

DATE	EC NUMBER	DATE	EC NUMBER	GENERAL MICROPROGRAM			
NOV 66	420613			LOGIC FLOW INDEX			
MAR 67	420655			DATE	NOV 66	P/N	2244550
						TYPE	2314/2844
				IBM		QA010	

**MEANING AND USE OF REGISTERS**

ER0 = WRITE DATA ERROR  
 ER1 = ADDRESS OUT  
 ER2 = BUS OUT PARITY CHECK  
 ER3 = CONTROL UNIT END OUTSTANDING (BUSY)  
 ER4 = ALU CHECK  
 ER5 = NOT USED  
 ER6 = 2 CHAN SWITCH B SELECT  
 ER7 = HALT I/O

ST0 = PROGRAM CONTROLLED BY CS FIELD.  
 ST1 = PROGRAM ENABLES TURN ON, ACTUALLY TURNED ON BY FILE INDEX. TURNED OFF ONLY BY PROGRAM PROVIDES BRANCHING CONDITION CALLED INDEX.  
 ST2 = TURN ON PERMITTED BY CS FIELD. ACTUALLY TURNED ON BY D BUS BEING NON ZERO (DNST21). TURN OFF BY PROGRAM CS FIELD.  
 ST3 = PROGRAM CONTROLLED BY CS FIELD. ALSO TURNED ON AND OFF AS A RESULT OF THE CARRY FROM THE ALU WHEN ARITHMETIC STATEMENT CONTAINS A C AFTER THE DESTINATION REGISTERS NAME. ALSO IS SOURCE OF CARRY IN CERTAIN ARITHMETIC STATEMENTS.  
 ST4 = TURNED ON ONLY BY SERIAL-DESERIALIZER. TURNED OFF ONLY BY PROGRAM. IN READ OP, ST4=1 SAYS BYTE HAS BEEN DESERIALIZED AND PLACED IN DR REG. IN WRITE OP, ST4=1 SAYS BYTE HAS BEEN TAKEN FROM DR REG FOR SERIALIZING.  
 ST5 = PROGRAM CONTROLLED BY CS FIELD.  
 ST6 = PROGRAM CONTROLLED BY CS FIELD.  
 ST7 = PROGRAM CONTROLLED BY CS FIELD. ALSO TURNED ON BY SELECTIVE RESET.

IE0 = } REFER TO NOTE 1.  
 IE1 = }  
 IE2 = ENABLE METERING IN  
 IE3 = } THESE THREE BITS  
 IE4 = } FORM AN EXECUTION CONTROL  
 IE5 = } CODE FOR IN LINES.  
 IE6 = CHAINING IN-LINES  
 IE7 = 2X8 SWITCH DIAGNOSTIC SYNC

IS0 = }  
 IS1 = } CONTROL UNIT ADDRESS  
 IS2 = }  
 IS3 = }  
 IS4 = DRIVE A SELECTED  
 IS5 = FILE OPERABLE  
 IS6 = SPARE MOD. GATED ATTENTION  
 IS7 = ANY GATED ATTENTION

FS0 = BUSY  
 FS1 = ON LINE  
 FS2 = UNSAFE  
 FS3 = WRITE CURRENT SENSE  
 FS4 = PACK CHANGE  
 FS5 = END OF CYLINDER  
 FS6 = MULTIPLE MOD SELECT  
 FS7 = SEEK INCOMPLETE

**FT REGISTER**

FT0 = CONTROL TAG  
 FT1 = SET CYLINDER ADDRESS TAG  
 FT2 = SET HEAD TAG  
 FT3 = SET DIFFERENCE TAG  
 FT4 = ADDRESS MARK  
 FT5 = AUXILIARY STORAGE CONTROL  
 FT6 = BURST EVEN  
 FT7 = FILE SELECT

**FC REG WITH CONTROL TAG**

FC0 = WRITE GATE  
 FC1 = READ GATE  
 FC2 = SEEK START  
 FC3 = HEAD RESET  
 FC4 = ERASE GATE  
 FC5 = SELECT HEAD  
 FC6 = RETURN TO 0  
 FC7 = HEAD ADVANCE

NOTE 1: WITH THE CE-NORMAL-IN-LINE SWITCH IN CE OR IN-LINE THE MODE SELECT SWITCH CONTROLS IE0 AND IE1 AS FOLLOWS:

MODE SELECT SWITCH POSITION	IE0	IE1
LOAD	1	1
ROUTINE	1	0
ERROR	0	1
RESULT	0	1
ALL OTHERS	0	0

NOTE 2: THE DIFF. ADDR. IS DEFINED TO BE THE COMPLIMENT OF THE DIFFERENCE BETWEEN THE OLD ADDRESS AND NEW ADDRESS.

EXAMPLE: FOR A DIFFERENCE OF 1 CYLINDER BETWEEN OLD ADDRESS AND NEW ADDRESS, DIFF. ADDR. EQUALS 11111110.

**FC REG WITH SET CYLINDER TAG**

FC0 = CYL 128  
 FC1 = CYL 64  
 FC2 = CYL 32  
 FC3 = CYL 16  
 FC4 = CYL 8  
 FC5 = CYL 4  
 FC6 = CYL 2  
 FC7 = CYL 1

**FC REG WITH SET SIGN AND HEAD TAG**

FC0 = FORWARD  
 FC1 = SELECT LOCK RESET  
 FC2 = NOT USED  
 FC3 = HEAD 16  
 FC4 = HEAD 8  
 FC5 = HEAD 4  
 FC6 = HEAD 2  
 FC7 = HEAD 1

**FC WITH SET DIFF. TAG (REFER TO NOTE 2)**

FT0 = DIFF. ADDR. 128  
 FT1 = DIFF. ADDR. 64  
 FT2 = DIFF. ADDR. 32  
 FT3 = DIFF. ADDR. 16  
 FT4 = DIFF. ADDR. 8  
 FT5 = DIFF. ADDR. 4  
 FT6 = DIFF. ADDR. 2  
 FT7 = DIFF. ADDR. 1

**SL REGISTER DECODE**

SL IS ONLY A CA DECODE AND IS NOT A REGISTER. A MICROPROGRAM STATEMENT OF SL GATES THE DRIVE SELECTED LINES (B THRU J) FROM THE FILES ONTO THE "A" BUS. DRIVE B SELECTED GATES INTO BIT 0 AND C GATES INTO BIT 1, ETC. (DRIVE A GATES INTO THE IS<sup>4</sup> BIT).  
 SL IS ALSO USED TO ENABLE THE CATCH UP HARDWARE IN THE WRITE MODE OF OPERATION.

**SW REGISTER**

SW0 DEVICE RESERVED TO CHANNEL A.  
 SW1 DEVICE END--PACK CHANGE--CHANNEL A.  
 SW2 DEVICE END--SEEK COMPLETE--CHANNEL A.  
 SW3 SEEK IN PROGRESS--CHANNEL A.  
 SW4 DEVICE RESERVED TO CHANNEL B.  
 SW5 DEVICE END--PACK CHANGE--CHANNEL B.  
 SW6 DEVICE END--SEEK COMPLETE--CHANNEL B.  
 SW7 SEEK IN PROGRESS--CHANNEL B.

**IG REGISTER**

IG0 WRITE LATCH  
 IG1 RESET OPERATIONAL IN LATCH DROPS OPL-IN TO CHANNEL. DEGATES STAT-IN AND ADDR-IN.  
 IG2 READ LATCH  
 IG3 REQUEST IN (GATED BY NOT SUP/O)  
 IG4 POLL ENABLE RAISES REQUEST IN WHEN ATTENTION IS RECEIVED FROM A FILE.  
 IG5 STATUS IN  
 IG6 WITH OPL-IN UP: DATA TRANSFER NOT SUPPRESSABLE WITH OPL-IN DOWN: REQUEST IN (NOT GATED BY SUP/O)  
 IG7 ADDRESS IN TURNS ON OPERATIONAL IN; RAISES ADDRESS IN WHEN ADDRESS OUT IS DOWN.

**STATUS CODE PRESENTED TO CHANNEL**

BIT	MEANING
0	ATTENTION. NOT USED.
1	STATUS MODIFIER SET WHEN SEARCH HAS BEEN SATISFIED OR WHEN CONTROL UNIT IS BUSY.
2	CONTROL UNIT END.
3	BUSY
4	CHANNEL END.
5	DEVICE END.
6	UNIT CHECK: ERROR IN FILE OR CONTROL UNIT.
7	UNIT EXCEPTION. END OF FILE.

DATE	EC NUMBER	DATE	EC NUMBER	MICROPROGRAM DEFINITIONS			
NOV 66	420613			MEANING & USE OF REGISTERS			
MAR 67	420655			DATE	NOV 66	P/N	2244551
JAN 68	420662					TYPE	2314/2844
16AUG68	420664			IBM		QA020	

**COMMAND EXECUTION BYTE**

THIS BYTE CODE MAY RESIDE IN EITHER THE OP REGISTER OR THE BY REGISTER. IN EXECUTING A READ, WRITE OR SEARCH OPERATION, THIS BYTE CONTAINS INFORMATION INDICATING THE TYPE OF OPERATION AND INDICATING WHICH PHASE OF THE OPERATION IS CURRENTLY IN PROGRESS. THE CODE IS GENERATED INTERNALLY IN THE MICROPROGRAM, BUT DOES HAVE SOME SIMILARITIES TO THE COMMAND BYTE CODE.

**BIT 0** USED TO INDICATE WHETHER THE OPERATION HAS BEEN TRUNCATED (COMMAND/OUT GIVEN IN RESPONSE TO SERVICE/IN). IN FLAG BYTE PROCESSING, LOAD COUNTS, READ/CLOCKING, SEARCH, SCAN, BURST BYTE PROCESSING OR GAP SPACING ROUTINES, TRUNCATION IS NORMALLY INDICATED IF BIT 0 IS ON. IN STATUS PRESENTATION, WRITE OR OTHER ROUTINES, TRUNCATION IS INDICATED IF BIT 0 IS OFF. IN THE EARLY PHASES OF A COMMAND EXECUTION, BIT 0 MAY INDICATE A MULTITRACK OPERATION RATHER THAN INDICATING TRUNCATION.

**BIT 1** INDICATES SEARCH (OR SCAN) H1.

**BIT 2** INDICATES SEARCH (OR SCAN) EQUAL. BITS 1 AND 2 TOGETHER INDICATE SEARCH (OR SCAN) H1 OR EQUAL. IF BIT 7 IS ON OR THE SEARCH (OR SCAN) OPERATION HAS BEEN COMPLETED (i.e., IN BURST PROCESSING OR CLOCKING ROUTINES AFTER LAST BYTE IS COMPARED), THEN BIT 2 IS SET OR RESET SO THAT IT IS ON ONLY IF STATUS MODIFIER IS TO BE PRESENTED IN ENDING STATUS AND BIT 1 MAY BE SET TO INDICATE SEARCH (OR SCAN) COMMAND IN CASE BIT 2 IS TURNED OFF.

**BIT 3, 4 AND 5** FORM A CODE WHICH INDICATES WHAT TYPE OF FIELD IS TO BE PROCESSED NEXT OR IS CURRENTLY BEING PROCESSED AND INDICATES WHETHER CLOCKING IS TO OCCUR IN THAT FIELD. CLOCKING REFERS TO THE PROCESS OF SPACING OVER A FIELD BY READING THE FIELD INTERNALLY IN THE 2314 WITHOUT DATA TRANSFER TO THE CHANNEL. (CLOCKING MAY BE REQUIRED TO ACCESS A FIELD, SUCH AS A KEY FIELD, WHICH IS NOT IMMEDIATELY PRECEDED BY AN ADDRESS MARK.) BIT 7 IS ALSO USED TO INDICATE CLOCKING IN SOME CASES. IN FLAG BYTE PROCESSING, READ/CLOCKING AND BURST BYTE PROCESSING ROUTINES, ST0=1 OVERRIDES THE CODE INDICATED BY BITS 3, 4 AND 5 AND ST0 INDICATES CLOCKING OF HOME ADDRESS. THE CODE IS:

- 000 COUNT FIELD, OPERATION WILL CONTINUE INTO KEY AND DATA FIELDS. NOT CLOCKING.
- 001 COUNT FIELD, OPERATION WILL TERMINATE AT END OF COUNT FIELD. NOT CLOCKING.
- 010 HOME ADDRESS FIELD. BIT 7=1 INDICATES CLOCKING IF NOT IN SEARCH/SCAN ROUTINE.
- 011 KEY FIELD. NOT CLOCKING.
- 100 CLOCKING COUNT FIELD. OPERATION COMMENCES IN THE KEY FIELD.
- 101 CLOCKING COUNT FIELD. WHEN FINISHED WITH COUNT FIELD, PROCEED CLOCKING IN KEY FIELD.
- 110 DATA FIELD. IF BIT 6=0, THEN BIT 7=1 INDICATES CLOCKING.
- 111 CLOCKING KEY FIELD.

**COMMAND EXECUTION BYTE (CONTINUED)**

NOTE THAT BIT 4=0 IMPLIES COUNT FIELD AND BIT 3=1 IMPLIES DATA FIELD WHEN NOT CLOCKING.

**BIT 6** INDICATES A READ COMMAND OR IF BITS 1 OR 2 ARE ON, INDICATES FILE SCAN COMMAND. BITS 1,2 AND 6 OFF INDICATE WRITE COMMAND.

**BIT 7** MAY INDICATE CLOCKING OF HOME ADDRESS OR DATA FIELD AS INDICATED ABOVE. OTHERWISE, INDICATES AN UNEQUAL COMPARE HAS OCCURRED IN A SEARCH (OR SCAN) OPERATION.

THE COMMAND EXECUTION BYTE IS FORMED IN THE BY REGISTER DURING COMMAND DECODE AND RESIDES IN THE BY REGISTER IN THE INITIAL STATUS PRESENTATION ROUTINES. IN THE READ/CLOCKING, SEARCH/SCAN, WRITE, INDEX PROCESSING, FLAG BYTE PROCESSING, LOAD COUNTS, BURST BYTE PROCESSING, GAP SPACING AND GAP WRITING ROUTINES, THE COMMAND EXECUTION BYTE RESIDES IN THE OP REGISTER.

**OP REGISTER**

IN THE TIMER SUBROUTINE OR INDEX SUBROUTINE, IF OP5=1, THEN THE OP REGISTER CONTAINS THE RETURN ADDRESS TO RETURN THE PROPER POINT IN END PROCEDURE-TIMED OR CHAINED RESELECTION. IF OP5=0, THEN BIT ASSIGNMENTS ARE LIKE THOSE IN INITIAL STATUS PRESENTATION, NOT WRITE IMMEDIATE.

IN INITIAL STATUS PRESENTATION, NOT WRITE IMMEDIATE, AND IN MOST OF INITIAL STATUS PRESENTATION, INTERFACE TO ROUTINES, THE BITS OF THE OP REGISTER HAVE THE FOLLOWING ASSIGNMENTS:

- BIT 0** NOT USED
- BIT 1** ORIENTATION IS AT END OF DATA FIELD AND AN ADDRESS MARK OPERATION FOLLOWS.
- BIT 2** OVERFLOW RECORD OPERATION IN PROGRESS. IN THIS CASE, THE WRITE ROUTINE HAS RETURNED TO THE INITIAL STATUS ROUTINE TO SHUT OFF WRITE AND ERASE GATES, BUT THE INITIAL STATUS ROUTINE DOES NOT PRESENT STATUS. THIS OCCURS AFTER EACH SEGMENT EXCEPT THE LAST ON AN OVERFLOW RECORD UPDATE OPERATION. BIT 7=1 INDICATES LAST SEGMENT (END OF FILE).
- BIT 3** OPERATION WILL BEGIN BY LOOKING FOR ADDRESS MARK AND/OR INDEX POINT. THIS BIT IS ALSO ON FOR CONTROL/SENSE OPERATIONS.
- BIT 4** INDEX POINT HAS BEEN DETECTED SINCE COMPLETION OF PREVIOUS COMMAND.
- BIT 5** ALWAYS OFF.
- BIT 6** DO NOT CHECK FOR MISSING ADDRESS MARK ON THIS OPERATION. THIS BIT IS SET IF THE UNORIENTED STATE EXISTED PRIOR TO THIS (READ OR SEARCH) COMMAND.

**OP REGISTER (CONTINUED)**

**BIT 7** THIS IS A CONTROL OR SENSE OPERATION. INDICATES END OF FILE IF BIT 2=1.

IN READ/CLOCKING, SEARCH/SCAN, INDEX PROCESSING, FLAG BYTE PROCESSING, LOAD COUNTS, BURST BYTE PROCESSING, GAP SPACING, GAP WRITING AND WRITE ROUTINES, THE OP REGISTER CONTAINS THE COMMAND EXECUTION BYTE (PREVIOUSLY DESCRIBED), EXCEPT THAT IN THE WRITE ROUTINE, THE FOLLOWING ASSIGNMENTS EXIST:

- BIT 1** INDICATES WRITE DATA IN-LINE ROUTINE.
- BIT 6** INDICATES THAT THIS IS A FORMATTING TYPE OF WRITE OPERATION. ALSO INDICATES RO WHEN WRITING GAP BEFORE COUNT FIELD.
- BIT 7** INDICATES DATA LENGTH OF ZERO, FOR END-OF-FILE PURPOSES. ALSO INDICATES IN-LINES.

NOTE THAT OP4=0 WITH OP5=1 CANNOT OCCUR IN THE WRITE ROUTINE ON NORMAL WRITE OPERATIONS. THIS COMBINATION IS THEREFORE USED TO INDICATE A SPACE COUNT OPERATION.

**GP REGISTER**

BITS 0, 1 AND 2 HAVE THE FOLLOWING ASSIGNMENTS (ALL ROUTINES):

- 000 THE INFORMATION STORED IN GP IS BINARY-CODED SENSE INFORMATION.
- 001 THE INFORMATION STORED IN GP IS BINARY-CODED SENSE INFORMATION.
- 010 THE INFORMATION STORED IN GP IS BINARY-CODED SENSE INFORMATION.
- 011 ALLOW ALL WRITE COMMANDS FILE MASK.
- 100 NO FILE MASK HAS BEEN ISSUED IN THIS CHAIN.
- 101 INHIBIT WRITE HA AND WRITE RECORD ZERO COMMANDS.
- 110 INHIBIT ALL FORMATTING WRITE COMMANDS.
- 111 INHIBIT ALL WRITE COMMANDS.

BITS 3,4,5,6 AND 7 ARE USED IN THE BINARY SENSE. INFORMATION CODE WHEN GP IS HOLDING SENSE INFORMATION. OTHERWISE (IN ALL ROUTINES), BITS 3,4,5,6, AND 7 ARE USED IN STORING THE CURRENT SEEK (HEAD) ADDRESS. WHEN BITS 3,4,5,6, AND 7 ARE ALL ON, NO SEEK HAS BEEN ISSUED IN THE CURRENT CCM CHAIN.

**FR REGISTER**

THE BITS OF THE FR REGISTER HAVE THE FOLLOWING ASSIGNMENTS IN ALL ROUTINES:

- BIT 0** ASSOCIATED WITH BIT 0 OF THE FLAG BYTE OF A COUNT FIELD. THIS BIT DIFFERS IN ANY TWO SUCCESSIVE RECORDS AND IS USED TO DETECT A MISSING ADDRESS MARK SITUATION.
- BIT 1** ASSOCIATED WITH BIT 1 OF THE FLAG BYTE OF A COUNT FIELD. THIS BIT IS USED TO INDICATE THAT AN OVERFLOW RECORD IS BEING PROCESSED.
- BIT 2** INDEX PASSED LATCH. THIS BIT IS USED IN DETECTING WHEN INDEX HAS BEEN PASSED TWICE FOR PURPOSES OF AVOIDING AN INFINITE LOOP IN A CHANNEL PROGRAM. WHEN INDEX POINT IS PASSED A SECOND TIME IN CERTAIN SEQUENCES, A UNIT CHECK (NO RECORD FOUND) INTERRUPT OCCURS.
- BIT 3,4** USED IN STORING THE SEEK FILE MASK. BITS 3 AND 4 HAVE THE FOLLOWING ASSIGNMENTS:
  - 00 PERMIT ALL SEEKS AND RECALIBRATE
  - 01 PERMIT SEEK CCMH AND SEEK HH
  - 10 PERMIT SEEK HH
  - 11 INHIBIT ALL SEEKS
- BIT 5** NOT USED.
- BIT 6** ASSOCIATED WITH BIT 6 OF THE HOME ADDRESS OR RECORD ZERO FLAG BYTE. INDICATES THAT THE TRACK IS DEFECTIVE.
- BIT 7** ASSOCIATED WITH BIT 7 OF THE FLAG BYTE. INDICATES AN ALTERNATE TRACK.

**KL REGISTER**

BITS 0 AND 1 HAVE THE FOLLOWING ASSIGNMENTS DURING UNTIMED END PROCEDURE AND INITIAL SELECTION.

- 1 1 SENSE CODE IN DH MAINTAIN CHANNEL AND FILE CONNECTION
- 1 0 SENSE CODE IN DH, BUT HAS BEEN SENSED. BREAK CONTINGENT CONNECTION.
- 0 1 SENSE CODE IN DH. FILE CONNECTION BROKEN BUT MAINTAIN CHANNEL CONNECTION.
- 0 0 NO SENSE CODE STORED.

BITS 3,4 AND 5 HAVE THE FOLLOWING ASSIGNMENTS DURING CHAINED RESELECTION AND COMMAND DECODE.

- 0 0 0 UNORIENTED
- 1 0 0 INDEX HAS BEEN PASSED
- 0 1 0 AT END OF H.A.
- 0 0 1 AT END OF COUNT FIELD
- 0 1 1 AT END OF KEY FIELD
- 1 1 0 AT END OF DATA FIELD

BIT 7=1 IF AN UNSAFE OCCURED AFTER A WRITE OPERATION.

DATE	EC NUMBER	DATE	EC NUMBER	REGISTER USAGE CONVENTIONS		
MAR 67	420655					
APR 67	420656			DATE	MAR 67	P/N 2250864
12NOV68	420664				TYPE	2314/2844
				<b>IBM</b>		QA022

EXPLANATION OF INFORMATION WITHIN MICROPROGRAM BLOCKS

**SENSE BYTES** PRESENTED TO CHANNEL ON SENSE COMMAND

BINARY CODED SENSE INFORMATION POSTED IN GP OR DH

**LINE 1**  
 LEFT SIDE-TWO OR THREE DIGIT LEG IDENTIFIER.  
 RIGHT SIDE-ENTIRE HEX ADDRESS OF THE WORD.  
 THIS IS THE ADDRESS WHICH MUST BE PLACED IN  
 ROSAR IN ORDER TO READ OUT THE WORD.

**LINE 2**  
 WHERE APPLICABLE, CONTAINS AS EMIT VALUE  
 REPRESENTING A BINARY PICTURE OF THE CK  
 FIELD WHEN USED AS A CONSTANT.

**LINE 3**  
 A.L.U. STATEMENTS  
 A.L.U. SYMBOLS  
 + MEANS TRUE ADD  
 - MEANS COMPLEMENT ADD  
 . MEANS ANDED  
 & MEANS ORED  
 v MEANS EXCLUSIVE ORED  
 MEANS SET INTO

**LINE 4**  
 NOT ASSIGNED

**LINE 5**  
 ST REG SET AND RESET STATEMENTS WHICH  
 ESTABLISH CS FIELD

**LINE 6**  
 BRANCH STATEMENTS (CH AND CL FIELD)

**LINE 7**  
 REPLACABLE WORD CODE. THE R.W.C. DEFINES  
 ALTERNATE MICROPROGRAM STATEMENTS WHICH  
 MUST BE USED WHEN OPTIONAL FEATURES ARE  
 INSTALLED. THEY ARE ADDITIONS TO OR  
 REPLACEMENTS FOR THE BASIC PROGRAM.

**REPLACABLE WORD CODE:**  
 / MEANS OR.  
 . MEANS AND.  
 1 = BUFFER  
 2 = 2 CHAN SWITCH  
 3 = 2 x 8 SWITCH (2844 ATTACHMENT)

**LINE 8**  
 LEFT SIDE 2 CHAR DRAWING COORD.  
 CENTER - 2 OR 3 CHAR LEG SELECTOR WHICH  
 IDENTIFIES THE BRANCH CONDITIONS FOR THE  
 NEXT ADDRESS. THE CNS5 BIT IS INDICATED  
 BY THE THIRD CHARACTER.  
 RIGHT SIDE - 2 CHAR BOX SERIAL.

BIT	BYTE 0	BYTE 1	BYTE 2	BYTE 3*	BYTE 4*	BYTE 5*
BIT 0	COMMAND REJECT	DATA CHECK IN COUNT FIELD	UNSAFE	BUSY	* REFER BELOW	
BIT 1	INTERVENTION REQUIRED	TRACK OVERRUN		ON LINE		
BIT 2	BUS-OUT PARITY	END OF CYLINDER	SERIALIZER CHECK	UNSAFE		
BIT 3	EQUIPMENT CHECK	INVALID SEQUENCE		WRITE CURRENT SENSE		
BIT 4	DATA CHECK	NO RECORD FOUND	ALU CHECK	PACK CHANGE		
BIT 5	OVERRUN	FILE PROTECTED	UNSELECTED FILE STATUS	END CYLINDER		
BIT 6	TRACK CONDITION CHECK	MISSING ADDRESS MARK		MULTIPLE MOD SELECT		
BIT 7	SEEK CHECK	OVERFLOW INCOMPLETE		SEEK INCOMPLETE		

**BYTE 3**  
 THIS SENSE BYTE CONSISTS OF THE FILE STATUS LINES REFLECTED AT  
 THE TIME THE BYTE IS ISSUED.

**BYTE 4**  
 BIT 0 INDICATES "WRONG LENGTH RECORD" (BUFFER ONLY).  
 BIT 1 INDICATES "OUTSTANDING STATUS" (BUFFER ONLY).

BITS 2 AND 3 UNUSED  
 BITS 4 THRU 7 INDICATE THE PHYSICAL DEVICE ADDRESS OF THE SELECTED  
 DEVICE ACCORDING TO THE FOLLOWING BINARY CODE:

PHYSICAL DRIVE SELECTED	BITS 4 THRU 7 (HEX)
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7
J	8
NONE	F

THE LAST ENTRY "F" SHOULD ONLY OCCUR WHEN THE MOD  
 SELECT PLUG OF THE ADDRESSED DEVICE IS NOT INSERTED.

**BYTE 5**  
 THIS BYTE IS ALWAYS ZERO EXCEPT WHEN OVERFLOW INCOMPLETE OCCURS (BYTE 1, BIT 7). IF  
 OVERFLOW INCOMPLETE OCCURS, BYTE 5 REFLECTS THE CHANNEL COMMAND THAT WAS IN PROGRESS  
 WHEN THE ERROR WAS DETECTED DURING THE NON-FORMATTING RECORD OVERFLOW OPERATION. SENSE  
 BYTE 5 IS STORED IN THE DL REGISTER.

DECIMAL VALUE	NAME OF CODE	PAGES ON WHICH CODE IS POSTED
0	COMMAND REJECT	QD100, QG170, QP025
1	INTERVENTION REQUIRED	QB070
2	BUS OUT PARITY	QD110, QG040, QG170, QP185, QR031
4	DATA CHECK	QK030, QR031, QR041
5	OVERRUN	QD100, QD120, QE061, QE090, QJ011, QL030, QN065, QP090, QP100, QP120, QP185, QR031, QR041
6	TRACK CONDITION CHECK	QG120, QH200, QJ011
7	SEEK CHECK	QB070, QB080, QG120, QH220
9	TRACK OVERRUN	QD120, QE070, QP189
10	END-OF-CYLINDER	QH210
12	NO RECORD FOUND	QE061, QH020
13	FILE PROTECTED	QD040, QH200
14	MISSING ADDRESS MARK	QJ021, QJ031
28	NO RECORD FOUND-HA OR RO	QH010-(SETS BITS 4 AND 6 IN SENSE BYTE 1)
32	COMMAND REJECT AND SEEK CHECK	QG040
43	INVALID SEQUENCE AND COMMAND REJECT.	QD110, QD120, QH210
45	FILE PROTECTED AND COMMAND REJECT	QD090, QD100
48	UNSAFE AND EQUIPMENT CHECK	QB070, QE030, QE090, QP010, QP181, QS080
50	SERIALIZER CHECK AND EQUIP. CHECK	QP185
52	ALU CHECK AND EQUIP. CHECK	QD100, QN030
53	UNSELECTED FILE STATUS AND EQUIP. CHK.	QB070
56	DATA CHK IN COUNT AND DATA CHECK	QR031, QR041

NOTE 2: AFTER ENDING STATUS, THE ABOVE CODE IS STORED IN THE DH REGISTER UNTIL A  
 SENSE COMMAND IS ISSUED; AT WHICH TIME THE INFORMATION IS DECODED INTO  
 SENSE BYTES 0, 1 AND 2. BIT 0 IN DH IS TURNED ON IF THE ERROR OCCURED  
 DURING A NON-FORMATTING OVERFLOW RECORD OPERATION.

DATE	EC NUMBER	DATE	EC NUMBER	MICROPROGRAM DEFINITIONS		
NOV 66	420613					
MAR 67	420655			DATE	MAR 67	P/N 2244552
JAN 68	420662					TYPE 2314/2844
16AUG68	420664			IBM		QA030

COMMAND TYPE	COMMAND	HEX CODE	BINARY CODE														HEX CODE		
			SINGLE TRACK							MULTI-TRACK									
			0	1	2	3	4	5	6	7	0	1	2	3	4	5		6	7
CONTROL	NO-OP	03	0	0	0	0	0	0	1	1									
	SEEK	07	0	0	0	0	0	1	1	1									
	SEEK CYLINDER	0B	0	0	0	0	1	0	1	1									
	SPACE COUNT	0F	0	0	0	0	1	1	1	1									
	RECALIBRATE	13	0	0	0	1	0	0	1	1									
	RESTORE (1)	17	0	0	0	1	0	1	1	1									
	SEEK HEAD	1B	0	0	0	1	1	0	1	1									
	SET FILE MASK	1F	0	0	0	1	1	1	1	1									
	RELEASE DEVICE	94	1	0	0	1	0	1	0	0									
	RESERVE DEVICE	B4	1	0	1	1	0	1	0	0									
SENSE	TEST I/O	00	0	0	0	0	0	0	0	0									
	SENSE I/O	04	0	0	0	0	0	1	0	0									
READ	READ IPL	02	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	82
	READ DATA	06	0	0	0	0	0	1	1	0	1	0	0	0	0	1	1	0	86
	READ KEY-DATA	0E	0	0	0	0	1	1	1	0	1	0	0	0	1	1	1	0	8E
	READ COUNT	12	0	0	0	1	0	0	1	0	1	0	0	1	0	0	1	0	92
	READ RO	16	0	0	0	1	0	1	1	0	1	0	0	1	0	1	1	0	96
	READ HOME ADDRESS	1A	0	0	0	1	1	0	1	0	1	0	0	1	1	0	1	0	9A
	READ COUNT-KEY DATA	1E	0	0	0	1	1	1	1	0	1	0	0	1	1	1	1	0	9E

COMMAND TYPE	COMMAND	HEX CODE	BINARY CODE														HEX CODE		
			SINGLE TRACK							MULTI-TRACK									
			0	1	2	3	4	5	6	7	0	1	2	3	4	5		6	7
WRITE	WRITE COUNT-KEY-DATA (2)	01	0	0	0	0	0	0	0	1									
	WRITE DATA	05	0	0	0	0	0	1	0	1									
	WRITE KEY-DATA	0D	0	0	0	0	1	1	0	1									
	ERASE	11	0	0	0	1	0	0	0	1									
	WRITE RO	15	0	0	0	1	0	1	0	1									
	WRITE HOME ADDRESS	19	0	0	0	1	1	0	0	1									
	WRITE COUNT-KEY-DATA	1D	0	0	0	1	1	1	0	1									
SEARCH	SEARCH EQUAL ID	31	0	0	1	1	0	0	0	1	1	0	1	1	0	0	0	1	B1
	SEARCH HIGH ID	51	0	1	0	1	0	0	0	1	1	1	0	1	0	0	0	1	D1
	SEARCH HIGH-EQUAL ID	71	0	1	1	1	0	0	0	1	1	1	1	1	0	0	0	1	F1
	SEARCH EQUAL KEY	29	0	0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	A9
	SEARCH HIGH KEY	49	0	1	0	0	1	0	0	1	1	1	0	0	1	0	0	1	C9
	SEARCH HIGH-EQUAL KEY	69	0	1	1	0	1	0	0	1	1	1	1	0	1	0	0	1	E9
	SEARCH EQUAL HOME ADDRESS	39	0	0	1	1	1	0	0	1	1	0	1	1	1	0	0	1	B9
	SEARCH EQUAL KEY-DATA	2D	0	0	1	0	1	1	0	1	1	0	1	0	1	1	0	1	AD
	SEARCH HIGH KEY-DATA	4D	0	1	0	0	1	1	0	1	1	1	0	0	1	1	0	1	CD
	SEARCH HIGH-EQUAL KEY-DATA	6D	0	1	1	0	1	1	0	1	1	1	1	0	1	1	0	1	ED
	CONTINUE SCAN EQUAL	25	0	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1	A5
	CONTINUE SCAN HIGH	45	0	1	0	0	0	1	0	1	1	1	0	0	0	1	0	1	C5
	CONTINUE SCAN HIGH-EQUAL	65	0	1	1	0	0	1	0	1	1	1	1	0	0	1	0	1	E5
	CONTINUE SCAN NO COMP.	55	0	1	0	1	0	1	0	1	1	1	0	1	0	1	0	1	D5
	CONTINUE SCAN SET COMP.	35	0	0	1	1	0	1	0	1	1	0	1	0	0	1	0	1	B5
CONTINUE SCAN SET COMP.	75	0	1	1	1	0	1	0	1	1	1	1	1	0	1	0	1	F5	

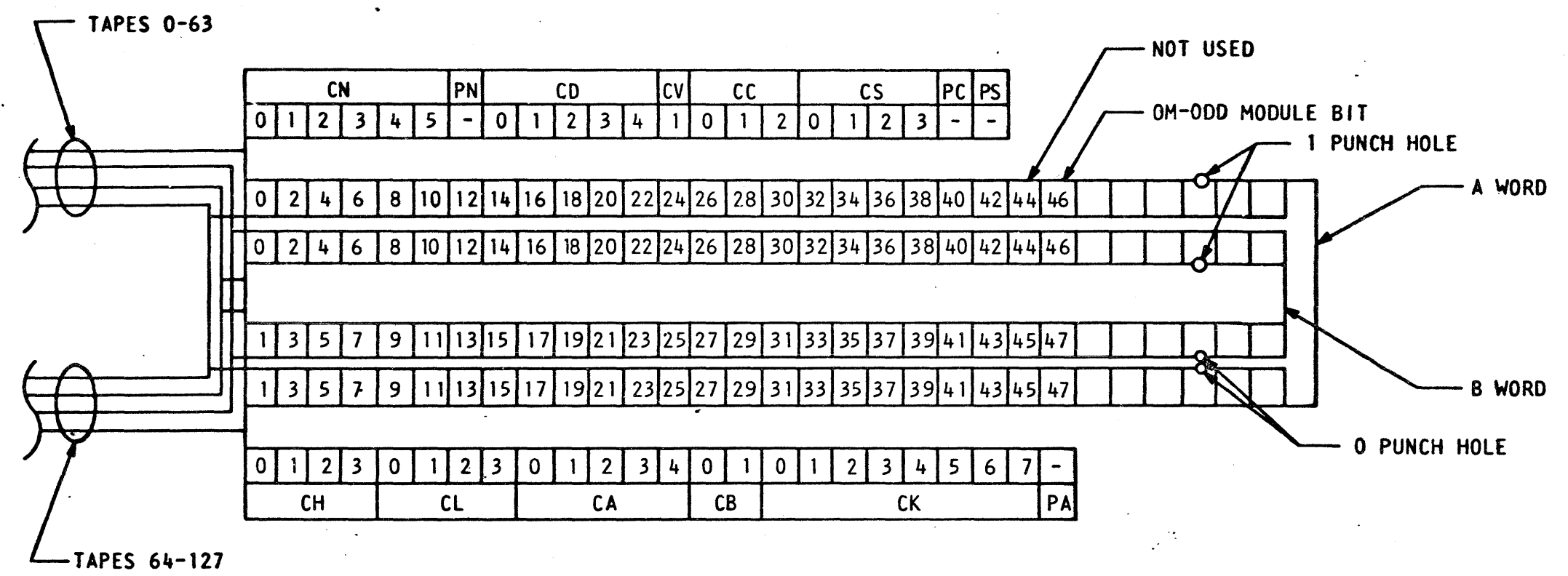
- NOTES:  
 1. NO OPERATION IS PERFORMED.  
 2. USED WHEN FORMATTING AN OVERFLOW RECORD SEGMENT.

