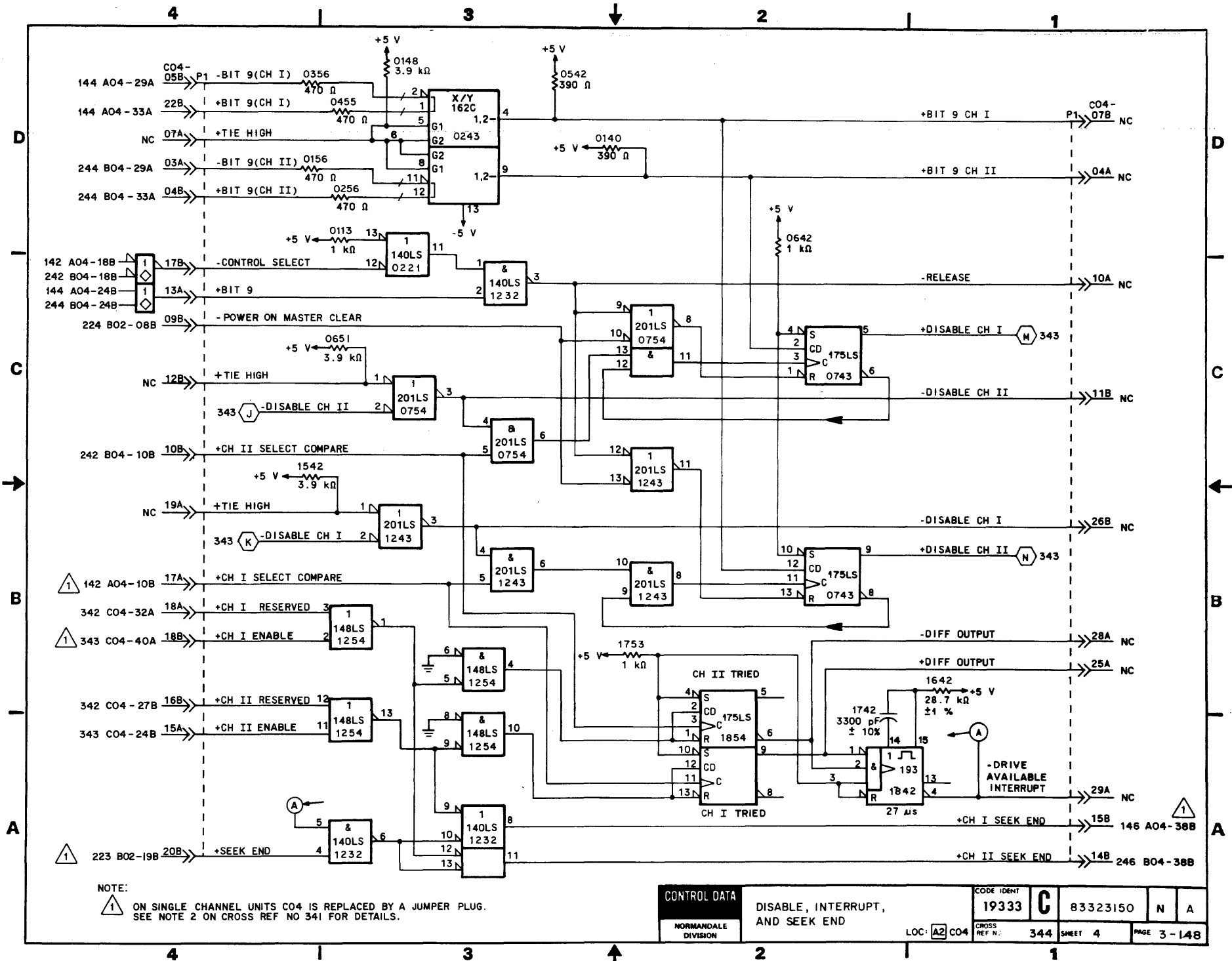
⚠ ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG. SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

|              |                                      |         |     |              |       |       |          |      |       |
|--------------|--------------------------------------|---------|-----|--------------|-------|-------|----------|------|-------|
| CONTROL DATA | CHANNEL SELECTED, RESERVED, AND BUSY |         |     | CODE IDENT   | 19333 | C     | 83323150 | AC   | B     |
|              | NORMANDALE DIVISION                  | LOC: A2 | CO4 | CROSS REF NO | 342   | SHEET | 2        | PAGE | 3-146 |



NOTE:  
 1 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.  
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

|              |                          |             |                  |          |            |   |
|--------------|--------------------------|-------------|------------------|----------|------------|---|
| CONTROL DATA | CHANNEL ENABLE / DISABLE |             | CODE IDENT       | 83323150 | AC         | B |
|              | NORMANDEALE DIVISION     | LOC: A2 CO4 | 19333 C          |          |            |   |
|              |                          |             | CROSS REF NO 343 | SHEET 3  | PAGE 3-147 |   |



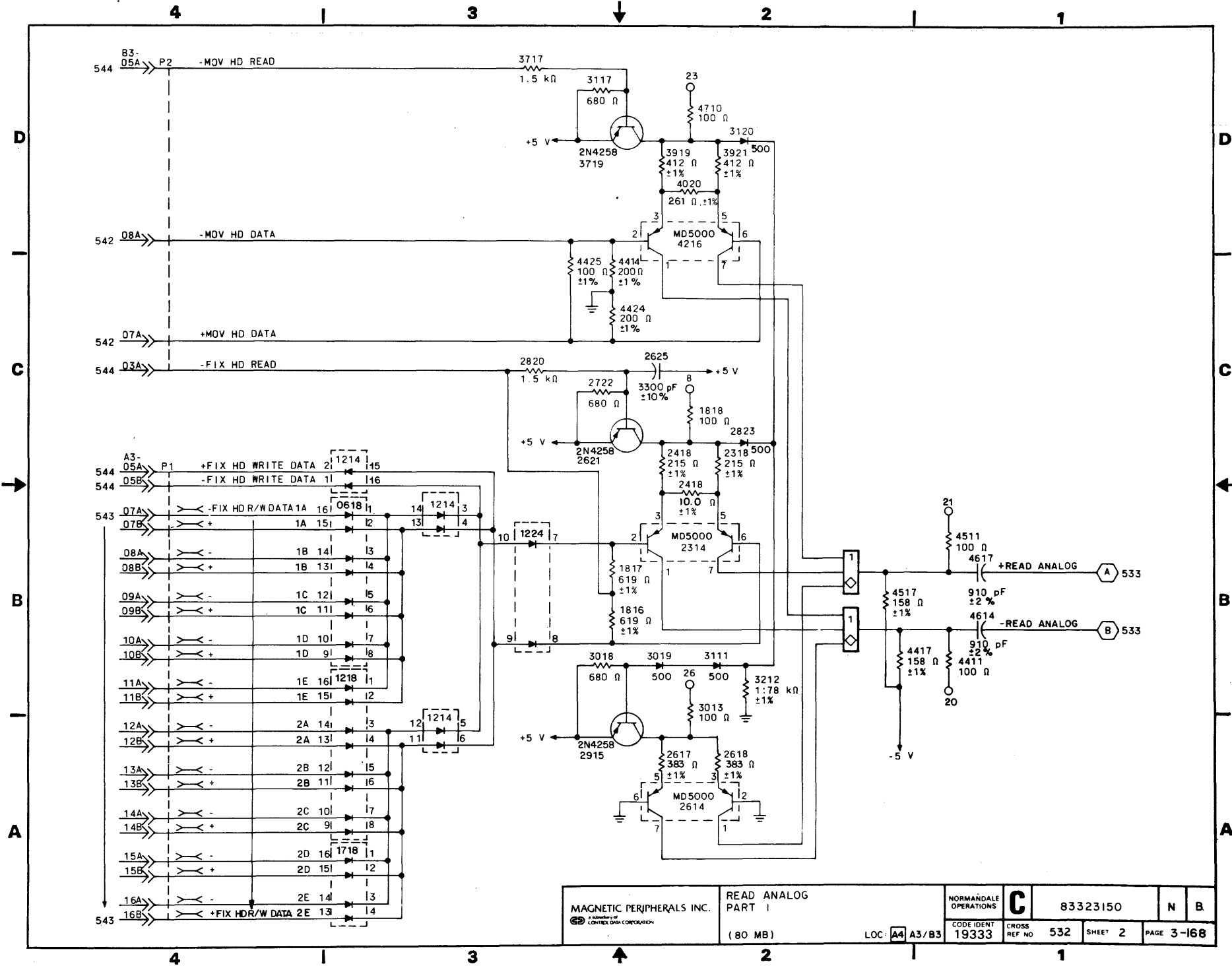
NOTE:

⚠ ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG. SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

|              |                                  |             |            |   |          |   |   |
|--------------|----------------------------------|-------------|------------|---|----------|---|---|
| CONTROL DATA | DISABLE, INTERRUPT, AND SEEK END |             | CODE IDENT | C | 83323150 | N | A |
|              | NORMANDEALE DIVISION             | LOC: A2 CO4 | 19333      |   |          |   |   |







|  |                       |                           |                     |                     |         |            |
|--|-----------------------|---------------------------|---------------------|---------------------|---------|------------|
| MAGNETIC PERIPHERALS INC.<br><small>Subsidiary of<br/>         CONTEX DATA CORPORATION</small> | READ ANALOG<br>PART I | NORMANDEALE<br>OPERATIONS | <b>C</b>            | 83323150            | N       | B          |
|  | (80 MB)               | LOC: A4 A3/B3             | CODE IDENT<br>19333 | CROSS<br>REF NO 532 | SHEET 2 | PAGE 3-168 |

4

3

2

1

### REVISION STATUS OF SHEETS

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| A | A | A | A | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B | B |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| C |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| D |   | D |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| E | E | E | E | E |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| F | F | F | F | F |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

| UNUSED DIODE PACK |         |
|-------------------|---------|
| LOCATION          | PIN(S)  |
| 0309              | 5,6,7,8 |

| FILTER CAPACITOR |      |
|------------------|------|
| .1 μF            |      |
| +5 V             | -5 V |
| 2714             | 3821 |
| 2821             |      |
| 3313             |      |
| 5413             |      |
| 6113             |      |

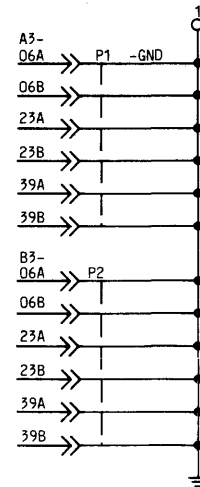
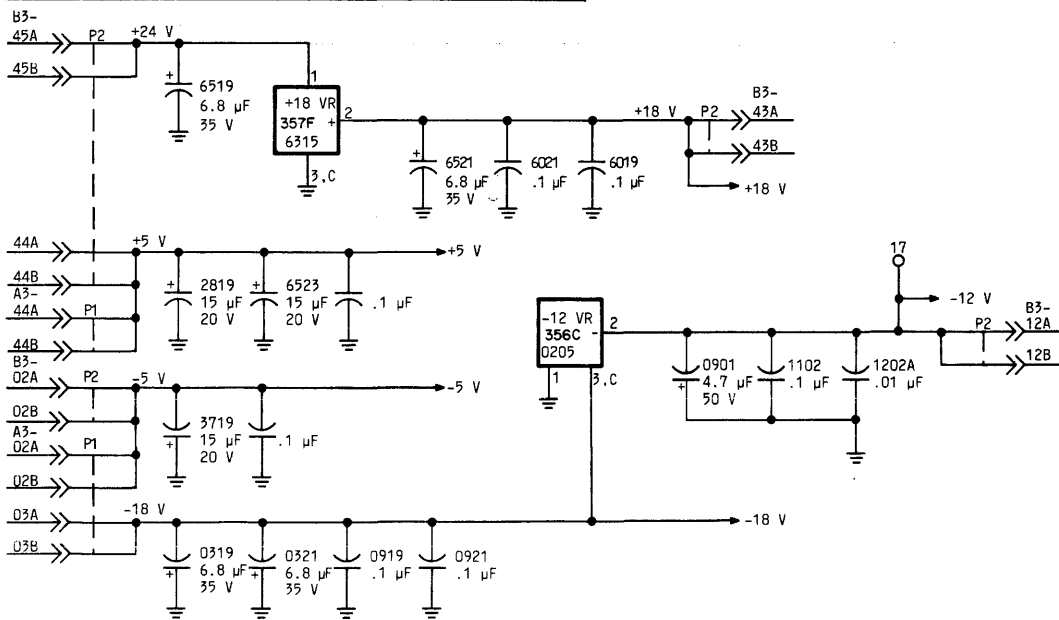
| REVISIONS |         |                       |       |         |       |
|-----------|---------|-----------------------|-------|---------|-------|
| REV.      | ECO.    | DESCRIPTION           | DRFT. | DATE    | CHK'D |
| A         | PE23000 | RELEASED              | MA    | 8-19-79 | GR    |
| B         | PE49188 | ENRN & ENRN RES CHG   | TH    | 9-26-80 | GR    |
| C         | PE21000 | ADD IDD STICKER       | MF    | 2-2-81  |       |
| D         | PE62277 | DELETE CAP            | MF    | 4-7-81  | DGD   |
| E         | DJ23000 | TRANSFER FROM PE      | SMS   | 5-17-82 | CB    |
| F         | DJ02555 | UPDATE LOGIC DIAGRAMS | MJ    | 4-8-83  | SKS   |