DATE	EC NUMBER	DATE	EC NUMBER	2314/COMMAND CODES			
NOV 66	420613						
MAR 67	420655			DATE	NOV 66	P/N	2244553
						TYPE	2314/2844
				<b>IBM</b>		QA040	

TROS TAPE (SAL BIT)	3																4																5																6																7															
WORD BIT POSITION	19	21	23	25	27	29	31	33	35	37	39	41	43	45	09	11	13	15	01	03	05	07	47	42	00	02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	17	46																																	
FIELD NAME	CA FIELD				CB	CK FIELD								CL FIELD				CH FIELD				PA	PS	CN FIELD					PN	CD FIELD				CD	CV	CC				CS				PC	CA	OM																																		
FIELD BIT POSITION	1	2	3	4	0	1	0	1	2	3	4	5	6	7											0	0	0	1	2	3	4	5	0	0	1	2	3	4	5	0	0	1	2	3	0	0	1	2	0	0	1	2	0	1	2	3	0	A	0	0	1	2	0	1	2	3	0	A	0	0										
BINARY VALUE	8	4	2	1	2	1	128	64	32	16	8	4	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	4	2	1	16	1	4	2	1	8	4	2	1	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
USE	A REG ENTRY				B ENT	W REG OR B REG ENTRY								BRANCH				BRANCH				P	P	NEXT ADDRESS X0-5					P	DESTINATION				ALU CONTROL				ST CONTROL																																										
ALT	NORMAL		ALT																																																																													
16	0	NONE	STOP	NONE											(0)	(0)	N	N	EXCEPT ON A → X STATEMENTS WHEN THE NEXT ADDRESS IS THE CONTENTS OF THE REGISTER DEFINED BY THE CA FIELD IN THE ALU STATEMENT					N	D	NORMAL	ALT	SEE NOTE 4																																																				
17	1	GL	SC	BY											(1)	(1)	0	0	CN5 IS SOMETIMES SHOWN AS A 1 OR 0 IN THE LEG SELR WHEN IT IS USED AS A CONTROL OF CERTAIN REGISTERS					0	GL		BT	A+B → D	0	→ST4																																																		
18	2	BY	FS	CK											ST3	ST0	T	T						T	BY		WH	A.B → D	0	→ST1																																																		
19	3	IH	BX	DR											ST5	OP6	E	E						E			WL	AQB → D	1	→ST1																																																		
20	4	FR	DR												ST7	ST2	2	2						2	FR		AH	A+B → DC	0	→ST0																																																		
21	5	KL	ER												D-0	ST4											KL	A+B+1 → DC	1	→ST0																																																		
22	6	DL	IE												A → X	ST6											DL	A+B+C → DC	0	→ST5																																																		
23	7	DH	OA												INLIN	BUF											DH	A ∨ B → D	1	→ST5																																																		
24	8	OP	CX												SERVO	CARRY											OP	A-B → D	0	→ST2																																																		
25	9	GP	IS												SORSF	COMMO											GP	A-B+1 → D																																																				
26	10	SP	UR												SELTO	SUPPO											UR	A.-B → D	0	→ST3																																																		
27	11	DW	SL												OP1	ADCPR											DW	AQ-B → D	1	→ST3																																																		
28	12	WH	AH												OP3	OP0											DR	A-B → DC	0	→ST6																																																		
29	13	WL	AL												OP5	OP2											FT	A-B+1 → DC	1	→ST6																																																		
30	14	SW	BH												INDEX	OP4											FC	A-B+C → DC	0	→ST7																																																		
31	15	BC	BL												OP7												IG	A ∨ B → D	1	→ST7																																																		

- NOTES:
- DNST21 SAYS SET ST2 TO 1 IF D BUS IS NON-ZERO. ST2 IS NEVER SET TO ZERO BY THIS STATEMENT.
  - PA IS PARITY BIT FOR ADDRESS OF THE WORD READING OUT PA;  
PS IS PARITY BIT FOR CA, CB, CK, CL, CA ALT, PA, CH  
PC IS PARITY BIT FOR CD, CD ALT, CV, CC, CS, PC  
PN IS PARITY BIT FOR CN AND OM
  - OM IS ACTIVE WHEN A WORD IN AN ODD MODULE IS ADDRESSED.
  - CC DECODE OF 4.5 OR 6 SETS ST3 WITH CARRY OUT (DC).  
CC DECODE OF 6 SETS CARRY IN WITH CONTENTS OF ST3 (+C).

DATE	EC NUMBER	DATE	EC NUMBER	FIELD DECODE ASSIGNMENTS			
NOV 66	420613						
MAR 67	420655			DATE	NOV 66	P/N	2244554
JUL 67	420659					TYPE	2314/2844
12NOV68	420664			<b>IBM</b>		QA050	



NOTES:  
 1. LAY TAPE ON TEMPLATE TO READ PROGRAMMED DATA.  
 2. NUMBERS 0 THRU 47 ON TEMPLATE INDICATE TROS TAPE (SAL BIT) POSITION. REFER TO QA050.

DATE	EC NUMBER	DATE	EC NUMBER	TROS TAPE READER		
NOV 66	420613			DATE	NOV 66	P/W 2244555
MAR 67	420655					TYPE 2314/2488
				IBM		QA060

INDEX OF MODULE AND ADDRESS LIST PART NUMBERS

NOTE: ALL PART NUMBERS ARE 2244---. THE LAST THREE DIGITS ARE INDICATED BELOW. AN X MEANS THAT THE P/NS ARE THE SAME AS THE BASIC 2314 FOR THAT POSITION.

0-BASIC WITHOUT INDICATED FEATURE 1-BASIC WITH INDICATED FEATURE	2314						2844			
	2844 ATTACHMENT	0	1	0	1	0	1	-	-	-
2 CHANNEL SWITCH	0	0	1	1	1	1	1	0	1	1
B GATE OPTION	0	0	0	0	1	1	1	0	0	1
MODULE 0 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	400 500 F0M00	X	X	X	420 650 F1M00	420 650 F1M00	X	X	420 650 F1M00	
MODULE 1 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	401 501 F0M01	671 515 F3M01	408 508 F2M01	408 508 F2M01	421 591 F0M01	421 591 F0M01	671 515 F3M01	408 508 F2M01	421 591 F0M01	
MODULE 2 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	402 502 F0M02	X	X	X	X	X	X	X	X	
MODULE 3 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	403 503 F0M03	X	X	X	423 653 F1M03	423 653 F1M03	X	X	423 653 F1M03	
MODULE 4 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	404 504 F0M04	X	X	X	424 654 F1M04	424 654 F1M04	X	X	424 654 F1M04	
MODULE 5 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	405 505 F0M05	X	409 509 F2M05	409 509 F2M05	425 595 F0M05	425 595 F0M05	X	409 509 F2M05	425 595 F0M05	
MODULE 6 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	406 506 F0M06	X	X	X	606 666 F1M06	606 666 F1M06	X	X	606 666 F1M06	
MODULE 7 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.	407 507 F0M07	607 667 F3M07	X	607 667 F3M07	X	607 667 F3M07	607 667 F3M07	607 667 F3M07	607 667 F3M07	
MODULE 8 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.		608 668 F3M08		688 698 F6M08		688 698 F6M08	608 668 F3M08	688 698 F6M08	688 698 F6M08	
MODULE 9 MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.		609 669 F3M09		689 699 F6M09		689 699 F6M09	609 669 F3M09	689 699 F6M09	689 699 F6M09	
MODULE A MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.					410 510 F1M10	410 510 F1M10			410 510 F1M10	
MODULE B MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.					411 596 F0M11	411 596 F0M11			411 596 F0M11	
MODULE C MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.					412 597 F0M12	412 597 F0M12			412 597 F0M12	
MODULE D MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.					413 598 F0M13	413 598 F0M13			413 598 F0M13	
MODULE E MOD. P/N ADD. LIST P/N ADD LIST PAGE NO.					414 514 F1M14	414 514 F1M14			414 514 F1M14	
MODULE F MOD. P/N ADD. LIST P/N										

MODULE 1 THRU 7 POSITIONS ARE LOCATED ON THE TROS B GATE  
MODULE 8 THRU F POSITIONS ARE LOCATED ON THE TROS C GATE.

RED

DATE	EC NUMBER	DATE	EC NUMBER	MODULE AND ADDRESS LIST			
MAR 67	420655			PART NO. INDEX			
MAY 67	420657			DATE	JUL 67	P/N	2250865
JUL 67	420659					TYPE	2314/2844
				<b>IBM</b>			QA070



00 — 000  
 A 00AL  
 C  
 B B+W ST7  
 P I  
 04 — 04 — AB  
 SEE NOTE BELOW.

QT290 — ABE  
 (00.01)

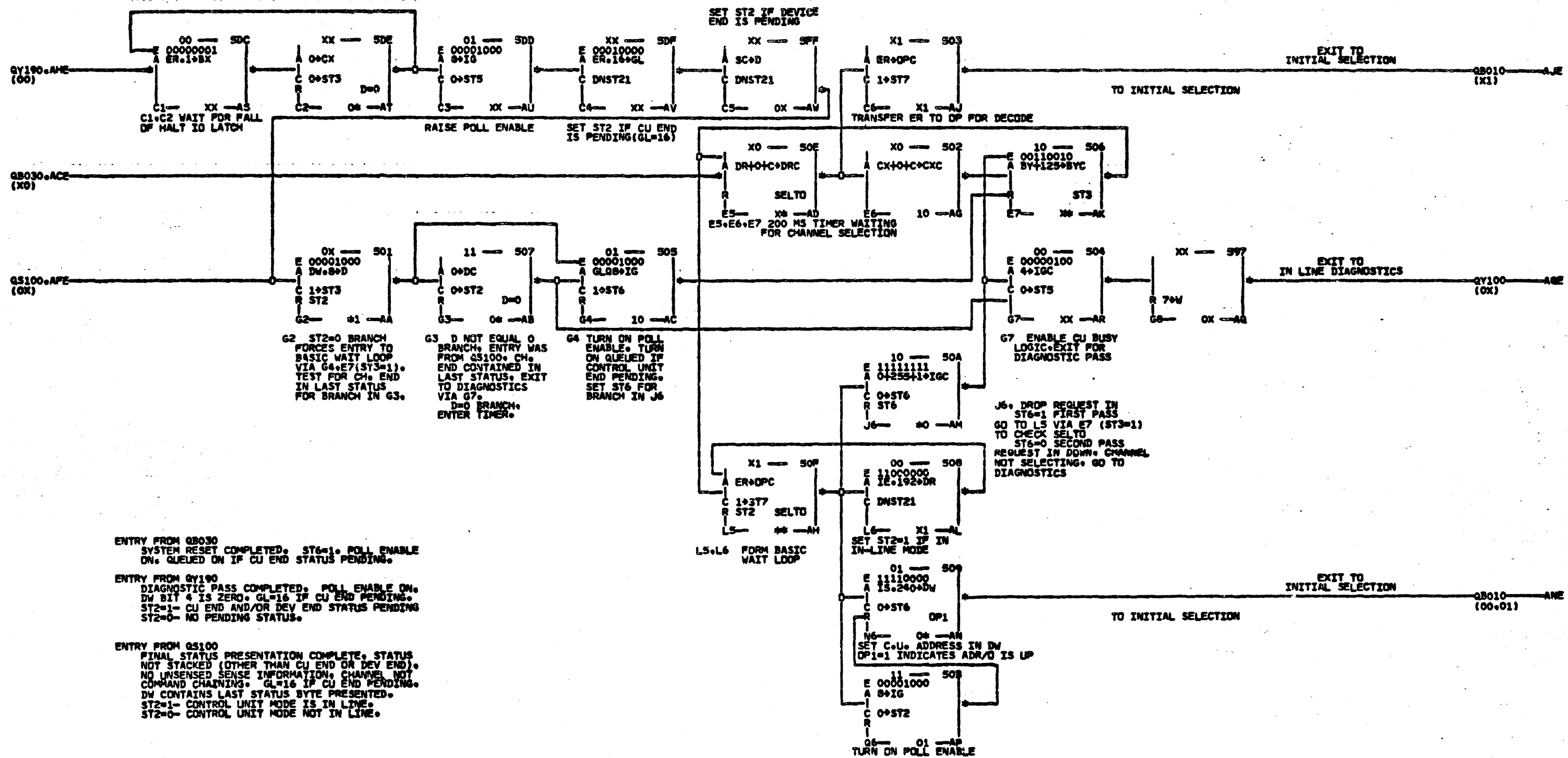
XX — 000  
 R S+W  
 JA — 0X — AA

EXIT TO END PROCEDURE  
 INITIALIZATION.  
 QS090 — AAE  
 (0X)

MACHINE RESET RETURNS RQS TO THIS WORD.  
 ST7=1 MEANS THAT SELECTIVE (MALFUNCTION)  
 RESET WAS ISSUED. ST7=0 FOR SYSTEM RESET  
 OR POWER ON RESET. IF ST7=0, MICROPROGRAM  
 WILL EXECUTE A ROUTINE TO RESET ALL  
 ATTENTION SIGNALS WHICH ARE UP FROM THE  
 FILES. THIS ROUTINE UTILIZES THE INITIAL  
 SELECTION AND END PROCEDURE MICROPROGRAMS  
 IN ORDER TO SELECT EACH FILE WITH AN  
 ATTENTION CONDITION AND TO RESET THE  
 CONDITION.

00000

420613	10/11/66	MACH	2844	DATE	08/03/67	SHEET	1	QB000
420652	12/20/66	NAME	2314/2844	LOG	215L	VERSION		
420655	02/09/67	MODE	MANUAL					
420659	07/31/67	P.N.	2250200					
		IBM CORP.	SDD			RESET ENTRY BLOCK		



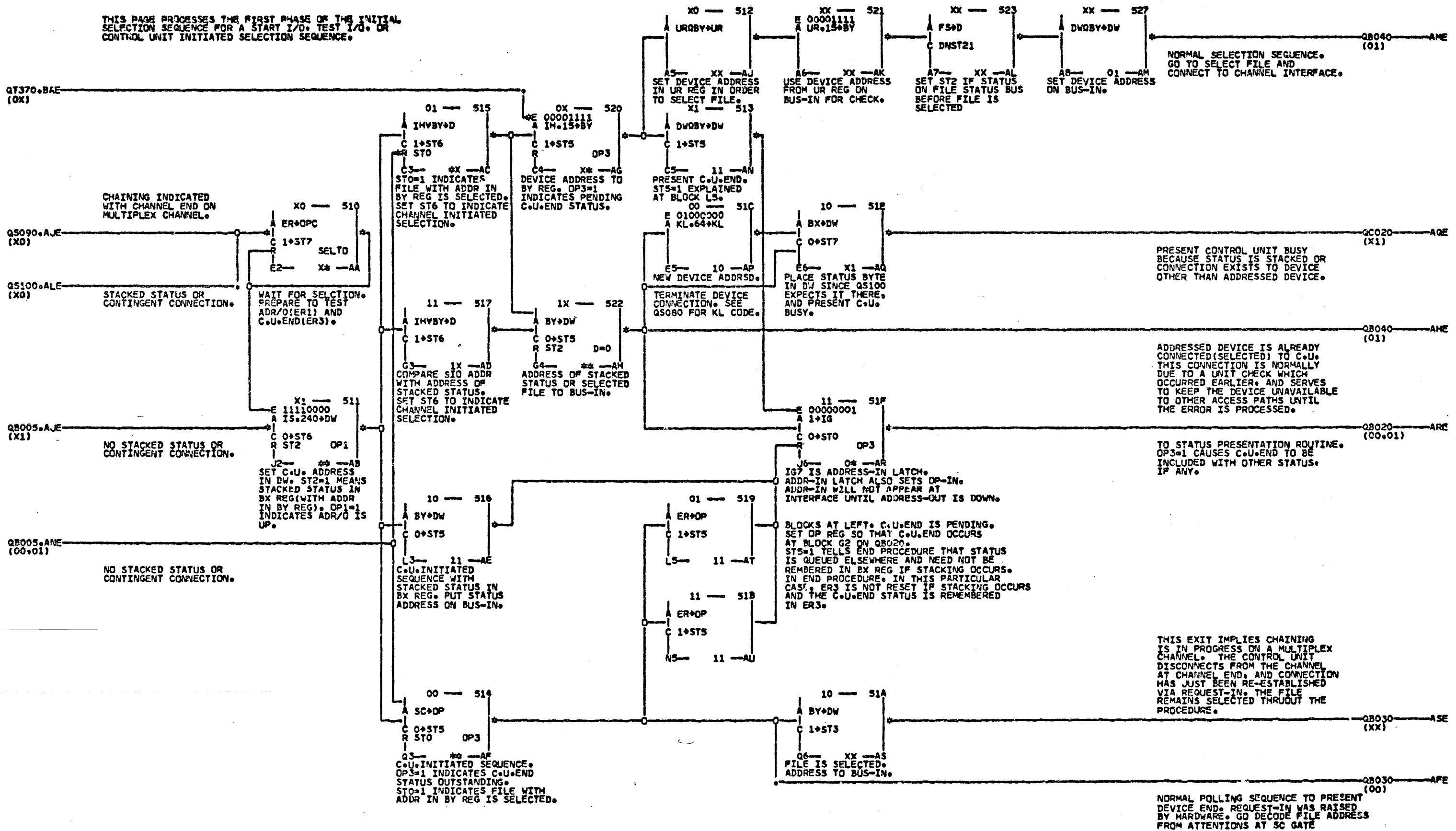
ENTRY FROM QB030  
 SYSTEM RESET COMPLETED. ST6=1. POLL ENABLE ON. QUEUED ON IF CU END STATUS PENDING.

ENTRY FROM QY190  
 DIAGNOSTIC PASS COMPLETED. POLL ENABLE ON. DW BIT 4 IS ZERO. GL=16 IF CU END PENDING. ST2=1- CU END AND/OR DEV END STATUS PENDING. ST2=0- NO PENDING STATUS.

ENTRY FROM QS100  
 FINAL STATUS PRESENTATION COMPLETE. STATUS NOT STACKED (OTHER THAN CU END OR DEV END). NO UNSENSED SENSE INFORMATION. CHANNEL NOT COMMAND CHAINING. GL=16 IF CU END PENDING. DW CONTAINS LAST STATUS BYTE PRESENTED. ST2=1- CONTROL UNIT MODE IS IN LINE. ST2=0- CONTROL UNIT MODE NOT IN LINE.

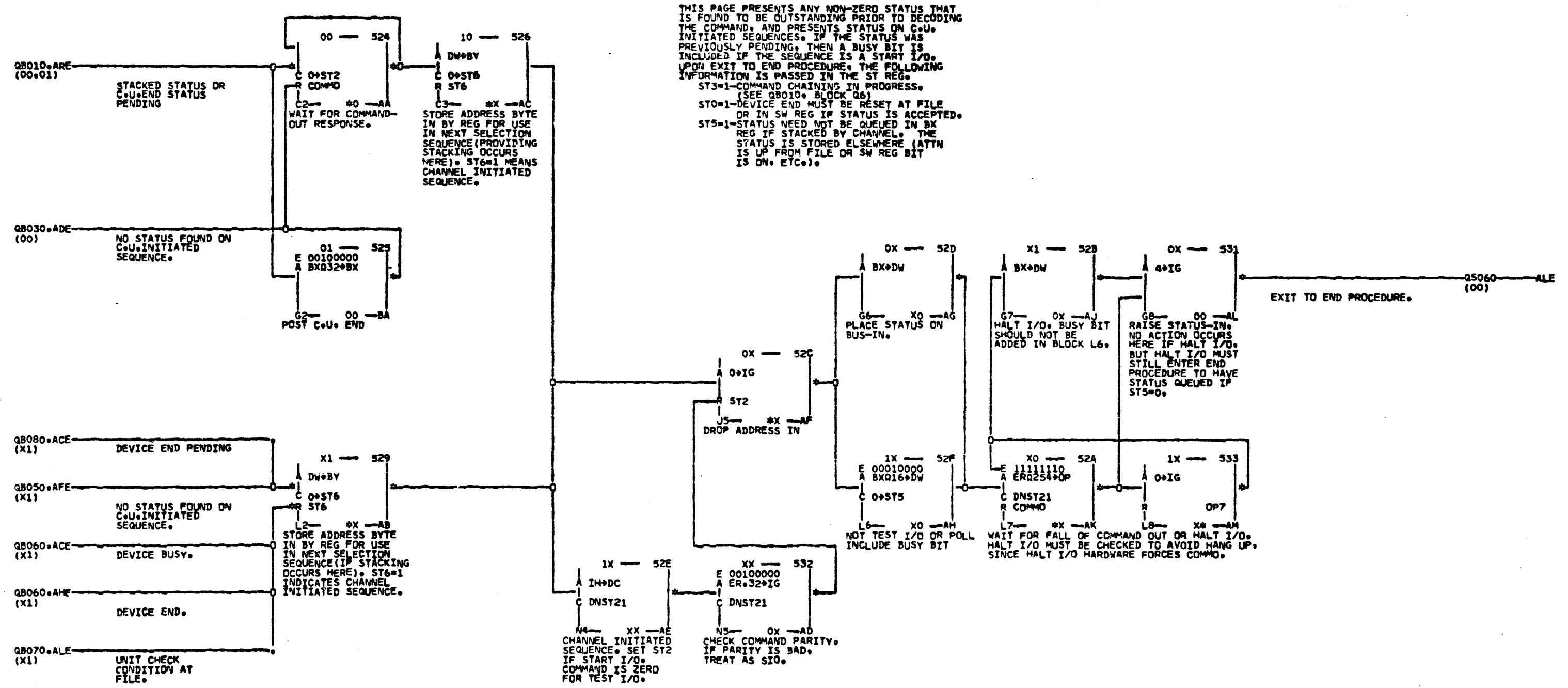
80000

THIS PAGE PROCESSES THE FIRST PHASE OF THE INITIAL SELECTION SEQUENCE FOR A START I/O, TEST I/O, OR CONTROL UNIT INITIATED SELECTION SEQUENCE.



0-0-0-0-0

QNOB



THIS PAGE PRESENTS ANY NON-ZERO STATUS THAT IS FOUND TO BE OUTSTANDING PRIOR TO DECODING THE COMMAND, AND PRESENTS STATUS ON CoU. INITIATED SEQUENCES. IF THE STATUS WAS PREVIOUSLY PENDING, THEN A BUSY BIT IS INCLUDED IF THE SEQUENCE IS A START I/O. UPON EXIT TO END PROCEDURE, THE FOLLOWING INFORMATION IS PASSED IN THE ST REG.

ST3=1—COMMAND CHAINING IN PROGRESS. (SEE QB010, BLOCK Q6)

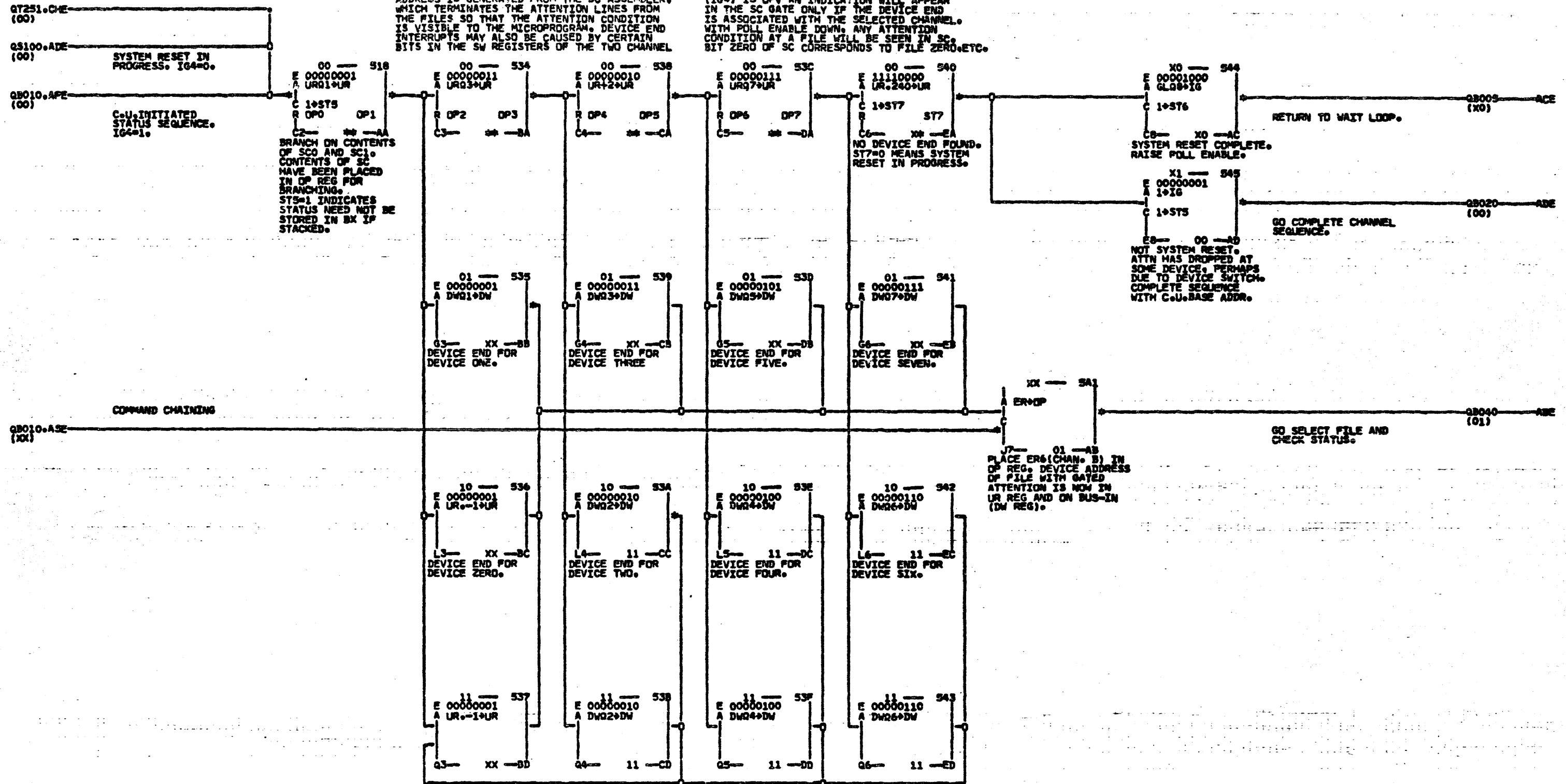
ST0=1—DEVICE END MUST BE RESET AT FILE OR IN SW REG IF STATUS IS ACCEPTED.

ST5=1—STATUS NEED NOT BE QUEUED IN BX REG IF STACKED BY CHANNEL. THE STATUS IS STORED ELSEWHERE (ATTN IS UP FROM FILE OR SW REG BIT IS ON, ETC.).

420613	10/11/66	MACH	2844	DATE	08/03/67	SHEET	1	QB020
420652	12/20/66	NAME	2314/2844	LOG	215L	VERSION		
420655	02/09/67	MODE	MANUAL	STATUS PRESENTATION				
420656	04/11/67	PeNo	2250203	NON-O INITIAL STATUS				
420659	07/31/67	IBM CORP.	SDD					

THIS PAGE GENERATES THE BINARY DEVICE ADDRESS FOR CONTROL UNIT INITIATED STATUS SEQUENCES WHERE DEVICE END IS GENERATED. THE BINARY ADDRESS IS GENERATED FROM THE SC ASSEMBLER, WHICH TERMINATES THE ATTENTION LINES FROM THE FILES SO THAT THE ATTENTION CONDITION IS VISIBLE TO THE MICROPROGRAM. DEVICE END INTERRUPTS MAY ALSO BE CAUSED BY CERTAIN BITS IN THE SW REGISTERS OF THE TWO CHANNEL

SWITCH, AND THESE BITS WILL CAUSE AN INDICATION IN THE SC ASSEMBLER. THE LOGIC IS SUCH THAT WHEN POLL ENABLE (IG4) IS UP, AN INDICATION WILL APPEAR IN THE SC GATE ONLY IF THE DEVICE END IS ASSOCIATED WITH THE SELECTED CHANNEL. WITH POLL ENABLE DOWN, ANY ATTENTION CONDITION AT A FILE WILL BE SEEN IN SC. BIT ZERO OF SC CORRESPONDS TO FILE ZERO, ETC.



BRANCH ON CONTENTS OF SC0 AND SC1. CONTENTS OF SC HAVE BEEN PLACED IN DP REG FOR BRANCHING. STS=1 INDICATES STATUS NEED NOT BE STORED IN BX IF STACKED.

NO DEVICE END FOUND. ST7=0 MEANS SYSTEM RESET IN PROGRESS.

SYSTEM RESET COMPLETE. RAISE POLL ENABLE.

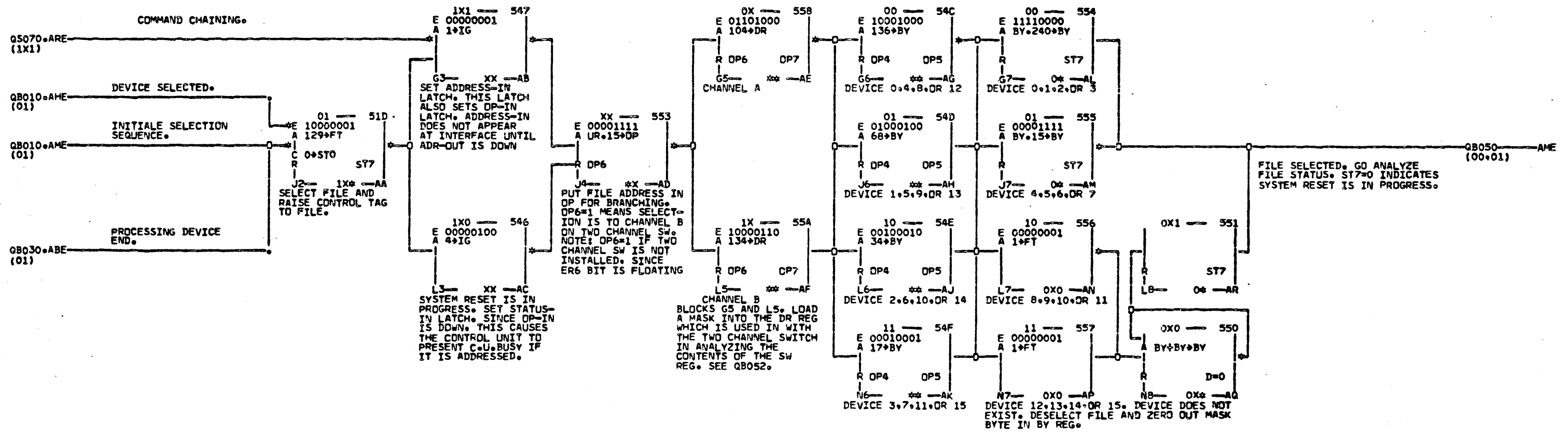
NOT SYSTEM RESET. ATTN HAS DROPPED AT SOME DEVICE, PERHAPS DUE TO DEVICE SWITCH. COMPLETE SEQUENCE WITH C.U. BASE ADDR.

PLACE ER6 (CHAN. B) IN DP REG. DEVICE ADDRESS OF FILE WITH GATED ATTENTION IS NOW IN UR REG AND ON BUS-IN (DW REG).

Q3, Q4, Q5, Q6. DEVICE END FOR TWO DEVICES. CHOSE LOWEST DEVICE ADDRESS. Q3-DEVICE END ON EVEN NUMBERED FILE. MASK OUT ONE BIT OF DEVICE ADDRESS IN UR REG.

010000

THIS PAGE SELECTS THE FILE AND INITIATES THE CHANNEL INTERFACE SEQUENCE. IN ADDITION, IT CREATES A BIT SIGNIFICANT FILE ADDRESS BYTE IN THE BY REG FOR FUTURE USE, AND LOADS A MASK BYTE IN THE DR REG FOR FUTURE USE.



04080



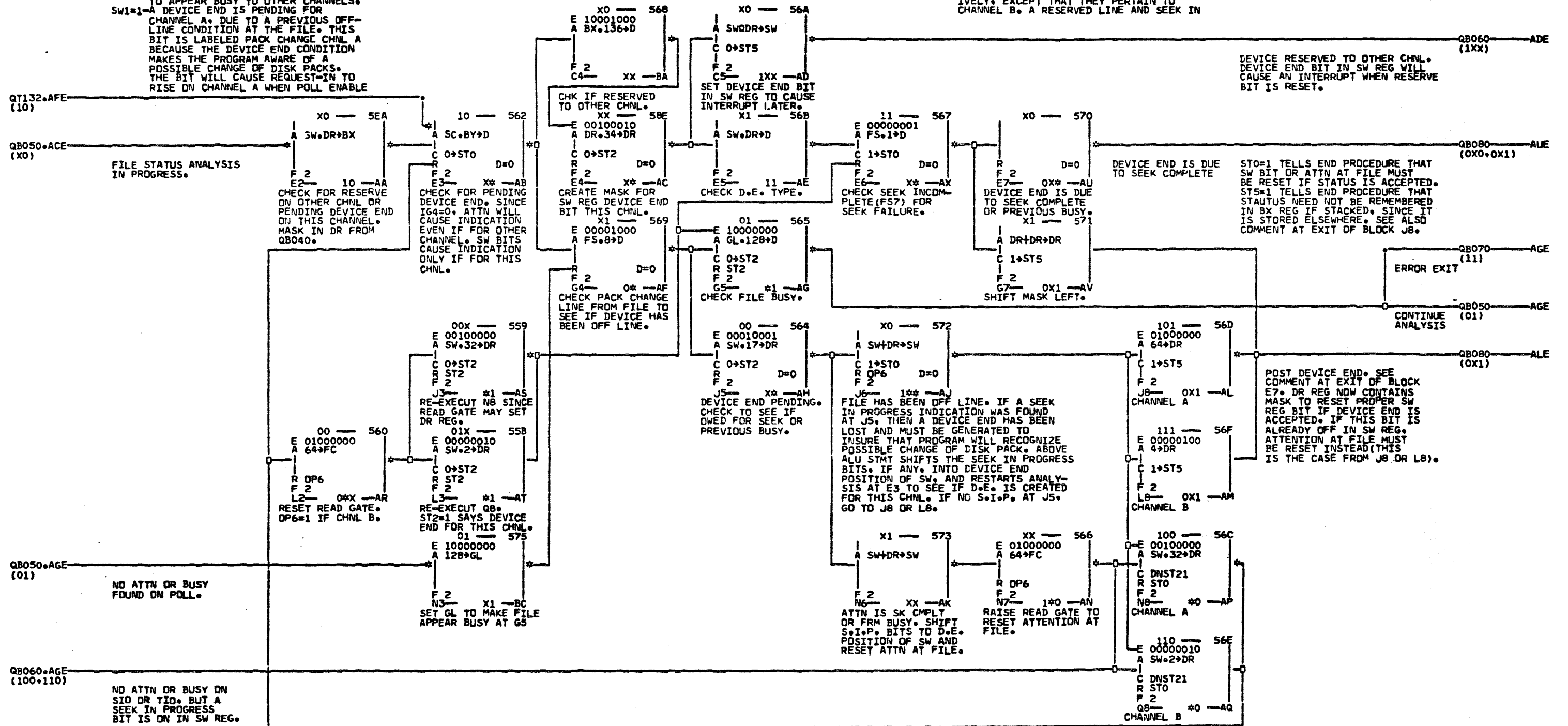
THIS PAGE CHECKS FOR AND PROCESSES STATUS CONDITIONS IN THE SW REG FOR TWO CHANNEL SWITCH MACHINES. THERE ARE EIGHT SW REGISTERS, ONE FOR EACH FILE, AND ONLY THE SW REG FOR THE SELECTED FILE IS ADDRESSED BY HARDWARE. THE BITS OF THE SW REG ARE ASSIGNED AS FOLLOWS:  
 SW0=1-THE DEVICE IS RESERVED TO CHANNEL A. THIS CAUSES THE DEVICE TO APPEAR BUSY TO OTHER CHANNELS.  
 SW1=1-A DEVICE END IS PENDING FOR CHANNEL A. DUE TO A PREVIOUS OFF-LINE CONDITION AT THE FILE. THIS BIT IS LABELED PACK CHANGE CHNL A BECAUSE THE DEVICE END CONDITION MAKES THE PROGRAM AWARE OF A POSSIBLE CHANGE OF DISK PACKS. THE BIT WILL CAUSE REQUEST-IN TO RISE ON CHANNEL A WHEN POLL ENABLE

(IG4) IS UP IF THE DEVICE IS NOT RESERVED TO CHANNEL B. IT WILL ALSO CAUSE AN INDICATION IN THE SC ASSEMBLER UNLESS C.U. IS SELECTED TO DR DEVICE RESERVED BY CHNL B.  
 SW2=1-A DEVICE END IS PENDING FOR CHANNEL A DUE TO A SEEK COMPLETION OR DUE TO A PREVIOUS DEVICE BUSY RESPONSE ON CHNL A. THIS BIT IS

WIRED LIKE SW1( TO SC AND REQ-IN). SW3=1-AN ATTENTION IS EXPECTED FROM THE DEVICE INTERFACE DUE TO A SEEK OR DUE TO A PREVIOUS BUSY RESPONSE. WHEN ATTENTION OCCURS, DEVICE END WILL BE PENDING FOR CHANNEL A. SW3=1 AND ATTENTION FROM THE FILE INTERFACE CAUSES REQUEST-IN TO RISE (UNDER CONTROL OF POLL ENABLE

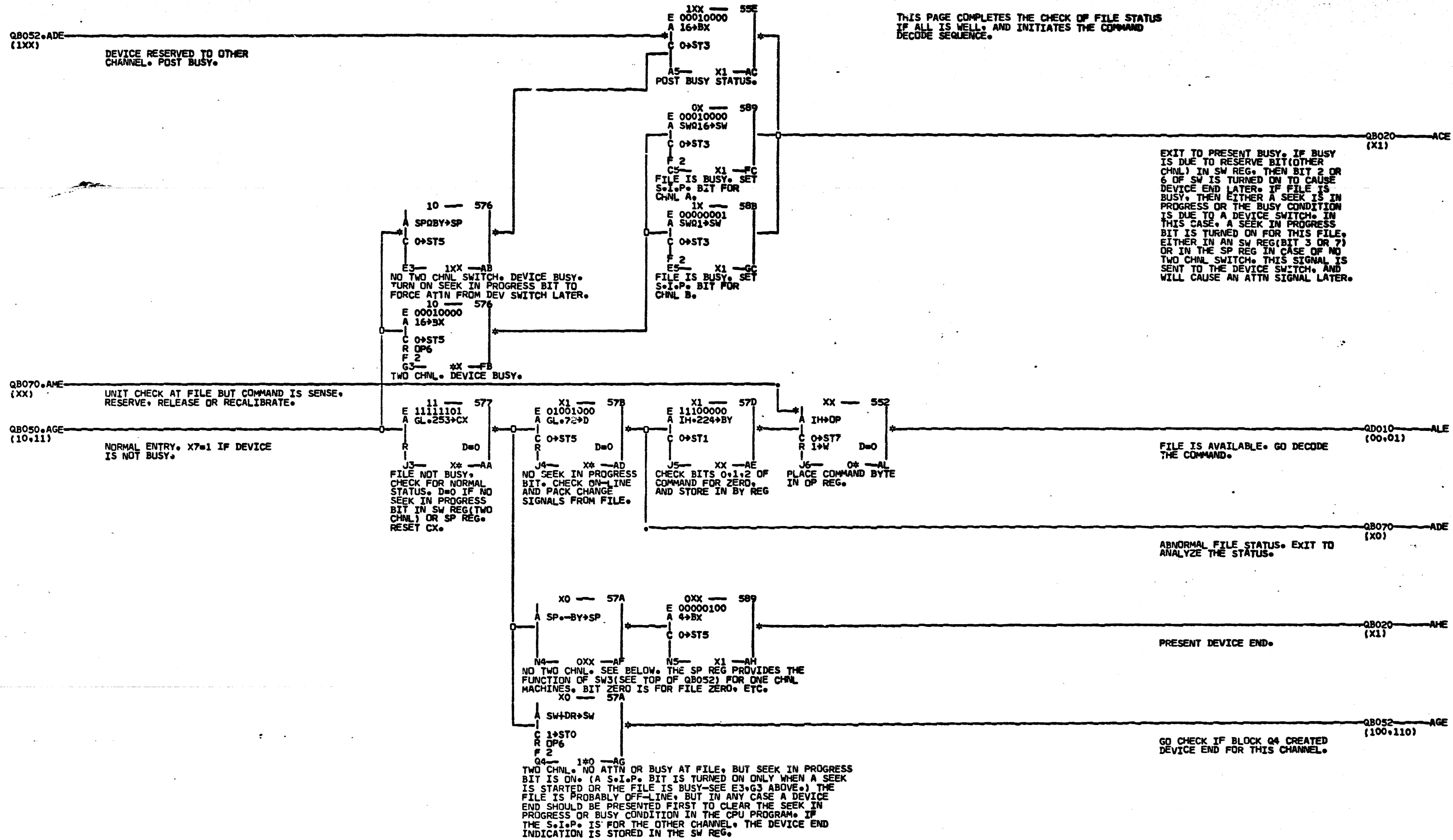
AND CH B RESERVE AS WITH SW1). THE BIT IS CALLED SEEK IN PROGRESS CH A. AND IS TURNED ON DURING SEEKS OR WHEN FILE BUSY OCCURS. WHEN ATTENTION IS RESET, THE DEVICE END IS STORED IN SW2 UNTIL ACCEPTANCE.  
 SW4, SW5, SW6, AND SW7 ARE IDENTICAL IN FUNCTION TO SW0, SW1, SW2 AND SW3 RESPECTIVELY, EXCEPT THAT THEY PERTAIN TO CHANNEL B. A RESERVED LINE AND SEEK IN

PROGRESS LINE ARE DERIVED FROM EACH SW REG AND SENT TO EACH DEVICE SWITCH FOR USE IN GENERATING BUSY (TO OTHER C.U.) AND ATTN. SEE ALSO QB030 AND Q5060.



N8, Q8. CHECK IF DEVICE END BIT FOR THIS CHNL WAS SET AT J6 OR N6.





THIS PAGE COMPLETES THE CHECK OF FILE STATUS IF ALL IS WELL, AND INITIATES THE COMMAND DECODE SEQUENCE.

EXIT TO PRESENT BUSY, IF BUSY IS DUE TO RESERVE BIT(OTHER CHNL) IN SW REG, THEN BIT 2 OR 6 OF SW IS TURNED ON TO CAUSE DEVICE END LATER. IF FILE IS BUSY, THEN EITHER A SEEK IS IN PROGRESS OR THE BUSY CONDITION IS DUE TO A DEVICE SWITCH. IN THIS CASE, A SEEK IN PROGRESS BIT IS TURNED ON FOR THIS FILE, EITHER IN AN SW REG(BIT 3 OR 7) OR IN THE SP REG. IN CASE OF NO TWO CHNL SWITCH, THIS SIGNAL IS SENT TO THE DEVICE SWITCH, AND WILL CAUSE AN ATTN SIGNAL LATER.

FILE IS AVAILABLE. GO DECODE THE COMMAND.

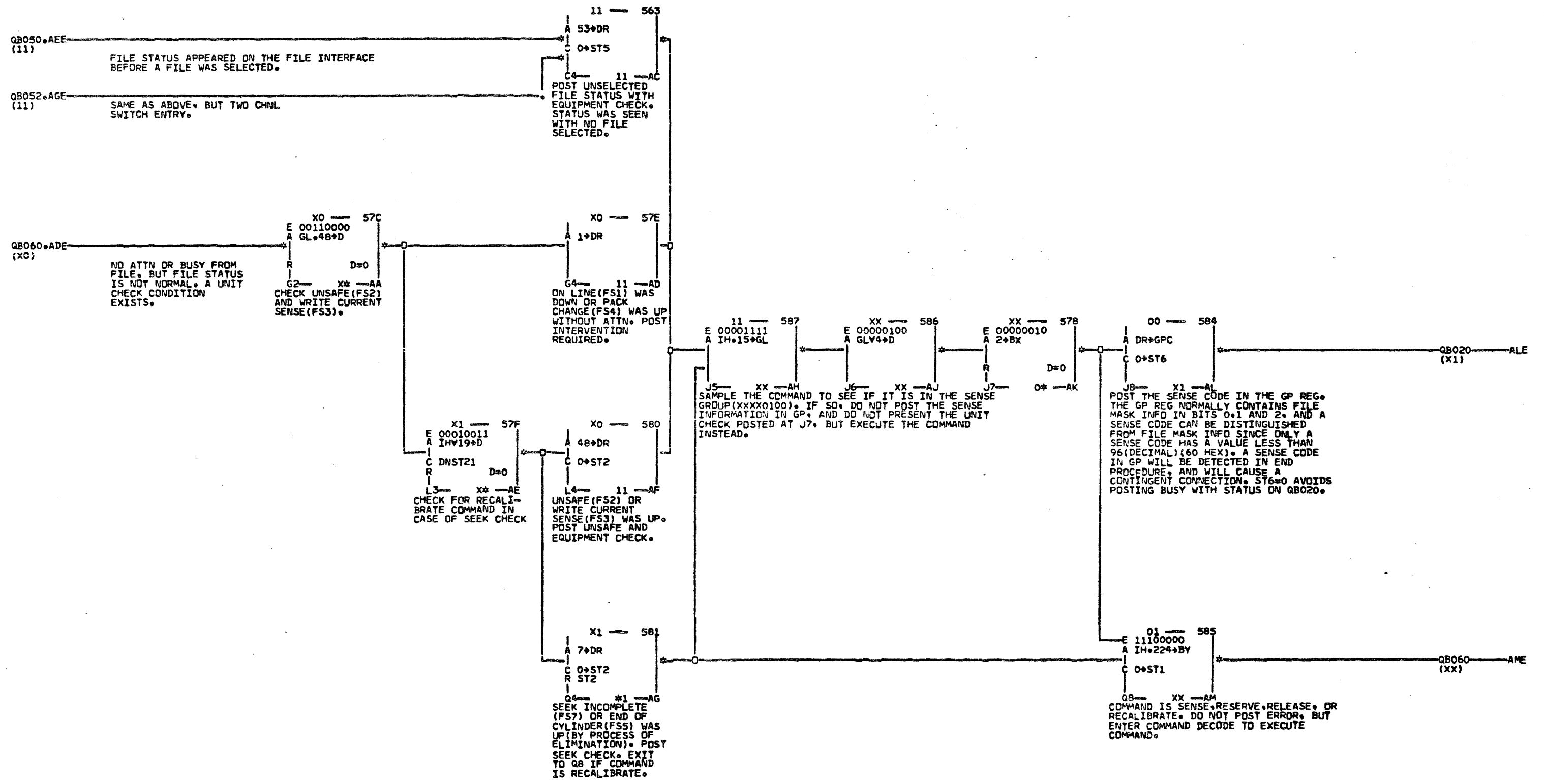
ABNORMAL FILE STATUS. EXIT TO ANALYZE THE STATUS.

PRESENT DEVICE END.

GO CHECK IF BLOCK Q4 CREATED DEVICE END FOR THIS CHANNEL.

0600

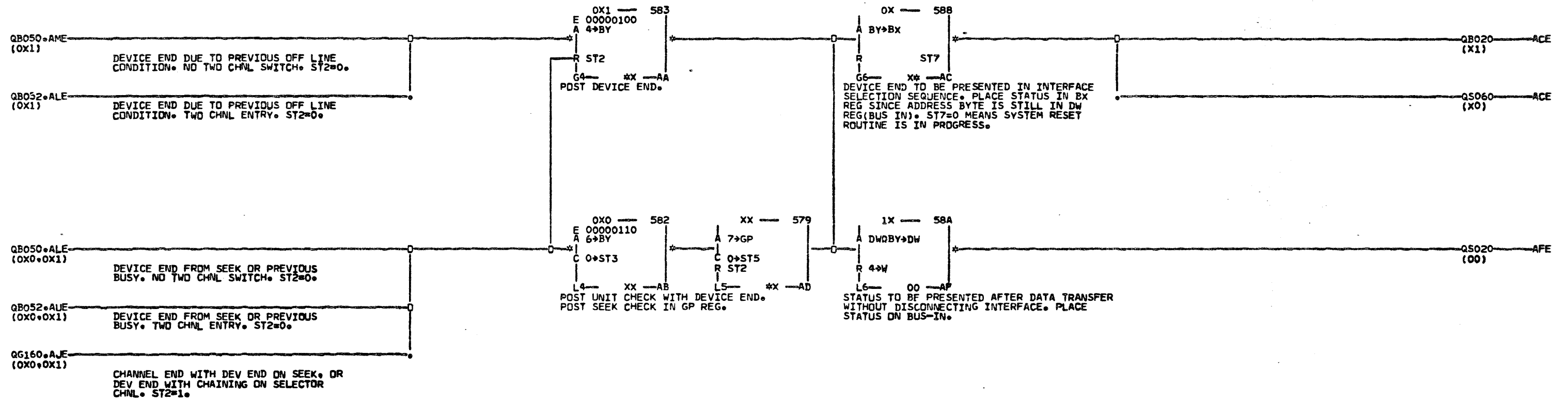
THIS PAGE ANALYZES THE FILE STATUS AND DETERMINES THE SENSE INDICATION. THE COMMAND IS THEN CHECKED TO SEE IF THE ERROR INDICATION SHOULD BE SUPPRESSED SO THAT THE COMMAND MAY BE EXECUTED.



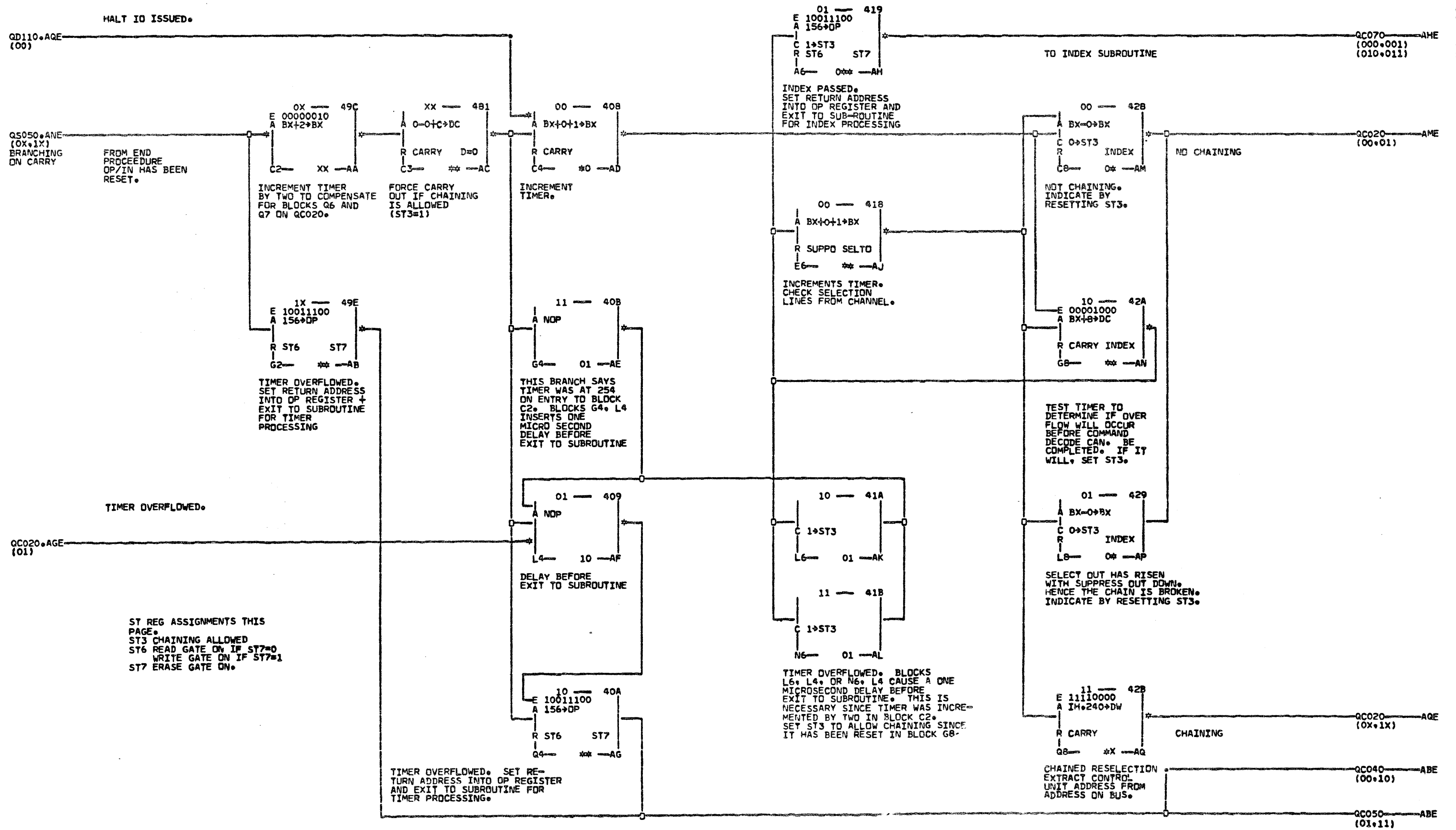
QB070

7

THIS PAGE POSTS UNIT CHECK FOR SEEK ERRORS  
AND POSTS DEVICE END STATUS.



QB080



HALT IO ISSUED.

QD110 AGE (00)

Q5050 ABE (0X,1X) BRANCHING ON CARRY

FROM END PROCEDURE OP/IN HAS BEEN RESET.

INCREMENT TIMER BY TWO TO COMPENSATE FOR BLOCKS Q6 AND Q7 ON QC020.

FORCE CARRY OUT IF CHAINING IS ALLOWED (ST3=1)

INCREMENT TIMER.

INDEX PASSED. SET RETURN ADDRESS INTO OP REGISTER AND EXIT TO SUB-ROUTINE FOR INDEX PROCESSING

NOT CHAINING. INDICATE BY RESETTING ST3.

NO CHAINING

TIMER OVERFLOWED. SET RETURN ADDRESS INTO OP REGISTER + EXIT TO SUBROUTINE FOR TIMER PROCESSING

THIS BRANCH SAYS TIMER WAS AT 254 ON ENTRY TO BLOCK C2. BLOCKS G4, L4 INSERTS ONE MICRO SECOND DELAY BEFORE EXIT TO SUBROUTINE

TEST TIMER TO DETERMINE IF OVERFLOW WILL OCCUR BEFORE COMMAND DECODE CAN BE COMPLETED. IF IT WILL, SET ST3.

TIMER OVERFLOWED.

DELAY BEFORE EXIT TO SUBROUTINE

TIMER OVERFLOWED. BLOCKS L6, L4, OR N6, L4 CAUSE A ONE MICROSECOND DELAY BEFORE EXIT TO SUBROUTINE. THIS IS NECESSARY SINCE TIMER WAS INCREMENTED BY TWO IN BLOCK C2. SET ST3 TO ALLOW CHAINING SINCE IT HAS BEEN RESET IN BLOCK G8.

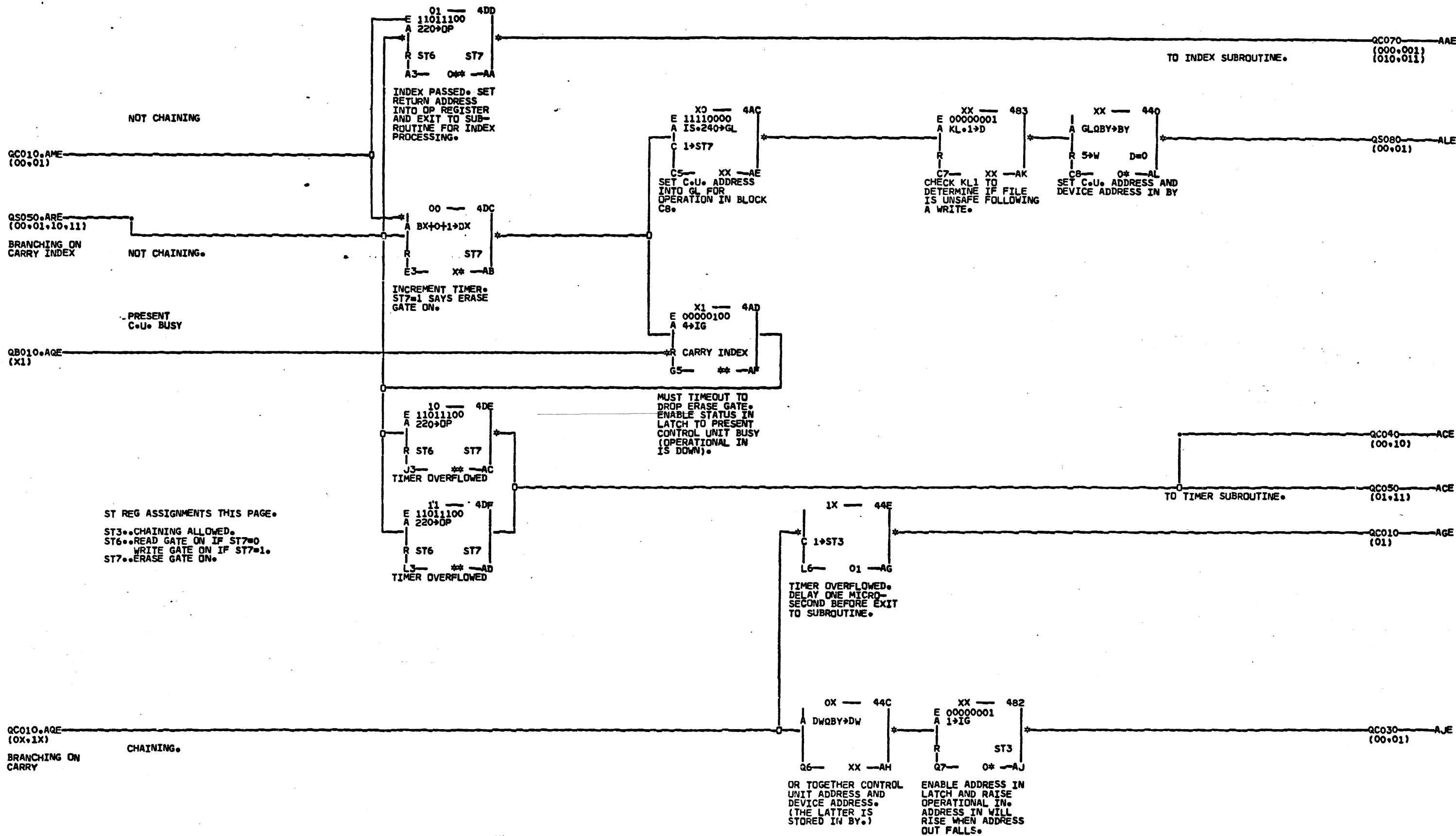
SELECT OUT HAS RISEN WITH SUPPRESS OUT DOWN. HENCE THE CHAIN IS BROKEN. INDICATE BY RESETTING ST3.

ST REG ASSIGNMENTS THIS PAGE.  
ST3 CHAINING ALLOWED  
ST6 READ GATE ON IF ST7=0  
WRITE GATE ON IF ST7=1  
ST7 ERASE GATE ON.

TIMER OVERFLOWED. SET RETURN ADDRESS INTO OP REGISTER AND EXIT TO SUBROUTINE FOR TIMER PROCESSING.

CHAINED RESELECTION EXTRACT CONTROL UNIT ADDRESS FROM ADDRESS ON BUS.

01-000

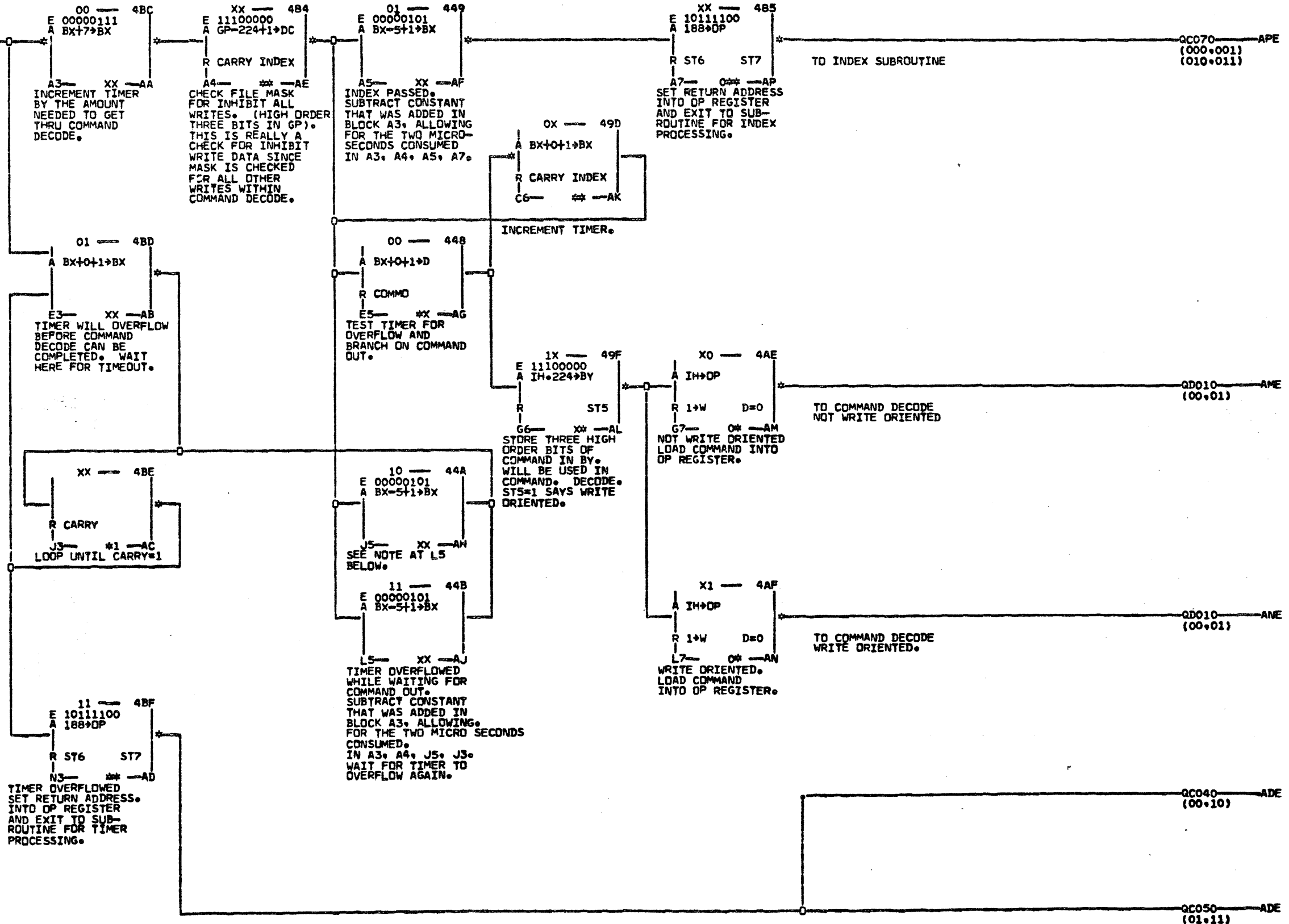


ST REG ASSIGNMENTS THIS PAGE.

ST3..CHAINING ALLOWED.  
ST6..READ GATE ON IF ST7=0  
WRITE GATE ON IF ST7=1.  
ST7..ERASE GATE ON.

QC020-AJE  
(00.01)

BRANCHING ON  
ST3  
ST3=1 SAYS TIMER WILL  
OVERFLOW BEFORE COMMAND  
DECODE CAN BE COMPLETED.



ST REG ASSIGNMENTS THIS PAGE.  
ST3-INHIBIT ALL WRITES  
ST5-WRITE ORIENTED.  
ST6-READ GATE ON IF ST7=0  
WRITE GATE ON IF ST7=1.  
ST7-ERASE GATE ON.

TIMER OVERFLOWED  
SET RETURN ADDRESS  
INTO OP REGISTER  
AND EXIT TO SUB-  
ROUTINE FOR TIMER  
PROCESSING.

TIMER OVERFLOWED  
WHILE WAITING FOR  
COMMAND OUT.  
SUBTRACT CONSTANT  
THAT WAS ADDED IN  
BLOCK A3, ALLOWING  
FOR THE TWO MICRO SECONDS  
CONSUMED.  
IN A3, A4, J5, J3.  
WAIT FOR TIMER TO  
OVERFLOW AGAIN.

TO TIMER SUBROUTINE.

05000

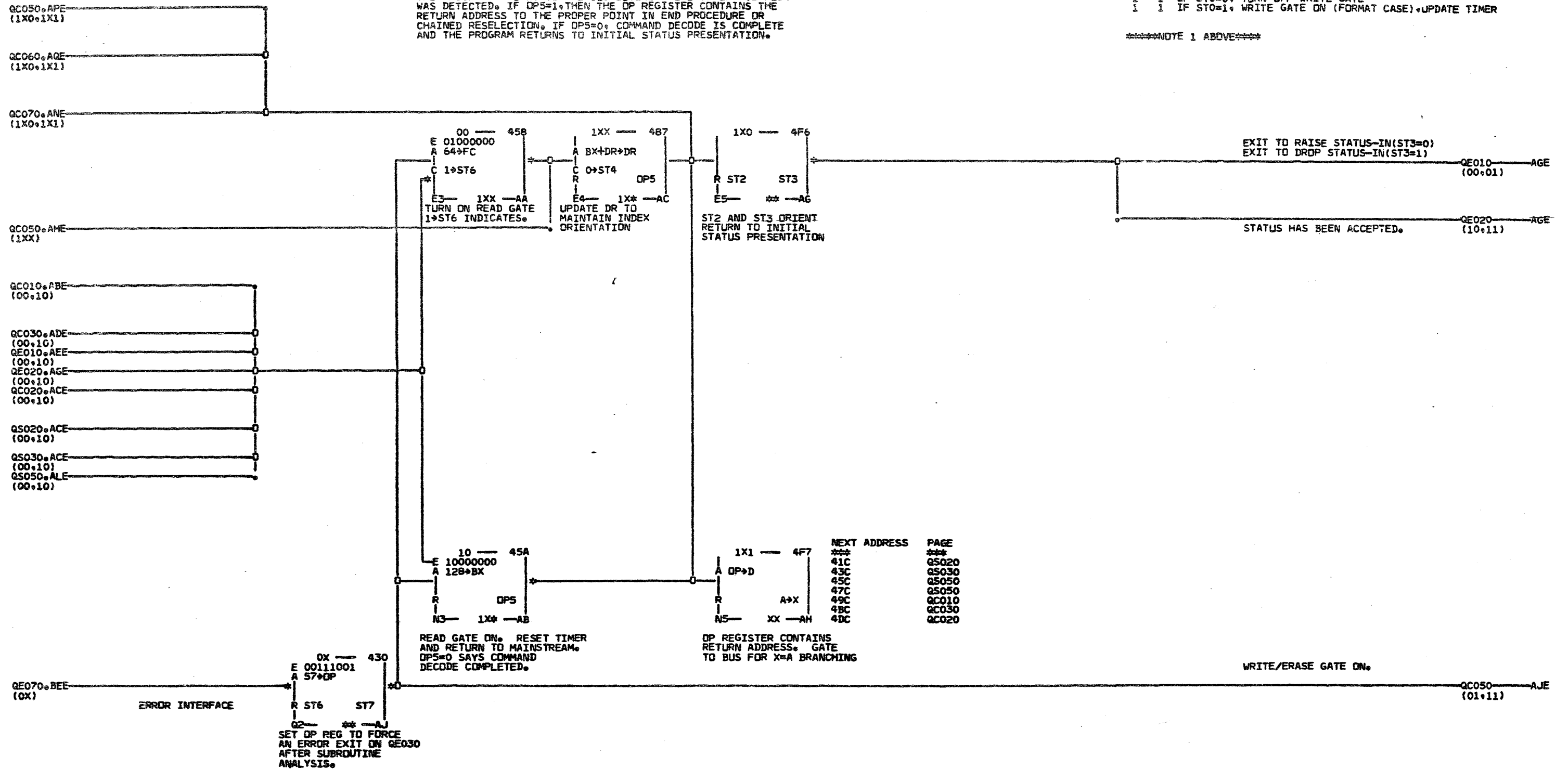
ENTRANCE TO TIMER SUBROUTINE IS MADE IF THE TIMER (BX) OVERFLOWED DURING A RESELECTION SEQUENCE. THE CONDITION OF READ/WRITE/ERASE GATES ARE ANALYZED AND SPECIFIC ACTION RESULTS. REFER TO NOTE 1 AT RIGHT.

THE PROGRAM RETURNS TO THE SUBROUTINE WHERE TIMER OVERFLOW WAS DETECTED. IF OP5=1, THEN THE OP REGISTER CONTAINS THE RETURN ADDRESS TO THE PROPER POINT IN END PROCEDURE OR CHAINED RESELECTION. IF OP5=0, COMMAND DECODE IS COMPLETE AND THE PROGRAM RETURNS TO INITIAL STATUS PRESENTATION.

MEANING OF ST6 AND ST7 WHEN TIMER OVERFLOWS

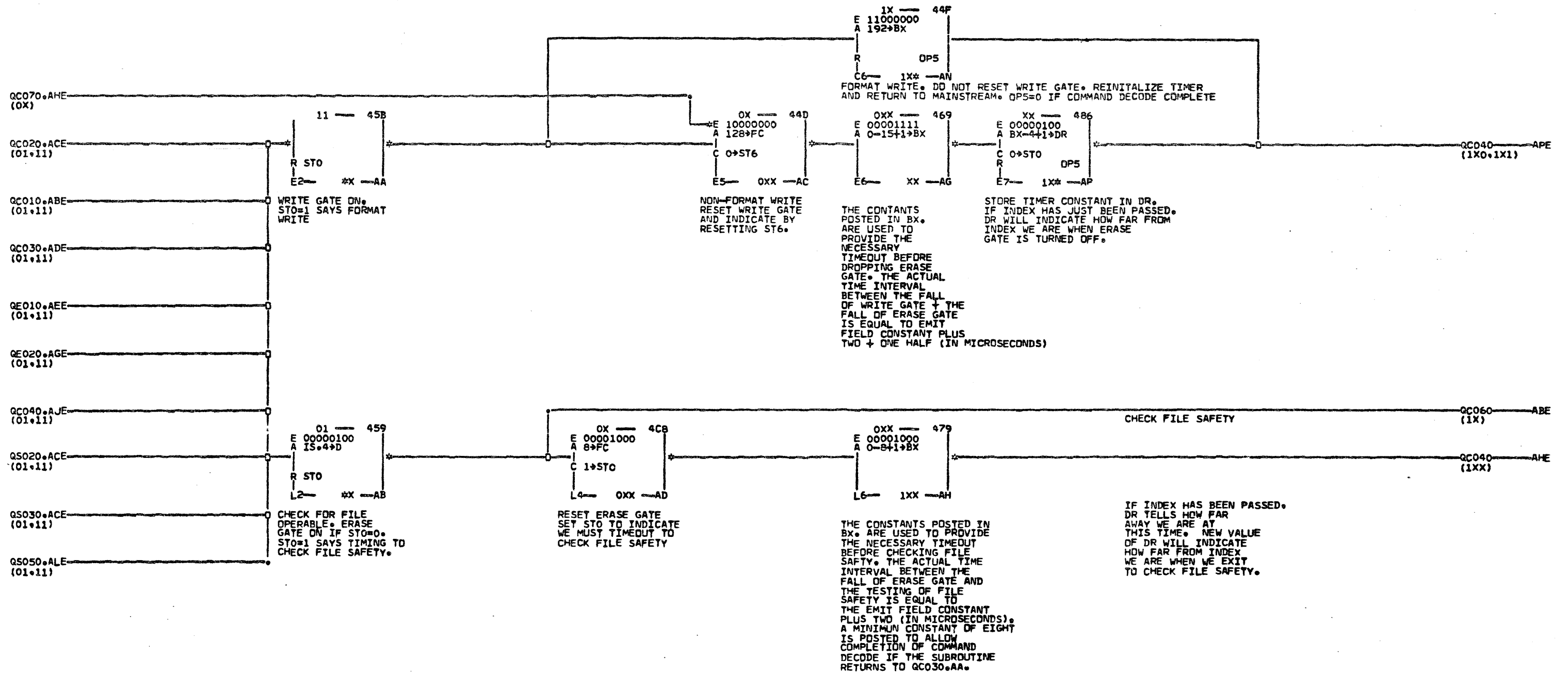
ST6	ST7	MEANING
0	0	TURN ON READ GATE
0	1	IF ST0=0, TURN OFF ERASE GATE
0	1	IF ST0=1, CHECK FOR FILE UNSAFE
1	0	READ GATE IS ON, UPDATE TIMER
1	1	IF ST0=0, TURN OFF WRITE GATE
1	1	IF ST0=1, WRITE GATE ON (FORMAT CASE), UPDATE TIMER

\*\*\*\*\*NOTE 1 ABOVE\*\*\*\*\*



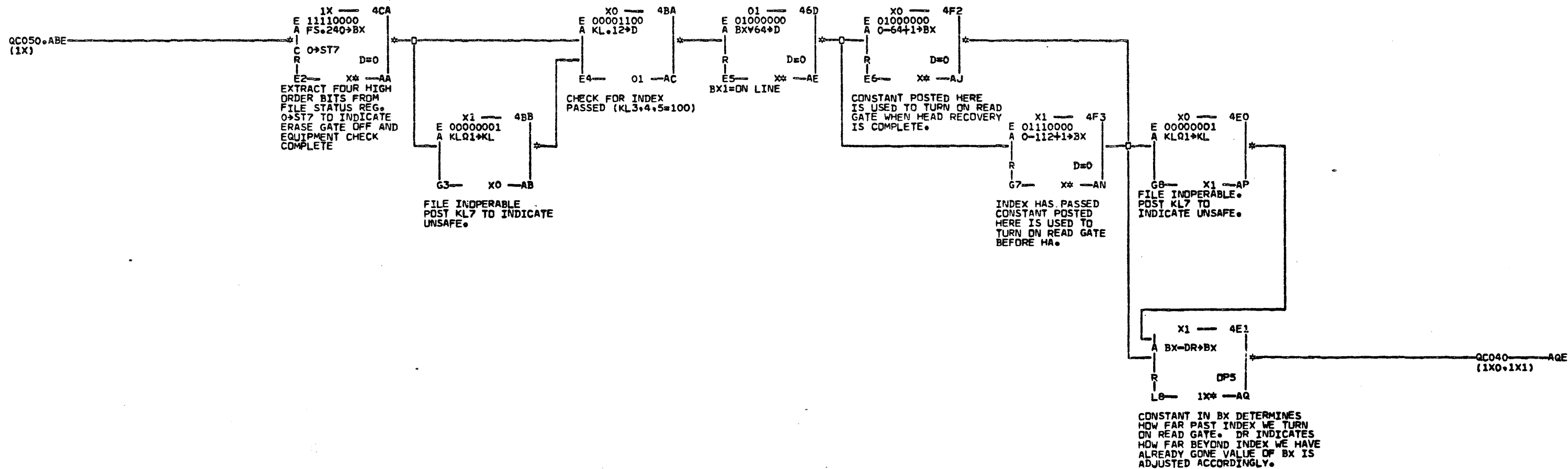
04000

SEE NOTE AT TOP OF PAGE QC040  
FOR EXPLANATION OF TIMER SUBROUTINE



00000





06000

QC010.AHE  
(000.001)  
(010.011)

QC020.AAE  
(000.001)  
(010.011)

QC030.APE  
(000.001)  
(010.011)

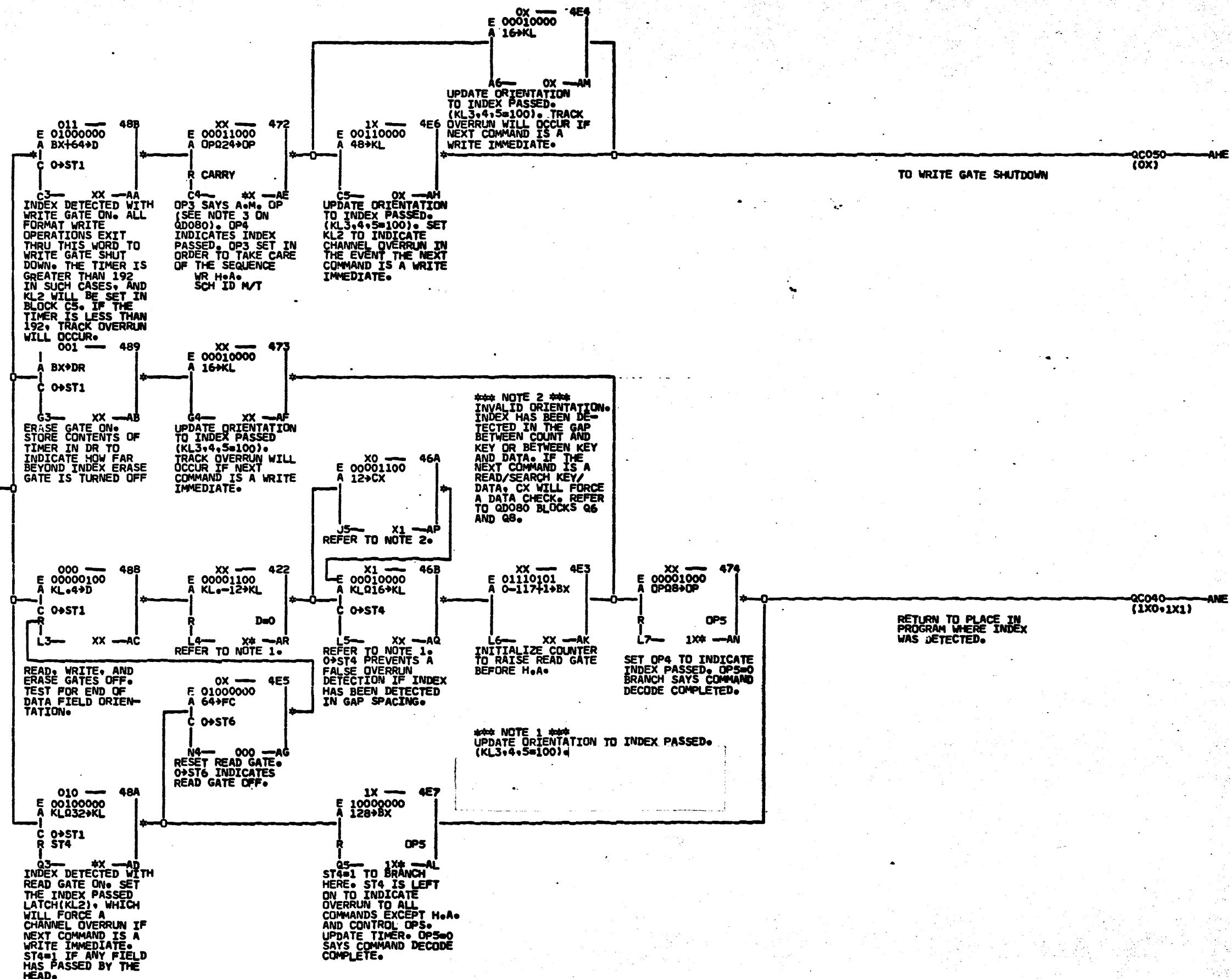
QE010.ADE  
(000.001)  
(010.011)