D

C

B

A



APPLICABLE ONLY TO 80MB UNITS WITH ENRN REV L & ABOVE.

|          |                     |         |
|----------|---------------------|---------|
| DRAWN    | William B. Thompson | 1-12-83 |
| CHECKED  | DGD                 | 1/14/83 |
| ENGINEER | John A. [unclear]   | 3/17/83 |
| APPROVED |                     |         |

MAGNETIC PERIPHERALS INC.  
A DIVISION OF  
CENTRAL DATA CORPORATION

LOGIC DIAGRAM  
READ ANALOG  
TYPE: ENRN

LOC. A4 A3/B3

|                           |          |              |      |              |
|---------------------------|----------|--------------|------|--------------|
| TWIN CITIES DISK DIVISION | <b>C</b> | 83 323150    | AC   | F            |
| CODE IDENT                | 19333    | CROSS REF NO | 531  | SHEET 1 of 4 |
|                           |          |              | PAGE | 3-170.1      |

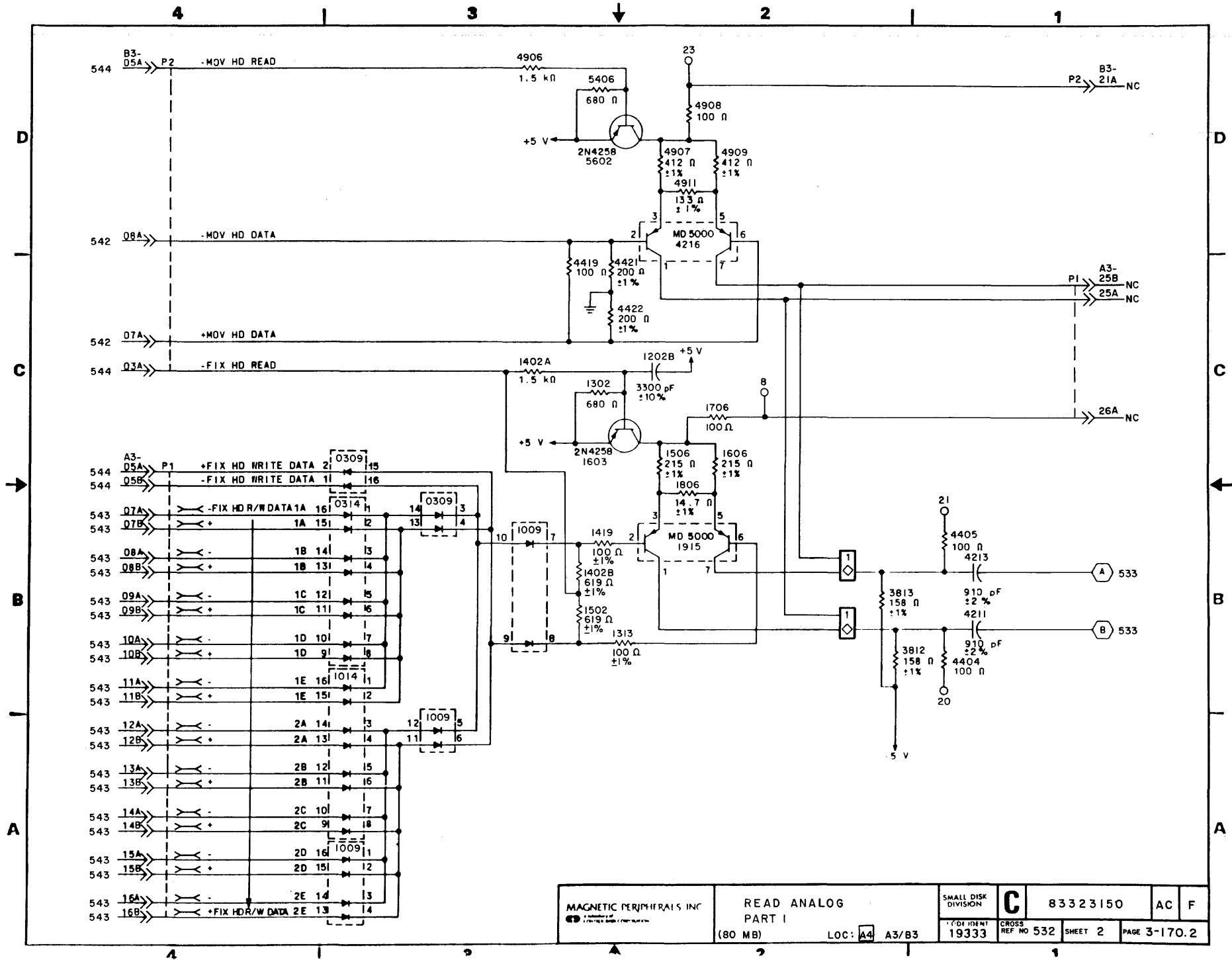
1 REF: 70121618

4

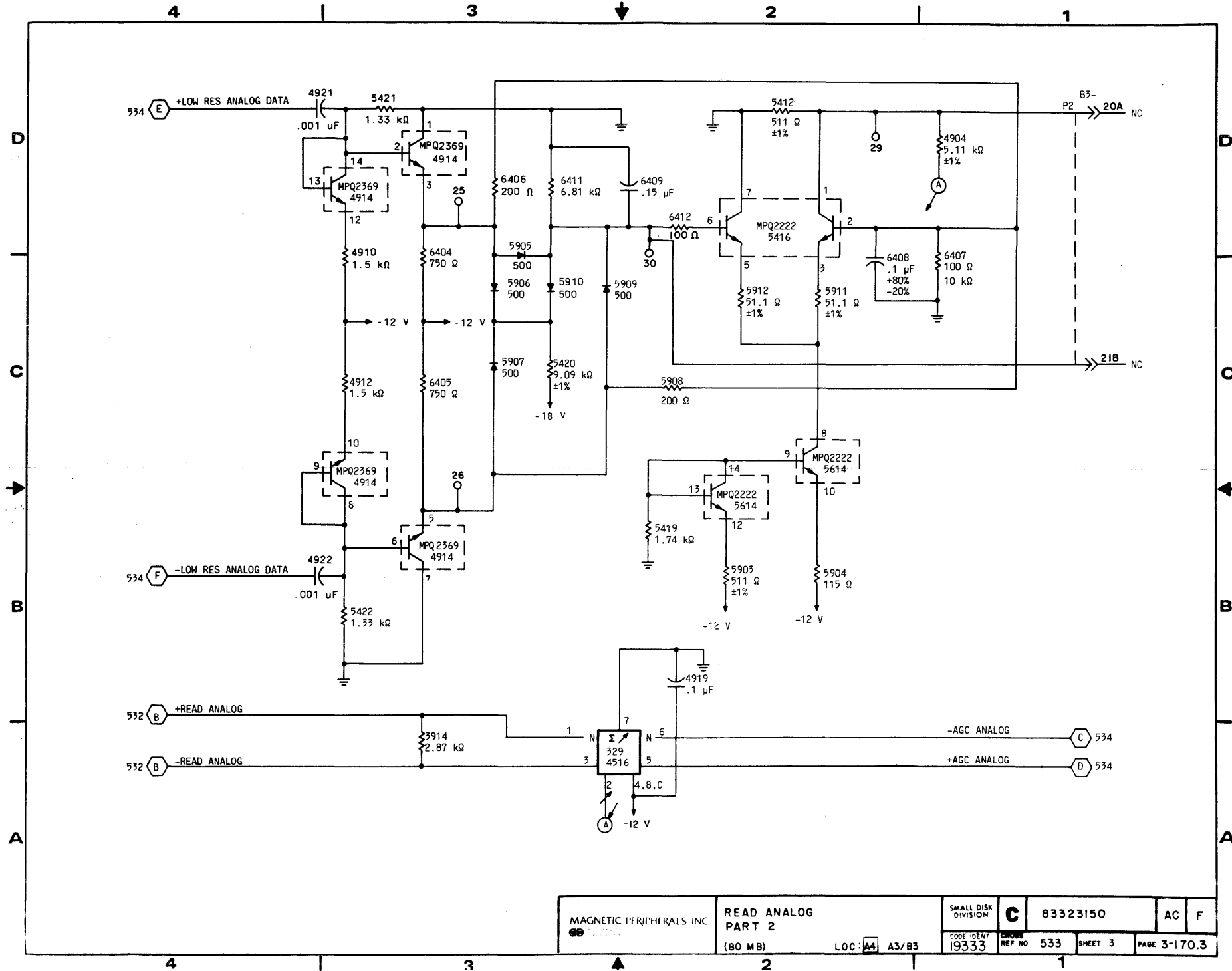
3

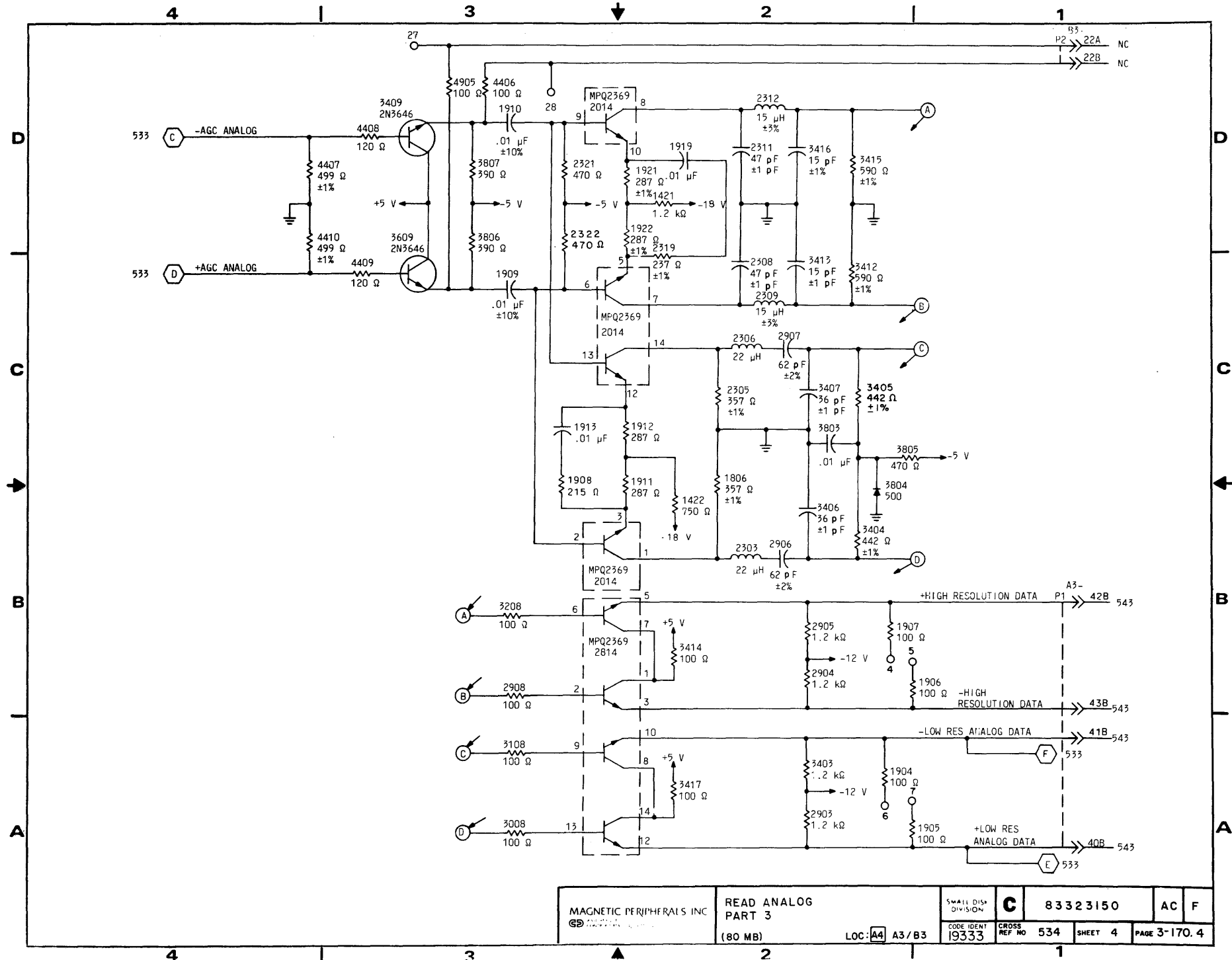
2

1



|  |                                  |               |                        |   |          |    |   |
|--|----------------------------------|---------------|------------------------|---|----------|----|---|
| MAGNETIC PERIPHERALS INC<br>A DIVISION OF<br>IBM CORPORATION | READ ANALOG<br>PART I<br>(80 MB) | LOC: A4 A3/B3 | SMALL DISK<br>DIVISION | C | 83323150 | AC | F |
|  |                                  |               | (DT IDENT)<br>19333    |   |          |    |   |