QE020.AEE  
(000.001)  
(010.011)

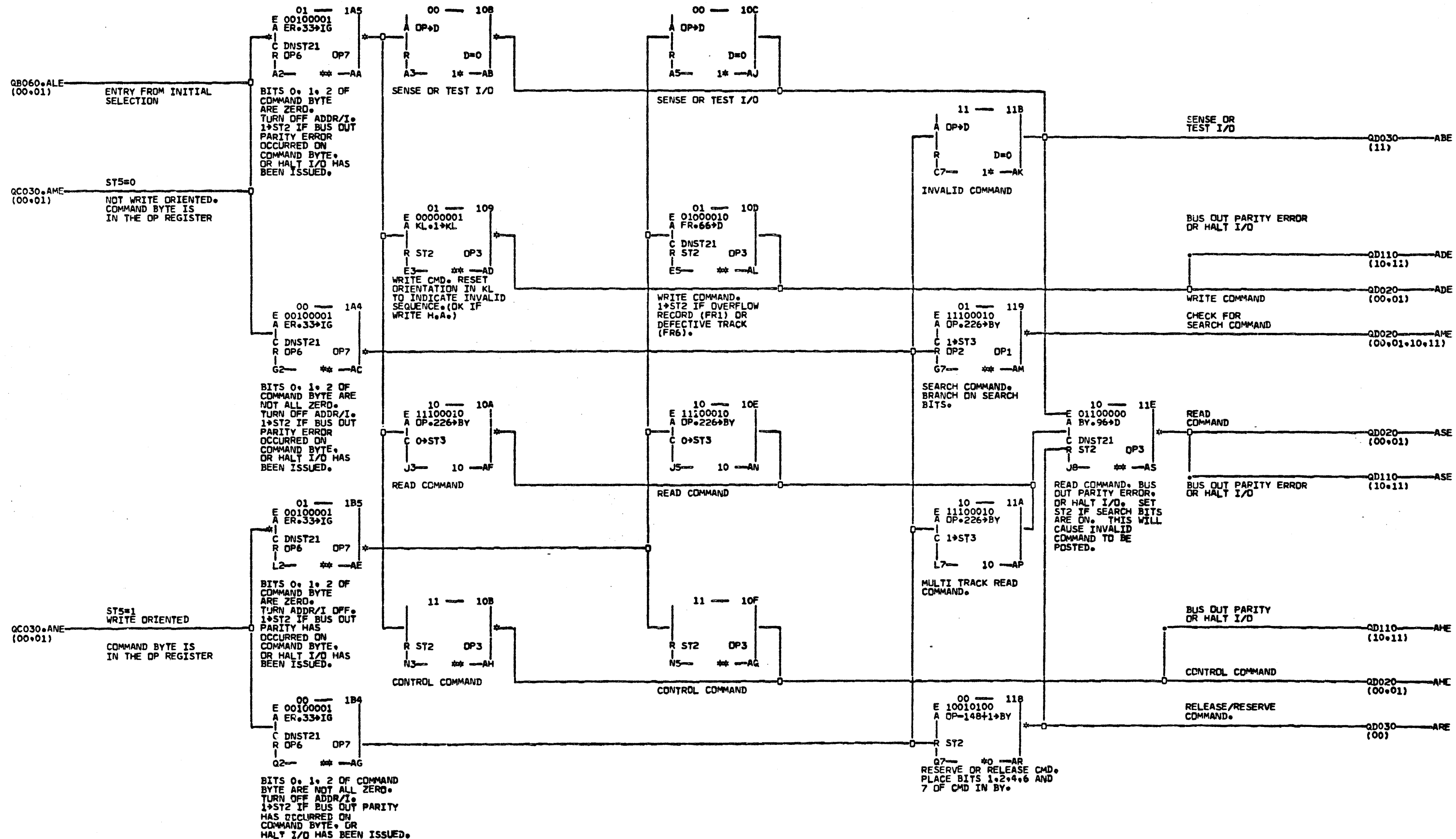
QS020.AAE  
(000.001)  
(010.011)

QS030.AAE  
(000.001)  
(010.011)

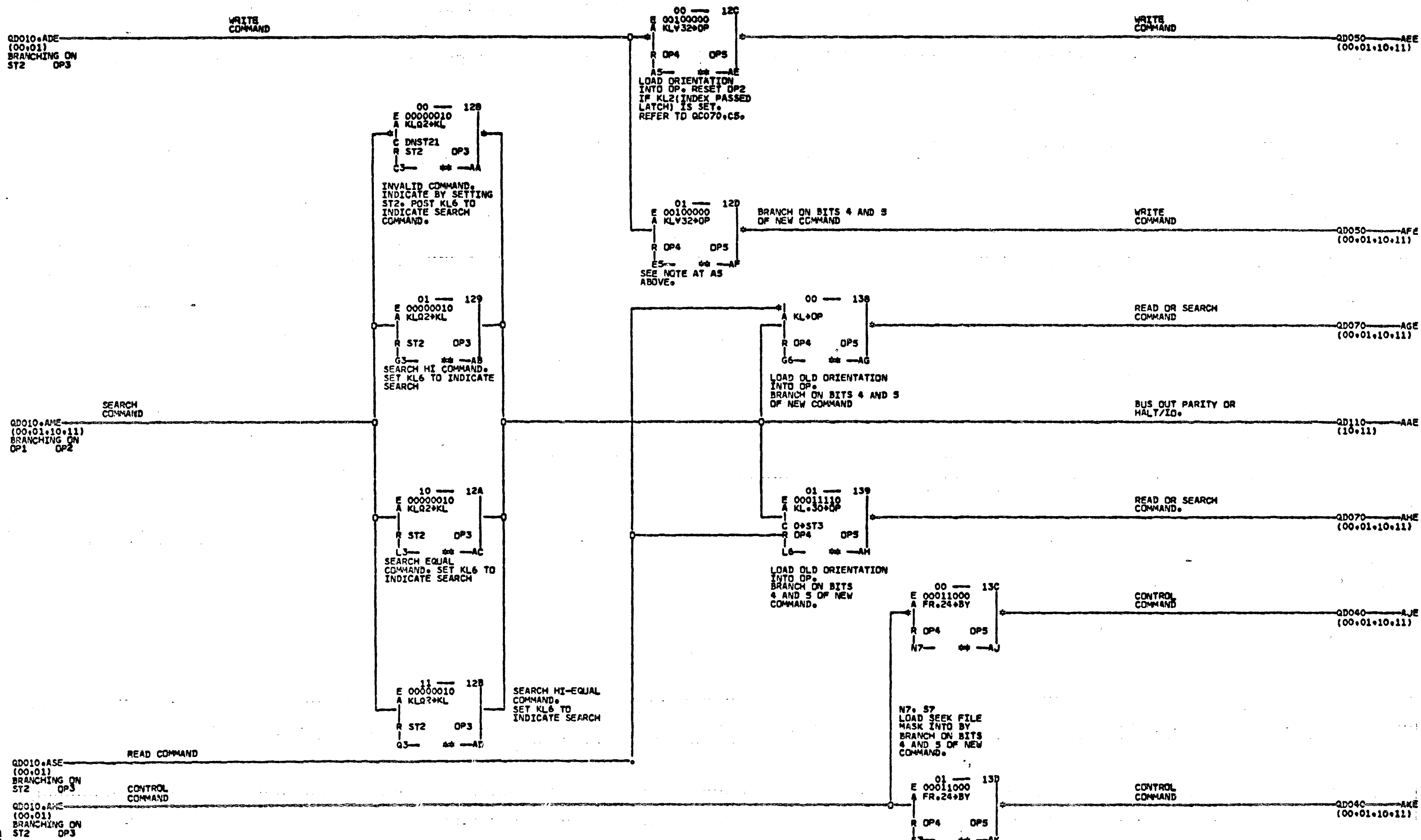
QS050.AAE  
(000.001)  
(010.011)



04000

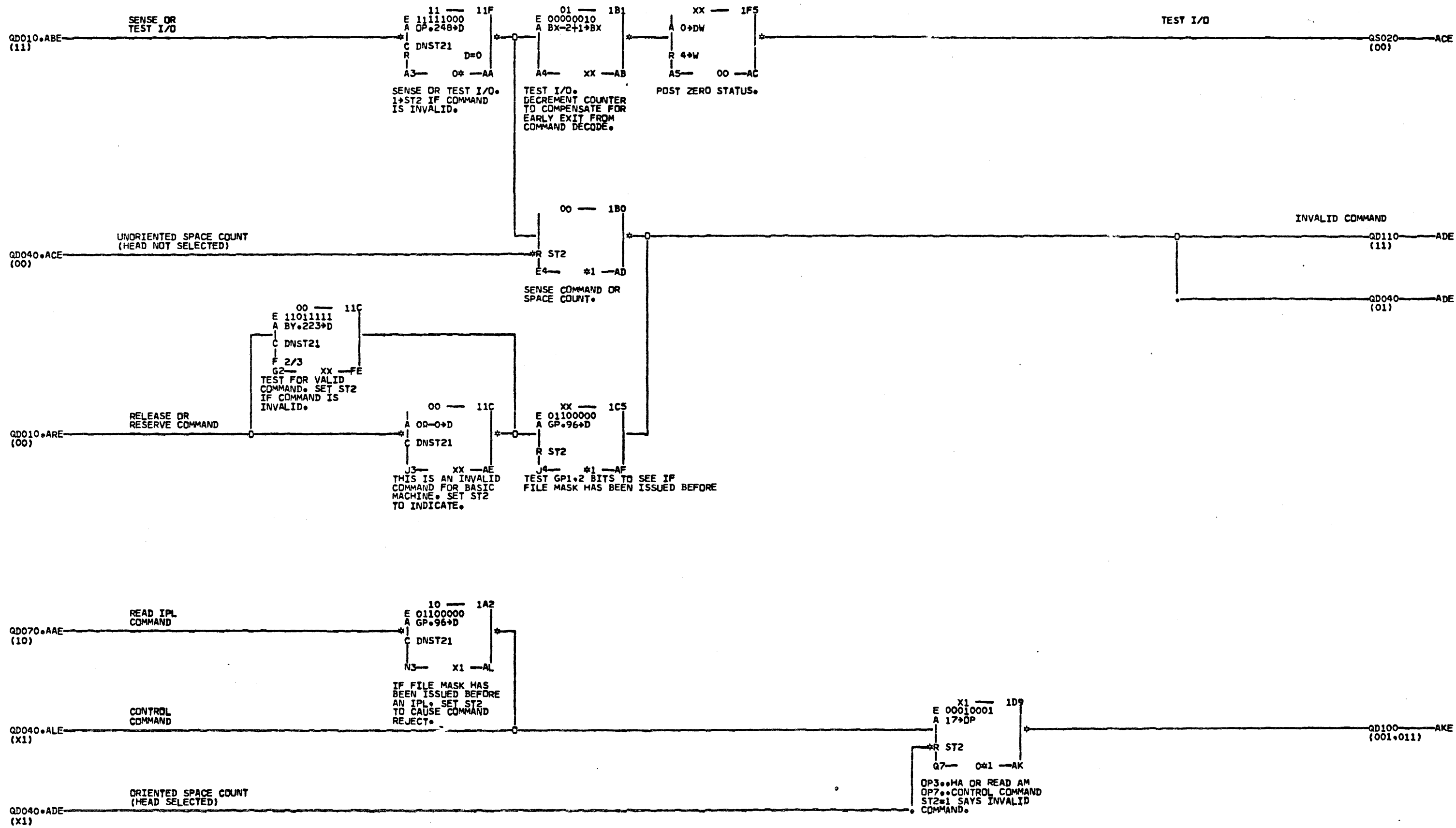


8-0010

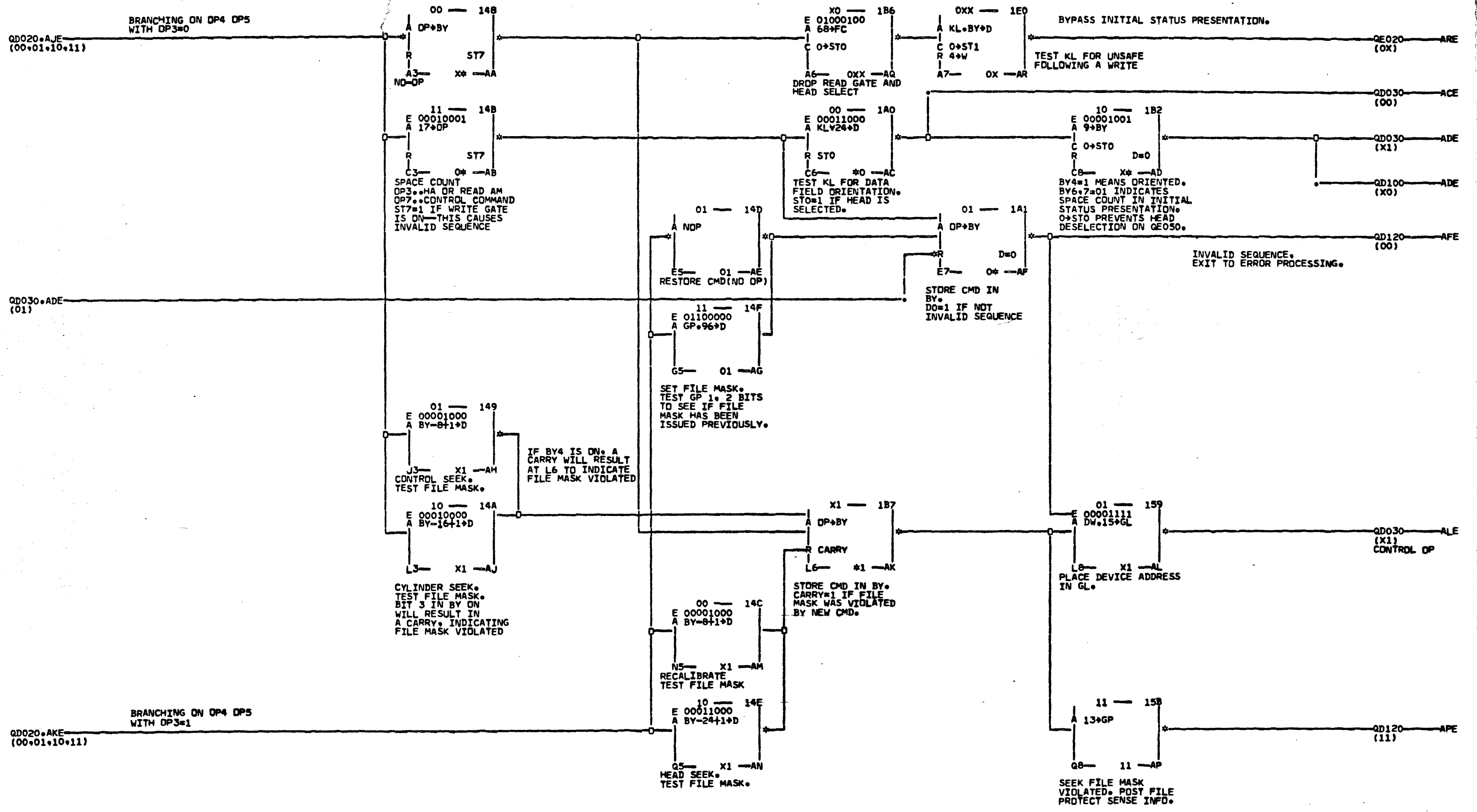


QD020

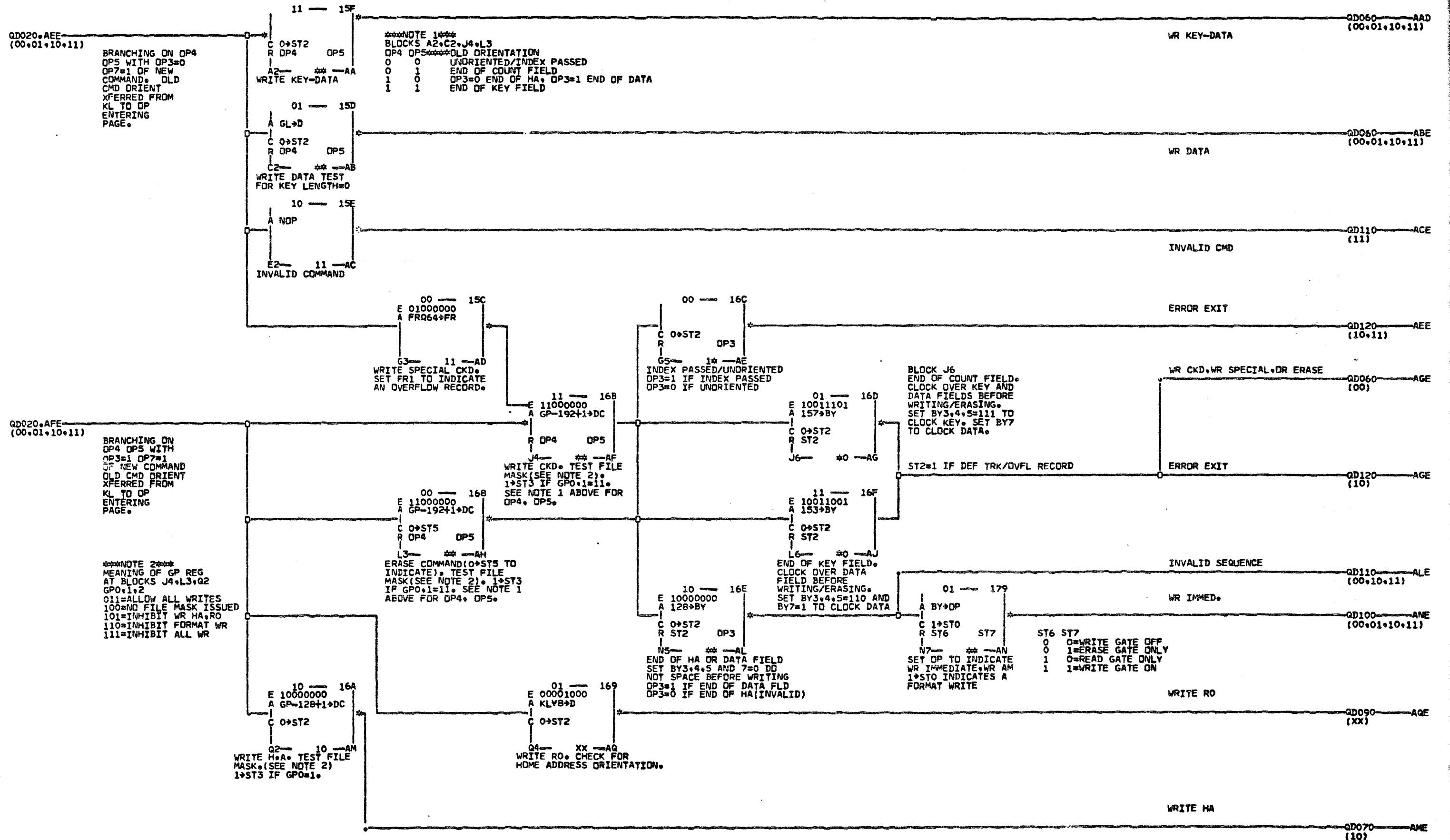
420613	10/11/66	MACH	2844	DATE	04/21/67	SHEET	1	QD020
420655	02/09/67	NAME	2314/2844	LOG	111D	VERSION		
420656	04/11/67	MODE	MANUAL	COMMAND DECODE				
		P.N.	2250219					
		IBM CORP.	SDD					

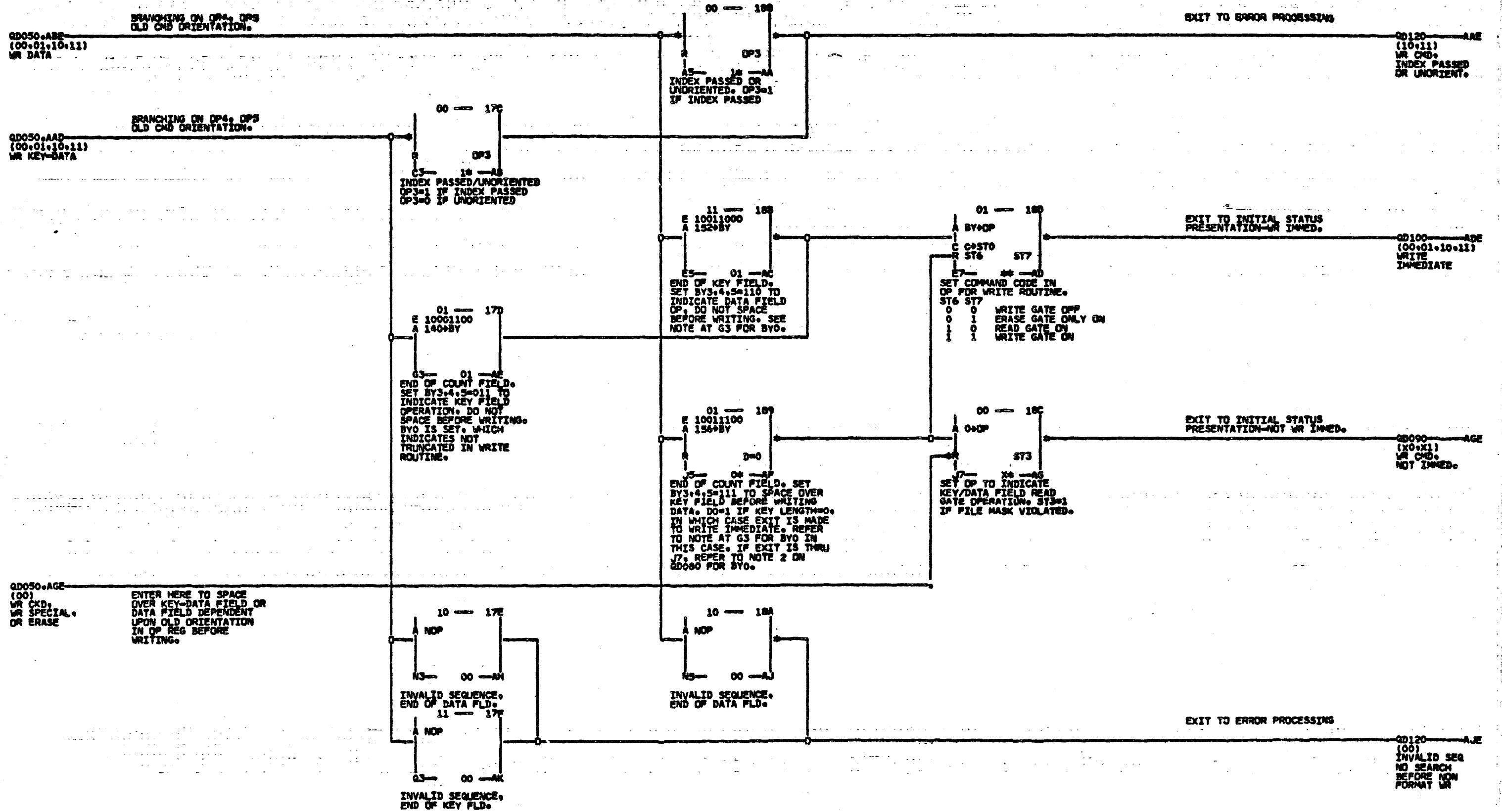


01000

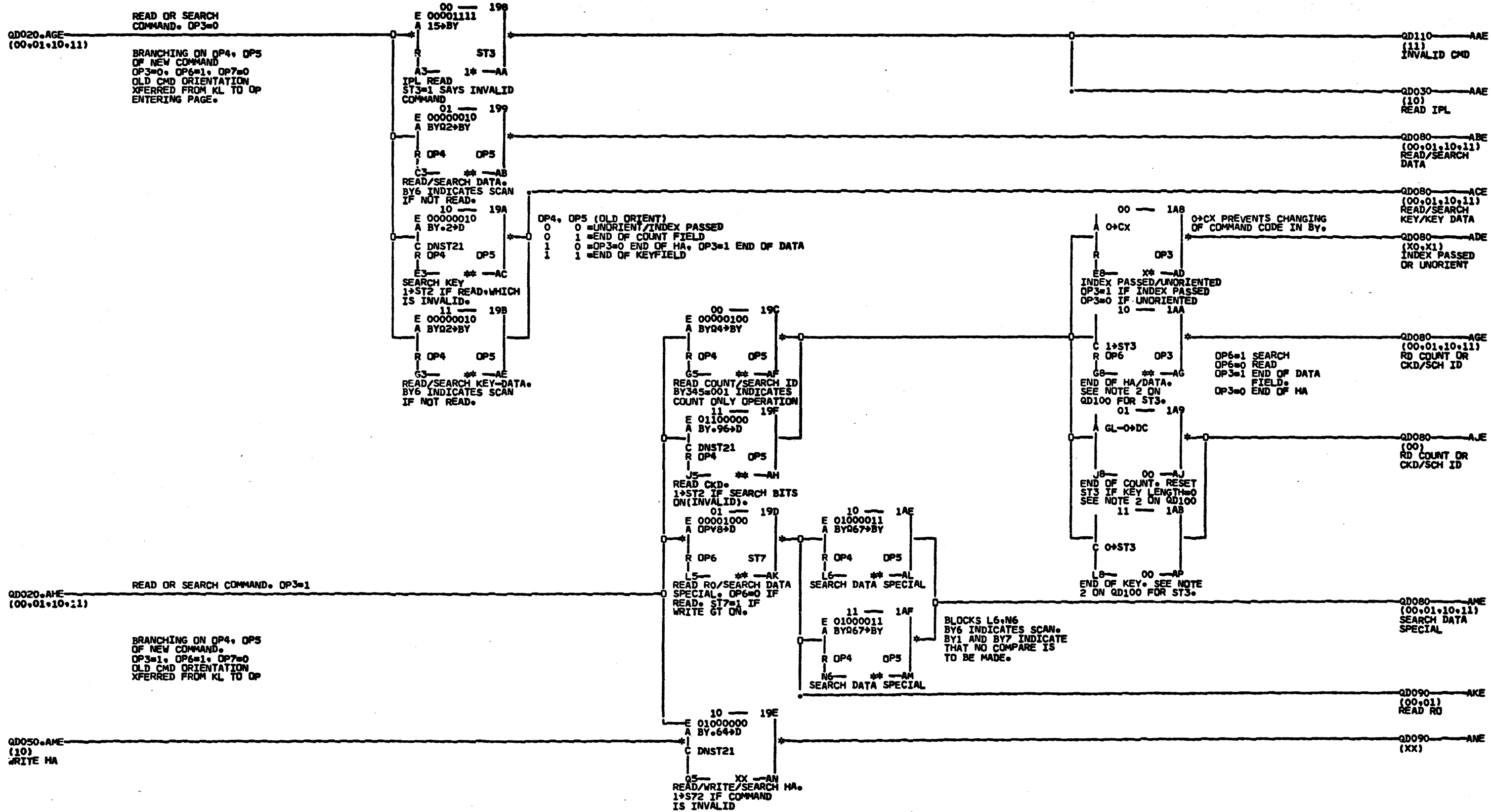


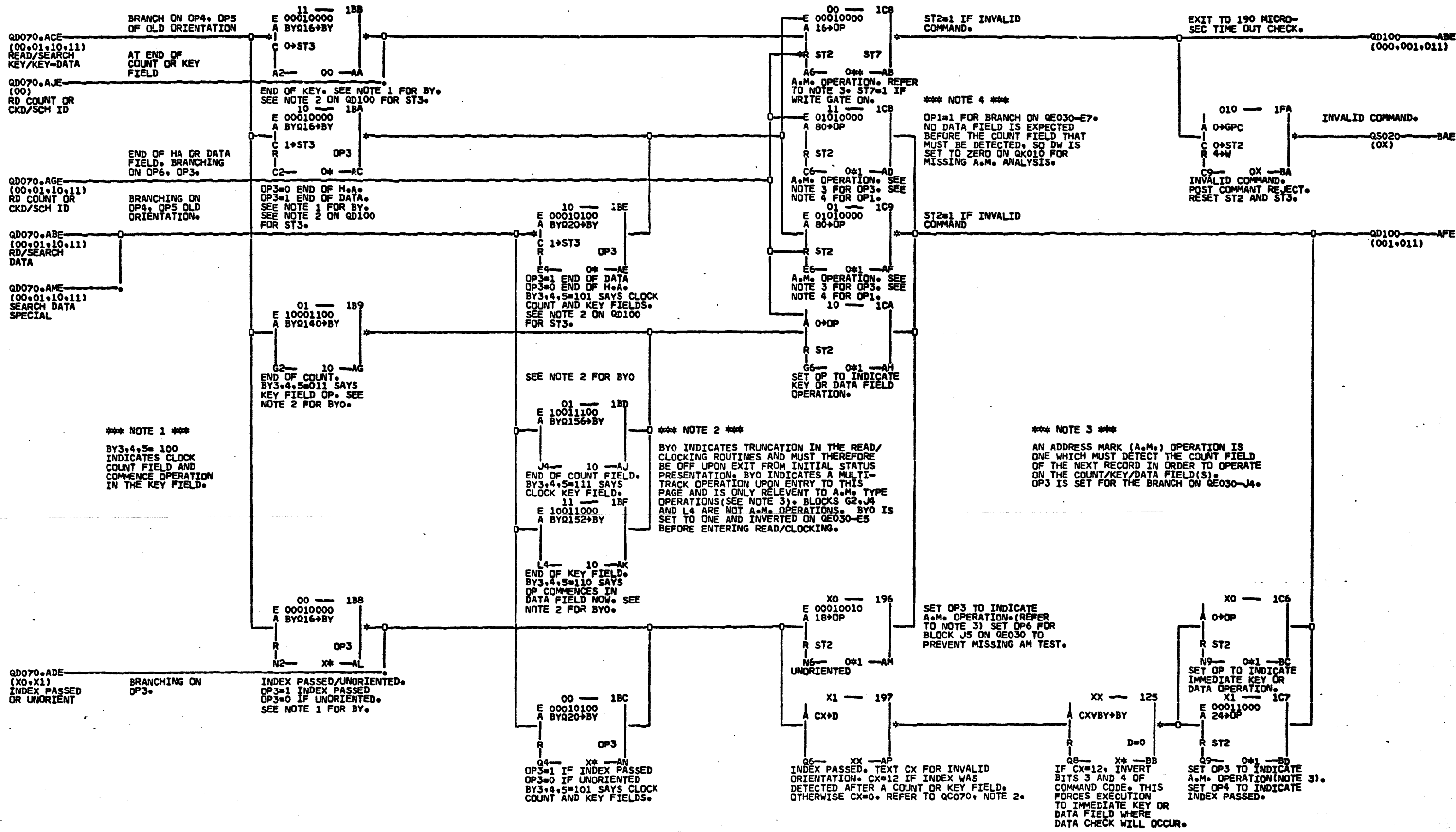
04000

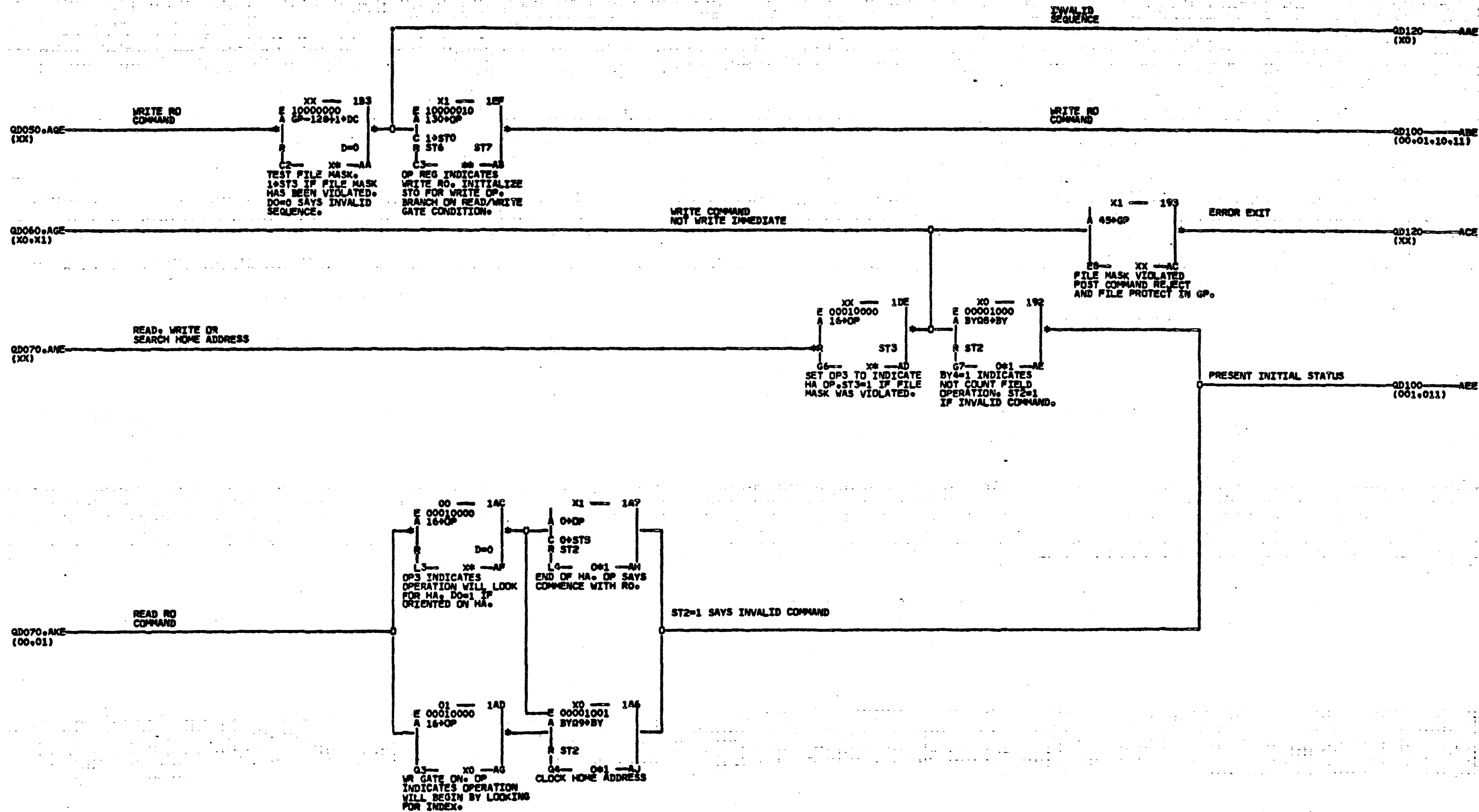












420613  
420635  
420656

10/11/66  
02/09/67  
04/11/67

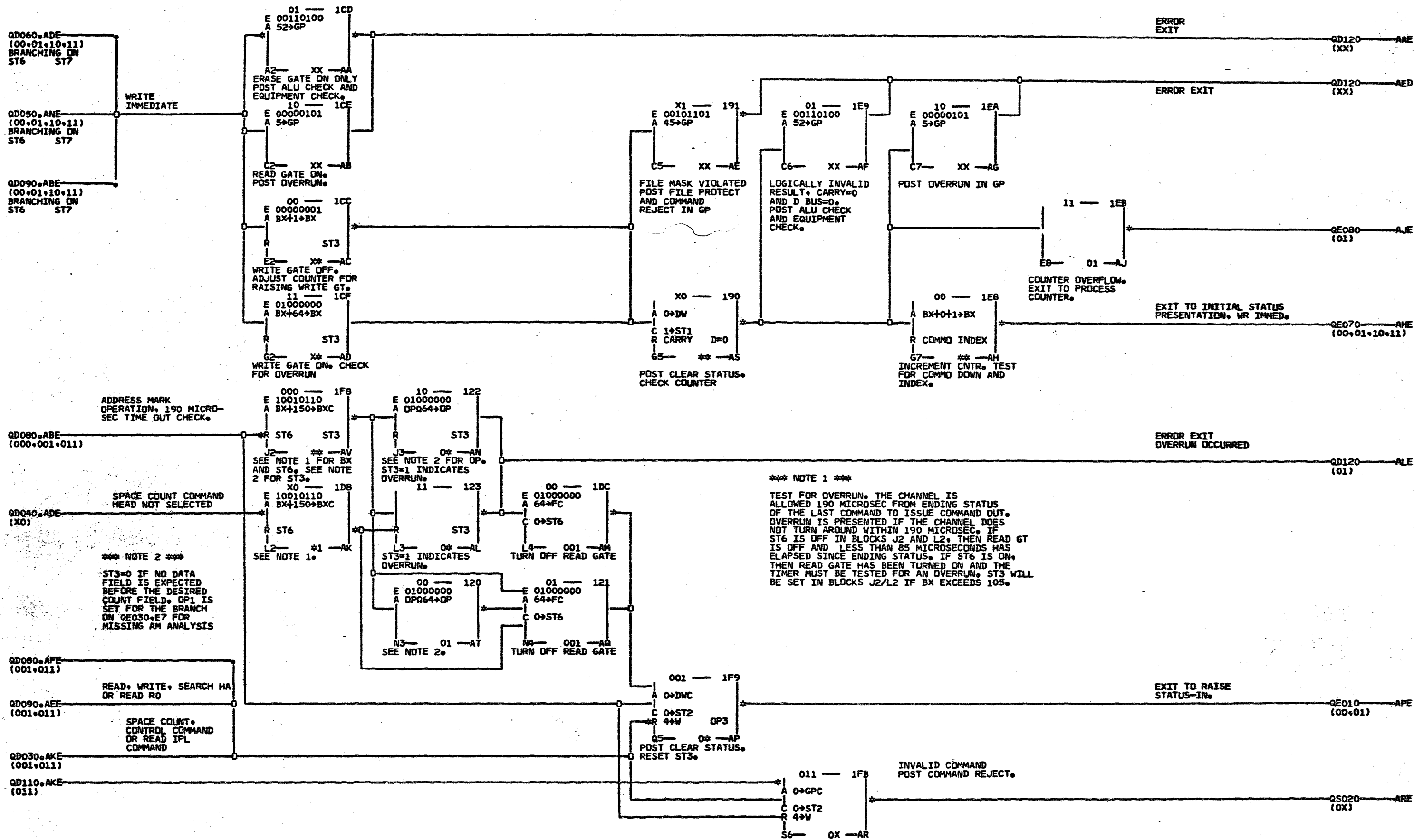
MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.N. 2250226  
IBM CORP. 800

DATE 04/21/67  
LOG 111D

COMMAND DECODE

SHEET 1 QD090  
VERSION

*J*



ADDRESS MARK OPERATION, 190 MICRO-SEC TIME OUT CHECK.

SPACE COUNT COMMAND HEAD NOT SELECTED

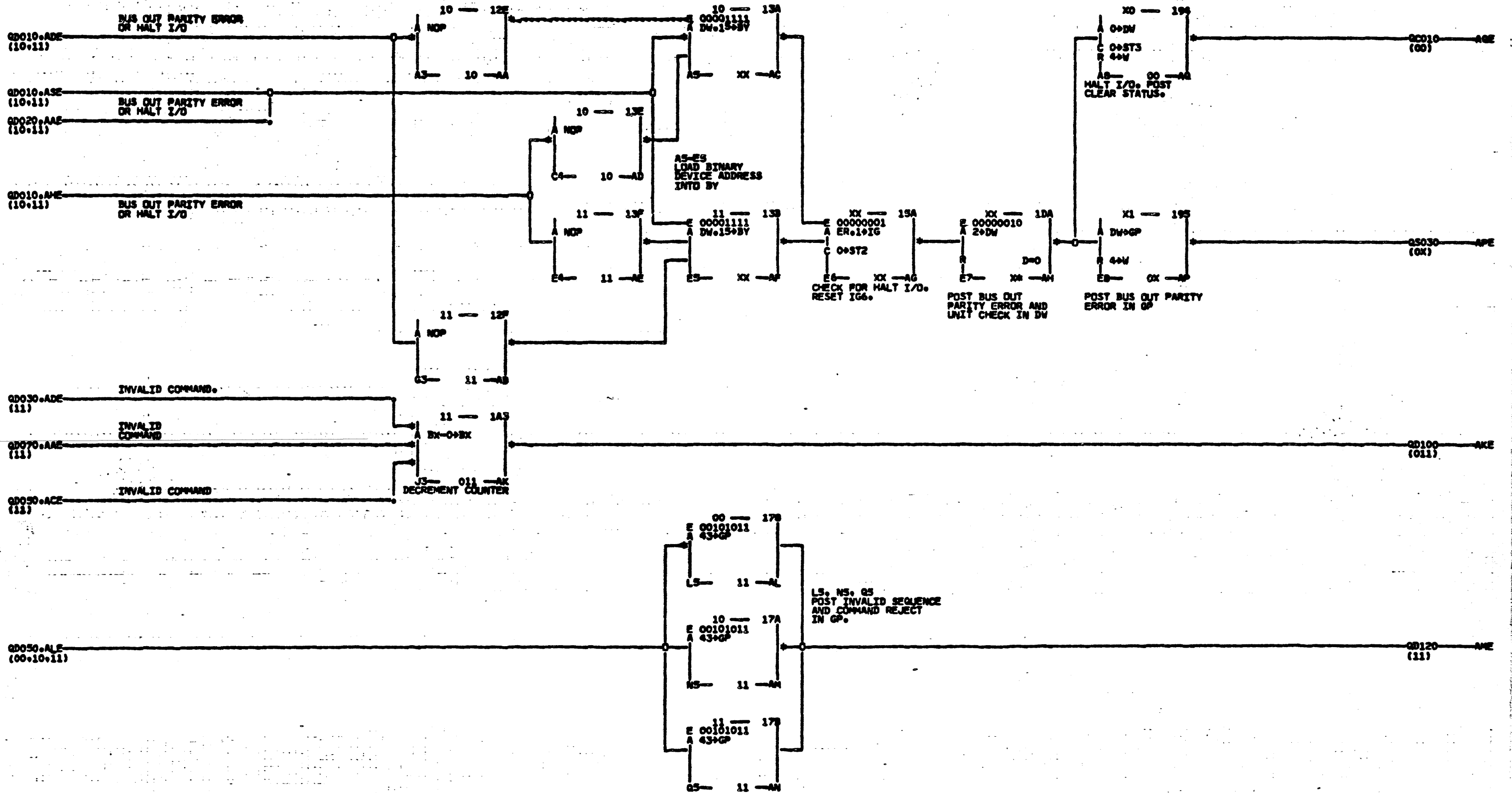
\*\*\* NOTE 2 \*\*\*  
ST3=0 IF NO DATA FIELD IS EXPECTED BEFORE THE DESIRED COUNT FIELD. DP1 IS SET FOR THE BRANCH ON QE030.E7 FOR MISSING AM ANALYSIS

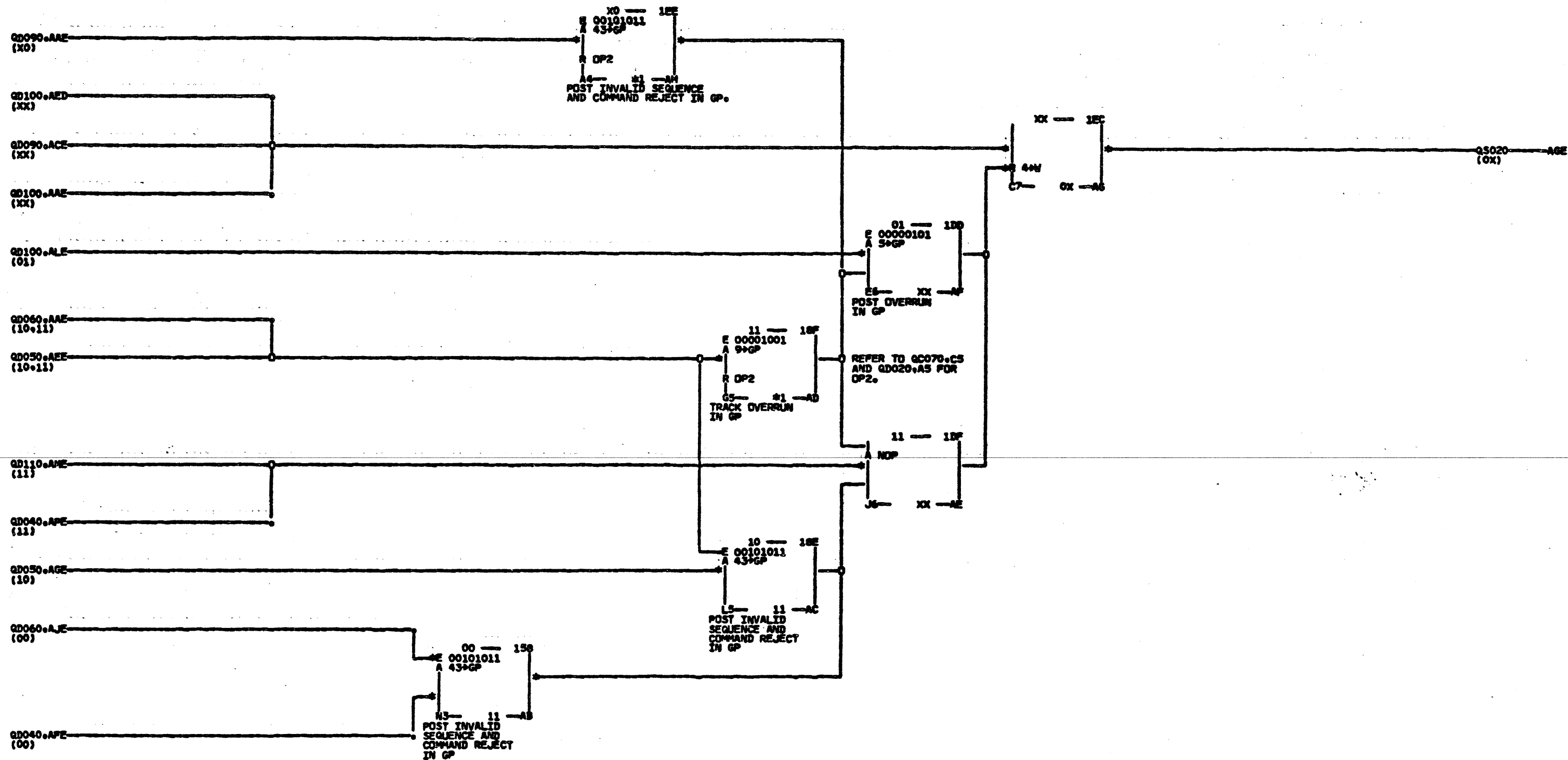
READ, WRITE, SEARCH MA OR READ R0

SPACE COUNT CONTROL COMMAND OR READ IPL COMMAND

\*\*\* NOTE 1 \*\*\*  
TEST FOR OVERRUN. THE CHANNEL IS ALLOWED 190 MICROSEC FROM ENDING STATUS OF THE LAST COMMAND TO ISSUE COMMAND OUT. OVERRUN IS PRESENTED IF THE CHANNEL DOES NOT TURN AROUND WITHIN 190 MICROSEC. IF ST6 IS OFF IN BLOCKS J2 AND L2, THEN READ GT IS OFF AND LESS THAN 85 MICROSECONDS HAS ELAPSED SINCE ENDING STATUS. IF ST6 IS ON, THEN READ GATE HAS BEEN TURNED ON AND THE TIMER MUST BE TESTED FOR AN OVERRUN. ST3 WILL BE SET IN BLOCKS J2/L2 IF BX EXCEEDS 105.

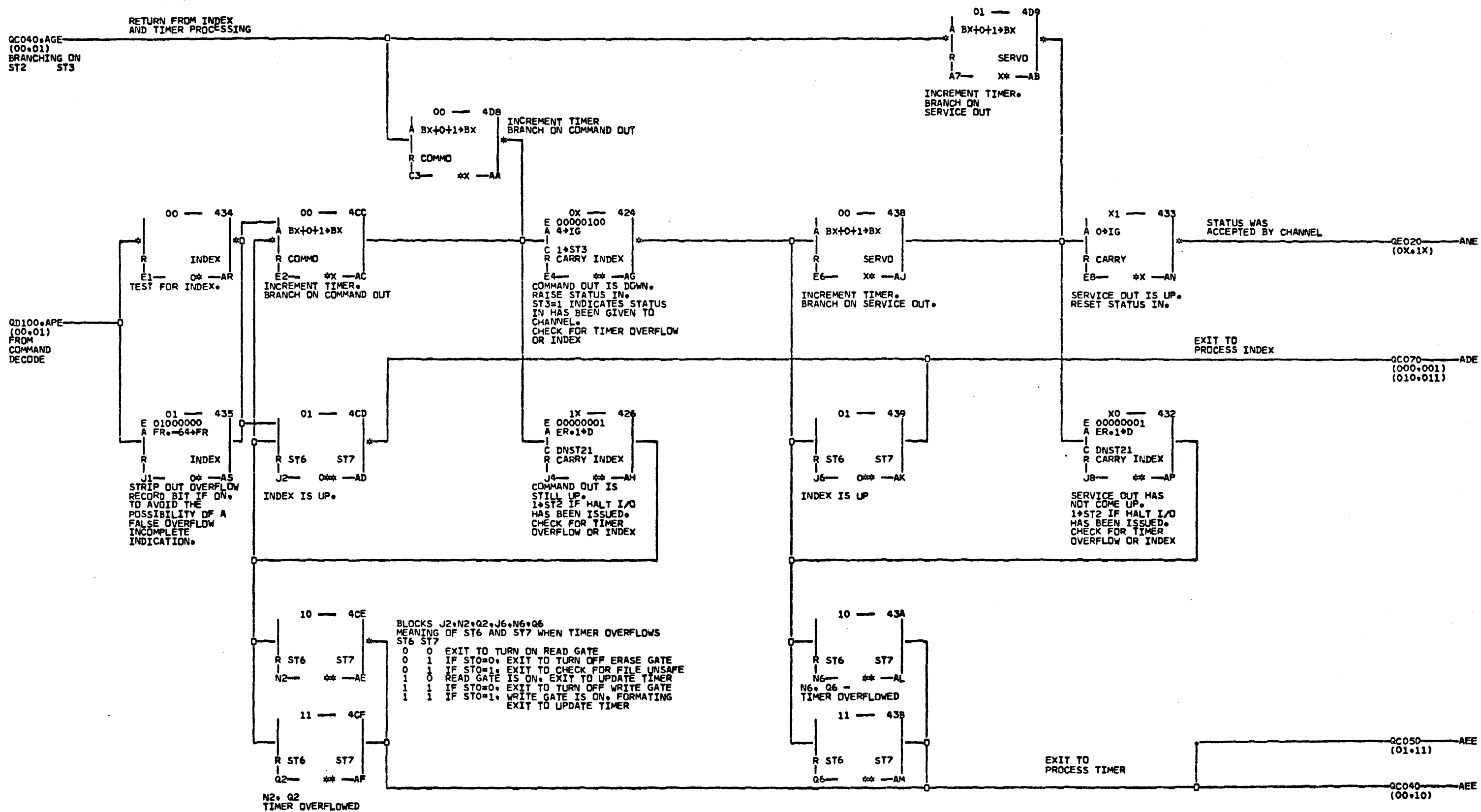
420613	10/11/66	MACH	2844	DATE	11/20/68	SHEET	1	QD100
420655	02/09/67	NAME	2314/2844	LOG	3256	VERSION		
420656	04/11/67	MODE	MANUAL					
420664	09/19/68	P.No.	2250227					
			IBM CORP.	SDD				
				COMMAND DECODE				

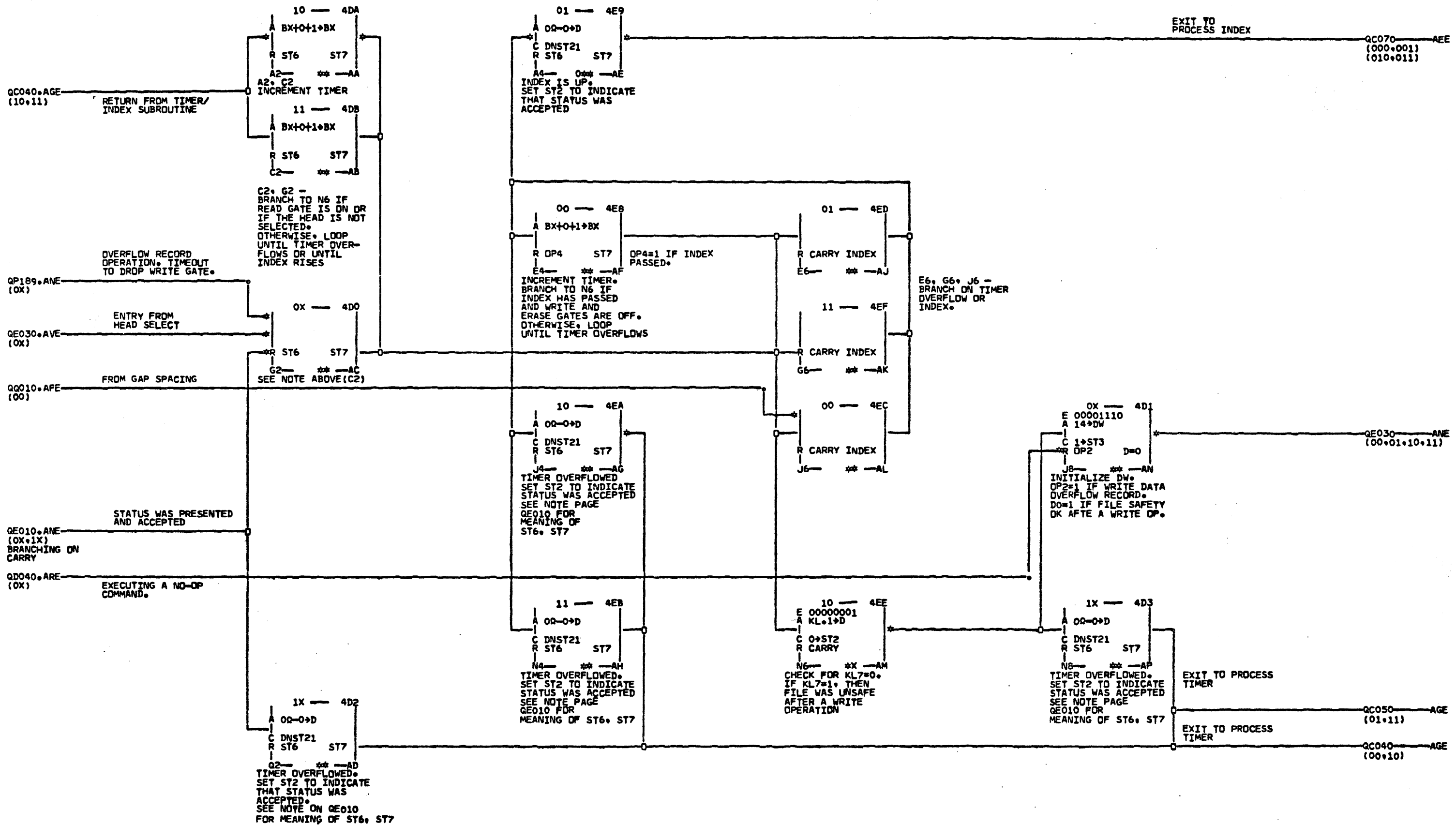




01-58

18





01000

420613  
420655

10/11/66  
02/09/67

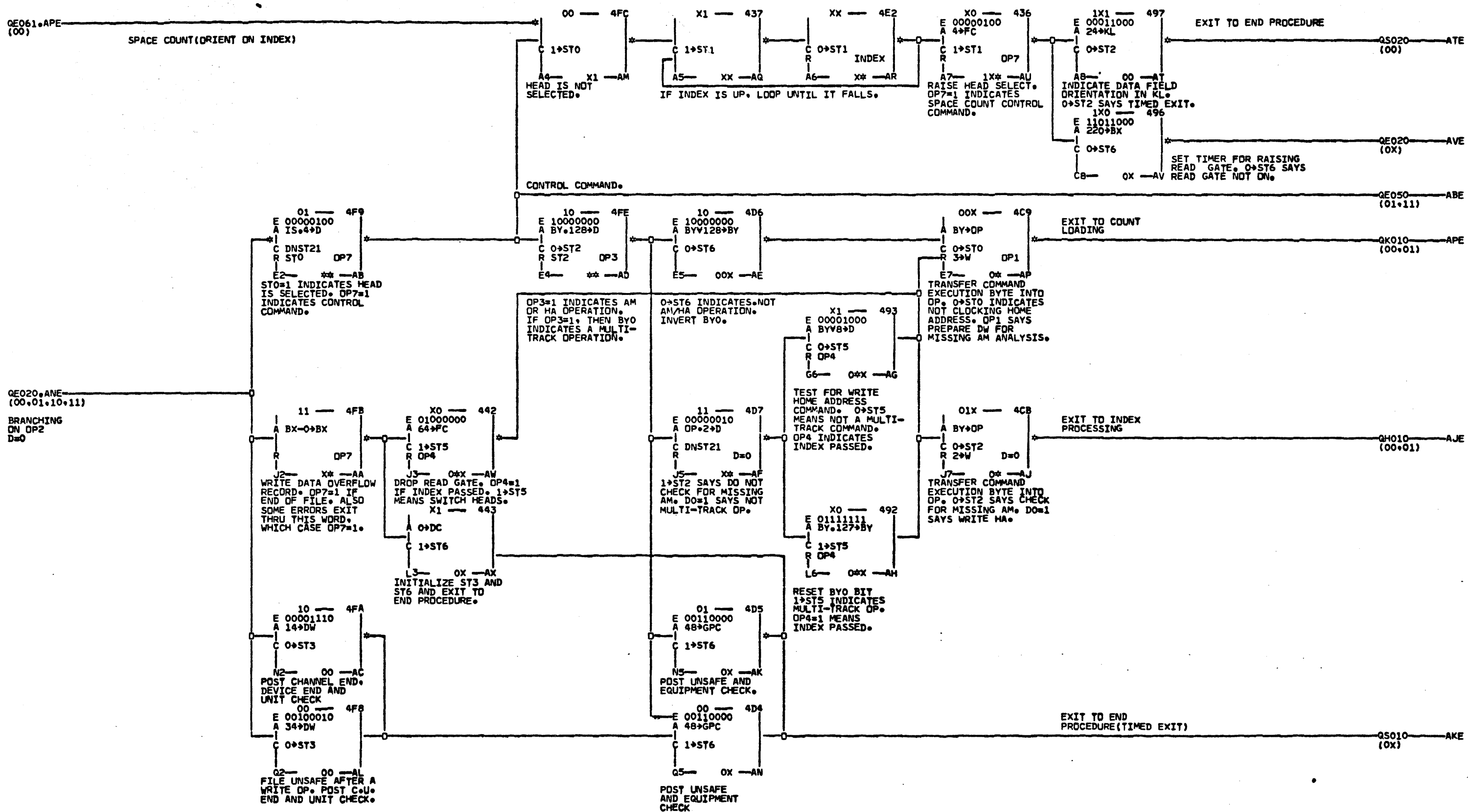
MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.N. 2250231  
IBM CORP. SDD

DATE 03/03/67  
LOG 0626

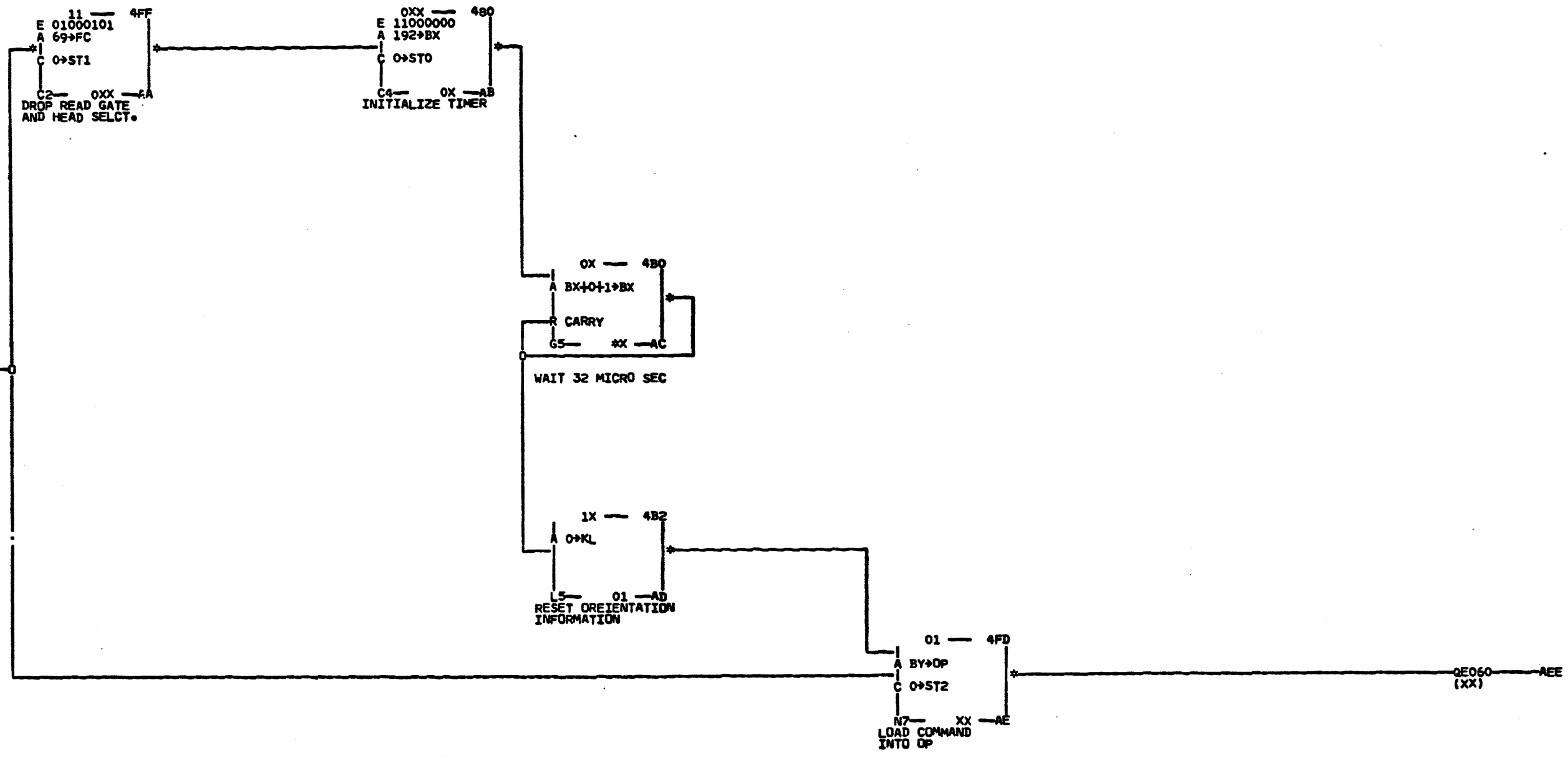
SHEET 1  
VERSION  
QE020

INITIAL STATUS PRESENTATION  
NOT WRITE IMMEDIATE



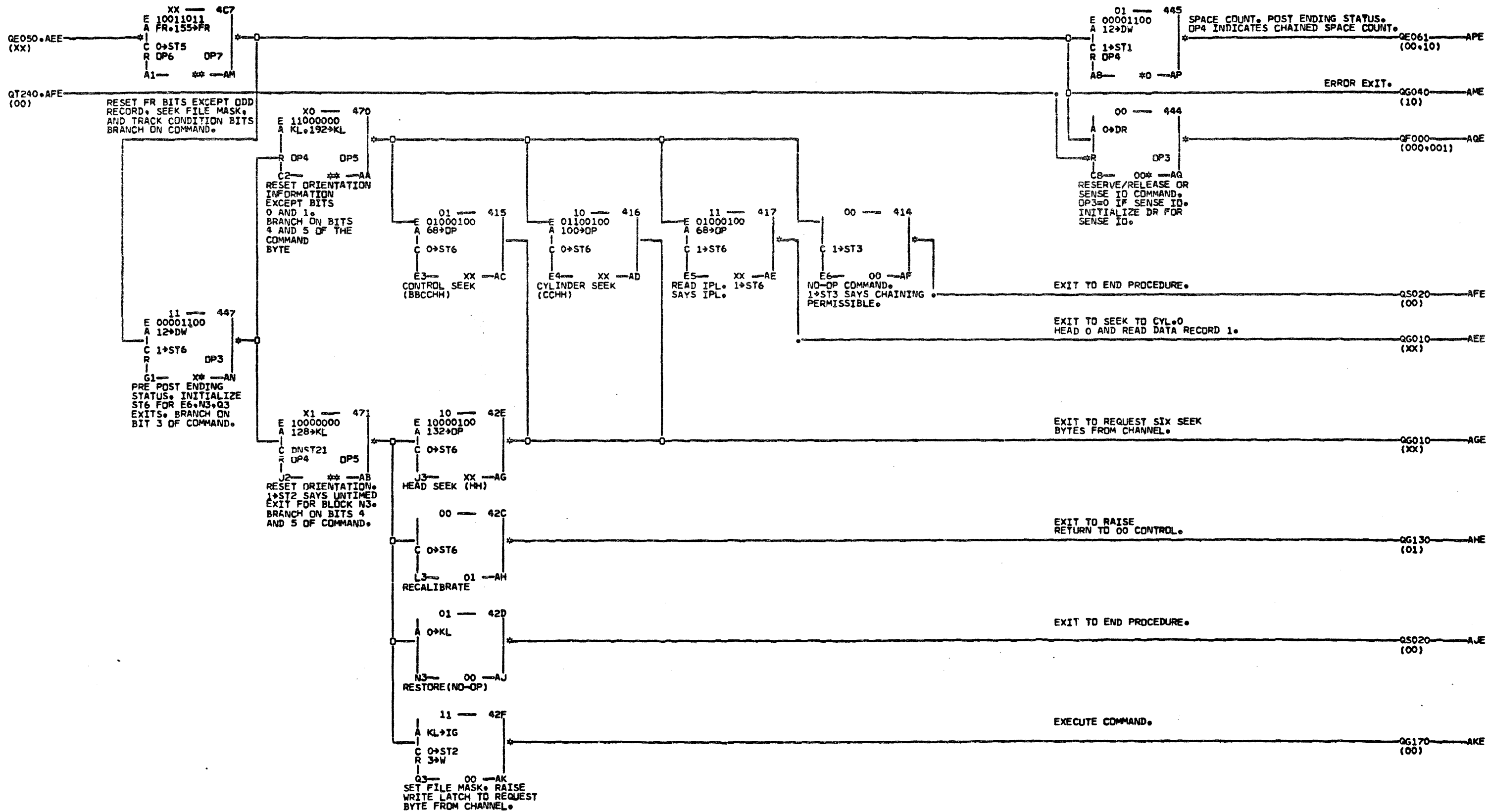


QEO30.ABE  
(01.11)

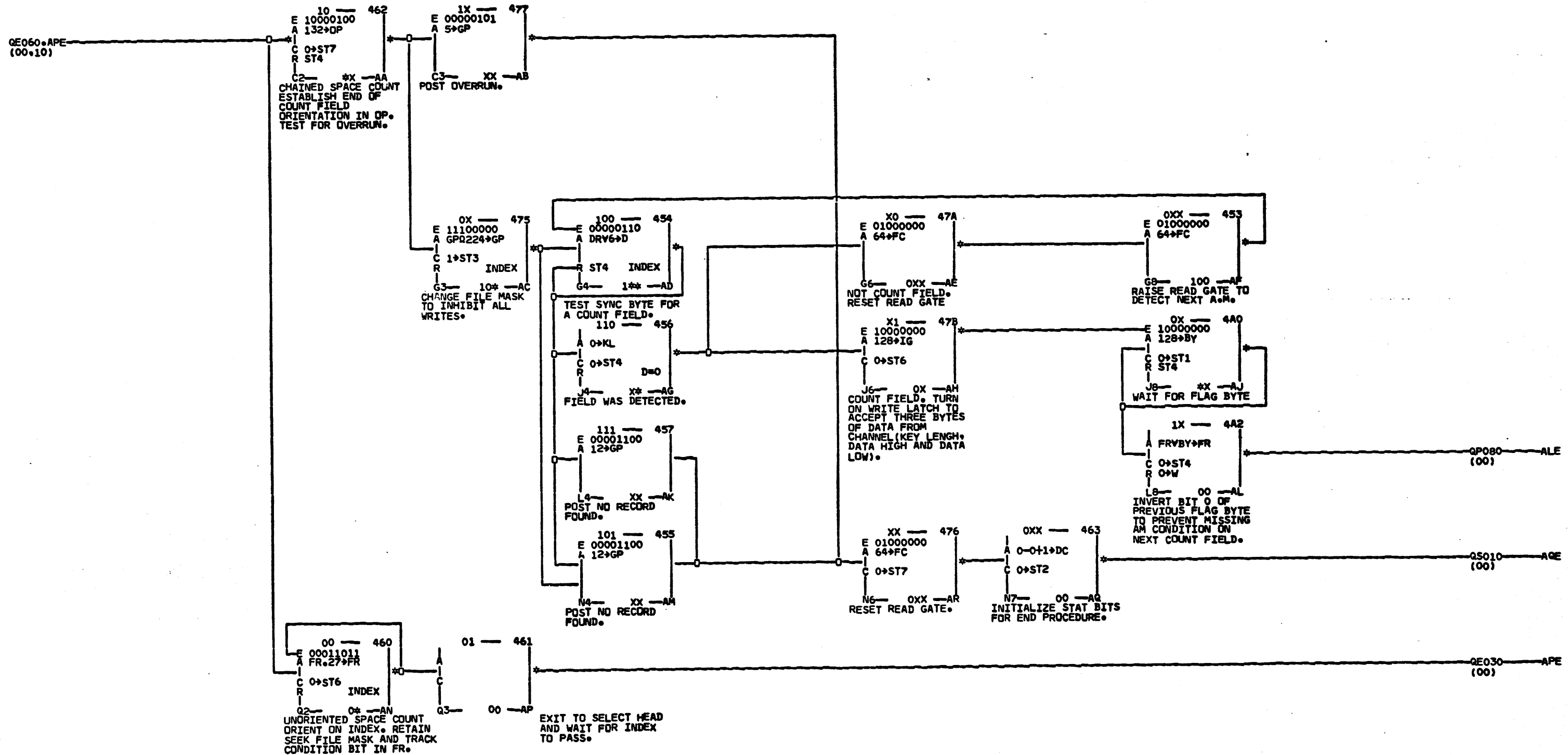


QEO60  
(XX) AEE

010101



09060



1-8-68

420613  
420655  
420662

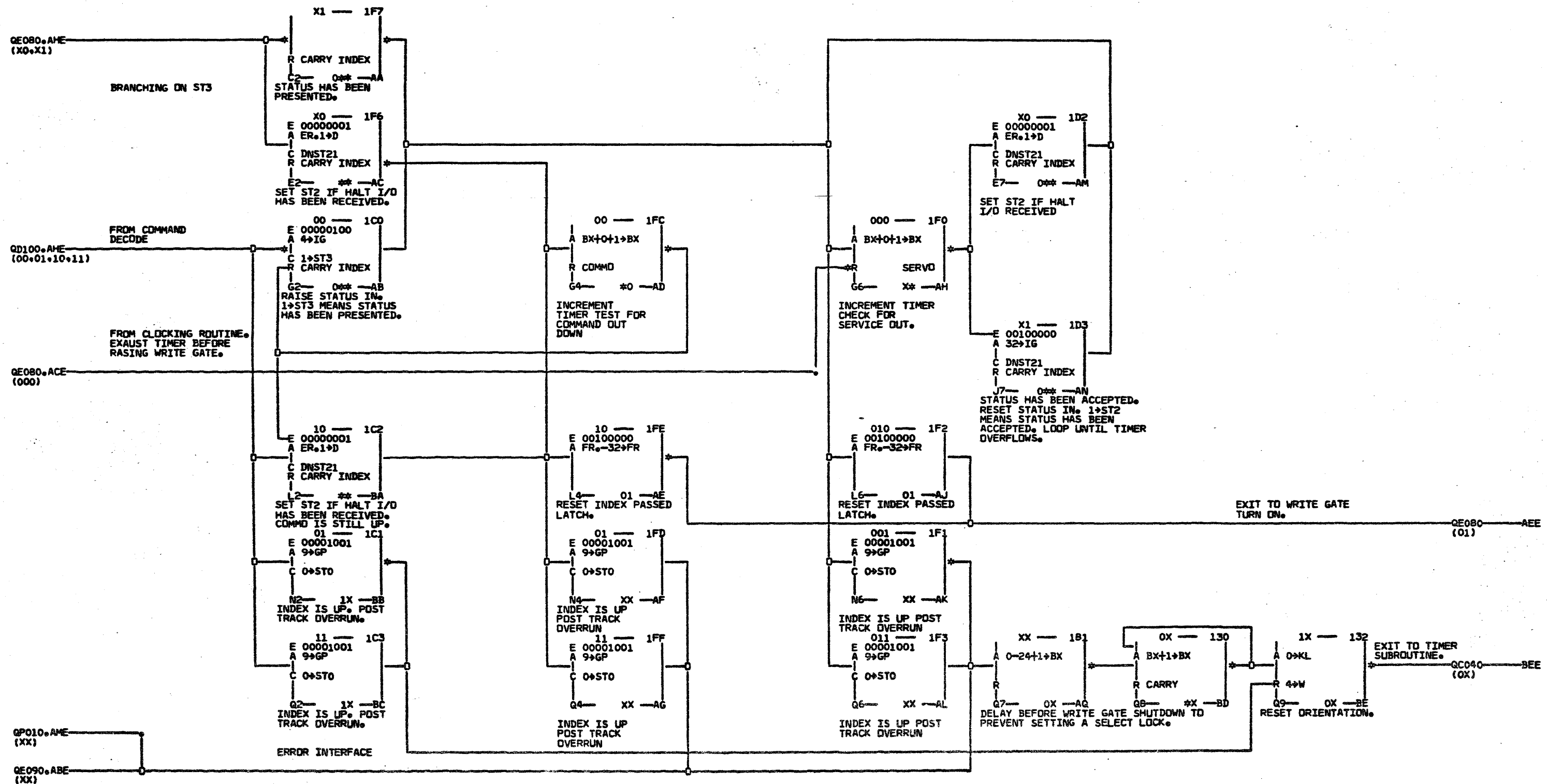
10/11/66  
02/09/67  
01/15/68

MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.N. 2250235  
IBM CORP. SDD