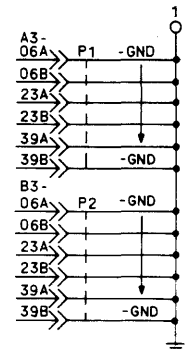
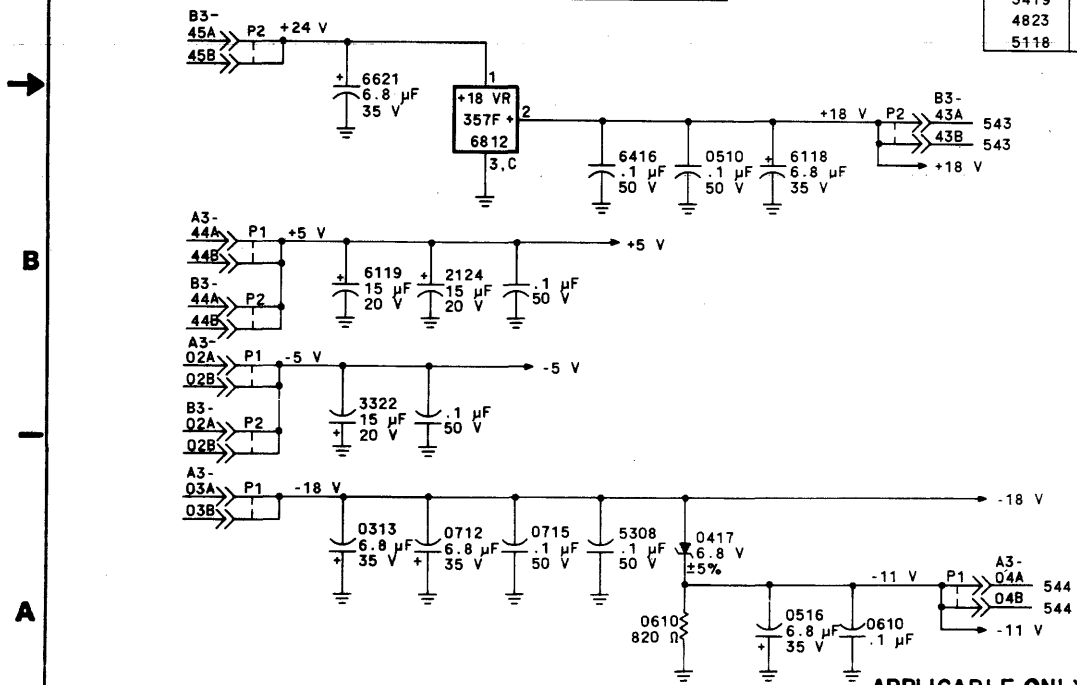
|                                |                                  |         |       |                       |   |          |    |   |
|--------------------------------|----------------------------------|---------|-------|-----------------------|---|----------|----|---|
| MAGNETIC PERIPHERALS INC<br>GD | READ ANALOG<br>PART 3<br>(80 MB) | LOC: A4 | A3/B3 | SMALL DIS<br>DIVISION | C | 83323150 | AC | F |
|                                |                                  |         |       | CODE IDENT<br>19333   |   |          |    |   |

| REVISION STATUS OF SHEETS |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|---------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A                         | A | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| B                         | B | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| C                         | C | A | A |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| D                         | C | D | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| E                         | C | E | D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |

| REVISIONS |         |                  |      |          |       |
|-----------|---------|------------------|------|----------|-------|
| REV       | ECO     | DESCRIPTION      | DRFT | DATE     | CHK'D |
| A         | PE23000 | RELEASED         |      |          |       |
| B         | PE50632 | FNRN TO GNRN     | TH   | 12-27-79 |       |
| C         | PE49188 | CHG REF AT 2418  | MF   | 11-17-80 |       |
| D         | PE62155 | GNRN TO HNRN     | MF   | 6-3-81   |       |
| E         | PE62269 | REMOVE CAPACITOR | MF   | 6-3-81   |       |

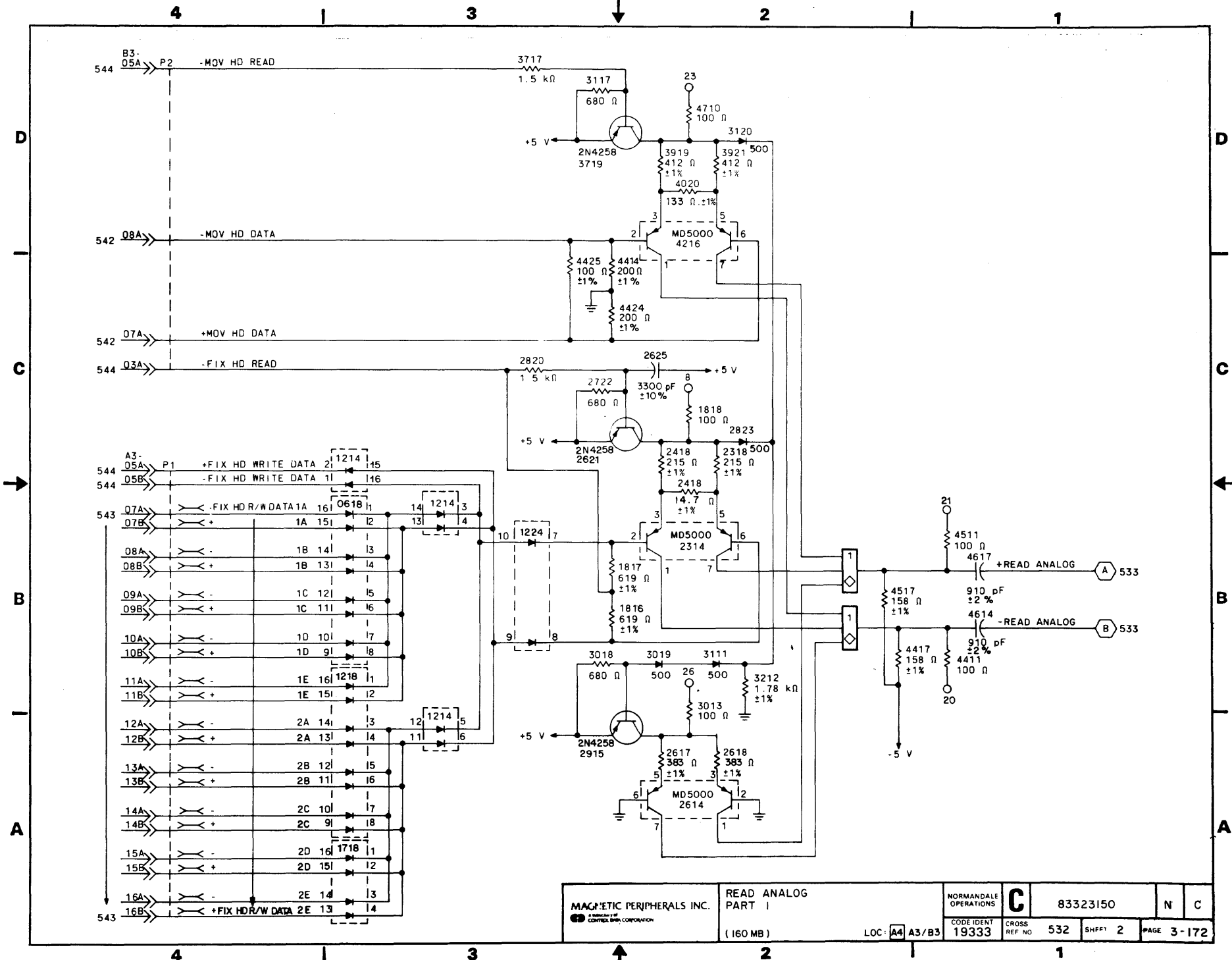
| UNUSED DIODE ARRAY |                           |
|--------------------|---------------------------|
| LOCATION           | PINS                      |
| 1718               | 5, 6, 7, 8, 9, 10, 11, 12 |

| .1 μF FILTER CAPS |      |
|-------------------|------|
| +5 V              | -5 V |
| 2023              | 4810 |
| 3419              | 4910 |
| 4823              | 7006 |
| 5118              |      |



APPLICABLE ONLY TO I60MB UNITS WITH HNRN REV G & BELOW.

|          |                     |  |                         |                           |     |          |              |       |
|----------|---------------------|--|-------------------------|---------------------------|-----|----------|--------------|-------|
| DRAWN    | <i>M. Anderson</i>  | MAGNETIC PERIPHERALS INC.<br>A Subsidiary of<br>CONTROL DATA CORPORATION | READ ANALOG<br>DIAGRAMS | NORMAN DALE<br>OPERATIONS | C   | 83323150 | AC           | E     |
| CHECKED  | <i>S.K. Johnson</i> |  | TYPE: GNRN/HNRN         | CODE IDENT                |     |          | CROSS REF NO | SHEET |
| ENGINEER | <i>S. Jones</i>     |  | LOC: A4/A3/B3           | 19333                     | 531 | 1 of 4   | 3-171        |       |
| APPROVED | <i>[Signature]</i>  |  |                         |                           |     |          |              |       |



|  |   |                              |                         |                 |                   |          |
|--|---|------------------------------|-------------------------|-----------------|-------------------|----------|
| <b>MAGNETIC PERIPHERALS INC.</b><br><small>a subsidiary of</small><br><b>COMPTON CORPORATION</b> | <b>READ ANALOG</b><br><b>PART I</b><br>(160 MB) | <b>NORMANDALE OPERATIONS</b> | <b>C</b>                | <b>83323150</b> | <b>N</b>          | <b>C</b> |
|  | LOC: <b>A4</b> A3/B3                            | <b>CODE IDENT</b> 19333      | <b>CROSS REF NO</b> 532 | <b>SHFT</b> 2   | <b>PAGE</b> 3-172 |          |

4 | 3 | 2 | 1

REVISION STATUS OF SHEETS

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|--|
| A | A | A | A |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| B | B |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| C |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| D | D |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| E |   | E | E |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| F |   | F |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| G | G | G | G |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |
| H | H | H | H |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |  |

UNUSED DIODE PACK

| LOCATION | PIN(S)  |
|----------|---------|
| 0309     | 5,6,7,8 |

FILTER CAPACITOR

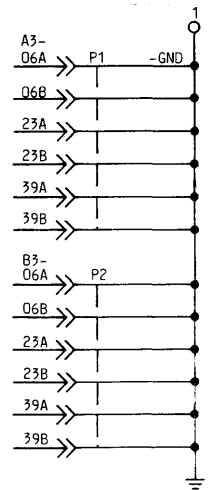
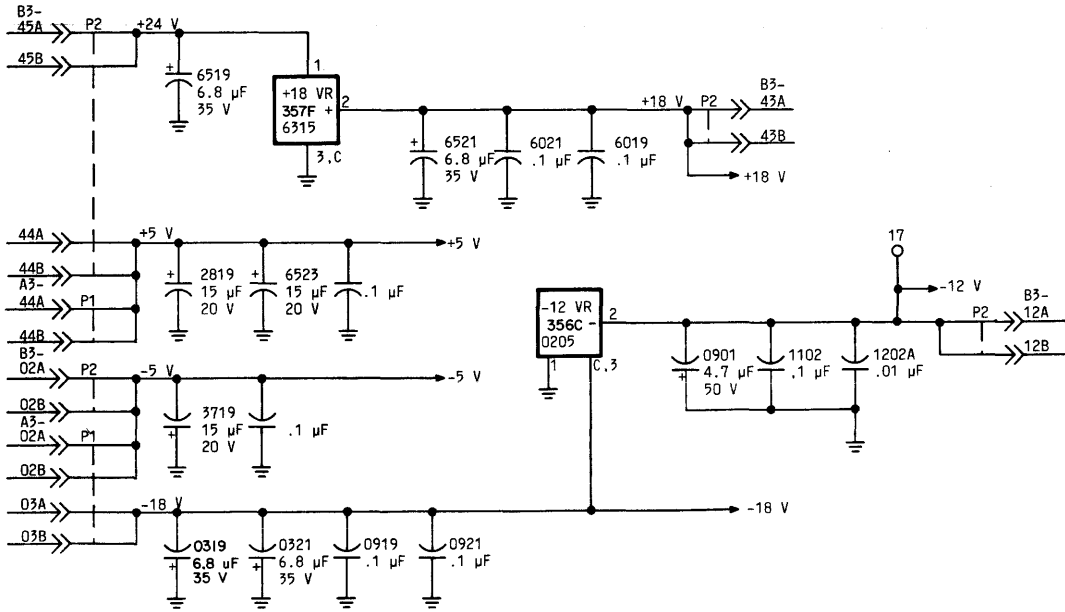
| .1 $\mu$ F |      |
|------------|------|
| +5 V       | -5 V |
| 2714       | 3821 |
| 2821       |      |
| 3313       |      |
| 3413       |      |
| 6113       |      |

REVISIONS

| REV. | ECO.     | DESCRIPTION           | DRFT. | DATE     | CHK'D |
|------|----------|-----------------------|-------|----------|-------|
| A    | PE23000  | RELEASED              | MA    | 6-19-74  | SK    |
| B    | PE30632  | FNRN TO GNRN          | TH    | 9-19-78  | GR    |
| C    | PE30632B | FNRN TO GNRN          | CB    | 2-25-80  | GR    |
| D    | PE49188  | GNRN & ENRN RES CHG   | TH    | 9-26-80  | GR    |
| E    | PE62155  | GNRN TO HNRN          | MF    | 12-16-80 |       |
| F    | PE62269  | DELETE CAP HNRN       | MF    | 5-1-81   | DGD   |
| G    | DJ22000  | TRANSFER FROM PE      | SMS   | 5-17-82  |       |
| H    | DJ02555  | UPDATE LOGIC DIAGRAMS | NJ    | 7-20-83  |       |

D  
C  
B  
A

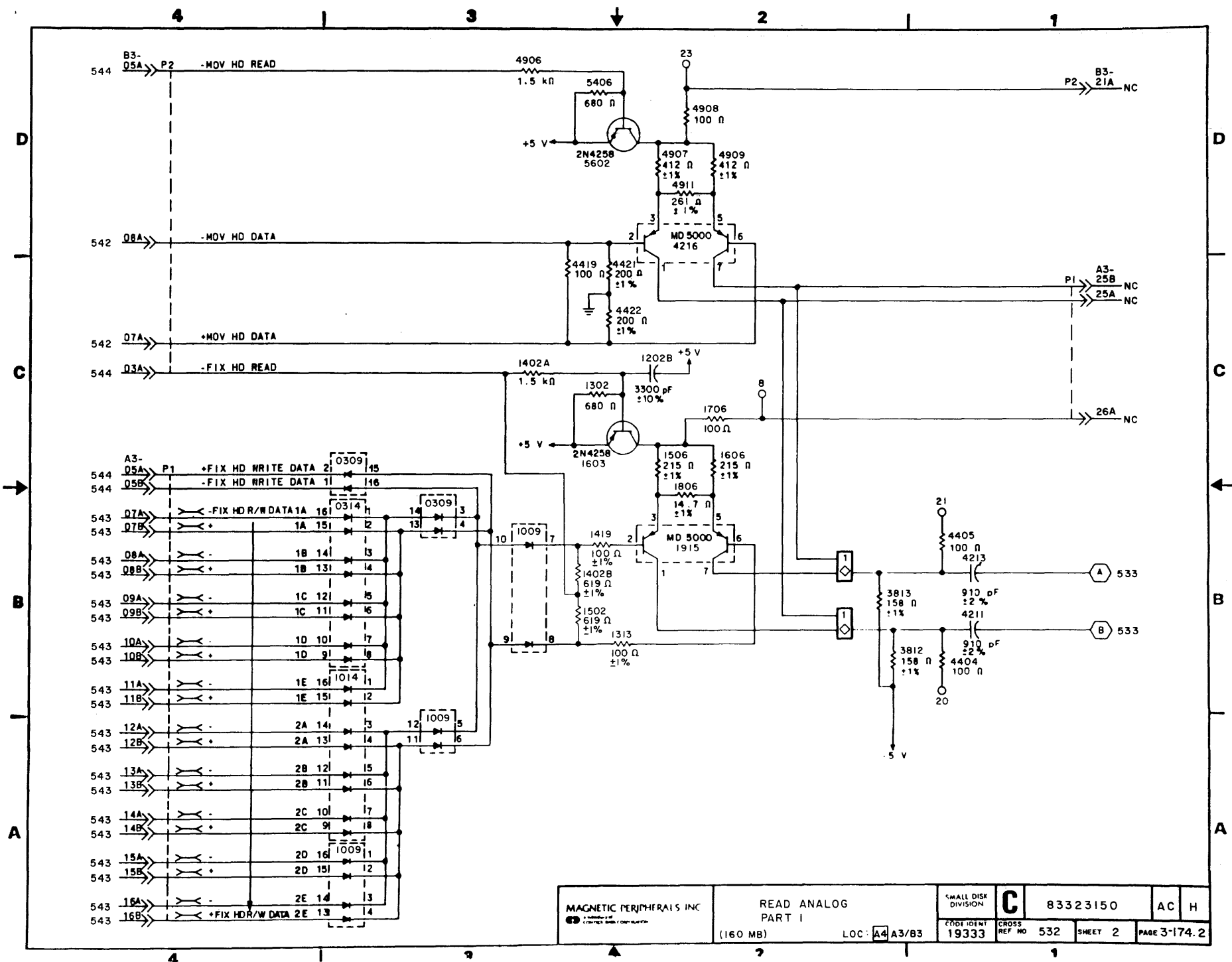
D  
C  
B  
A



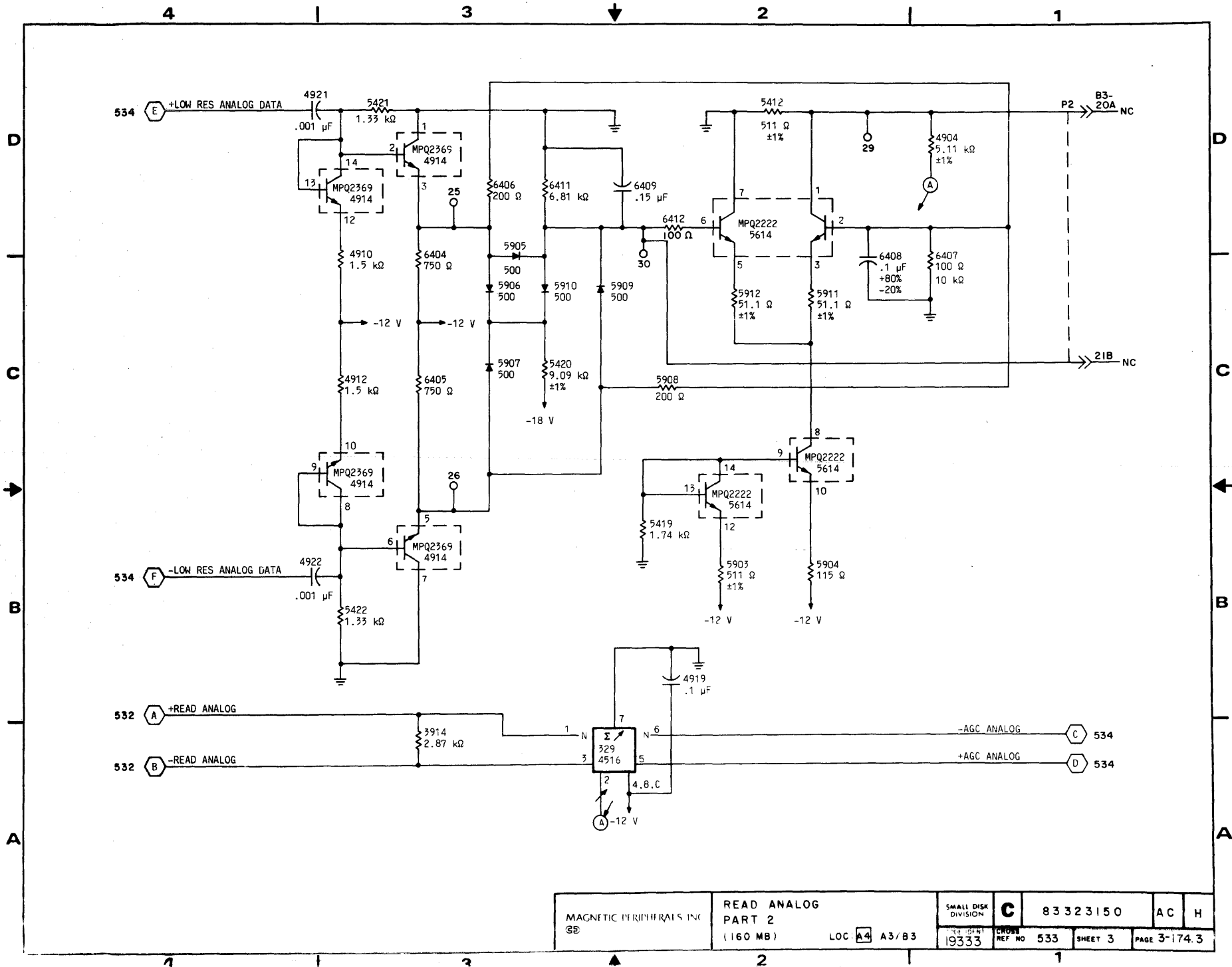
APPLICABLE ONLY TO 160MB UNITS WITH HNRN REV H & ABOVE.

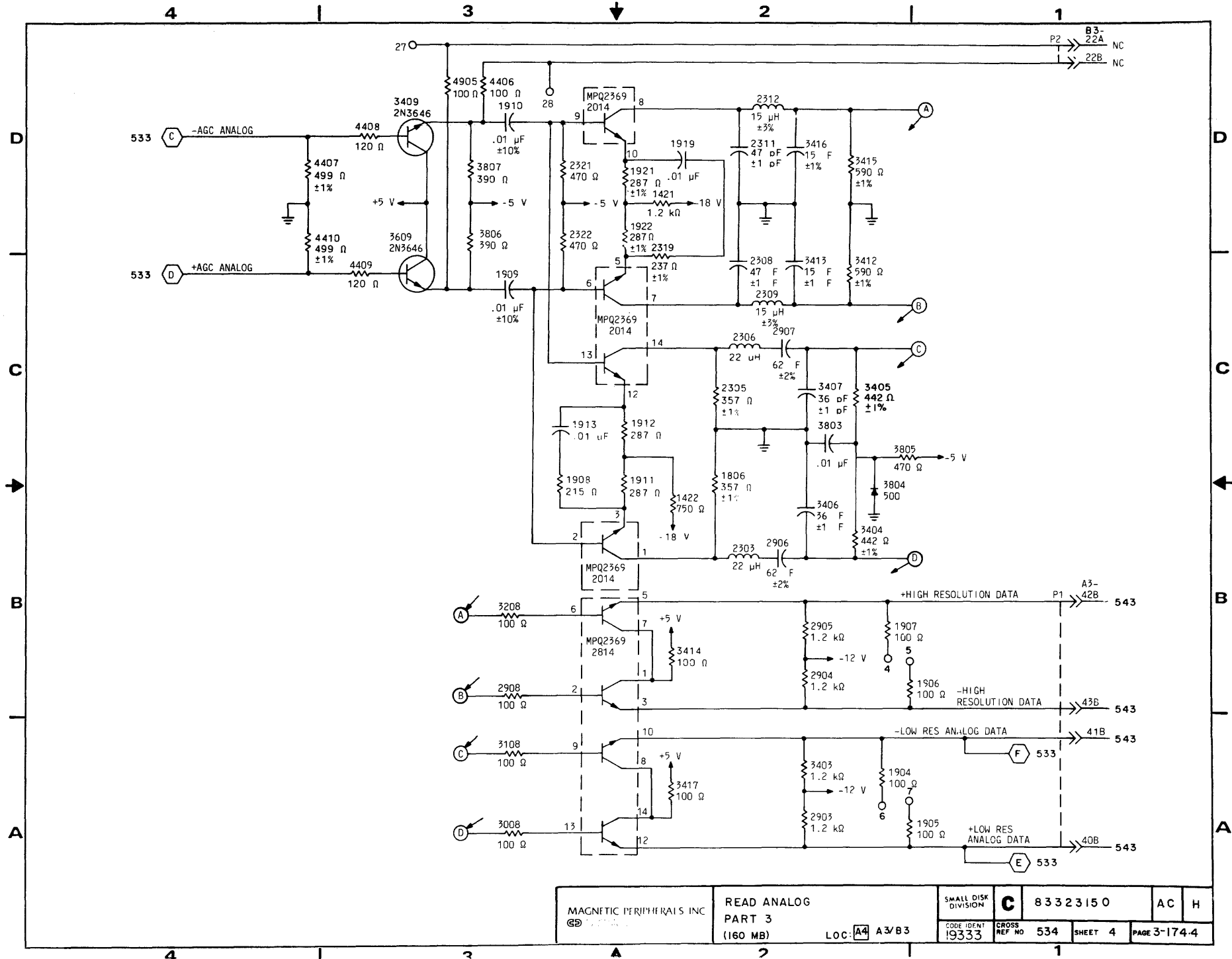
|   |                                   |   |          |  |  |   |          |    |   |
|---|-----------------------------------|---|----------|--|--|---|----------|----|---|
| DRAWN<br><i>William B. Koptman</i><br>1-12-83 | CHECKED<br><i>DG-D</i><br>1/19/83 | ENGINEER<br><i>W. B. Koptman</i><br>1/19/83 | APPROVED | MAGNETIC PERIPHERALS INC.<br>A member of<br>CONTRONICS CORPORATION | LOGIC DIAGRAM<br>READ ANALOG<br>TYPE: HNRN | TWIN CITIES<br>DISK<br>DIVISION<br><b>C</b> | 83323150 | AC | H |
| CODE IDENT<br>19333                           |                                   | CROSS<br>REF NO 531                         |          | SHEET<br>1 of 4  |  | PAGE<br>3-174.1                             |          |    |   |





|   |                                   |                        |                   |                         |            |
|---|-----------------------------------|------------------------|-------------------|-------------------------|------------|
| MAGNETIC PERIPHERALS INC<br><small>an IBM Company</small> | READ ANALOG<br>PART I<br>(160 MB) | SMALL DISK<br>DIVISION | <b>C</b> 83323150 | AC                      | H          |
|   |                                   | CODE IDENT<br>19333    |                   | CROSS<br>REF. NO<br>532 | SHEET<br>2 |





|                                |                                   |               |                        |                 |          |         |              |
|--------------------------------|-----------------------------------|---------------|------------------------|-----------------|----------|---------|--------------|
| MAGNETIC PERIPHERALS INC<br>GD | READ ANALOG<br>PART 3<br>(160 MB) | LOC: A4 A3/B3 | SMALL DISK<br>DIVISION | C               | 83323150 | AC      | H            |
|                                |                                   |               | CODE IDENT<br>19333    | GROSS<br>REF NO | 534      | SHEET 4 | PAGE 3-174.4 |