DATE 02/20/68  
LOG 051P

INTERFACE TO SPACE  
COUNT

SHEET 1  
VERSION  
1 QE061



0-0012

420613  
420655  
420664

10/11/66  
02/09/67  
09/19/68

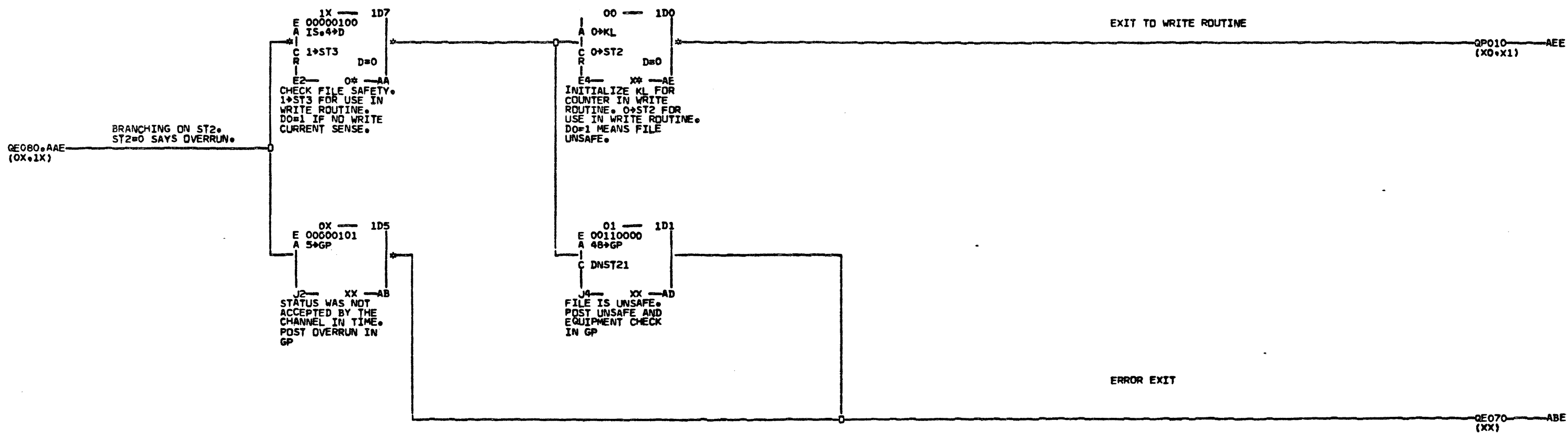
MACH NAME 2314/2844  
MODE MANUAL  
P.No. 2250236  
IBM CORP. SDD

DATE 11/20/68  
LOG 3256

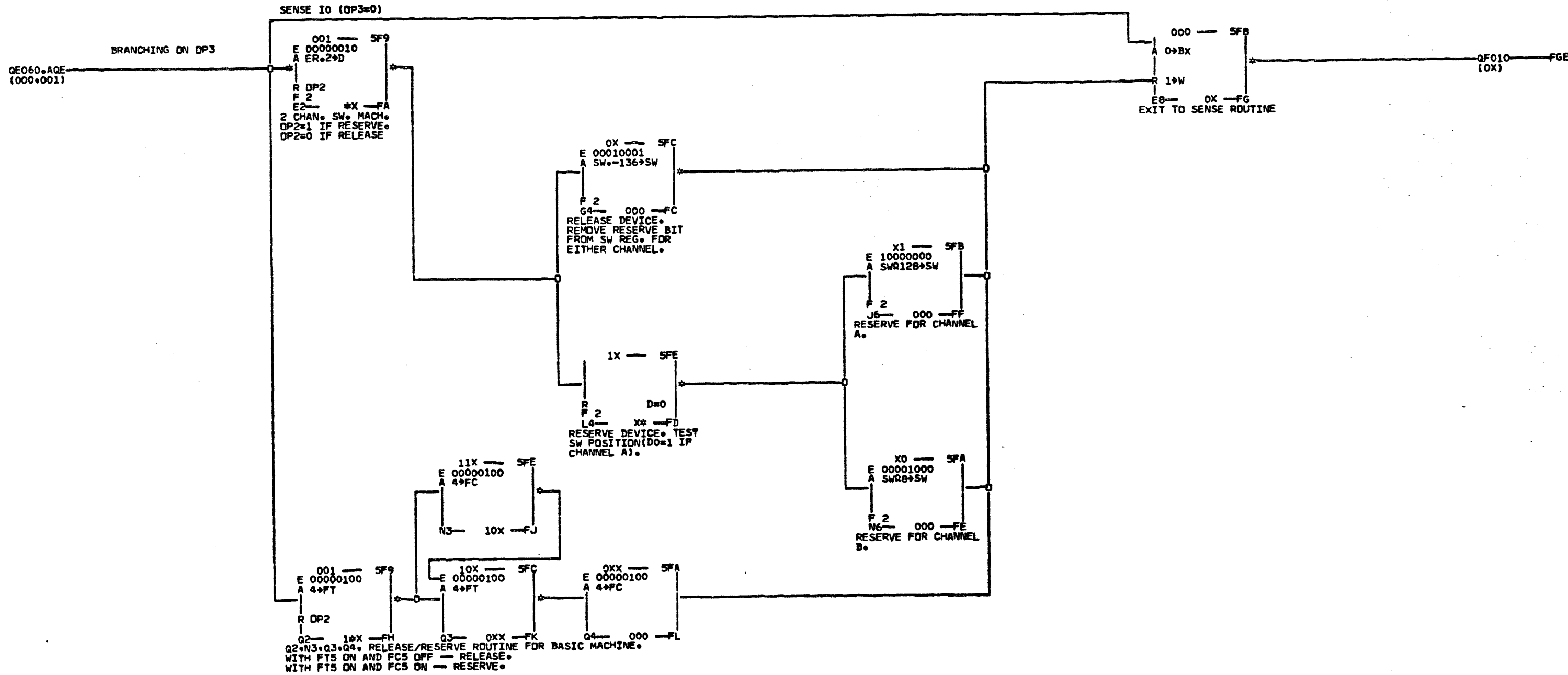
SHEET 1 GE070  
VERSION

INITIAL STATUS  
PRESENTATION WRITE IMMEDIATE





080MP



00078

420613  
420655

10/11/66  
02/09/67

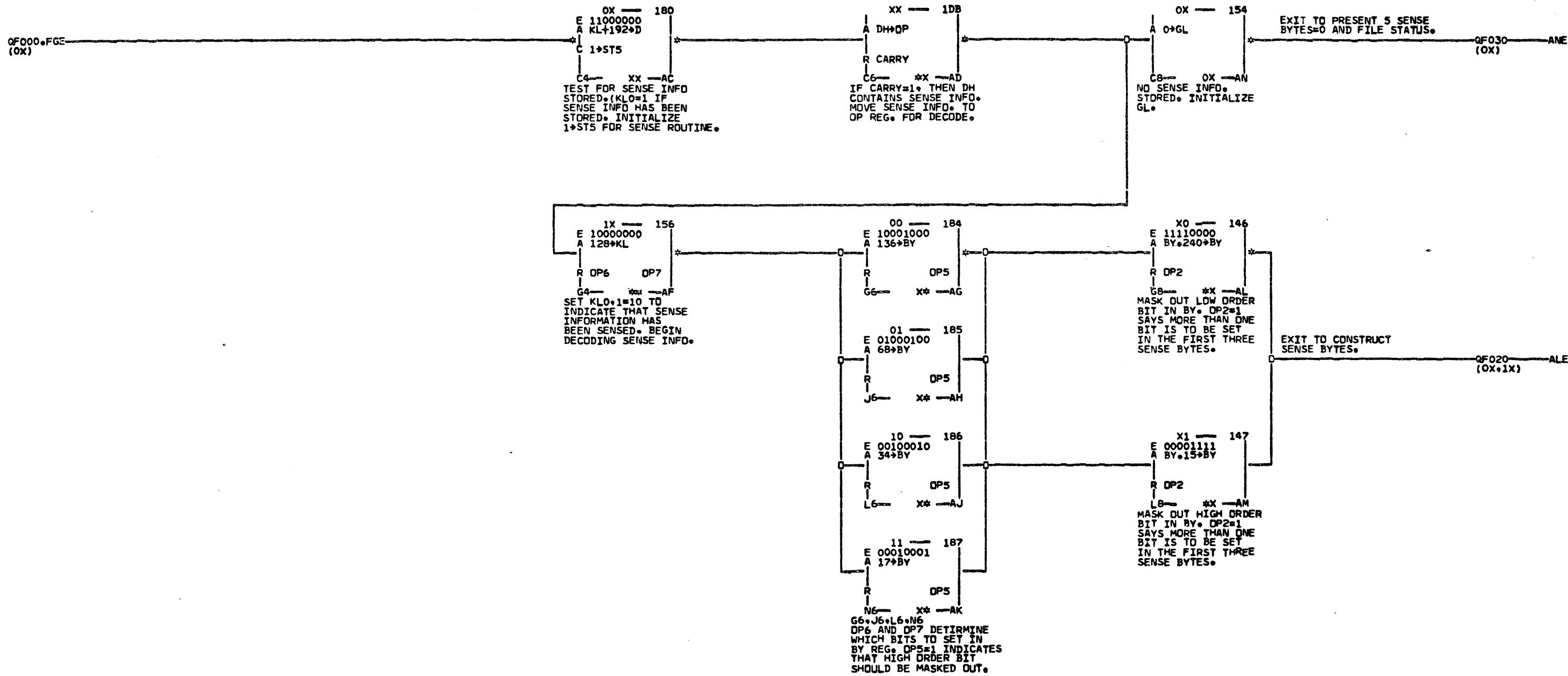
MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.N. 2250239  
IBM CORP. SDD

DATE 03/03/67  
LOG 062G  
RESERVE/RELEASE

SHEET 1 OF 000  
VERSION

F





01010

QF010.ALE  
(OX.1X)  
BRANCHING ON  
OP2

OX — 155  
A O→GL  
R OP4 OP3  
E3 — \*\* —AA

INITIALIZE GL.  
BRANCH ON OP3 AND  
OP4 TO DETERMINE IN  
WHICH OF THE FIRST  
3 SENSE BYTES THE  
BIT IN BY GETS PLACED.

1X — 157  
A O→GL  
R OP4 OP3  
J3 — \*\* —AB

INITIALIZE GL.  
BRANCH ON OP3 AND  
OP4 TO DETERMINE  
IN WHICH OF THE  
FIRST 3 SENSE  
BYTES THE BIT IN  
BY GETS PLACED.  
ALSO BRANCH TO  
DETERMINE WHICH  
EXTRA BIT GETS  
LOADED INTO DR  
(THE FIRST SENSE  
BYTE)

00 — 170  
E 00000001  
A 1→DR  
R OP6  
J4 — \*0 —AC  
POST SEEK CHECK

10 — 172  
E 10000000  
A 128→DR  
L4 — 10 —AD  
POST COMMAND REJECT

11 — 173  
E 00001000  
A 8→DR  
N4 — 10 —AE  
POST DATA CHECK

01 — 171  
E 00010000  
A 16→DR  
G4 — 01 —AF  
POST EQUIPMENT CHECK

11 — 177  
E 00000010  
A 2→BX  
C6 — 10 —AG  
INDICATE MISSING  
ADDRESS MARKER

00 — 174  
A DRQBY→DR  
R OP0  
G6 — \*X —AH  
LOAD BIT FROM BY  
INTO SENSE BYTE 0

10 — 176  
A BXQBY→BX  
R OP0  
L6 — \*X —AJ  
LOAD BIT FROM BY  
INTO SENSE BYTE 1

01 — 175  
A BY→GL  
R OP0  
Q6 — \*X —AK  
LOAD BIT FROM BY  
INTO SENSE BYTE 2

G6.L6.Q6—  
DPO=1 INDICATES A  
DEFECTIVE TRACK  
WAS FOUND DURING A  
RECORD OVERFLOW  
OPERATION.

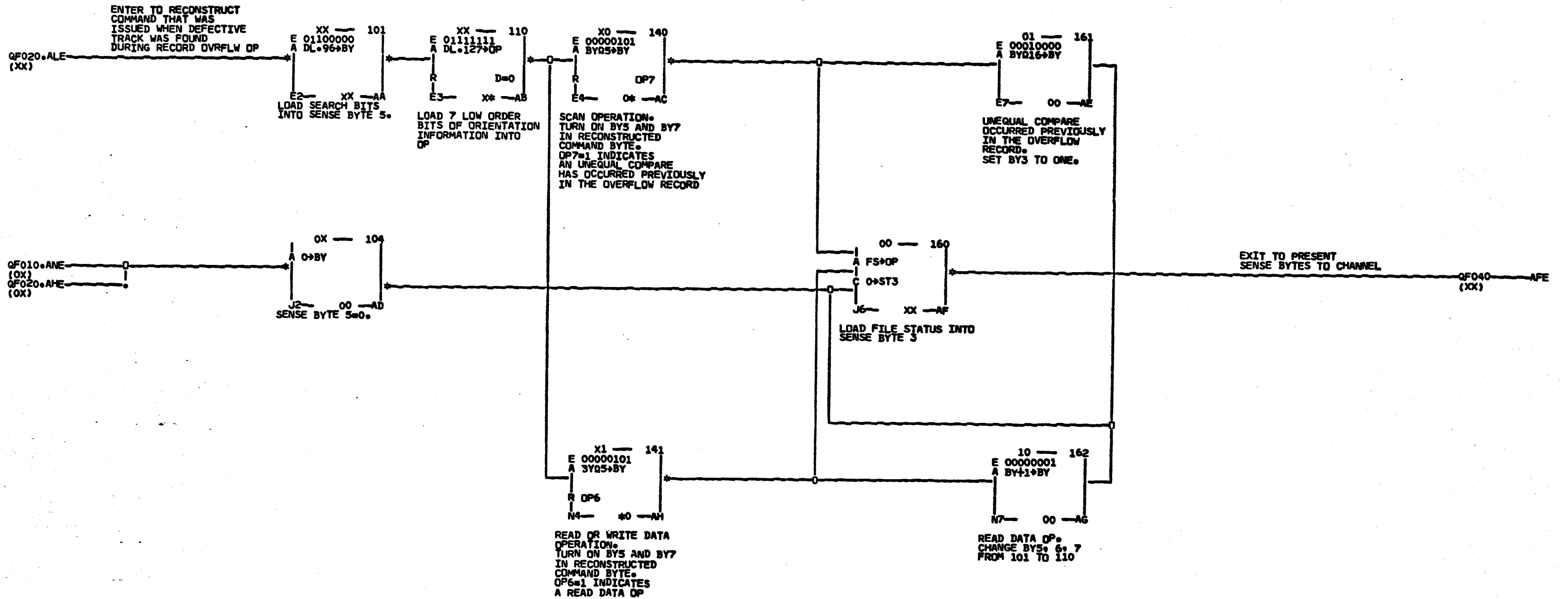
1X — 106  
E 00000001  
A BXQ1→BX  
J8 — XX —AL  
POST OVERFLOW  
INCOMPLETE

EXIT TO PROCESS  
SENSE BYTES.

QF030 — ALE  
(OX)

QF030 — ALE  
(XX)

EXIT TO RECONSTRUCT  
COMMAND THAT WAS  
SENT FROM CHANNEL  
WHEN DEFECTIVE TRACK  
WAS FOUND. THIS  
RECONSTRUCTED COMMAND  
IS SENT TO THE CHANNEL  
AS THE FIFTH SENSE  
BYTE. IT IS SENT BACK  
TO THE FCU AFTER  
SEEKING TO THE  
ALTERNATE TRACK.



04010



QG170-ATE  
(00)

```

      01 --- 421
      E 00001100
      A 12-DW
      C DNST21
      P 1
      C3--- 00 -AB
      R B+W
      P 1
      C4--- 0X -AD
      00 --- 478
  
```

QT241- ADE  
(0X)

EXIT TO END PROCEDURE

```

      01 --- 421
      E 00001100
      A 12-DW
      C DNST21
      G3--- 00 -AA
      LOAD ENDING STATUS INTO
      D+W. (CHANNEL END AND DEVICE END)
      1+ST2 MEANS GO TO UNTIMED END
      PROCEDURE.
  
```

QS020- AAE  
(00)

BRANCHING ON ST3

GF040-ACE  
(00-01)

EXIT BACK TO BYTE TRANSFER LOOP

```

      00 --- 420
      A DR+DW
      C 1+ST6
      R 1+W
      L3--- 01 -AC
      LOAD SENSE BYTE INTO
      BUS-IN(DW). 1+ST6
      INITIALIZES FOR
      END PROCEDURE.
  
```

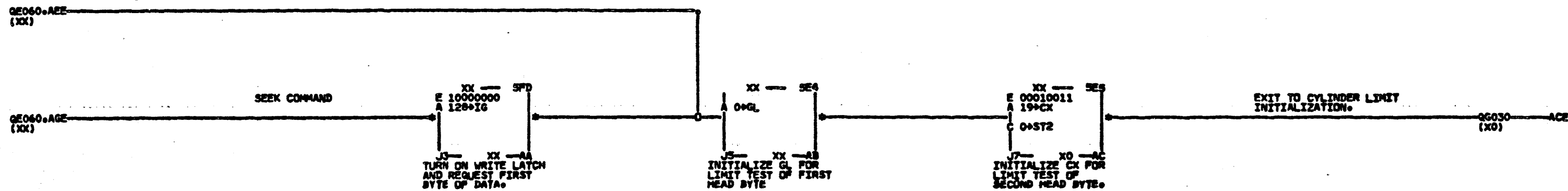
GF040- ACE  
(01)

DR 00 1

420613	10/11/66	MACH	2844	DATE	08/03/67	SHEET	1	GF041
420655	02/09/67	NAME	2314/2844	LOG	215L	VERSION		
420659	07/20/67	MODE	MANUAL					
		PeNo	2250244					
		IBM CORP.	SDD					

SENSE ROUTINE

IPL (SEEK TO CYL. 0, HEAD 0)

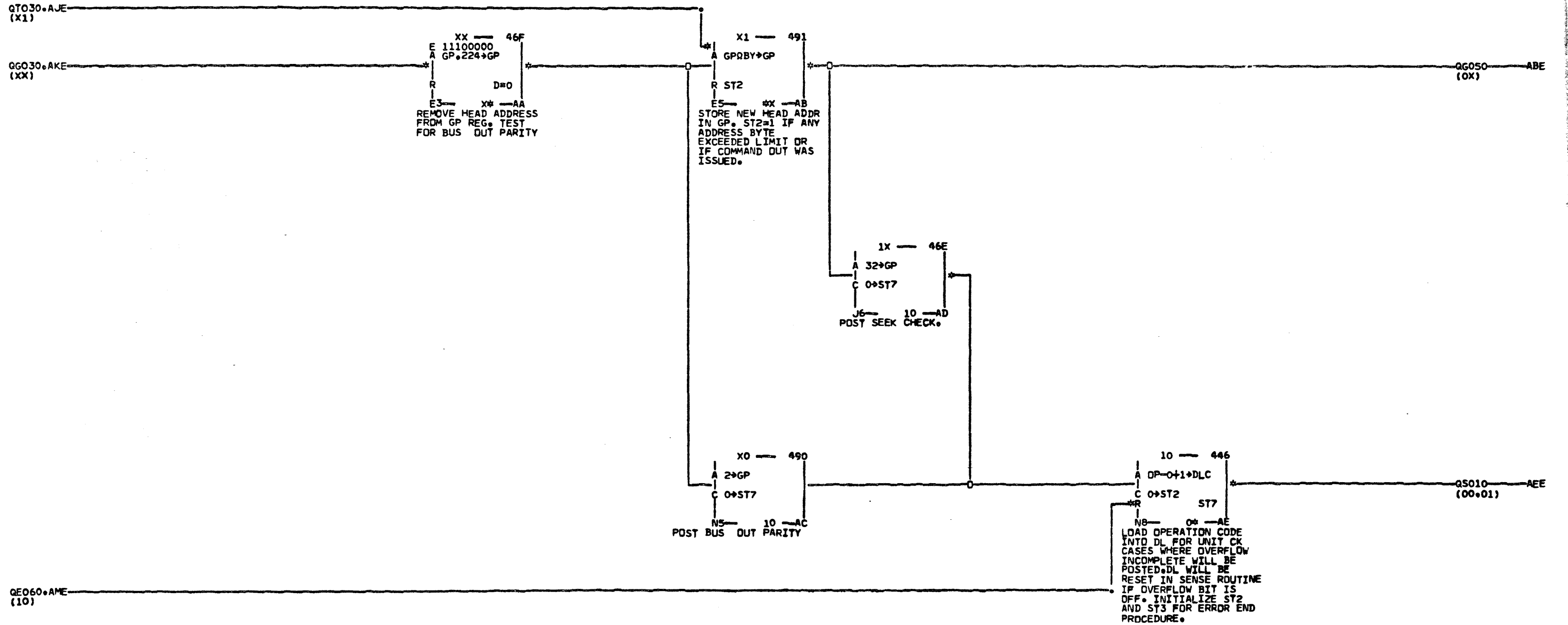


420613	10/11/66	MACH	2844	DATE	04/21/67	SHEET	1	06010
420635	02/09/67	NAME	2314/2844	LOG	111D	VERSION		
420656	04/11/67	MODE	MANUAL	SEEK ADDRESS LIMIT SET				
		P.N.	2230245					
		IBM CORP.	SDD					

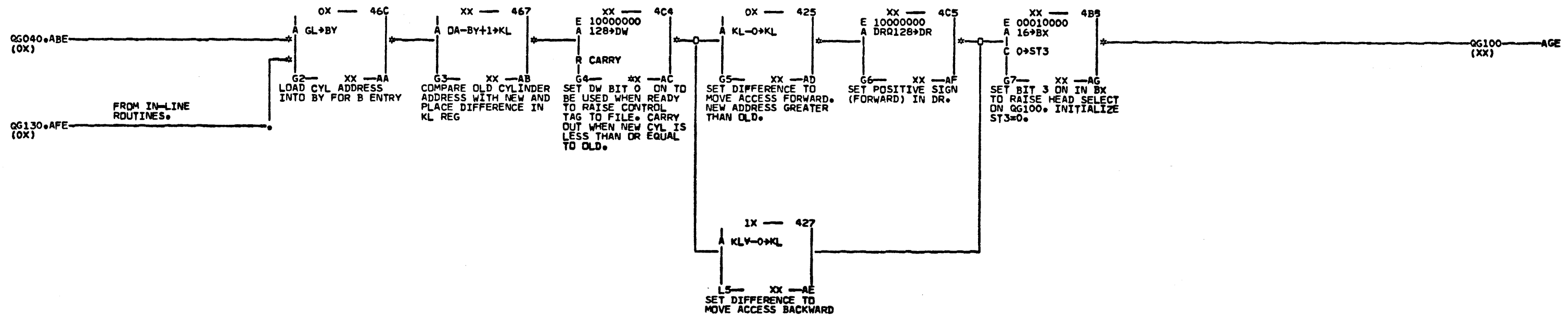








02000



000000



420613  
420652  
420655

10/11/66  
01/16/67  
02/09/67

MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.N. 2250249  
IBM CORP. SDD

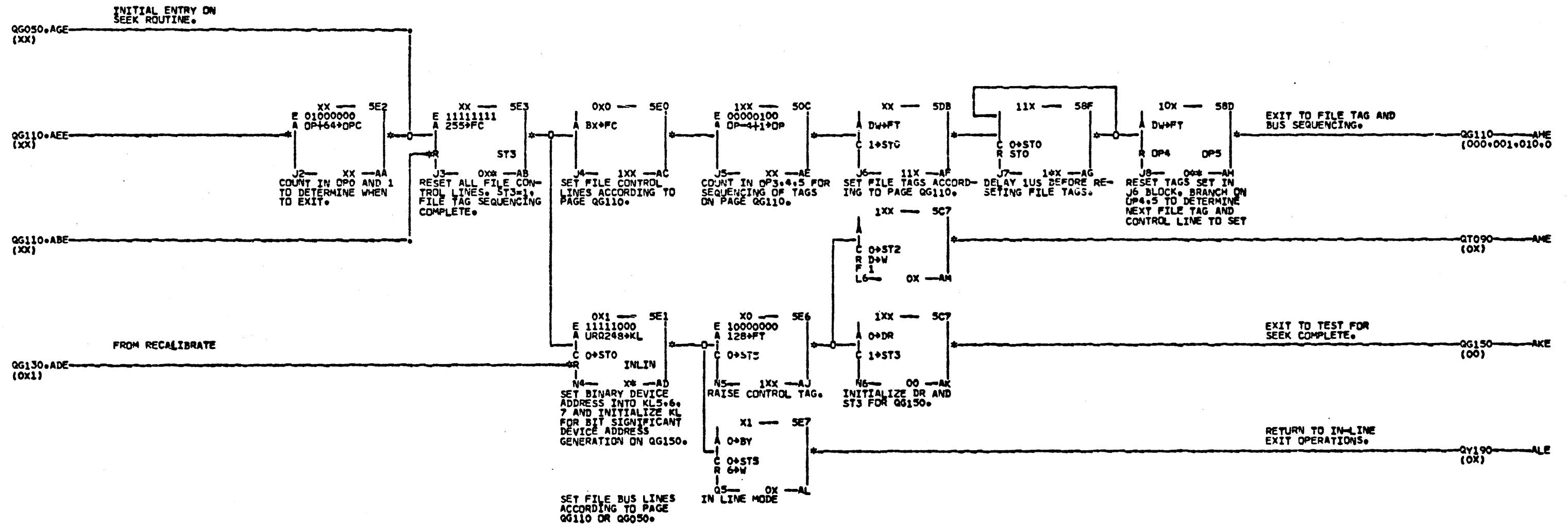
DATE 03/03/67  
LOG 062G

SHEET 1  
VERSION 06050

CYLINDER DIFFERENCE AND SIGN  
ROUTINE FOR SEEK COMMANDS

THE SEEK COMMAND WILL BE EXECUTED IN THE FOLLOWING SEQUENCE. ONLY THE FIRST AND THIRD STEPS WILL BE EXECUTED WITH A HEAD SEEK COMMAND.

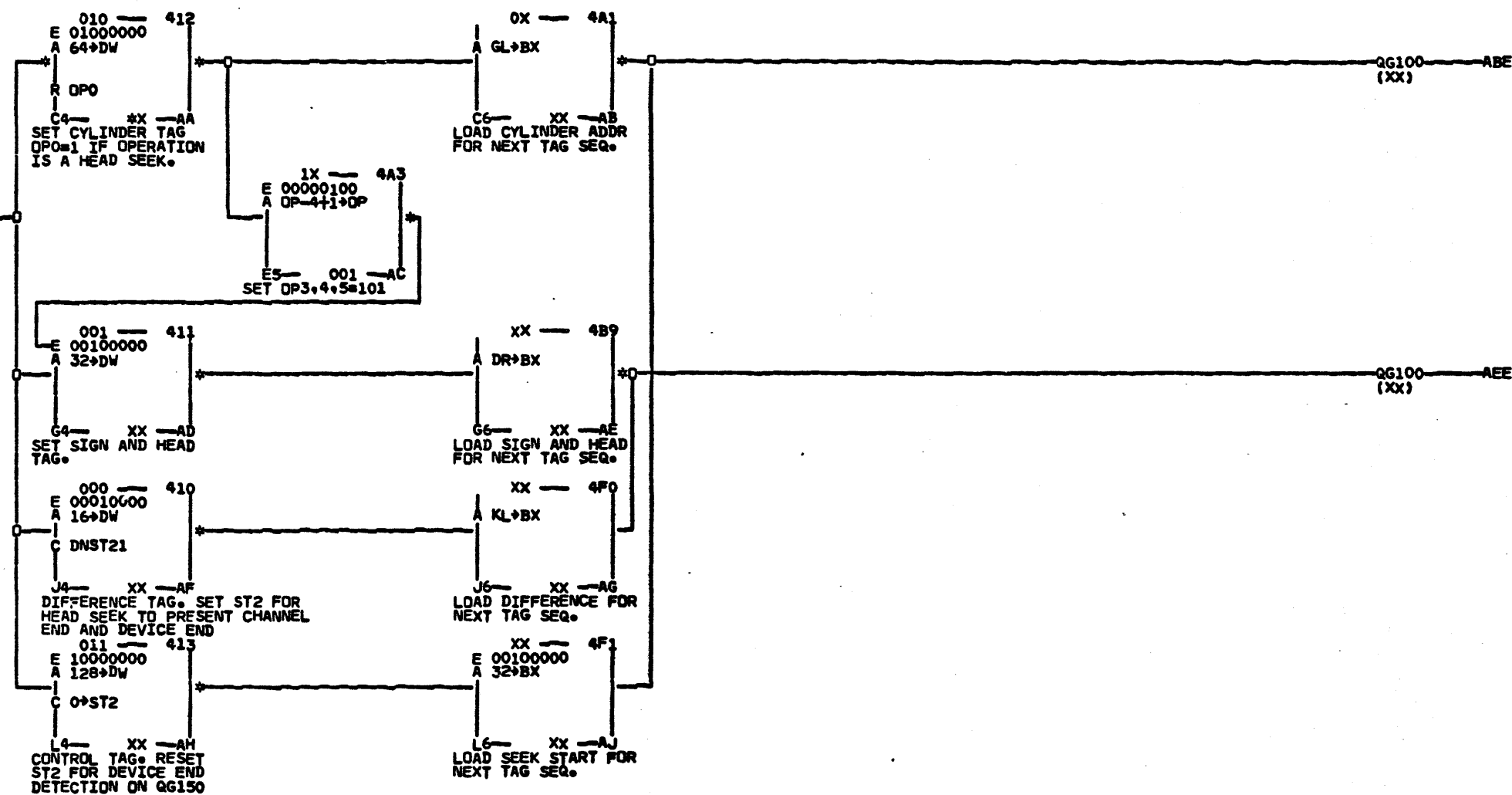
- 1- HEAD RESET
- 2- SET CYLINDER
- 3- SET SIGN AND HEAD
- 4- SET DIFFERENCE
- 5- SEEK START



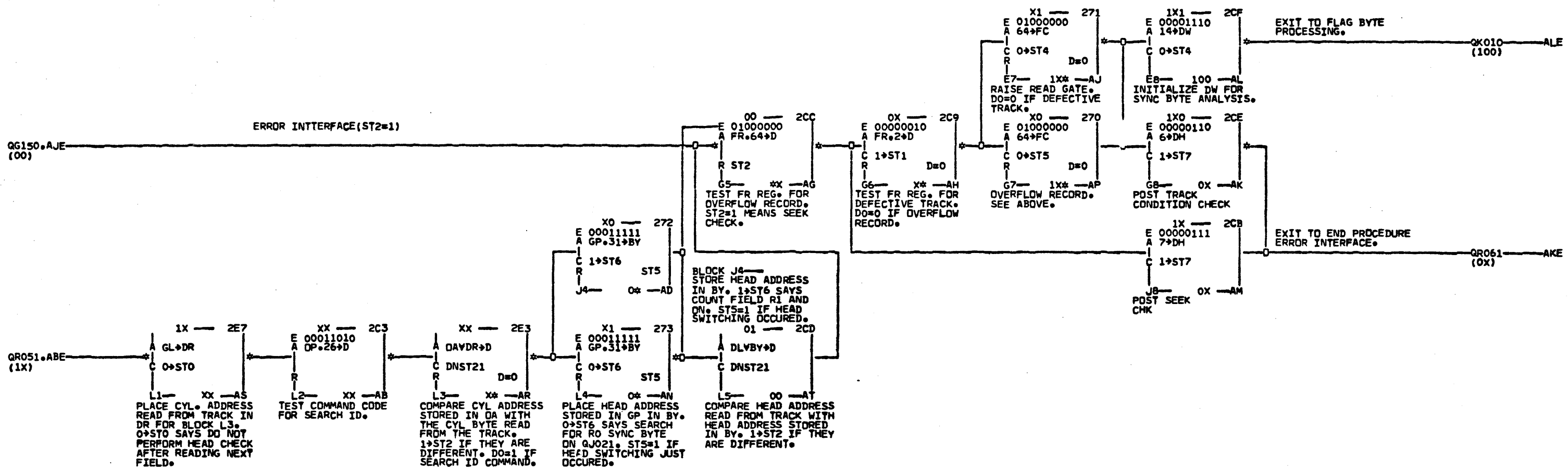
QG100.AHE  
(000,001,010,0

OP REGISTER CONTENTS FOR FIRST  
ENTRY TO THIS PAGE FROM QG100.

SEEK	OP 01234567
CYLINDER	01111000
CONTROL	01011000
HEAD	10011000
IPL	01011000



01-1-68



OM-69

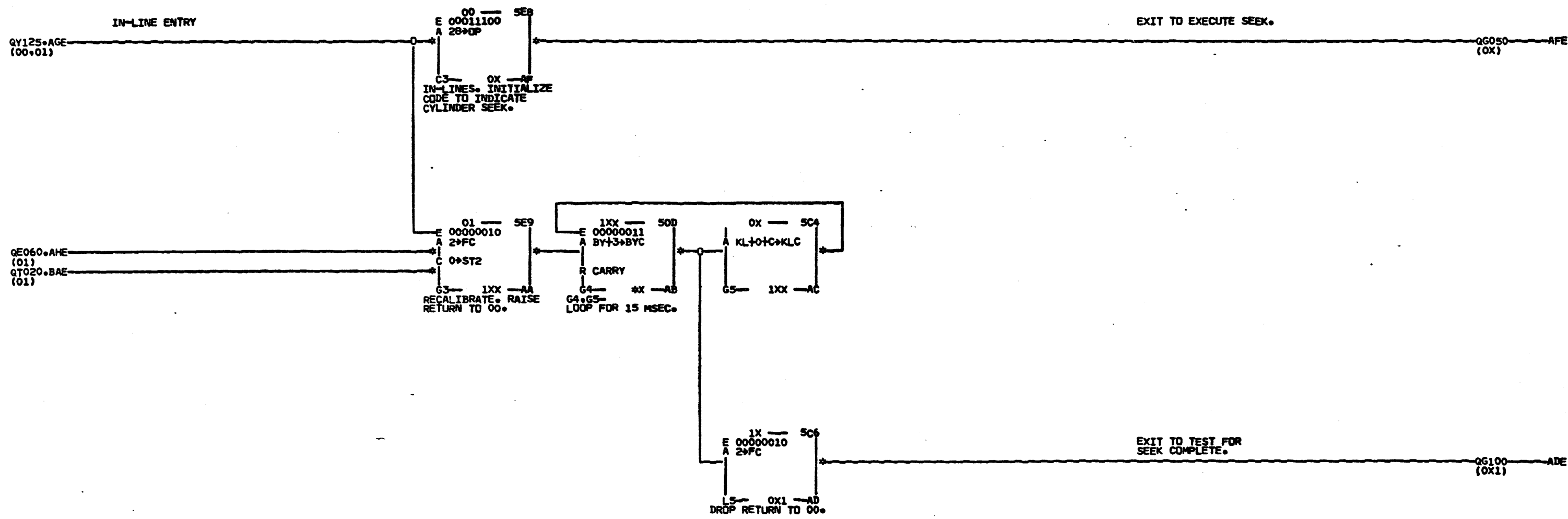
420613  
420655

10/11/66  
02/09/67

MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.N. 2250252  
IBM CORP. SDD

DATE 03/03/67  
LOG 062G  
HEAD CHECK

SHEET 1  
VERSION 1  
GG120



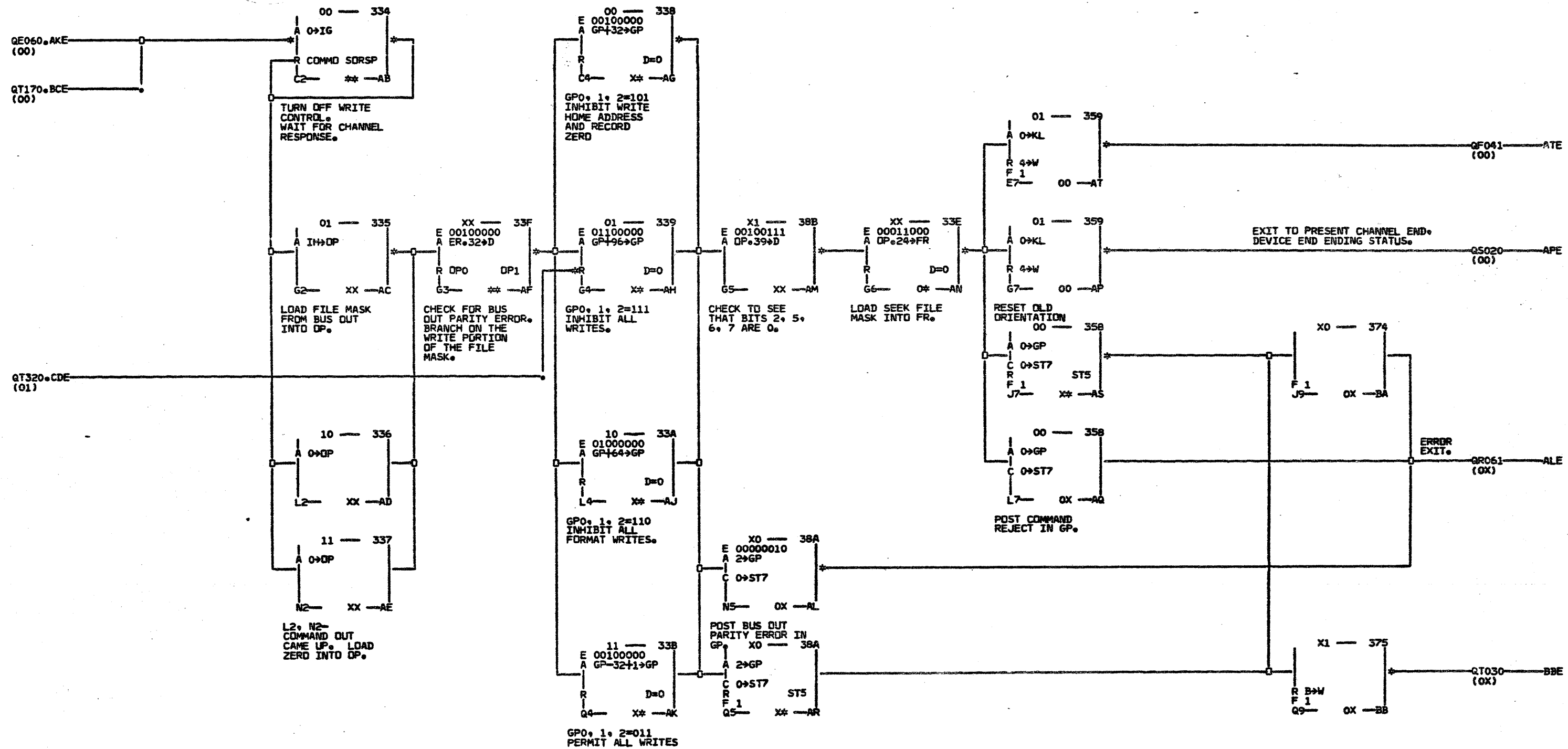
044-58D

420613	10/11/66	MACH	2844	DATE	02/20/68	SHEET	1	Q6130
420652	01/16/67	NAME	2314/2844	LOG	051P	VERSION		
420655	02/09/67	MODE	MANUAL	FILE CONTROL-RECALIBRATE				
420662	01/15/68	P.N.	2250253					
		IBM CORP.	SDD					