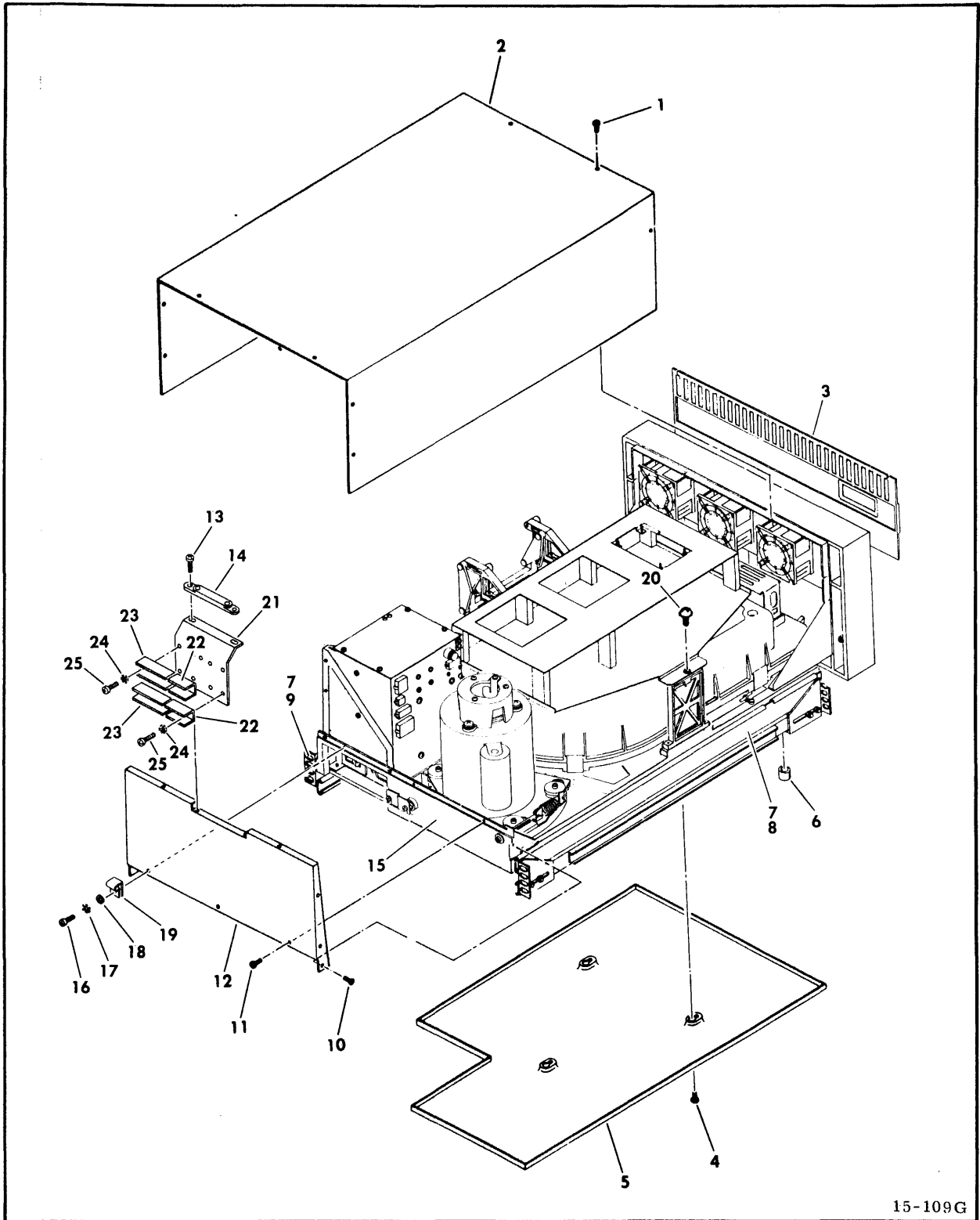
necessary to order these assemblies, the actual part number is found on the assembly identification label attached to the assembly. If the actual part number cannot be determined, include on the order the series code of the machine along with a list of all the change orders installed.

- NFR in the part number column. Used to indicate that an assembly is not field replaceable. If repair of the NFR item is necessary, refer to the maintenance section of this manual for further information.
- ## in the part number column. Indicates that the item is a recommended spare part and that the part number is located in the Spare Parts List (section 5B).

Description Column -- This column gives the name and a brief description of each part and assembly. The relationship of parts and assemblies is shown within the column by means of indentation. When an item is indented more than the previous item, it is part of the previous item.

When necessary, items are identified as being right or left side. Right and left are determined by facing the front panel of the drive.

Notes Column -- This column defines any multiple part number entries for a single index number. Multiple entries may be necessary to identify differences such as machine configuration (for example, whether the part is for a 50 Hz or 60 Hz machine) or to track history (for example, the part number differs between older and newer units).



15-109G

Figure 5-1. Top Level Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                      | NOTE  |
|----------|----------|---------------------------------------|---|
| 5-1      | 730367XX | TOP LEVEL ASSEMBLY                    | 80 MB   |
| 5-1      | 730368XX | TOP LEVEL ASSEMBLY                    | 160 MB  |
| 5-1      | 823997XX | TOP LEVEL ASSEMBLY                    | 80 MB   |
| 5-1      | 823998XX | TOP LEVEL ASSEMBLY                    | 160 MB  |
| 1        | 92721202 | SCREW, Sch Btn, 6-32 x 1/2            |   |
| 2        | 73011300 | COVER, Top                            |   |
| 3        |          | PANEL, Color                          | See Configuration Chart in front of manual for part number                |
| 4        | 93592196 | SCREW, SLFTPG, 8-32 x 1/4             |   |
| 5        | 73022700 | COVER, Bottom                         |   |
| 6        | 95796512 | CLOSURE, Vinyl                        |   |
| 7        | 10125724 | SCREW, Flat Hd, 8-32 x 3/8            | All except BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7E/F, BZ9A9G/H                     |
| 7        | 10127122 | SCREW, PHH PNH Mach, 8-32 x 3/8       | BZ9A1J/K/L/M, BZ9A5E/F only   |
| 8        | 94391905 | SLIDE, Quick Disconnect               | All except BZ511A/B, BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7E/F, BZ9A9G/H, BZ911A/B |
| 8        | 94391907 | SLIDE, Quick Disconnect               | BZ511A/B, BZ911A/B  |
| 8        | 73043500 | PLATE, Retainer                       | BZ9A1J/K/L/M, BZ9A5E/F only   |
| 9        | 94391904 | SLIDE, Quick Disconnect               | All except BZ511A/B, BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7E/F, BZ9A9G/H, BZ911A/B |
| 9        | 94391906 | SLIDE, Quick Disconnect               | BZ511A/B, BZ911A/B  |
| 9        | 73043500 | PLATE, Retainer                       | BZ9A1J/K/L/M, BZ9A5E/F only   |
| 10       | 10125722 | SCREW, Flat Hd, 8-32 x 1/4            |   |
| 11       | 93592196 | SCREW, SLFTPG, 8-32 x 1/4             |   |
| 12       | 73019500 | COVER, Rear                           |   |
| 13       | 10127113 | SCREW, PHH PNH Mach, 6-32 x 3/8       |   |
| 14       | 94386407 | MOUNT, Cable                          |   |
| 15       |          | DRIVE FINAL ASSEMBLY (See Figure 5-2) |   |

| INDEX NO | PART NO | PART DESCRIPTION | NOTE |
|----------|---------|------------------|------|
|----------|---------|------------------|------|

5-1 TOP LEVEL ASSEMBLY (Contd)

|    |          |                                      |   |
|----|----------|--------------------------------------|---|
| 16 | 93592200 | SCREW, Mach, 8-32 x 3/8              |   |
| 17 | 10126402 | LOCKWASHER, #8                       |   |
| 18 | 10125606 | WASHER, #8                           |   |
| 19 | 92602004 | CABLE CLAMP                          |   |
| 20 | 93660107 | SCREW, PHH PNH W/<br>Lockwasher      | S/C 21 & Abv<br>only  |
| 21 | 81914040 | MOUNTING BRACKET                     | ) S/C 34 W/DJ02479  |
| 22 | 81567760 | BAR, Mounting                        | ) & Abv except  |
| 23 | 81567761 | BAR, Mounting                        | ) BZ5A9L/M,   |
| 24 | 10126403 | LOCKWASHER #10                       | ) BZ5W1C/D,   |
| 25 | 10127144 | SCREW, PHH PNH Mach,<br>10-32 x .625 | ) BZ9A7A/B  |
|    | 92006812 | PLATE, Equip Ident                   |   |
|    | 82355113 | I/O CABLE ASSEMBLY                   | BZ5A1J/K/R/S,<br>BZ5A2C/D/G/H,<br>BZ5A5J  |
|    | 82355115 | I/O CABLE ASSEMBLY                   | BZ5A2E/F, BZ5A6C/D,<br>BZ9A2C/D, BZ9A6C/D   |
|    | 94397000 | EMBLEM, Product Ident                | BZ5A1B/H/L, BZ5A2A/<br>B/J, BZ5A3A/BBZ5A4<br>A/B, BZ5A5A/B/D/F/<br>K/L, BZ5A6A/B, BZ5A9<br>E/F/N/P/S/T, BZ5W1<br>A/B/E/F/G/H, BZ9A1<br>A/B/N/W/Y/Z, BZ9A2<br>A/B, BZ9A3A/B, BZ9A4<br>A/B, BZ9A5A/B, BZ9A6<br>A/B/E/F, BZ9A7L/P/<br>R/S/T/U/W/Y only |
|    | 75778737 | POWER CORD (60 Hz)<br>(S/C 32 & Abv) | All except BZ5A1L,<br>BZ9A7L  |
|    | 75778701 | POWER CORD (60 Hz)<br>(S/C 31 & Blw) | All except BZ5A1L,<br>BZ9A7L  |
|    | 82392310 | POWER CORD (60 Hz)                   | BZ5A1L, BZ9A7L  |
|    | 75778710 | POWER CORD (50 Hz)<br>(S/C 31 & Blw) | All except BZ5W1D   |
|    | 75778739 | POWER CORD (50 Hz)<br>(S/C 32 & Abv) | All except BZ5W1D   |
|    | 93907492 | POWER CORD (50 Hz)<br>(S/C 31 & Blw) | BZ5W1D  |
|    | 93907494 | POWER CORD (50 Hz)<br>(S/C 32 & Abv) | BZ5W1D  |
|    | 92034702 | PANEL, Front, Matched Set            | BZ5A5K only   |
|    | 92034700 | PANEL, Front, Matched Set            | BZ5A5L only   |
|    | 77563300 | BALLAST                              | BZ5A5K/L only   |

| INDEX NO | PART NO  | PART DESCRIPTION           | NOTE   |
|----------|----------|----------------------------|--|
| 5-1      |          | TOP LEVEL ASSEMBLY (Contd) |  |
|          | 76846300 | HARDWARE KIT*              | All except BZ5A5 D/F, BZ5A9L/M/N/P, BZ5W1C/D/E/F, BZ511A/B, BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7A/B/C/D/E/F/P/R, BZ9A9B |
|          | 76846303 | HARDWARE KIT*              | BZ5A9L/M, BZ5W1C/D, BZ9A7AB  |
|          | 76846305 | HARDWARE KIT*              | BZ5W1E/F, BZ9A7C/D/P/R   |
|          | 92555238 | HARDWARE KIT*              | BZ5A5D/F   |
|          | 76846306 | HARDWARE KIT*              | BZ5A9N/P, BZ9A1J/K/L/M, BZ9A5E/F, BZ511A/B, BZ911A/B   |
|          | 76846308 | HARDWARE KIT*              | BZ9A9B   |
|          | 76846307 | HARDWARE KIT*              |  |

\* Refer to table 5-1 for listing of kit piece parts.



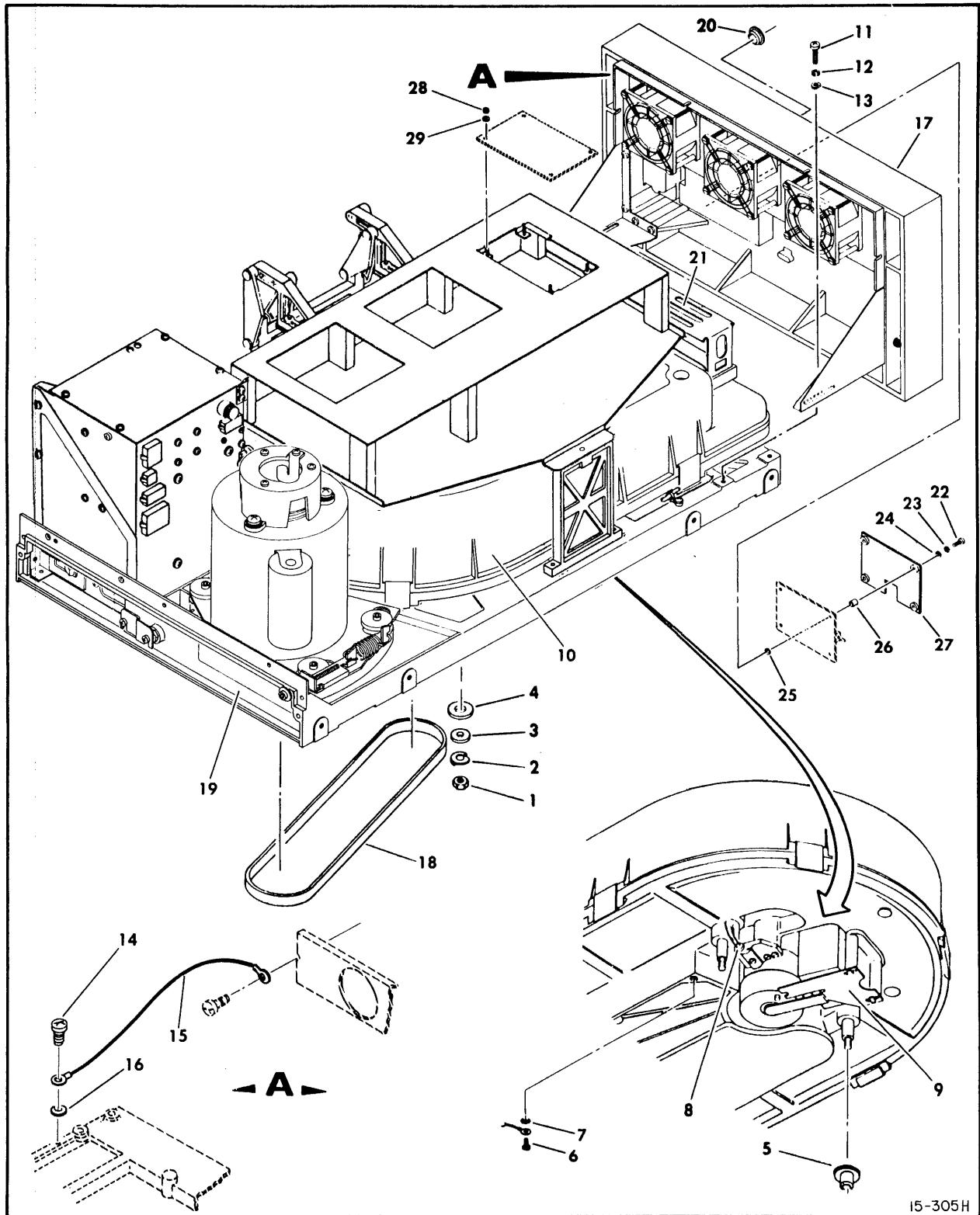


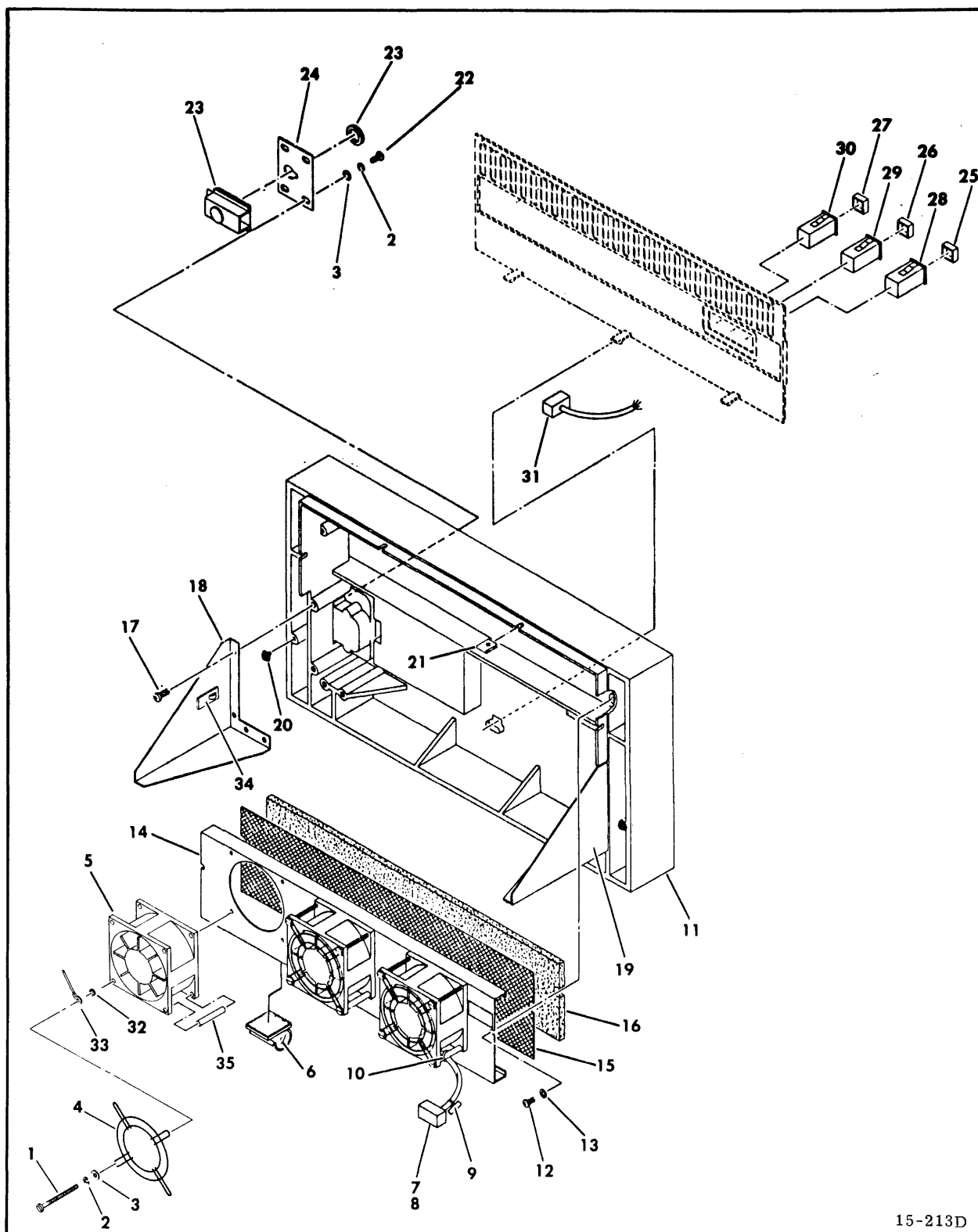
Figure 5-2. Drive Final Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                                  | NOTE                                    |
|----------|----------|---|---|
| 5-2      | 730355XX | DRIVE FINAL ASSEMBLY                              | See Note 1                              |
| 5-2      | 823994XX | DRIVE FINAL ASSEMBLY                              | See Note 2                              |
| 5-2      | 730639XX | DRIVE FINAL ASSEMBLY                              | See Note 3                              |
| 1        | 10125301 | NUT, Hex, 1/4-20                                  |   |
| 2        | 94388900 | LOCKWASHER, Special                               |   |
| 3        | 73005600 | WASHER, Special Flat                              |   |
| 4        | 73020800 | WASHER, Insulator                                 |   |
| 5        | 73020900 | BUSHING, Insulator                                |   |
| 6        | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8                |   |
| 7        | 10126402 | LOCKWASHER, #8                                    |   |
| 8        | ##       | SPEED TRANSDUCER ASSEMBLY                         |   |
| 9        | ##       | GROUND SPRING                                     |   |
| 10       | ##       | MINI MODULE ASSEMBLY                              |   |
| 11       | 10127132 | SCREW, PHH PNH Mach,<br>10-24 x 1/2               |   |
| 12       | 10125805 | LOCKWASHER, #10                                   |   |
| 13       | 73045100 | WASHER, Special                                   |   |
| 14       | 10127122 | SCREW, PHH PNH Mach,<br>8-32 x 3/8                | S/C 15 & Abv                            |
| 15       | 94369553 | GROUND CABLE                                      | S/C 15-19 only                          |
| 16       | 10126402 | LOCKWASHER, #8                                    | S/C 15 & Abv                            |
| 17       |          | FRONT PANEL ASSEMBLY (See<br>Figures 5-3,5-4,5-5) |   |
| 18       | ##       | BELT, Flat Drive                                  |   |
| 19       |          | BASE FRAME ASSEMBLY (See<br>Figures 5-6,5-7)      |   |
| 20       | 94305532 | BUSHING   | BZ5A1E/G/T/U,<br>BZ9A1C/E/F/N/T<br>only |
| 21       | 73040600 | CARD CLAMP ASSEMBLY                               |   |
| 22       | 10127114 | SCREW, PHH PNH Mach, 6-32 x 1/2                   |   |
| 23       | 10125803 | LOCKWASHER, #6                                    |   |
| 24       | 10125605 | WASHER, #6  |   |
| 25       | 93564055 | WASHER, Nylon                                     |   |
| 26       |          | NOT USED  |   |
| 27       |          | NOT USED  |   |
| 28       | 10125105 | NUT, Hex, 6-32                                    |   |
| 29       | 93564032 | WASHER, Nylon                                     |   |
|          | 17901516 | SCREW, PHH, 8-32 x 3/8                            |   |

NOTE 1: All except BZ5A1J/K/R/S, BZ5A2C/D/G/H,  
BZ5A5J, BZ5A9N/P/S/T, BZ5W1A/B/E/F/G/H,  
BZ9A7C/D/E/F/G/R/P/S/U, BZ9A9C/D/G/H.

NOTE 2: BZ5A9N/P/S/T, BZ5W1A/B/E/F/G/H, BZ9A7  
C/D/E/F/G/R/P/S/U, BZ9A9C/D/G/H.

NOTE 3: BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J only

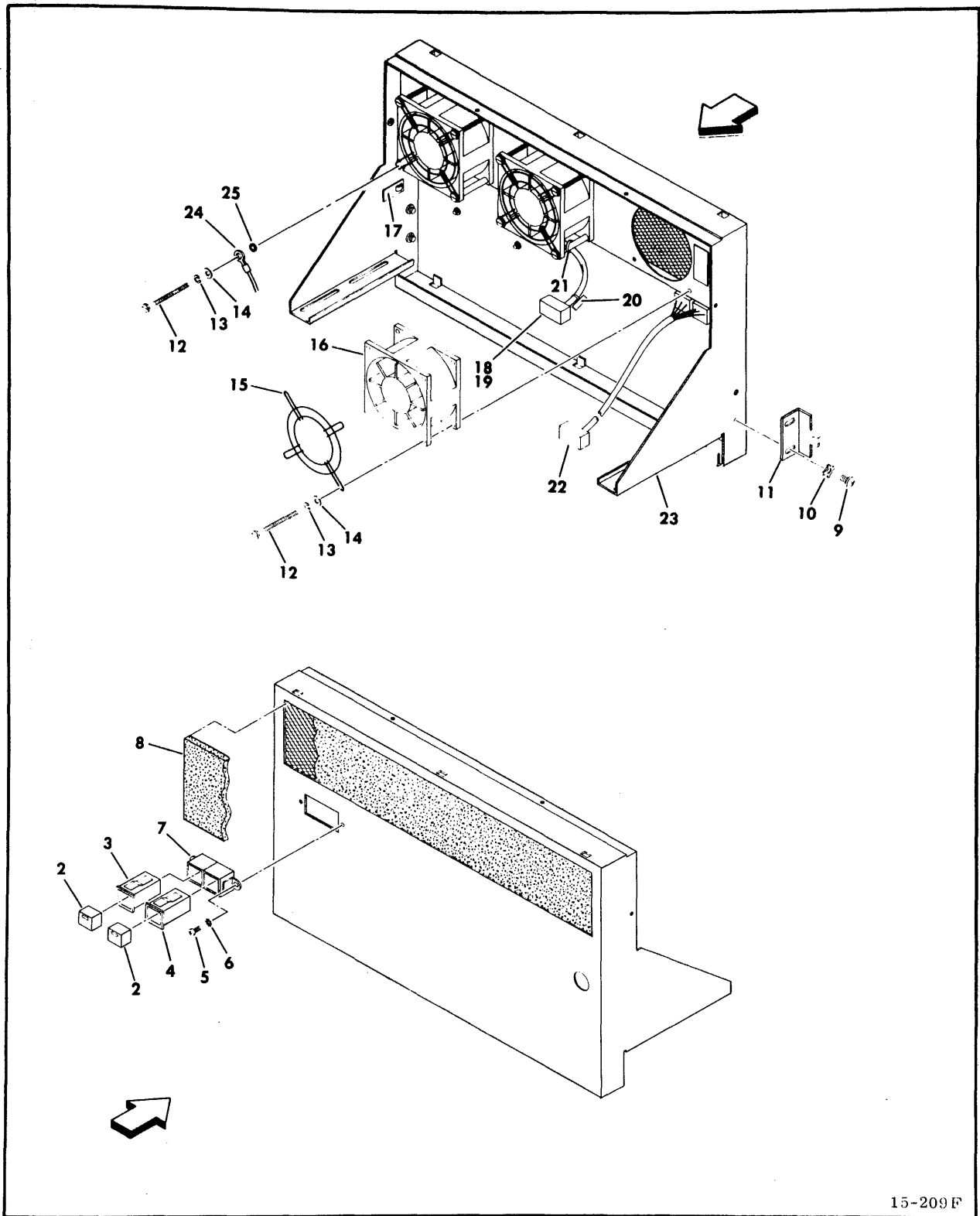


15-213D

Figure 5-3. Front Panel Assembly

| INDEX NO | PART NO  | PART DESCRIPTION               | NOTE              |
|----------|----------|--------------------------------|-------------------|
| 5-3      |          | FRONT PANEL ASSEMBLY (Contd)   |                   |
| 27       | 94394311 | LENS, Blank                    | See Note 4        |
| 27       | 94394230 | LENS, Lettered (Write Protect) | See Note 5        |
| 27       | 94394257 | LENS, Lettered (Write Protect) | See Note 11       |
| 27       | 94394254 | LENS, Lettered (Write Prot)    | See Note 10       |
| 28       | ##       | INDICATOR, LED                 | See Note 7        |
| 29       | ##       | SWITCH, P.B. W/LED Indicator   |                   |
| 30       | 94394007 | SWITCH, P.B. W/LED Indicator   | See Note 8        |
| 30       | 94394030 | SWITCH, P.B. W/LED Indicator   | See Note 9        |
| 31       | 73035100 | HARNESS ASSEMBLY               | See Note 7        |
| 32       | 10126103 | LOCKWASHER, #6                 | S/C 20 & Abv only |
| 33       | 73067200 | GROUND WIRE ASSEMBLY           | S/C 20 & Abv only |
| 34       | 94277503 | MOUNT, Cable                   |                   |
| 35       | 93109687 | STANDOFF, Spacer               |                   |
|          | 92021741 | LABEL, Fault Code              | See Note 12       |