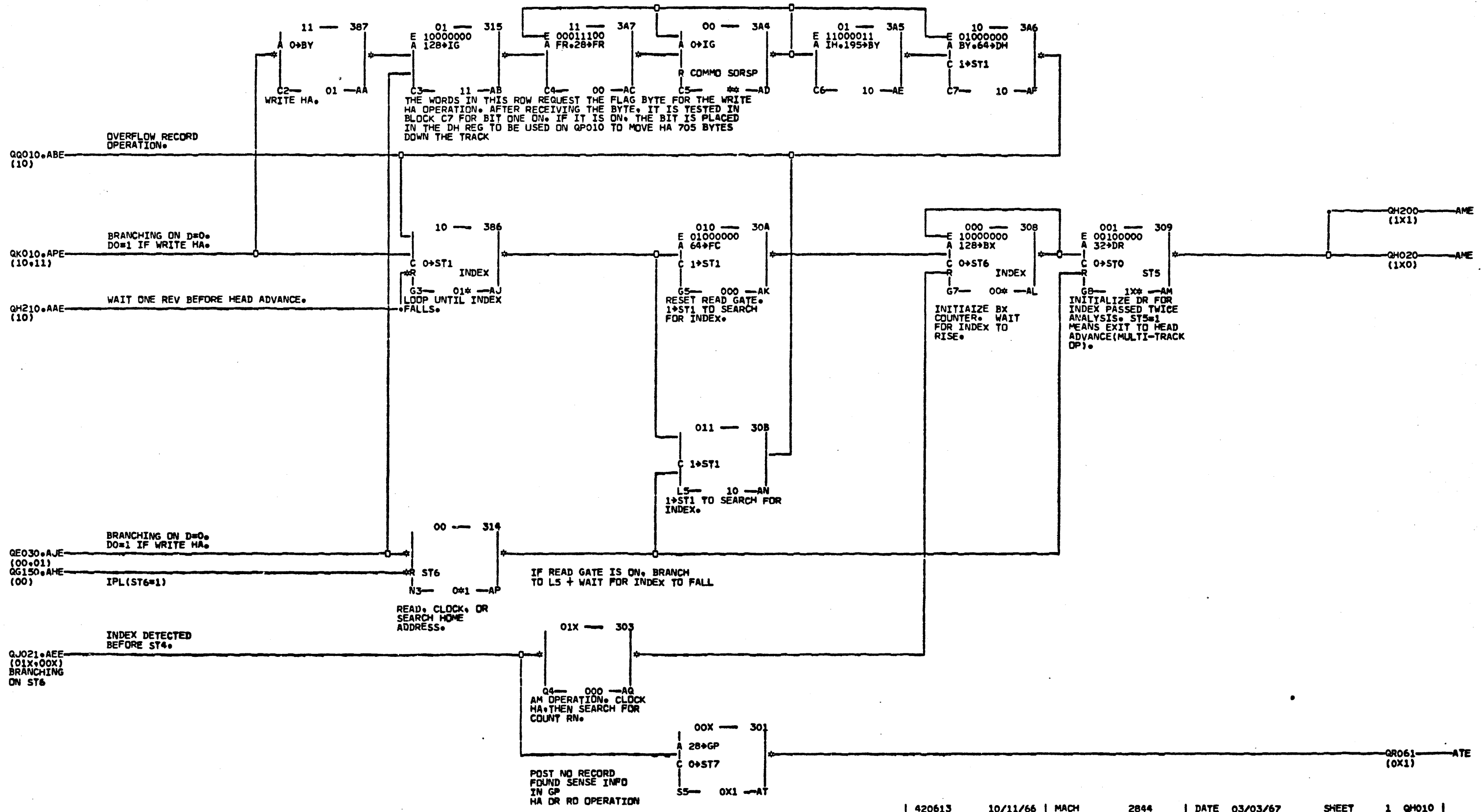


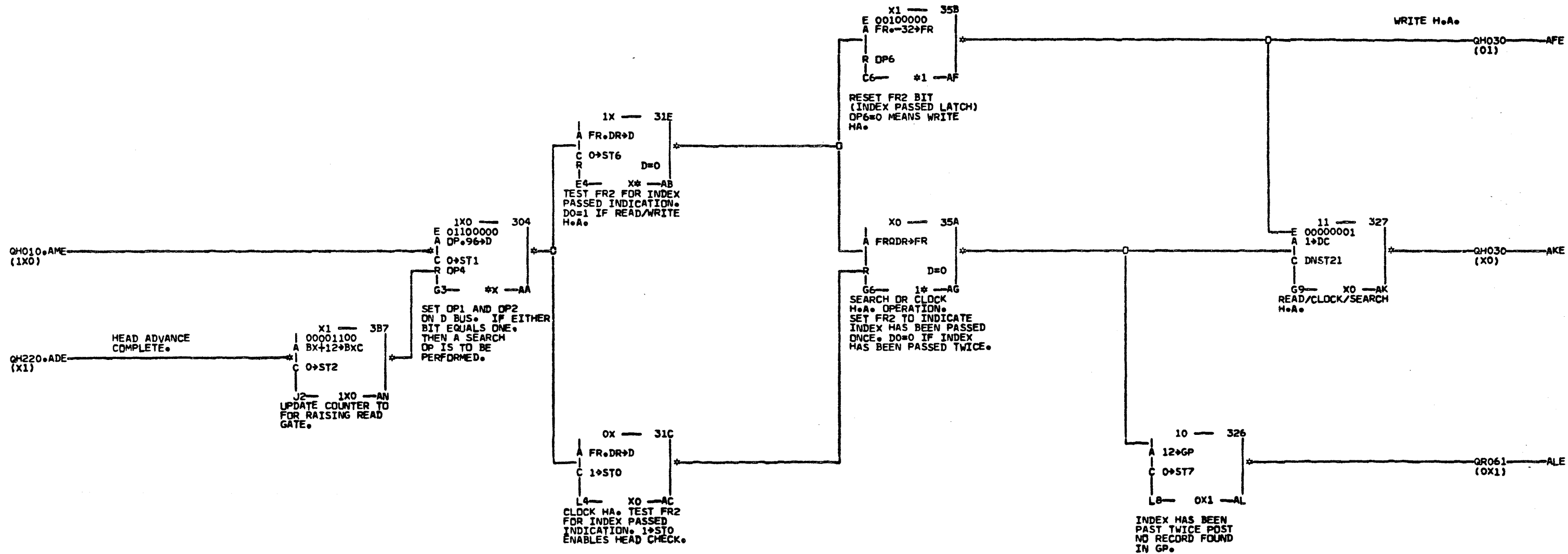






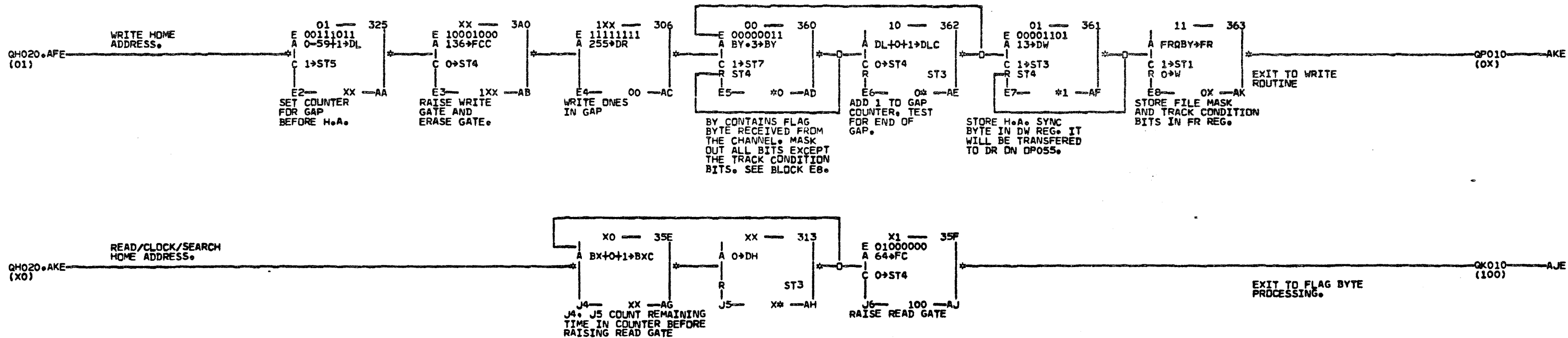
00000





01019

420613	10/11/66	MACH	2844	DATE	03/03/67	SHEET	1	QH020
420655	02/15/67	NAME	2314/2844	LOG	0626	VERSION		
		MODE	MANUAL					
		PoNo	2250258					
		IBM CORP.	SDD					
					INDEX PROCESSING			



04019

420613	10/11/66	MACH	2844	DATE	03/03/67	SHEET	1	GH030
420655	02/15/67	NAME	2314/2844	LDG	0626	VERSION		
		MODE	MANUAL					
		PoN	2250259					
		IBM CORP.	SDD					
					INDEX PROCESSING			

QH010.AME  
(1X1)

1X1 — 305  
E 00011000  
A FR-24-DW  
N1 — XX — AJ  
TRANSFER SEEK FILE  
MASK TO DW REG.

XX — 38C  
A FR-3-D  
C 0-ST3  
N2 — XX — AA  
CHECK FOR  
DEFECTIVE  
TRACK

XX — 3AE  
E 00011000  
A DW-24-D  
D=0  
N3 — X\* — AB  
CHECK TO SEE IF  
FILE MASK ALLOWS  
ANY SEEKS. DO=0 IF  
EITHER TRACK  
CONDITION BIT IS  
ON.

X1 — 38D  
A 0-DR  
D=0  
N4 — X\* — AC  
INITIAL DR TO  
BYPASS INDEX PASSED  
TEST AND SETTING  
INDEX PASSED LATCH  
ON QH020. DO=1 IF  
SEEK FILE MASK IS  
INHIBIT ALL SEEKS.

X0 — 3F4  
E 00000100  
A 4-FC  
N5 — OX0 — AD  
RESET HEAD SELECT.

OX0 — 3AA  
E 00011000  
A BX-24-DC  
N6 — XX — AE  
SET ST3 IF COUNTER  
HAS RUN TO FAR TO  
ALLOW TIME FOR HEAD  
ADVANCE.

EXIT TO HEAD ADVANCE

QH210 — AEE  
(XX)

X0 — 38C  
A 6-DH  
C 1-ST7  
G4 — OX1 — AF  
POST TRACK CONDITION  
CHECK.

X1 — 3F5  
A 13-DH  
C 1-ST7  
J5 — OX1 — AG  
FILE MASK VIOLATED.  
POST FILE PROTECT  
AND COMMAND REJECT.

EXIT TO END PROCEDURE  
ERROR INTERFACE.

QR061 — AFE  
(OX1)

00010

420613  
420655  
420664

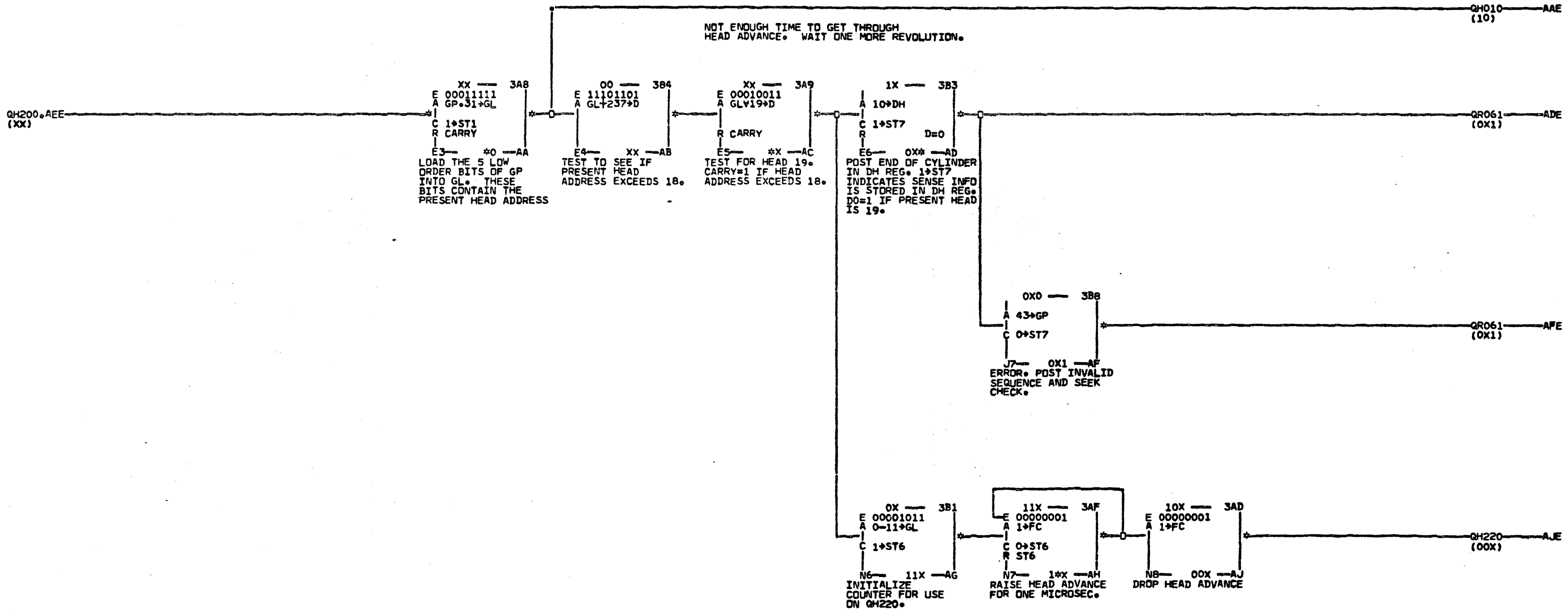
10/11/66  
02/15/67  
11/13/68

MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.No. 2250260  
IBM CORP. SDD

DATE 11/20/68  
LOG 3256

INDEX PROCESSING

SHEET 1 QH200  
VERSION



01-1119

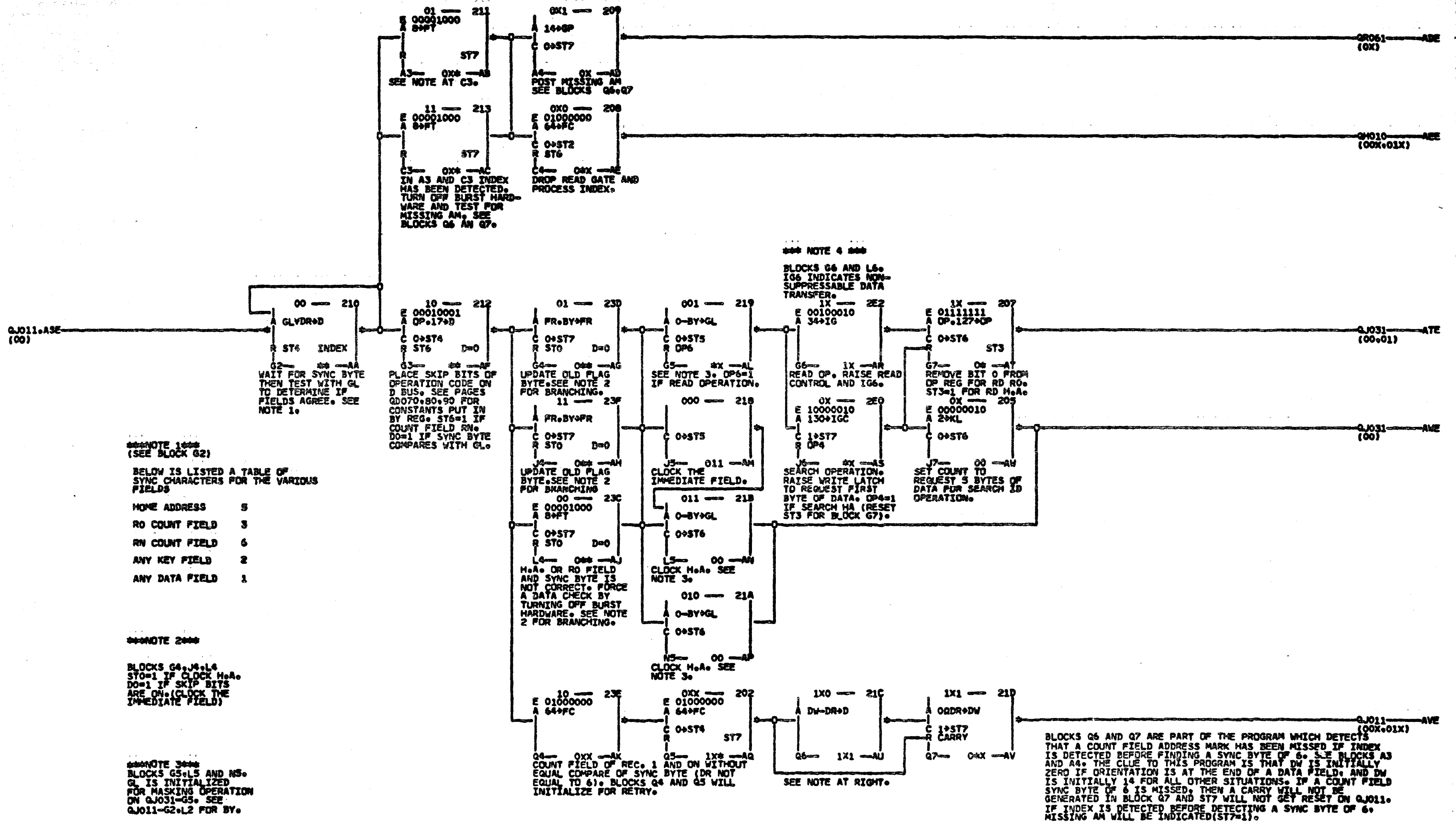
420613	10/11/66	MACH	2844	DATE	03/03/67	SHEET	1	GH210
420655	02/15/67	NAME	2314/2844	LOG	062G	VERSION		
		MODE	MANUAL					
		P.No.	2250261					
		IBM CORP.						

HEAD ADVANCE  
MULTI-TRACK OPERATION









\*\*\*NOTE 1\*\*\*  
(SEE BLOCK G2)

BELOW IS LISTED A TABLE OF SYNC CHARACTERS FOR THE VARIOUS FIELDS

HOME ADDRESS	5
RD COUNT FIELD	3
RN COUNT FIELD	6
ANY KEY FIELD	2
ANY DATA FIELD	1

\*\*\*NOTE 2\*\*\*

BLOCKS G4, J4, L4  
ST0=1 IF CLOCK H.A.  
DO=1 IF SKIP BITS  
ARE ON. (CLOCK THE  
IMMEDIATE FIELD)

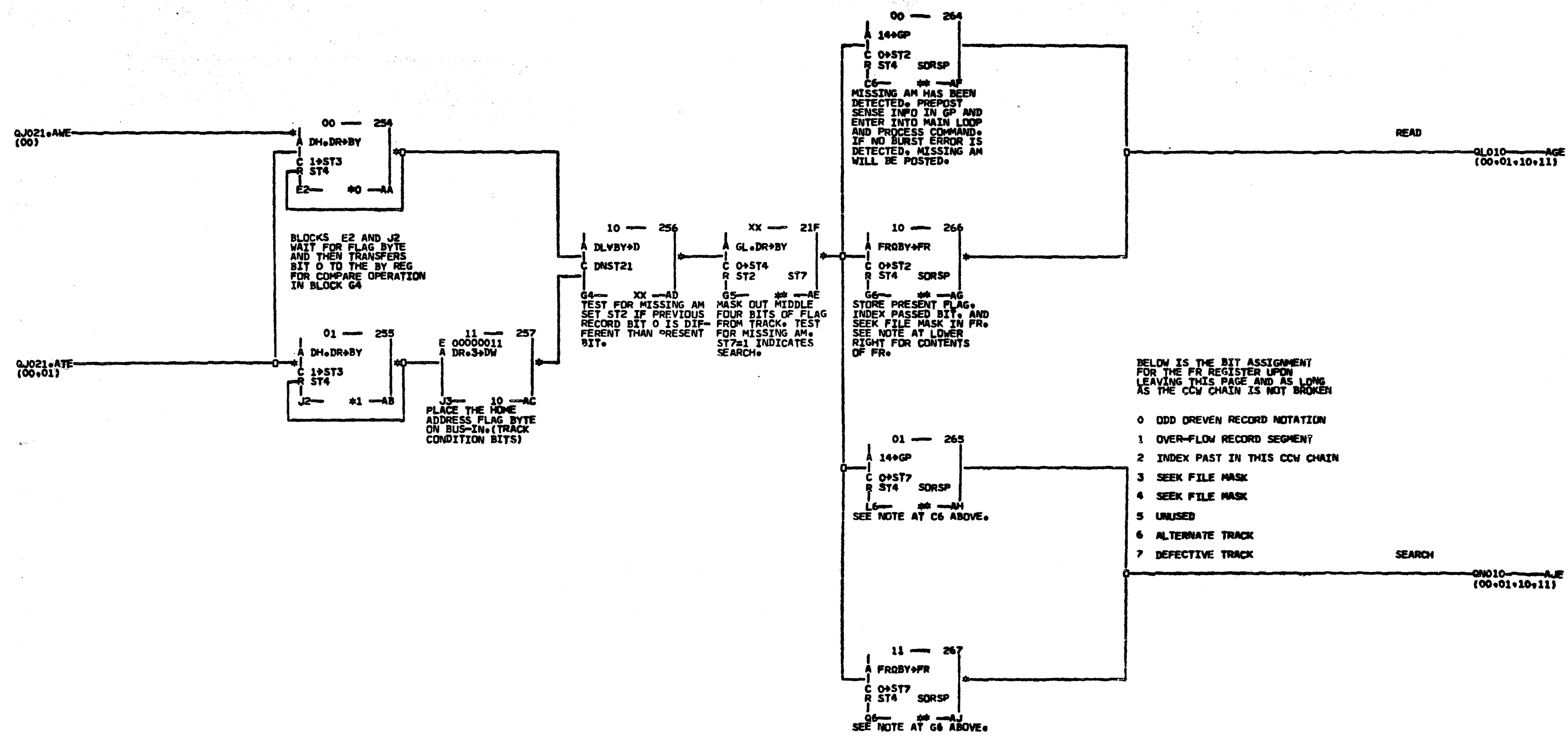
\*\*\*NOTE 3\*\*\*  
BLOCKS G5, L5 AND NS.  
GL IS INITIALIZED  
FOR MASKING OPERATION  
ON QJ031-G5. SEE  
QJ011-G2, L2 FOR BY.

\*\*\*NOTE 4\*\*\*

BLOCKS G6 AND L6.  
IG6 INDICATES NON-  
SUPPRESSIBLE DATA  
TRANSFER.

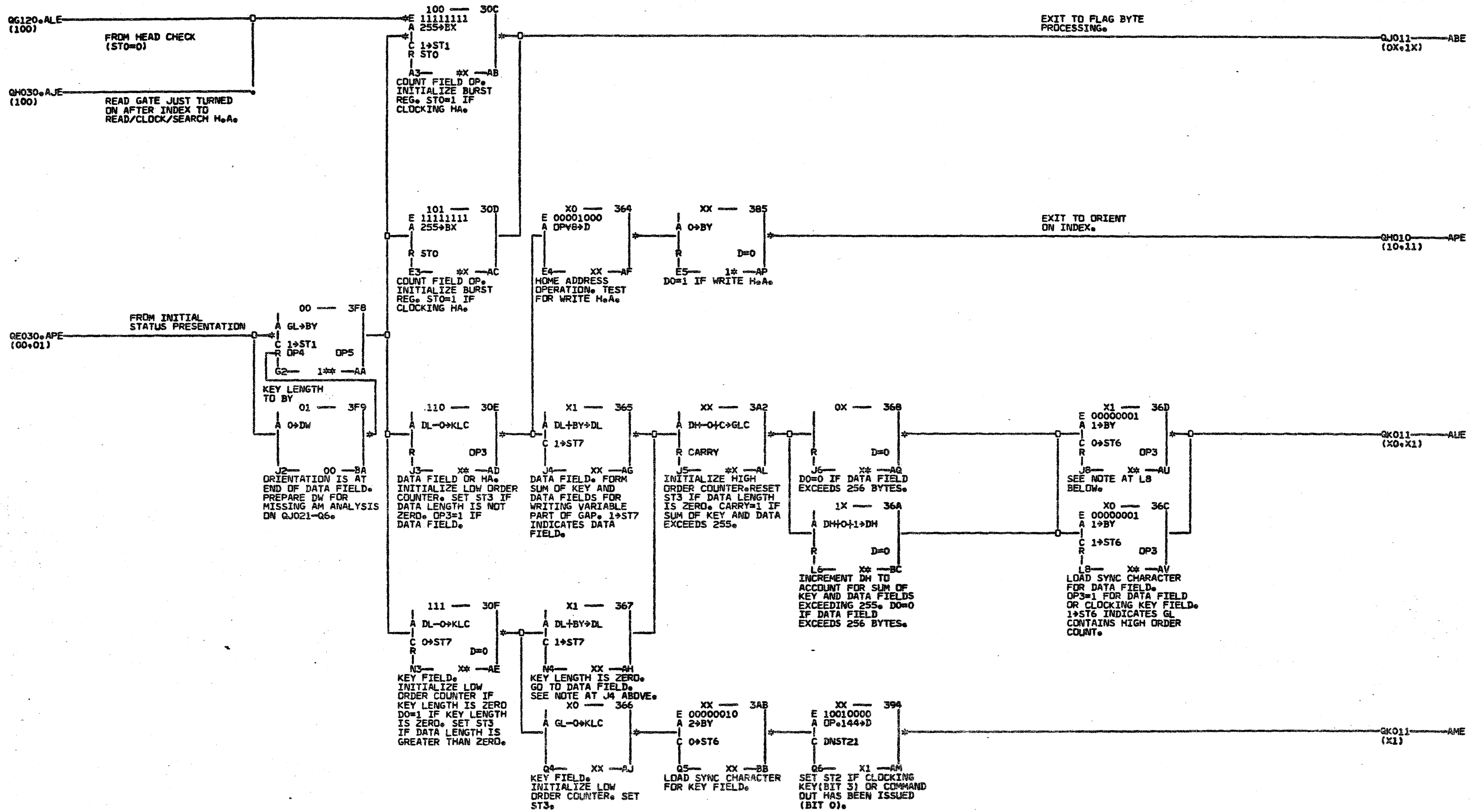
SEE NOTE AT RIGHT.

BLOCKS G6 AND G7 ARE PART OF THE PROGRAM WHICH DETECTS THAT A COUNT FIELD ADDRESS MARK HAS BEEN MISSED IF INDEX IS DETECTED BEFORE FINDING A SYNC BYTE OF 6. SEE BLOCKS A3 AND A4. THE CLUE TO THIS PROGRAM IS THAT DW IS INITIALLY ZERO IF ORIENTATION IS AT THE END OF A DATA FIELD, AND DW IS INITIALLY 14 FOR ALL OTHER SITUATIONS. IF A COUNT FIELD SYNC BYTE OF 6 IS MISSED, THEN A CARRY WILL NOT BE GENERATED IN BLOCK G7 AND ST7 WILL NOT GET RESET ON QJ011. IF INDEX IS DETECTED BEFORE DETECTING A SYNC BYTE OF 6, MISSING AM WILL BE INDICATED (ST7=1).



BELOW IS THE BIT ASSIGNMENT FOR THE FR REGISTER UPON LEAVING THIS PAGE AND AS LONG AS THE CCW CHAIN IS NOT BROKEN

- 0 DDD DREVEN RECORD NOTATION
- 1 OVER-FLOW RECORD SEGMENT
- 2 INDEX PAST IN THIS CCW CHAIN
- 3 SEEK FILE MASK
- 4 SEEK FILE MASK
- 5 UNUSED
- 6 ALTERNATE TRACK
- 7 DEFECTIVE TRACK



01000

KEY FIELD OPERATION

GK010.AME  
(X1)

GENERAL MEANING OF CODE IN THE  
OP REG UPON ENTRY TO THIS PAGE.

DP 345.67=

011 00	SEARCH KEY
011 10	READ/SEARCH KEY AND DATA
111 10	CLOCK KEY TO READ/SEARCH DATA
111 11	CLOCK KEY TO SEARCH DATA SPECIAL
111 01	CLOCK KEY AND DATA
110 10	READ/SEARCH DATA
110 01	CLOCK DATA

DATA FIELD OPERATION

GK010.AUE  
(X0,X1)

X1 3F1  
E 00000100  
A DP.4→DP  
C 0→ST2  
R DP6  
E4 \*1 AN  
DATA OPERATION OR  
CLOCK KEY OPERATION  
WITH KEY LENGTH=0.  
DP6=0 CLOCK DATA  
=1 READ/SEARCH  
DATA.  
SET DP345=110 TO  
INDICATE DATA DP.

X0 3F0  
E 00010100  
A DPV20→DP  
C 0→ST2  
R DP6  
J4 \*1 AP  
KEY OPERATION BUT  
KEY LENGTH=0. UPDATE  
DP345=110 TO INDICATE  
DATA DP.  
DP7=0 ALWAYS.  
DP6=0 SEARCH KEY  
=1 READ/SEARCH  
KEY AND DATA.

01 371  
E 10000001  
A DP.129→D  
C DNST21  
E6 X1 AQ  
CLOCK DATA. SET  
ST2=1. (DP7=1).

NOTE 1  
IF DP0=1, THEN  
TRUNCATION HAS  
OCCURRED DURING  
DATA TRANSFER. SET  
ST2 TO CLOCK FIELD.

10 372  
E 10000000  
A DP.128→D  
C DNST21 ST3  
G7 X\* AR  
READ/SEARCH DATA.  
REFER TO NOTE 1.  
ST3=0 IF DATA  
LENGTH IS ZERO.

11 373  
E 10000000  
A DP.128→D  
C DNST21 ST3  
J6 X\* AS  
READ/SEARCH DATA.  
REFER TO NOTE 1.  
ST3=0 IF DATA  
LENGTH IS ZERO.

00 370  
E 00001100  
A 12→DW  
C 1→ST3  
R ST4  
L7 X\* AT

SEARCH KEY OPERATION  
BUT KEY LENGTH=0.  
POST CHANNEL END AND  
DEVICE END IN DW.

X1 3F3  
E 00001000  
A 8→FT  
CB 1XX AV  
RAISE A.M. TO  
GATE BURST  
HARDWARE

X0 3F2  
A 0→KL  
R 4→W  
G8 00 AU  
DATA LENGTH IS ZERO.  
INDICATING END OF  
FILE. EXIT TO POST  
CHANNEL END. DEVICE  
END AND UNIT  
EXCEPTION.

OVERRUN

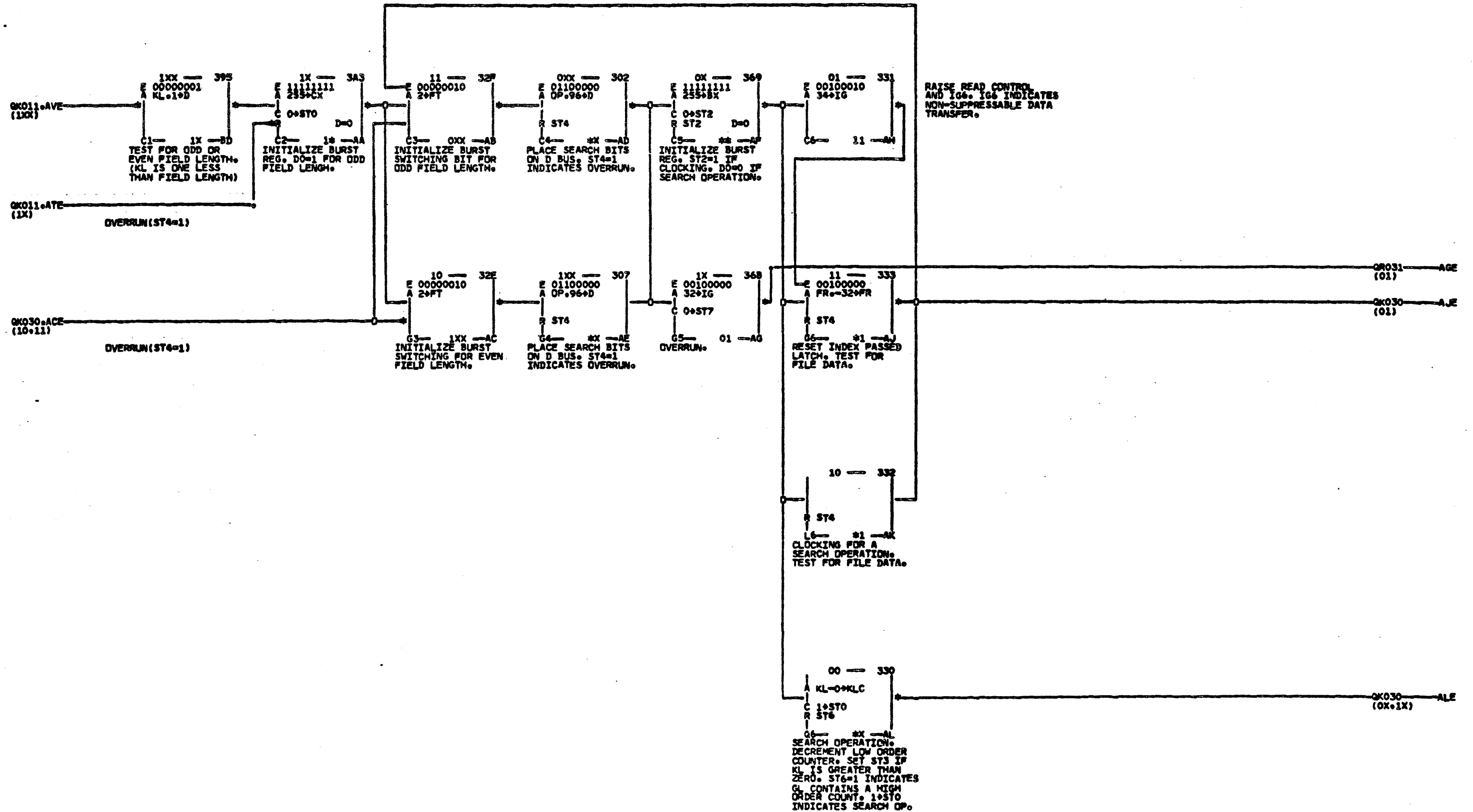
OX 3A1  
A 0→ST3  
R SERV0  
NB 1\* AL  
TEST FOR OVERRUN.  
0→ST3 SAYS DO NOT  
COMPARE BCA.