- NOTE 1: S/C 25 & Blw all except BZ5A1E/G/T/U, BZ9A1C/E/F/N.  
NOTE 2: S/C 26 & Abv all except BZ5A1E/G/T/U, BZ5W1G/H, BZ9A1C/E/F/N, BZ9A7T/U/V  
NOTE 3: S/C 25 & below all except BZ5A1J/K/R/S, BZ5A2C/D/E/F/G/H, BZ5A5J, BZ5A6C/D, BZ9A1J/K, BZ9A2C/D, BZ9A6C/D.  
NOTE 4: S/C 26 & Abv all except BZ5A1J/K/R/S, BZ5A2C/D/E/F/G/H, BZ5A5J, BZ5A6C/D, BZ5A9G/H, BZ9A2C/D, BZ9A6C/D, BZ9A7C/D.  
NOTE 5: S/C 25 & Blw BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.  
NOTE 6: S/C 26 & Abv BZ5A2E/F, BZ5A6C/D, BZ5A9G/H, BZ5W1E/F, BZ9A2C/D, BZ9A6C/D, BZ9A7C/D/P/R.  
NOTE 7: All except BZ5A1F.  
NOTE 8: S/C 25 & Blw all except BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J, BZ9A1J/K.  
NOTE 9: S/C 26 & Abv all except BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J. S/C 01 & Abv BZ9A1J/K.  
NOTE 10: BZ5A9G/H, BZ5W1E/F, BZ9A7C/D/P/R.  
NOTE 11: S/C 26 & Abv BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.  
NOTE 12: BZ5A1A/B/H/L, BZ5A2A/B/J, BZ5A3A/B, BZ5A4A/B, BZ5A5A/B, BZ5A6A/B, BZ5A9E/F/J/K/N/P/R, BZ5W1A/B, BZ9A1A/B/Y/Z, BZ9A2A/B, BZ9A3A/B, BZ9A4A/B, BZ9A5A/B, BZ9A6A/B, BZ9A7G/L/W/Y, BZ9A9C/D only.



15-209F

Figure 5-4. Front Panel Assembly

| INDEX NO | PART NO  | PART DESCRIPTION                             | NOTE              |
|----------|----------|--|-------------------|
| 5-10     |          | POWER SUPPLY ASSEMBLY (Sheet 2 of 2)         |                   |
| 1        | 76877701 | CHASSIS                                      | All except BZ9A7L |
| 1        | 76877703 | CHASSIS                                      | BZ9A7L            |
| 2        | 10126103 | LOCKWASHER, #6                               |                   |
| 3        | 96837908 | CIRCUIT BREAKER, 250 V (CB1)                 |                   |
| 4        | 10127113 | SCREW, PHH PNH Mach, 6-32 x 3/8              |                   |
| 5        | 70118701 | RFI FILTER ASSEMBLY (LF1)                    |                   |
| 6        | 17901515 | SCREW, PHH, 8-32 x 1/4                       |                   |
| 7        | 10126402 | LOCKWASHER, #8                               |                   |
| 8        | 93234236 | SCREW, PNH Mach, 10-32 x 5/16                |                   |
| 9        | 95524408 | LOCKWASHER, #10                              |                   |
| 10       | 94047081 | WASHER, Special                              |                   |
| 11       | 95645626 | CAPACITOR, 40 V, 4700 $\mu$ F (C2)           |                   |
| 12       | 10126401 | LOCKWASHER, #6                               |                   |
| 13       | 95686705 | CAPACITOR, 660 V, 3 $\mu$ F (C1)             |                   |
| 14       | 95655516 | SCREW, Sh Met, 6-20 x 3/8                    |                   |
| 15       | 95634801 | SPEEDNUT                                     |                   |
| 16       | 95510026 | NUT, Hex, 6-32                               |                   |
| 17       | 10125613 | WASHER, #6                                   |                   |
| 18       | 95643600 | CLAMP, Capacitor                             |                   |
| 19       | 95582500 | BOOT   |                   |
| 20       | 93749162 | SCREW, PHH PNH Mach W/Lockwasher, 6-32 x 3/8 |                   |
|          | 92015100 | COVER, Insulating                            |                   |
|          | 92006905 | PLATE, Warning, Fuse                         |                   |
|          | 92006900 | PLATE, Warning, High Voltage                 |                   |

TABLE 5-1. HARDWARE KIT PIECE PARTS

| Part Number | Part Description                 | Kit P/N                              |                                      |                                      |                                      |                                      |                                      |                                      |
|-------------|----------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
|             |                                  | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>0 | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>5 | 9<br>2<br>5<br>5<br>5<br>2<br>3<br>8 | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>6 | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>7 | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>3 | 7<br>6<br>8<br>4<br>6<br>3<br>0<br>8 |
| 94386402    | MOUNT, Cable                     | x                                    | x                                    | -                                    | x                                    | x                                    | x                                    | x                                    |
| 94277425    | CABLE TIE                        | x                                    | x                                    | -                                    | x                                    | x                                    | x                                    | x                                    |
| 73040500    | KEEPER, Latch                    | x                                    | x                                    | -                                    | x                                    | x                                    | -                                    | -                                    |
| 10125805    | LOCKWASHER, #10                  | x                                    | x                                    | -                                    | x                                    | x                                    | -                                    | x                                    |
| 10127143    | SCREW, PHH PNH Mach, 10-32 x 1/2 | x                                    | x                                    | x                                    | x                                    | x                                    | -                                    | x                                    |
| 10125108    | NUT, Hex, 10-32                  | x                                    | x                                    | x                                    | x                                    | x                                    | -                                    | -                                    |
| ##          | TERMINATOR ASSEMBLY, AYDV CARD   | -                                    | x                                    | -                                    | -                                    | -                                    | x                                    | x                                    |
| 73040501    | KEEPER, Latch                    | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10126502    | SCREW, Hex Hd, 1/4-20 x 3/4      | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10125806    | LOCKWASHER, 1/4                  | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10125608    | WASHER, 1/4                      | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10126105    | LOCKWASHER, #10                  | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10126244    | SCREW, SCH, 10-32 x 1/2          | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 92602002    | CLAMP, Cable                     | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10125606    | WASHER, #8 -                     | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    | -                                    |
| 10126402    | LOCKWASHER, #8                   | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10125106    | NUT, Hex, 8-32                   | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10127122    | SCREW, PHH PNH Mach, 8-32 x 3/8  | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 10125607    | WASHER, #10                      | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 73069600    | BRACKET, Slide                   | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 73069601    | BRACKET, Slide                   | -                                    | -                                    | x                                    | -                                    | -                                    | -                                    | -                                    |
| 70117605    | JUMPER PLUG                      | -                                    | -                                    | -                                    | -                                    | x                                    | -                                    | -                                    |
| 81537401    | "A" CABLE                        | -                                    | -                                    | -                                    | -                                    | -                                    | -                                    | x                                    |
| 92708901    | "B" CABLE                        | -                                    | -                                    | -                                    | -                                    | -                                    | -                                    | x                                    |
| 80456390    | NUT PLATE                        | x                                    | x                                    | -                                    | -                                    | -                                    | -                                    | -                                    |

NOTE: "x" SIGNIFIES PART IS IN THAT KIT.

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON<br>Fig.   Page   Index<br>No.   No.   No. | DESCRIPTION                               | PART<br>NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES   |
|---|---|----------------|---------------------------------|---|
|   | <u>_</u> FAX COMP ASSY, Loc A2A04/A2B04   |                |                                 | BZ5A1J/K/R/S, BZ5A2<br>C/D/G/H, BZ5A5J          |
|   | LFAX - Used on S/C 15-30                  | 76933116       | 76933134                        |   |
|   | ZFAX - Used on S/C 31 & sbove             | 76933134       | 76933134                        |   |
|   | <u>_</u> FAX COMP ASSY, Loc A2A04/A2B04   |                |                                 | BZ5A2E/F, BZ5A6C/D,<br>BZ9A2C/D, BZ9A6C/D       |
|   | JFAX - Used on S/C 14-28                  | 76933112       | 76933136                        |   |
|   | RFAX - Used on S/C 29-30                  | 76933126       | 76933136                        |   |
|   | ABFAX - Used on S/C 31 & above            | 76933136       | 76933136                        |   |
|   | <u>_</u> FAX COMP ASSY, Loc A2A04/A2B04   |                |                                 | BZ9A6E/F  |
|   | RFAX - Used on S/C 24-30                  | 76933126       | 76933136                        |   |
|   | ABFAX - Used on S/C 31 & above            | 76933136       | 76933136                        |   |
|   | <u>_</u> FAX - COMP ASSY, Loc A2A04/A2B04 |                |                                 | BZ9A7E/F, BZ9A9G/H                              |
|   | CFAX - Used on S/C 23 & below             | 76933107       | 76933140                        |   |
|   | MFAX - Used on S/C 24-30                  | 76933120       | 76933140                        |   |
|   | AFFAX - Used on S/C 31 & above            | 76933140       | 76933140                        |   |
|   | <u>_</u> KBX COMP ASSY, Loc A2B01/A2C01   |                |                                 | 80 MB units all<br>except BZ5A1V/W,<br>BZ5A5G/H |
|   | AJFX - Used on S/C 09-12                  | 76963900       | 76971912                        | To EKBX-FCO 50659                               |
|   | AKBX - Used on S/C 13                     | 76971900       | 76971912                        | To EKBX-FCO 50659                               |
|   | DKBX - Used on S/C 14                     | 76971904       | 76911912                        | To EKBX-FCO 50659                               |
|   | EKBX - Used on S/C 15-30                  | 76971905       | 76971912                        |   |
|   | MKBX - Used on S/C 31 & above             | 76971912       | 76971912                        |   |



ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON |          |           | DESCRIPTION                    | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES              |
|-----------------|----------|-----------|--------------------------------|-------------|------------------------------|--------------------|
| Fig. No.        | Page No. | Index No. |                                |             |                              |                    |
|                 |          |           | KBX COMP ASSY, Loc A2B01/A2C01 |             |                              | BZ5A1V/W, BZ5A5G/H |
|                 |          |           | - AKBX - Used on S/C 13        | 76971900    | 76971913                     | To HKBX-FCO 50967  |
|                 |          |           | DKBX - Used on S/C 14          | 76971904    | 76971913                     | To HKBX-FCO 50967  |
|                 |          |           | EKBX - Used on S/C 15-19       | 76971905    | 76971913                     | To HKBX-FCO 50967  |
|                 |          |           | HKBX - Used on S/C 20-30       | 76971908    | 76971913                     |                    |
|                 |          |           | NKBX - Used on S/C 31 & above  | 76971913    | 76971913                     |                    |
|                 |          |           | KBX COMP ASSY, Loc A2B01/A2C01 |             |                              | 160 MB units       |
|                 |          |           | - AJFX - Used on S/C 09-12     | 76963900    | 76971915                     |                    |
|                 |          |           | AKBX - Used on S/C 13          | 76971900    | 76971915                     |                    |
|                 |          |           | CKBX - Used on S/C 14-18       | 76971903    | 76971915                     |                    |
|                 |          |           | GKBX - Used on S/C 19-24       | 76971907    | 76971915                     |                    |
|                 |          |           | LKBX - Used on S/C 25-30       | 76971911    | 76971915                     |                    |
|                 |          |           | QKBX - Used on S/C 31 & above  | 76971915    | 76971915                     |                    |
|                 |          |           | FGX COMP ASSY, Loc A2B02/A2C02 |             |                              | 80 MB units        |
|                 |          |           | - BFGX - Used on S/C 09-12     | 76935501    | 76935523                     | To WFGX-FCO 62212  |
|                 |          |           | HFGX - Used on S/C 13-17       | 76935508    | 76935523                     | To WFGX-FCO 62212  |
|                 |          |           | TFGX - Used on S/C 18-21       | 76935518    | 76935523                     | To WFGX-FCO 62212  |
|                 |          |           | WFGX - Used on S/C 22 & above  | 76935523    | 76935523                     |                    |
|                 |          |           | FGX COMP ASSY, Loc A2B02/A2C02 |             |                              | 160 MB units       |
|                 |          |           | - EFGX - Used on S/C 13-17     | 76935505    | 76935524                     | To XFGX-FCO 62213  |
|                 |          |           | SFGX - Used on S/C 18-21       | 76935517    | 76935524                     | To XFGX-FCO 62213  |
|                 |          |           | XFGX - Used on S/C 22 & above  | 76935524    | 76935524                     |                    |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON           |      |       | DESCRIPTION                    | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES                               |
|---------------------------|------|-------|--------------------------------|-------------|---------------------------------|-------------------------------------|
| Fig.                      | Page | Index |                                |             |                                 |                                     |
| No.                       | No.  | No.   |                                |             |                                 |                                     |
| _JBX COMP ASSY, Loc A2B03 |      |       |                                |             |                                 | 80 MB units                         |
|                           |      |       | CFCX - Used on S/C 09-12       | 76933903    | 76962328                        | To RJBX-FCO 62112                   |
|                           |      |       | AJBX - Used on S/C 13-14       | 76962300    | 76962328                        | To RJBX-FCO 62112                   |
|                           |      |       | FJBX - Used on S/C 15          | 76962306    | 76962328                        | To RJBX-FCO 62112                   |
|                           |      |       | JJBX - Used on S/C 16-21       | 76962309    | 76962328                        | To RJBX-FCO 62112                   |
|                           |      |       | RJBX - Used on S/C 22-23       | 76962316    | 76962328                        |                                     |
|                           |      |       | YJBX - Used on S/C 24-26       | 76962323    | 76962328                        |                                     |
|                           |      |       | ADJBX - Used on S/C 27 & above | 76962328    | 76962328                        |                                     |
| _JBX COMP ASSY, Loc A2B03 |      |       |                                |             |                                 | 160 MB units all<br>except BZ9A7P/R |
|                           |      |       | EFCX - Used on S/C 09-12       | 76933906    | 76962329                        | To VJBX-FCO 62142                   |
|                           |      |       | AJBX - Used on S/C 13          | 76962300    | 76962329                        | To VJBX-FCO 62142                   |
|                           |      |       | DJBX - Used on S/C 14-16       | 76962303    | 76962329                        | To VJBX-FCO 62142                   |
|                           |      |       | MJBX - Used on S/C 17-22       | 76962312    | 76962329                        | To VJBX-FCO 62142                   |
|                           |      |       | VJBX - Used on S/C 23          | 76962320    | 76962329                        |                                     |
|                           |      |       | ZJBX - Used on S/C 24-26       | 76962324    | 76962329                        |                                     |
|                           |      |       | AEJBX - Used on S/C 27 & above | 76962329    | 76962329                        |                                     |
| _JBX COMP ASSY, Loc A2B03 |      |       |                                |             |                                 | BZ9A7P/R                            |
|                           |      |       | AEJBX - Used on S/C 29-34      | 76962329    | 76962333                        |                                     |
|                           |      |       | AHJBX - Used on S/C 35 & Above | 76962333    | 76962333                        |                                     |
| _HNX COMP ASSY, Loc A2C03 |      |       |                                |             |                                 | BZ9A1J/K/L/M,<br>BZ9A5E/F only      |
|                           |      |       | EHNX - Used on S/C 09 & above  | 76957106    | 76957106                        |                                     |