GK020  
(1XX) AVE

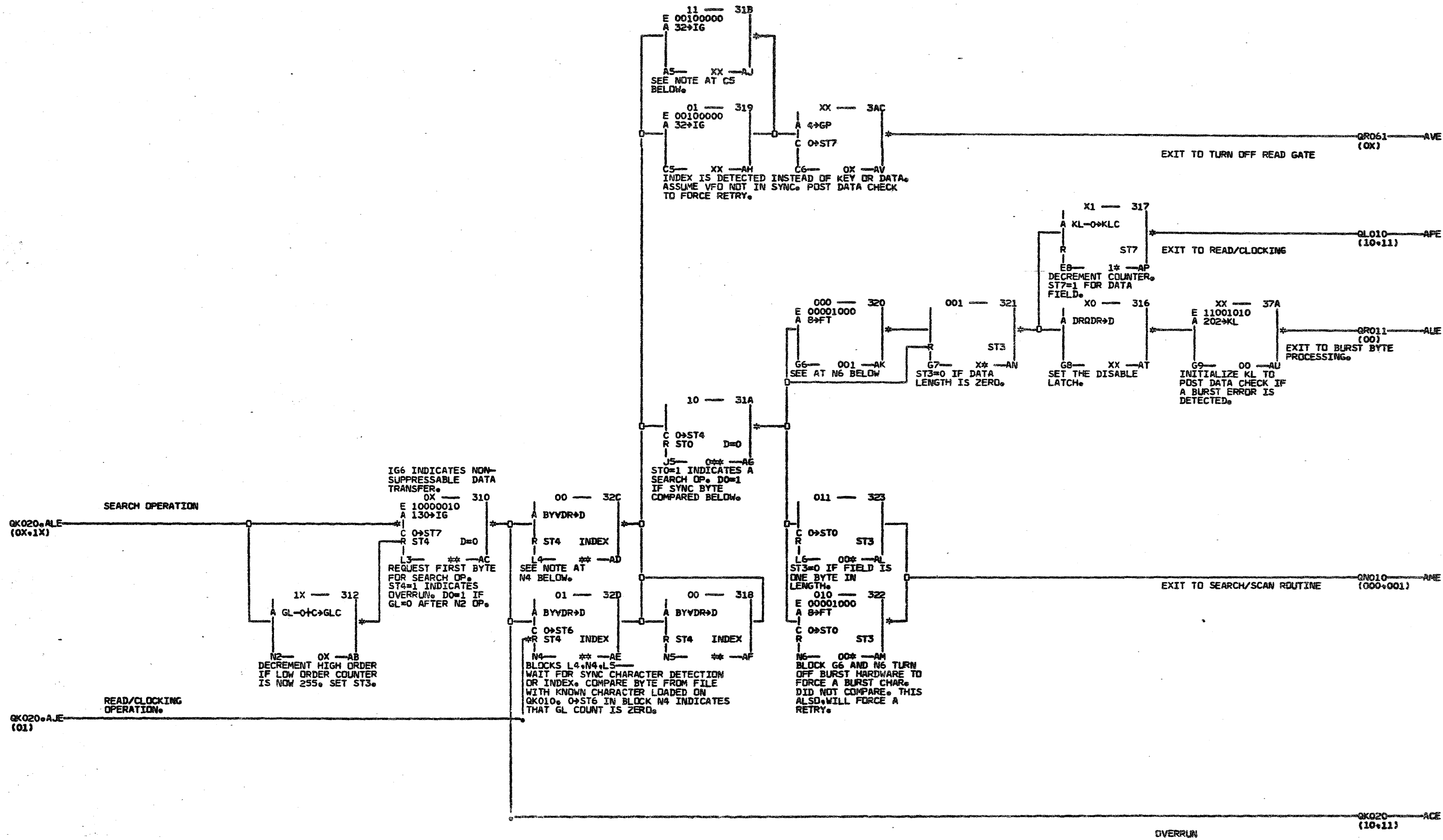
QS010  
(00) AUE

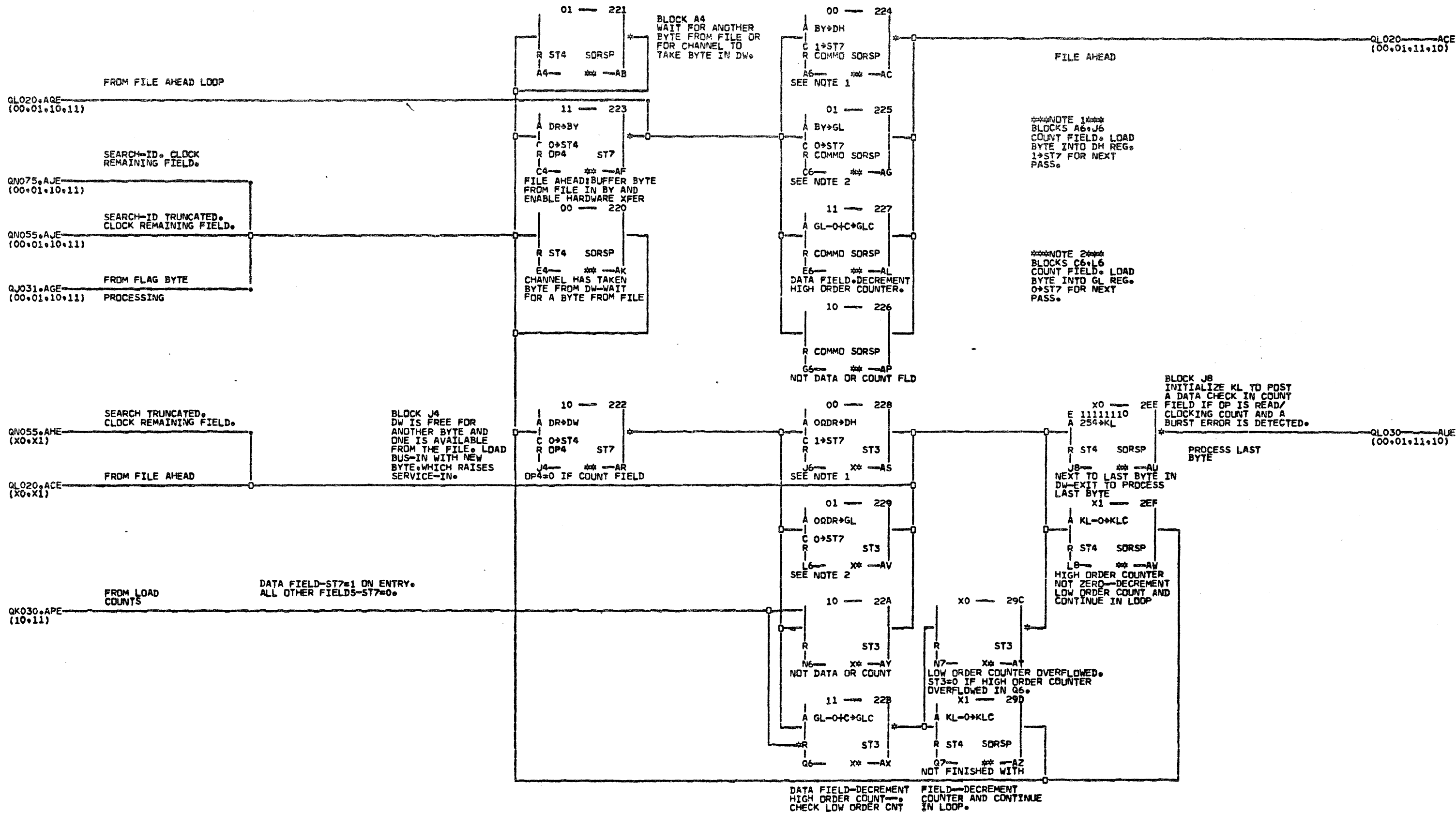
GK020  
(1X) ATE

QR031  
(10,11) ALE

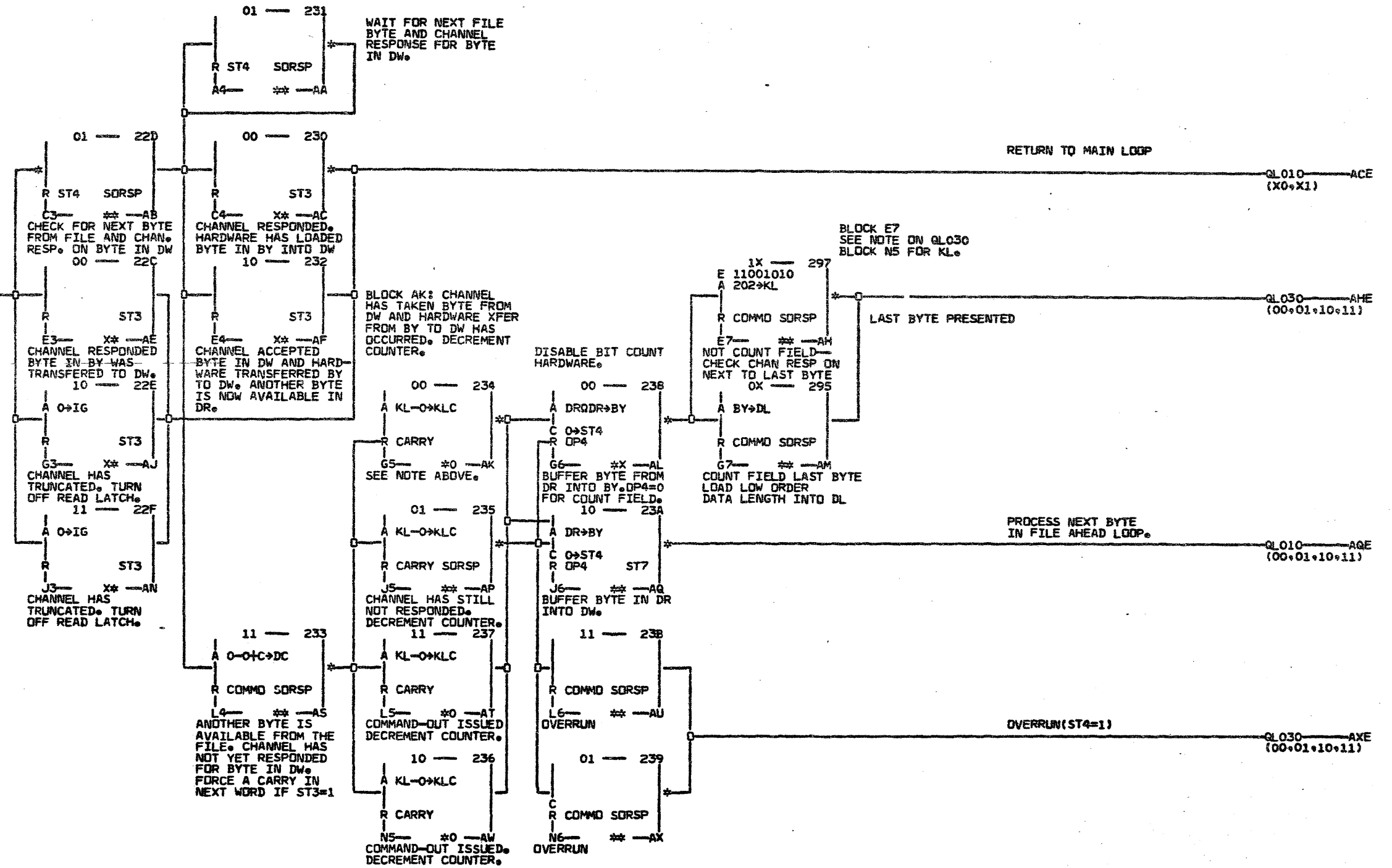


02000





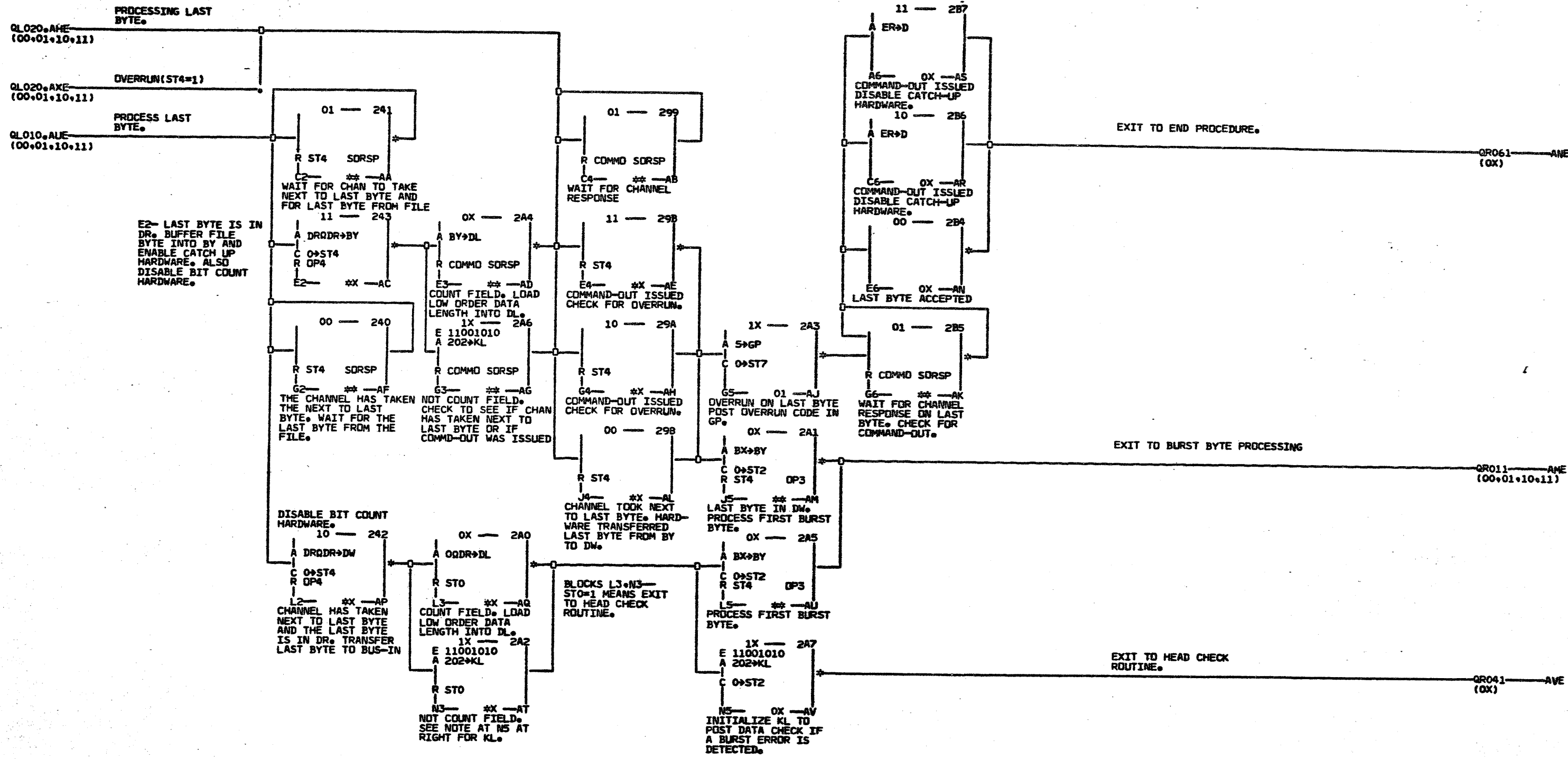
QL010.ACE  
(00.01.11.10)



01010

420613	10/11/66	MACH	2844	DATE	11/20/68	SHEET	1	QL020
420655	02/15/67	NAME	2314/2844	LOG	3256	VERSION		
420656	04/11/67	MODE	MANUAL					
420664	10/11/68	P.No.	2250271					
		IBM CORP.	SDD					
				READ/CLOCKING	FILE AHEAD			

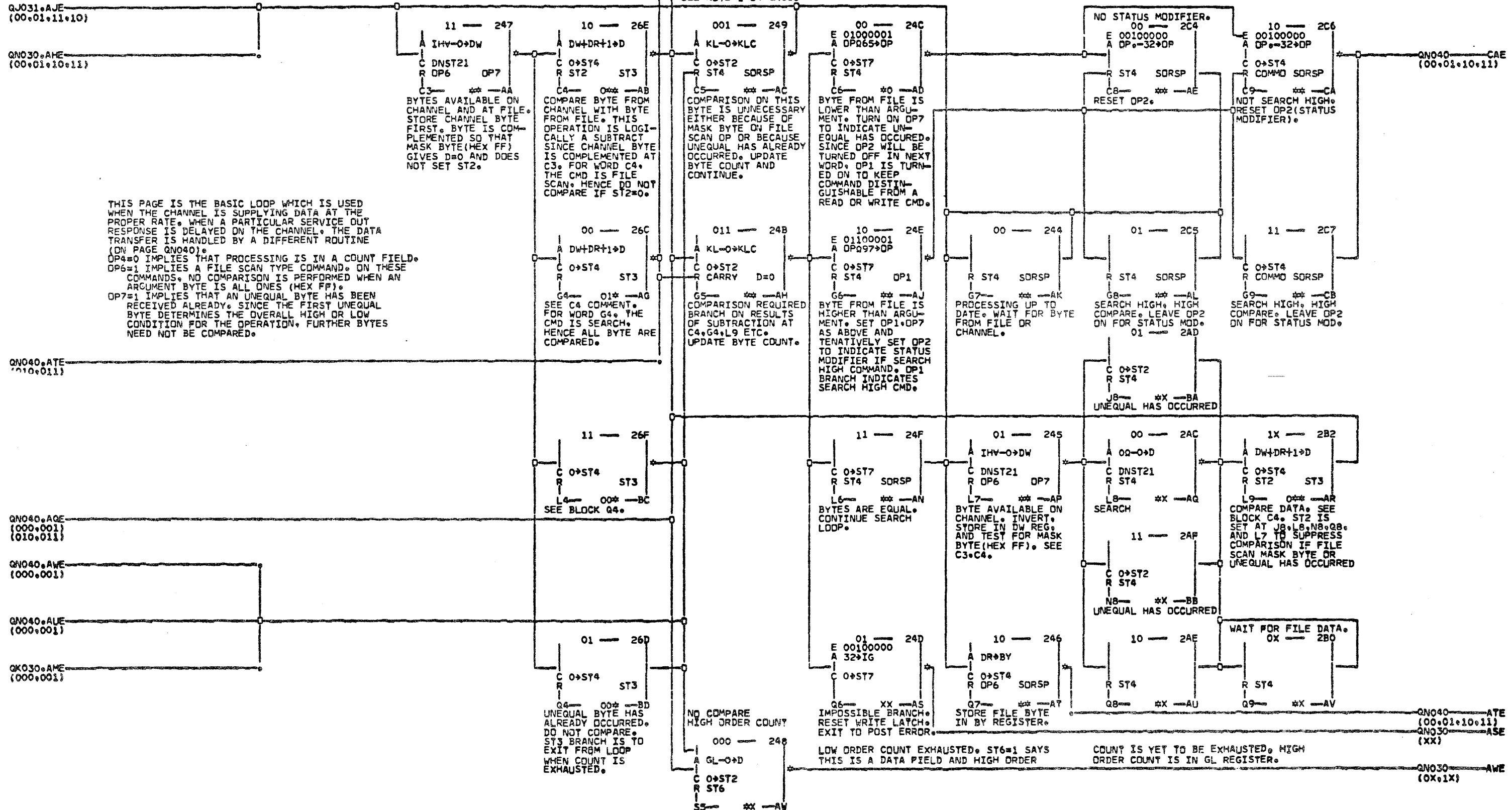




0406 P

THE SEARCH/SCAN ROUTINE HANDLES THE ACTUAL DATA TRANSFER AND COMPARE FOR SEARCH AND SCAN COMMANDS. PRIOR TO THE FIRST UNEQUAL BYTE COMPARE, DP1=1 INDICATES SEARCH HI AND DP2=1 INDICATES SEARCH EQUAL COMMAND. ON THE FIRST UNEQUAL BYTE, DP7 AND DP1 ARE TURNED ON, AND DP2 IS TURNED ON IF STATUS MODIFIER IS GENERATED

LOW ORDER COUNT REGISTER EXHAUSTED. EXIT TO CHECK HIGH ORDER COUNT. BRANCH ON BYTE COMPARE.



THIS PAGE IS THE BASIC LOOP WHICH IS USED WHEN THE CHANNEL IS SUPPLYING DATA AT THE PROPER RATE. WHEN A PARTICULAR SERVICE OUT RESPONSE IS DELAYED ON THE CHANNEL, THE DATA TRANSFER IS HANDLED BY A DIFFERENT ROUTINE (ON PAGE QN040). DP4=0 IMPLIES THAT PROCESSING IS IN A COUNT FIELD. DP6=1 IMPLIES A FILE SCAN TYPE COMMAND. ON THESE COMMANDS, NO COMPARISON IS PERFORMED WHEN AN ARGUMENT BYTE IS ALL ONES (HEX FF). DP7=1 IMPLIES THAT AN UNEQUAL BYTE HAS BEEN RECEIVED ALREADY. SINCE THE FIRST UNEQUAL BYTE DETERMINES THE OVERALL HIGH OR LOW CONDITION FOR THE OPERATION, FURTHER BYTES NEED NOT BE COMPARED.

BYTES AVAILABLE ON CHANNEL AND AT FILE. STORE CHANNEL BYTE FIRST. BYTE IS COMPLEMENTED SO THAT MASK BYTE (HEX FF) GIVES D=0 AND DOES NOT SET ST2.

COMPARE BYTE FROM CHANNEL WITH BYTE FROM FILE. THIS OPERATION IS LOGICALLY A SUBTRACT SINCE CHANNEL BYTE IS COMPLEMENTED AT C3. FOR WORD C4, THE CMD IS FILE SCAN. HENCE DO NOT COMPARE IF ST2=0.

COMPARISON ON THIS BYTE IS UNNECESSARY EITHER BECAUSE OF MASK BYTE ON FILE SCAN DP OR BECAUSE UNEQUAL HAS ALREADY OCCURRED. UPDATE BYTE COUNT AND CONTINUE.

BYTE FROM FILE IS LOWER THAN ARGUMENT. TURN ON DP7 TO INDICATE UNEQUAL HAS OCCURRED. SINCE DP2 WILL BE TURNED OFF IN NEXT WORD, DP1 IS TURNED ON TO KEEP COMMAND DISTINGUISHABLE FROM A READ OR WRITE CMD.

SEE C4 COMMENT. FOR WORD G4, THE CMD IS SEARCH. HENCE ALL BYTE ARE COMPARED.

COMPARISON REQUIRED BRANCH ON RESULTS OF SUBTRACTION AT C4, G4, L9 ETC. UPDATE BYTE COUNT.

BYTE FROM FILE IS HIGHER THAN ARGUMENT. SET DP1, DP7 AS ABOVE AND TENTATIVELY SET DP2 TO INDICATE STATUS MODIFIER IF SEARCH HIGH COMMAND. DP1 BRANCH INDICATES SEARCH HIGH CMD.

PROCESSING UP TO DATE. WAIT FOR BYTE FROM FILE OR CHANNEL.

SEARCH HIGH. HIGH COMPARE. LEAVE DP2 ON FOR STATUS MOD.

SEARCH HIGH. HIGH COMPARE. LEAVE DP2 ON FOR STATUS MOD.

SEE BLOCK Q4.

BYTES ARE EQUAL. CONTINUE SEARCH LOOP.

BYTE AVAILABLE ON CHANNEL. INVERT. STORE IN DW REG. AND TEST FOR MASK BYTE (HEX FF). SEE C3, C4.

SEARCH

COMPARE DATA. SEE BLOCK C4. ST2 IS SET AT JB, LB, NB, QB. AND L7 TO SUPPRESS COMPARISON IF FILE SCAN MASK BYTE OR UNEQUAL HAS OCCURRED

NO COMPARE HIGH ORDER COUNT

IMPOSSIBLE BRANCH. RESET WRITE LATCH. EXIT TO POST ERROR.

STORE FILE BYTE IN BY REGISTER.

WAIT FOR FILE DATA.

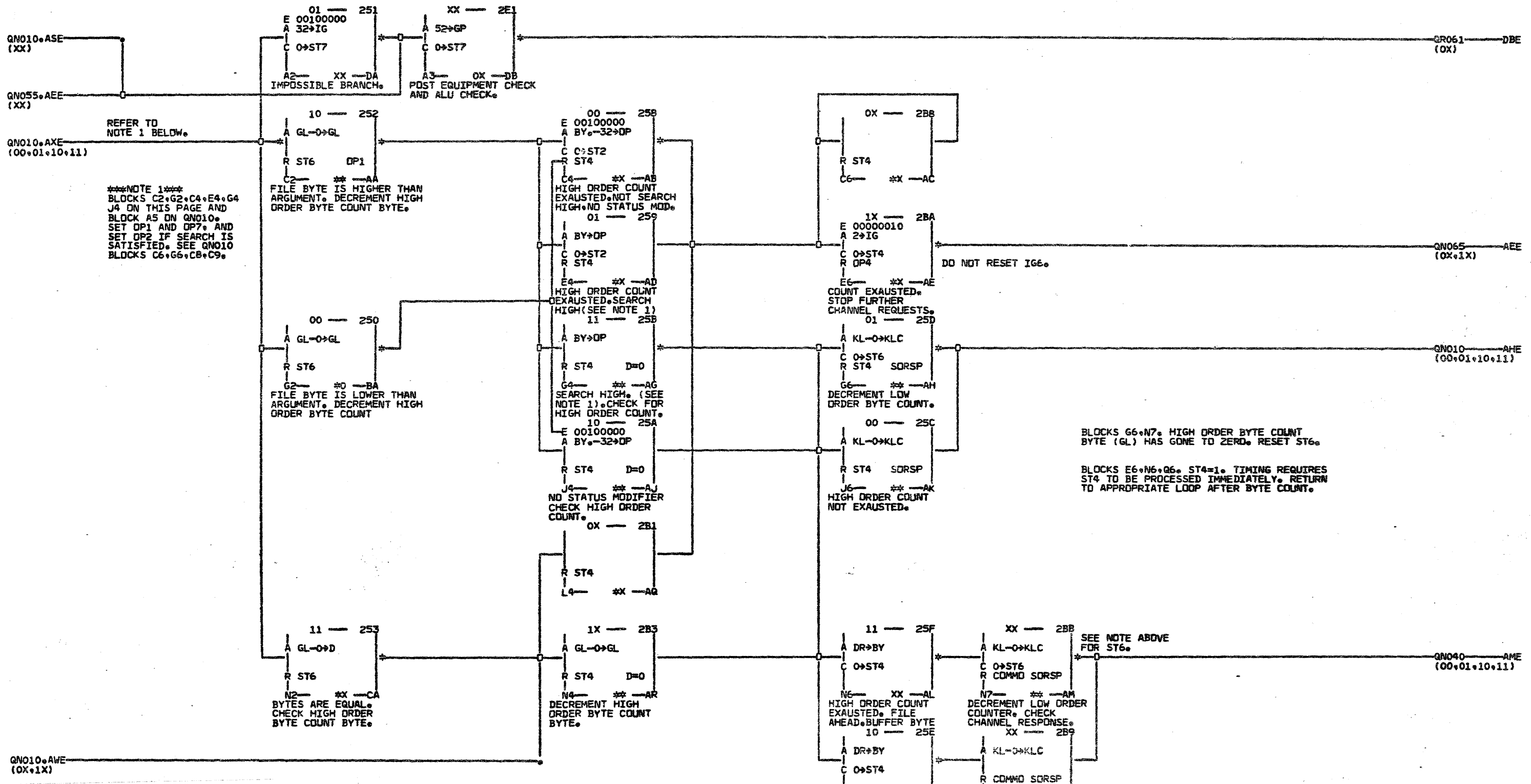
WAIT FOR FILE DATA.

WAIT FOR FILE DATA.

LOW ORDER COUNT EXHAUSTED. ST6=1 SAYS THIS IS A DATA FIELD AND HIGH ORDER

COUNT IS YET TO BE EXHAUSTED. HIGH ORDER COUNT IS IN GL REGISTER.

02-0-0



\*\*\*NOTE 1\*\*\*  
 BLOCKS C2,G2,C4,E4,G4  
 J4 ON THIS PAGE AND  
 BLOCK A5 ON QN010.  
 SET OP1 AND OP7. AND  
 SET OP2 IF SEARCH IS  
 SATISFIED. SEE QN010  
 BLOCKS C6,G6,C8,C9.

BLOCKS G6,N7. HIGH ORDER BYTE COUNT  
 BYTE (GL) HAS GONE TO ZERO. RESET ST6.

BLOCKS E6,N6,Q6. ST4=1. TIMING REQUIRES  
 ST4 TO BE PROCESSED IMMEDIATELY. RETURN  
 TO APPROPRIATE LOOP AFTER BYTE COUNT.

SEE NOTE ABOVE  
 FOR ST6.

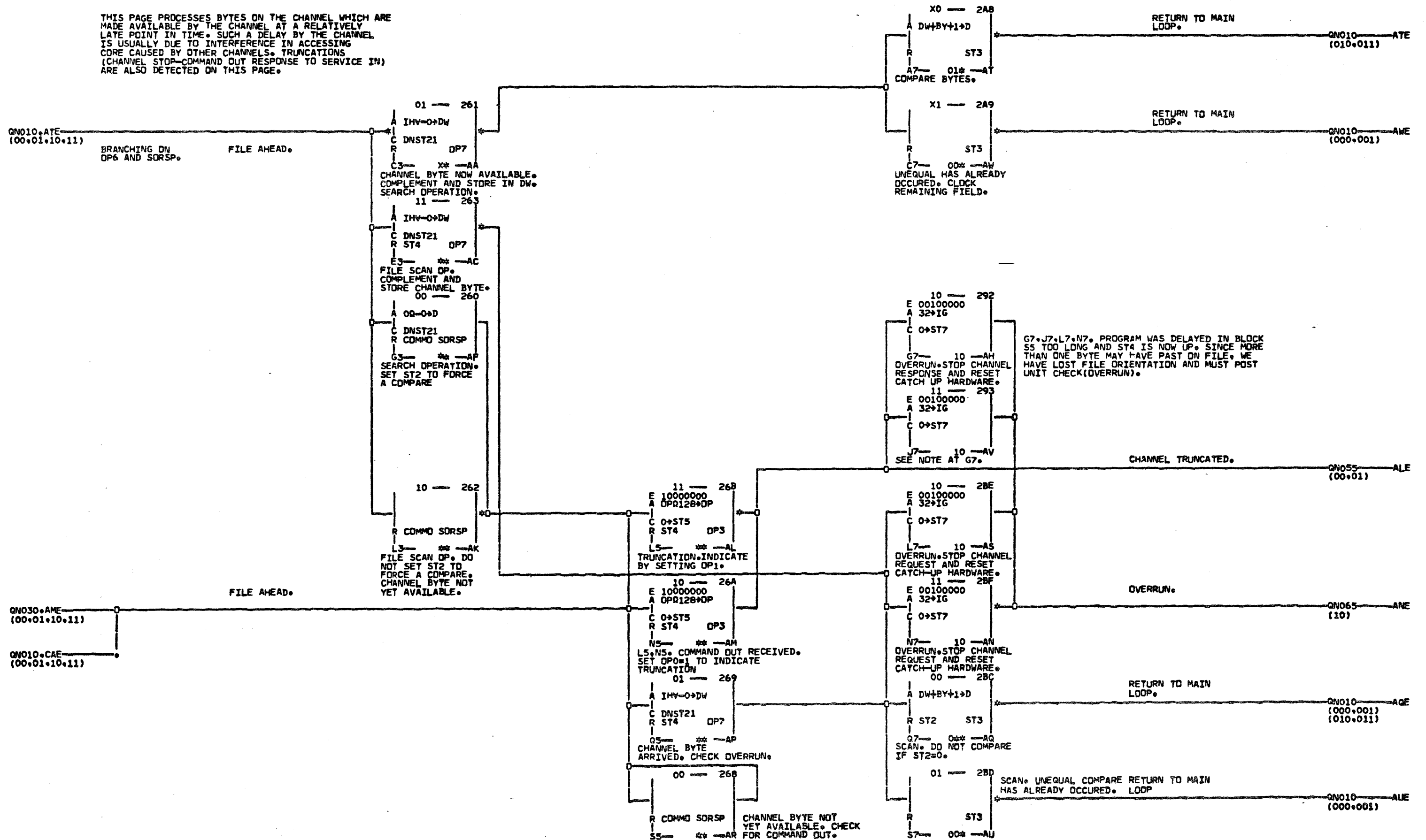
THIS PAGE PROCESSES THE HIGH ORDER BYTE COUNT IN  
 THE GL REGISTER. IF RELEVANT. ST6=1 INDICATES THAT  
 THERE IS A HIGH ORDER BYTE COUNT THAT HAS NOT  
 YET GONE TO ZERO (I.E., MORE THAN 255 BYTES  
 REMAIN TO BE COMPARED).

04022

420613	10/11/66	MACH	2844	DATE	11/20/68	SHEET	1	QN030
420655	02/23/67	NAME	2314/2844	LOG	3236	VERSION		
420656	04/11/67	MODE	MANUAL					
420664	10/11/68	P.No	2250274					
		IBM CORP.	SDD					

SEARCH/SCAN-HIGH ORDER COUNT.  
 HIGH COMPARE.

THIS PAGE PROCESSES BYTES ON THE CHANNEL WHICH ARE MADE AVAILABLE BY THE CHANNEL AT A RELATIVELY LATE POINT IN TIME. SUCH A DELAY BY THE CHANNEL IS USUALLY DUE TO INTERFERENCE IN ACCESSING CORE CAUSED BY OTHER CHANNELS. TRUNCATIONS (CHANNEL STOP-COMMAND OUT RESPONSE TO SERVICE IN) ARE ALSO DETECTED ON THIS PAGE.



G7. J7. L7. N7. PROGRAM WAS DELAYED IN BLOCK S5 TOO LONG AND ST4 IS NOW UP. SINCE MORE THAN ONE BYTE MAY HAVE PAST ON FILE, WE HAVE LOST FILE ORIENTATION AND MUST POST UNIT CHECK (OVERRUN).

04022

QNO40-ALE  
(00.01)  
CHANNEL HAS TRUNCATED.  
BRANCHING ON OP3.

00 290  
E 00000001  
A KL+1+D  
C 0+ST2  
R OP4  
DP5  
G3- \*\* -AC  
NOT DATA FIELD. TEST FOR ODD/EVEN COUNT REMAINING.

01 291  
A GL-0+C+GLC  
C 1+ST7  
L3- 11 -AD  
DATA FIELD (INDICATE BY SETTING ST7). DECREMENT HIGH ORDER COUNTER IF LOW ORDER COUNTER JUST OVERFLOWED. SET ST3 IF A LOW ORDER OR HIGH ORDER COUNT REMAINS.

00 2F0  
E 00100000  
A 32+IG  
C 0+ST7  
C5- XX -AE  
IMPOSSIBLE BRANCH. RESET WRITE LATCH AND CATCH-UP HARDWARE.

01 2F1  
A 0+IG  
C 1+ST3  
R D=0  
G5- \*\* -AF  
COUNT FIELD. 1+ST3 TO CONTINUE CLOCKING FIELD UNTIL KL REG OVERFLOWS.

10 2F2  
E 00000001  
A OP-1+OP  
L5- 11 -AG  
H.A. RESET OP7.

11 2F3  
A 0+IG  
C 0+ST2  
R ST3  
N5- \*\* -AH  
KEY FIELD IF FROM BLOCK G3. RESET WRITE LATCH. ST3=1 IF A COUNT REMAINS.

X0 2AA  
E 00000010  
A KL+2+KL  
C 0+ST7  
R ST4  
SORSP  
E6- \*\* -AJ  
SEE NOTE AT G6 BELOW.  
X1 2AB  
E 00000010  
A KL+2+KL  
C 1+ST7  
R ST4  
SORSP  
G6- \*\* -AK  
ADJUST COUNTER TO INCLUDE LAST THREE BYTES OF COUNT FIELD DURING CLOCKING OF REMAINING FIELD. 1+ST7 INDICATES AN EVEN COUNT REMAINS.

EXIT TO POST ALU AND EQUIPMENT CHECK.

QNO30-AEE  
(XX)

EXIT TO CLOCK REMAINING PORTION OF COUNT FIELD.

QLO10-AJE  
(00.01.10.11)

EXIT TO CLOCK REMAINING PORTION OF FIELD.

QLO10-AHE  
(X0.X1)

00029

420613  
420655

10/11/66  
02/23/67

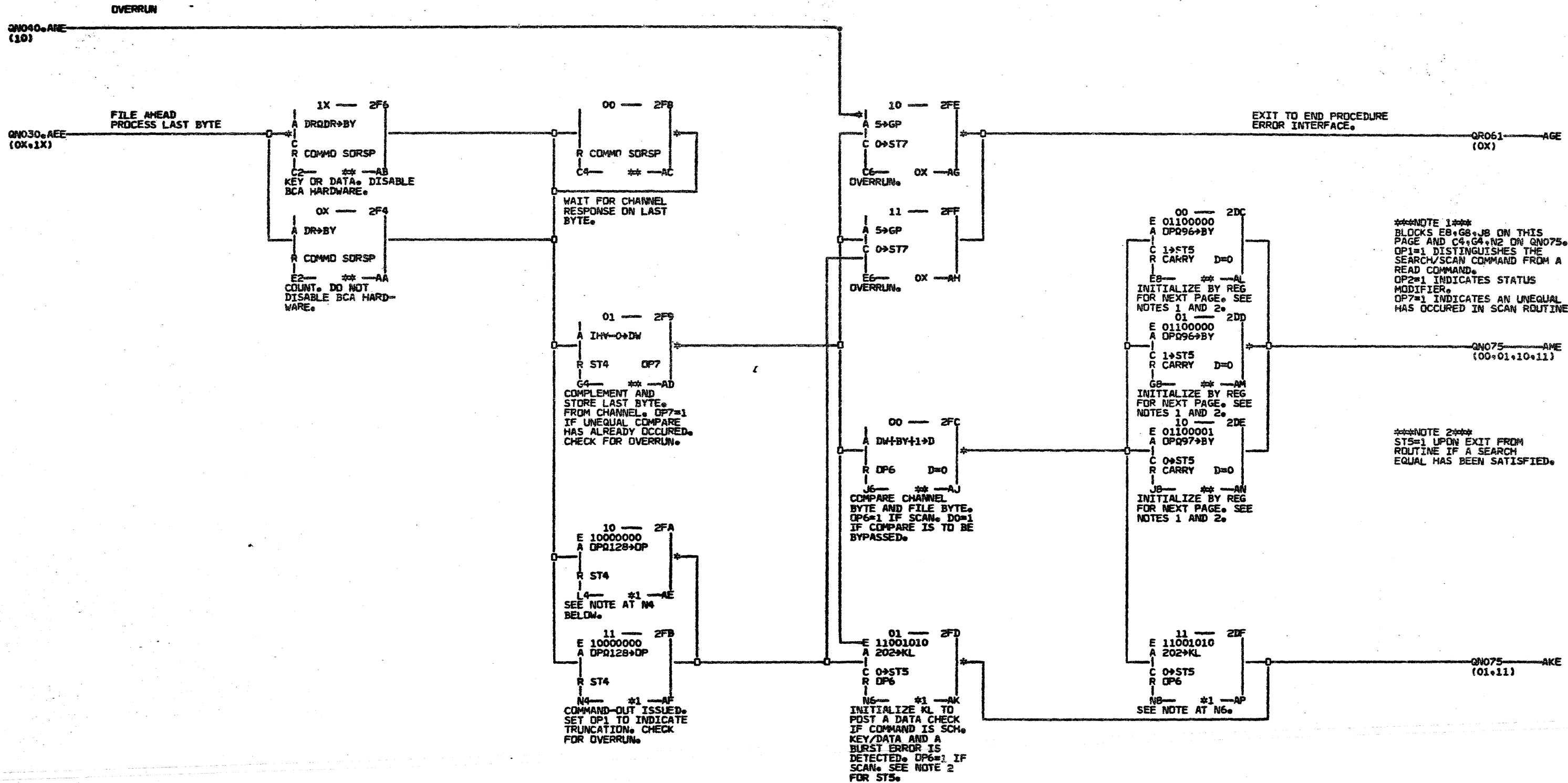
MACH 2844  
NAME 2314/2844  
MODE MANUAL  
P.No. 2250276  
IBM CORP.

DATE 03/03/67  
LDG 0626

SRCH/SCAN

SHEET 1 QNO55  
VERSION

1



\*\*\*NOTE 1\*\*\*  
 BLOCKS E8, G8, J8 ON THIS  
 PAGE AND C4, G4, N2 ON QN075.  
 OP1=1 DISTINGUISHES THE  
 SEARCH/SCAN COMMAND FROM A  
 READ COMMAND.  
 OP2=1 INDICATES STATUS  
 MODIFIER.  
 OP7=1 INDICATES AN UNEQUAL  
 HAS OCCURED IN SCAN ROUTINE

\*\*\*NOTE 2\*\*\*  
 ST5=1 UPON EXIT FROM  
 ROUTINE IF A SEARCH  
 EQUAL HAS BEEN SATISFIED.

420664