ENGINEERING RECOMMENDED SPARE PARTS LIST

| ITEMS APPEAR ON<br>Fig.   Page   Index<br>No.   No.   No. | DESCRIPTION  | PART<br>NUMBER                   | REPLACE-<br>MENT PART<br>NUMBER  | NOTES   |
|---|--|----------------------------------|----------------------------------|---|
|   | JUMPER PLUG ASSEMBLY (A2C04)<br>Used on S/C 09 & above   | 47203102                         | 47203102                         | Single Chan units   |
|   | <u>_</u> FBX COMP ASSY, Loc A2C04<br>AFBX - Used on S/C 09 & above   | 76933500                         | 76933500                         | Dual Chan units<br>All except<br>BZ5A2C/D/E/F/G/H,<br>BZ5A6C/D, BZ9A2C/D,<br>BZ9A6C/D |
|   | CFBX - Used on S/C 14-20   | 76933504                         | 76933508                         | BZ5A2E/F, BZ5A6C/D,<br>BZ9A2C/D, BZ9A6C/D   |
|   | DFBX - Used on S/C 15 & above  | 76933505                         | 76933505                         | BZ5A2C/D/G/H  |
|   | FFBX - Used on S/C 21 & above  | 76933508                         | 76933508                         | BZ5A2E/F, BZ5A6C/D,<br>BZ9A2C/D, BZ9A6C/D/<br>E/F                                     |
|   | <u>_</u> ZSV COMP ASSY, Loc A2C05<br>AZSV - Used on S/C 09-12<br>BZSV - Used on S/C 13-18<br>CZSV - Used on S/C 19 & above | 54286500<br>54286501<br>54286502 | 54286502<br>54286502<br>54286502 | To BZSV-FCO 50591   |
|   | <u>_</u> DZV COMP ASSY, Loc A3A1<br>ADZV - Used on S/C 09 & above  | 54209300                         | 54209300                         |   |
|   | <u>_</u> NSN COMP ASSY, Loc A4A1<br>BNSN - Used on S/C 09-28<br>CNSN - Used on S/C 29 & above                              | 54086501<br>54086502             | 54086502<br>54086502             |   |

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| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (80 MB)  |             |                                 | Moveable + 96<br>Fixed Heads<br>except BZ5A5G/H,<br>BZ5A9E/F                      |
|                 |          |           | Used on S/C 09-22             | 73034603    | 82397106                        |   |
|                 |          |           | Used on S/C 23-24             | 73034618    | 82397106                        |   |
|                 |          |           | Used on S/C 25 & above        | 82397106    | 82397106                        |   |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (80 MB)  |             |                                 | BZ5A5G/H  |
|                 |          |           | Used on S/C 09-22             | 73034603    | 82397103                        |   |
|                 |          |           | Used on S/C 23-24             | 73034618    | 82397103                        |   |
|                 |          |           | Used on S/C 25 & above        | 82397103    | 82397103                        |   |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (80 MB)  |             |                                 | BZ5A9E/F  |
|                 |          |           | Used on S/C 09-22             | 73034603    | 82397101                        |   |
|                 |          |           | Used on S/C 23-24             | 73034618    | 82397101                        |   |
|                 |          |           | Used on S/C 25 & above        | 82397101    | 82397101                        |   |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                                 | Moveable Heads<br>except BZ9A1J/K/P/R<br>Y/Z, BZ9A7G/S/W/Y,<br>BZ9A9E/F, BZ911A/B |
|                 |          |           | Used on S/C 09-16             | 73034604    | 82395200                        | Replacement re-<br>quires LKBX card   |
|                 |          |           | Used on S/C 17-22             | 73034607    | 82395200                        | Replacement re-<br>quires LKBX card   |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395200                        | Replacement re-<br>quires LKBX card   |
|                 |          |           | Used on S/C 25 & above        | 82395200    | 82395200                        |   |

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| ITEMS APPEAR ON |          |           | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART NUMBER | NOTES                                |
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| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                              | BZ9A1J/K                             |
|                 |          |           | Used on S/C 18-22             | 73034607    | 82395210                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395210                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 25 & above        | 82395210    | 82395210                     |                                      |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                              | BZ9A1P/R                             |
|                 |          |           | Used on S/C 09-16             | 73034604    | 82395215                     | Replacement<br>requires LKBX<br>card |
|                 |          |           | Used on S/C 17-22             | 73034607    | 82395215                     | Replacement<br>requires LKBX<br>card |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395215                     | Replacement<br>requires LKBX<br>card |
|                 |          |           | Used on S/C 25                | 82395200    | 82395200                     |                                      |
|                 |          |           | Used on S/C 26 & above        | 82395215    | 82395215                     |                                      |
| 5-2             | 5-11     | 10        | MINI MODULE ASSEMBLY (160 MB) |             |                              | BZ9A1Y                               |
|                 |          |           | Used on S/C 22                | 73034607    | 82395213                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 23-24             | 73034613    | 82395213                     | Replacement re-<br>quires LKBX card  |
|                 |          |           | Used on S/C 25 & above        | 82395213    | 82395213                     |                                      |

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| ITEMS APPEAR ON |             |              | DESCRIPTION                   | PART NUMBER | REPLACE-<br>MENT PART<br>NUMBER | NOTES  |
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| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | BZ9A1Z, BZ9A7G   |
|                 |             |              | Used on S/C 22                | 73034607    | 82395208                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 23-24             | 73034613    | 82395208                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 25 & above        | 82395208    | 82395208                        |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | BZ9A7S   |
|                 |             |              | Used on S/C 29-31             | 82395200    | 82395216                        |  |
|                 |             |              | Used on S/C 32 & above        | 82395216    | 82395216                        |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | BZ9A9E/F   |
|                 |             |              | Used on S/C 34 & Above        | 82395215    | 82395215                        |  |
| 5-2             | 5-11        | 10           | MINI MODULE ASSEMBLY (160 MB) |             |                                 | Moveable + 48<br>Fixed Heads                           |
|                 |             |              | Used on S/C 09-16             | 73034605    | 82395201                        | except BZ9A1L/M<br>Replacement re-<br>quires LKBX card |
|                 |             |              | Used on S/C 17-22             | 73034608    | 82395201                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 23-24             | 73034615    | 82395201                        | Replacement re-<br>quires LKBX card                    |
|                 |             |              | Used on S/C 25 & above        | 82395201    | 82395201                        |  |

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| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB)<br>Used on S/C 29-31<br>Used on S/C 32 & above   | 82395200<br>82395218                                     | 82395218<br>82395218                                     | BZ9A7W/Y   |
| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB)<br>Used on S/C 20-22<br><br>Used on S/C 23-24<br><br>Used on S/C 25 & above                              | 73034608<br><br>73034615<br><br>82395211                 | 82395211<br><br>82395211<br><br>82395211                 | BZ9A1L/M<br>Replacement re-<br>quires LKBX card<br>Replacement re-<br>quires LKBX card   |
| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB)<br><br>Used on S/C 09-16<br><br>Used on S/C 17-22<br><br>Used on S/C 23-24<br><br>Used on S/C 25 & above | 73034606<br><br>73034609<br><br>73034614<br><br>82395202 | 82395202<br><br>82395202<br><br>82395202<br><br>82395202 | Moveable + 96<br>Fixed Heads<br>except BZ9A5E/F<br>Replacement re-<br>quires LKBX card<br>Replacement re-<br>quires LKBX card<br>Replacement re-<br>quires LKBX card |
| 5-2             | 5-11 | 10    | MINI MODULE ASSEMBLY (160 MB)<br>Used on S/C 20-22<br><br>Used on S/C 23-24<br><br>Used on S/C 25 & above                              | 73034609<br><br>73034614<br><br>82396212                 | 82395212<br><br>82395212<br><br>82395212                 | BZ9A5E/F<br>Replacement re-<br>quires LKBX card<br>Replacement re-<br>quires LKBX card   |

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| 5-2             | 5-11 | 18    | BELT, Flat Drive<br>Used on S/C 09 & above   | 92314125                             | 92314125                             | 60 Hz                                  |
| 5-2             | 5-11 | 18    | BELT, Flat Drive<br>Used on S/C 09 & above   | 92314126                             | 92314126                             | 50 Hz                                  |
| 5-3             | 5-13 | 5     | FAN ASSEMBLY<br>Used on S/C 09 & above   | 73019800                             | 73019800                             |  |
| 5-3             | 5-13 | 16    | AIR FILTER, Foam<br>Used on S/C 09-11<br>Used on S/C 12 & above  | 94364904<br>73045700                 | 73045700<br>73045700                 |  |
| 5-3             | 5-15 | 28    | INDICATOR, LED<br>Used on S/C 09-25<br><br>Used on S/C 09-25<br>Used on S/D 26 & above                   | 94394101<br><br>94394114<br>94394114 | 94394101<br><br>94394114<br>94394114 | All except<br>BZ9A1J/K<br><br>BZ9A1J/K |
| 5-3             | 5-15 | 29    | SWITCH P.B PANEL W/LED Indicator<br>Used on S/C 09-25<br><br>Used on S/C 09-25<br>Used on S/C 26 & above | 94394000<br><br>94394028<br>94394028 | 94394000<br><br>94394028<br>94394028 | All except<br>BZ9A1J/K<br><br>BZ9A1J/K |



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| ITEMS APPEAR ON |          |           | DESCRIPTION   | PART NUMBER          | REPLACE-<br>MENT PART<br>NUMBER | NOTES |
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| 5-4             | 5-17     | 3         | INDICATOR, LED<br>Used on S/C 17-25<br>Used on S/C 26 & above               | 94394101<br>94394114 | 94394101<br>94394114            |       |
| 5-4             | 5-17     | 4         | SWITCH, P.B. W/LED Indicator<br>Used on S/C 17-25<br>Used on S/C 26 & above | 94394000<br>94394028 | 94394000<br>94394028            |       |
| 5-4             | 5-17     | 8         | AIR FILTER, Foam<br>Used on S/C 17 & above                                  | 73045702             | 73045702                        |       |
| 5-4             | 5-17     | 16        | FAN ASSEMBLY<br>Used on S/C 17 & above                                      | 73019800             | 73019800                        |       |
| 5-5             | 5-19     | 3         | SWITCH, P.B. W/LED Indicator<br>Used on S/C 17-25<br>Used on S/C 26 & above | 94394000<br>94394028 | 94394000<br>94394028            |       |
| 5-5             | 5-19     | 8         | AIR FILTER, Foam<br>Used on S/C 17 & above                                  | 73045701             | 73045701                        |       |
| 5-5             | 5-19     | 16        | FAN ASSEMBLY<br>Used on S/C 17 & above                                      | 73019800             | 73019800                        |       |

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