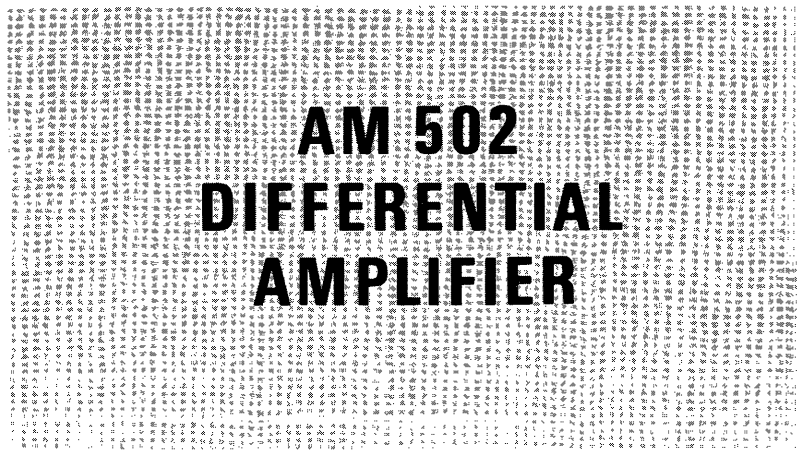


TEKTRONIX®



AM 502 DIFFERENTIAL AMPLIFIER

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97005

Serial Number _____

WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repair and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

Specifications and price change privileges reserved.

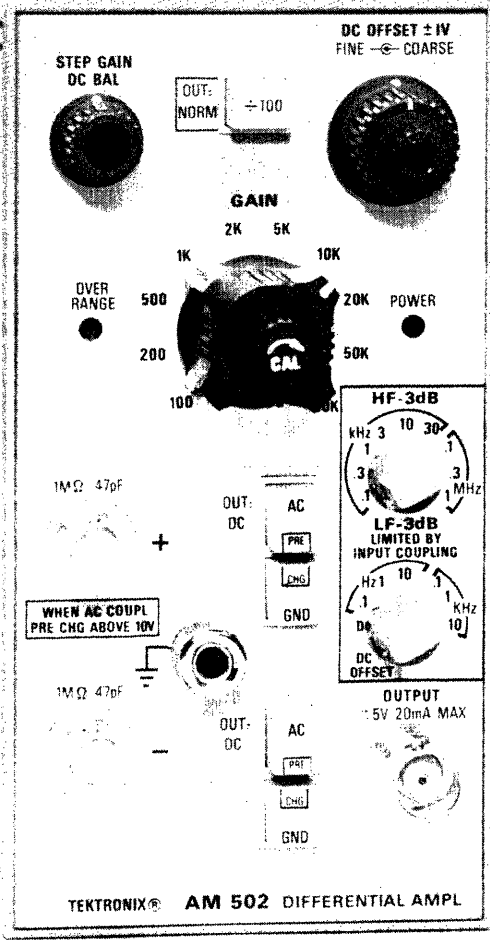
Copyright © 1973 by Tektronix, Inc., Beaverton, Oregon. Printed in the United States of America. All rights reserved. Contents of this publication may not be reproduced in any form without permission of Tektronix, Inc.

U.S.A. and Foreign TEKTRONIX products covered by U.S. and foreign patents and/or patents pending.

TEKTRONIX is a registered trademark of Tektronix, Inc.

TABLE OF CONTENTS

SECTION 1	OPERATING INSTRUCTIONS	Page	SECTION 2	THEORY OF OPERATION (cont)	Page
	Introduction	1-1		DC Offset	2-1
	Instrument Description	1-1		Input Cross Neutralization	2-1
	Installation and Removal	1-1		High Frequency Common-Mode Balance	2-3
	Instrument Operation	1-2		Preamp Output Stage	2-3
	Input Connections	1-2		LF -3 dB POINT Selector	2-3
	Probes	1-2		Gain Switching Amplifier	2-3
	High Impedance Input	1-2		HF -3 dB POINT Selector	2-3
	Input Overloading	1-2		Variable Gain Stage	2-3
	Output Connections	1-2		Output Amplifier	2-3
	Step Gain DC Balance	1-2		Overrange Indicator	2-4
	DC Offset Coarse and Fine	1-2		Power Supplies	2-4
	HF and LF Bandwidth Reduction	1-2			
	Pre-Charging	1-2			
	Functions Available at Rear Connector	1-3	SECTION 3	SERVICE INFORMATION	
	Measurement Techniques	1-3		Symbols and Reference Designators	3-1
	Single-Ended vs. Differential Measurements	1-3		Electrical Parts List	3-2
	Common Mode Rejection Ratio	1-4		Internal Adjustment Procedure	
	Degradation of CMRR	1-5		Parts Location Grid	
	Specifications	1-6		Front Panel Controls and Block Diagram	
				Preamplifier Schematic	
SECTION 2	THEORY OF OPERATION			Output Amplifier Schematic	
	Introduction	2-1		Switch Details Schematic	
	Input Coupling	2-1		Power Supplies Schematic	
	Input Overdrive Protection	2-1		Mechanical Parts List	
	Gate Current Compensation	2-1		Exploded View	
	Preamp	2-1		Accessories and Repackaging	



OPERATING INSTRUCTIONS

INTRODUCTION

Instrument Description

The AM 502 is a DC-coupled differential amplifier with excellent common-mode rejection capabilities and high gain for low-voltage measurements. The DC OFFSET capability permits nulling up to one volt DC, so that low level, low frequency signals impressed on a DC level can be amplified without the degradation often introduced by AC input coupling.

High and low frequency -3 dB points can be selected at the front panel to suit the application. Signal inputs and outputs are available at the rear connector as well as at the front panel. A front-panel lamp indicates most over-range conditions of excessive input signal (either differential or common mode), excessive gain, or excessive offset.

Installation and Removal

The AM 502 is calibrated and ready for use when received. It operates in any compartment of a TM 500-Series Power Module. See the Power Module instruction manual for line voltage requirements and Power Module operation. Fig. 1-1 shows the AM 502 installation and removal procedure.

CAUTION

Turn the Power Module off before inserting the plug-in; otherwise, damage may occur to the plug-in circuitry.

Check that the AM 502 is fully inserted in the Power Module. Pull the PWR switch on the Power Module. The power light on the front panel should now be lit. The Controls, Connectors and Adjustments foldout page in Section 3 gives a complete description of the front panel controls.

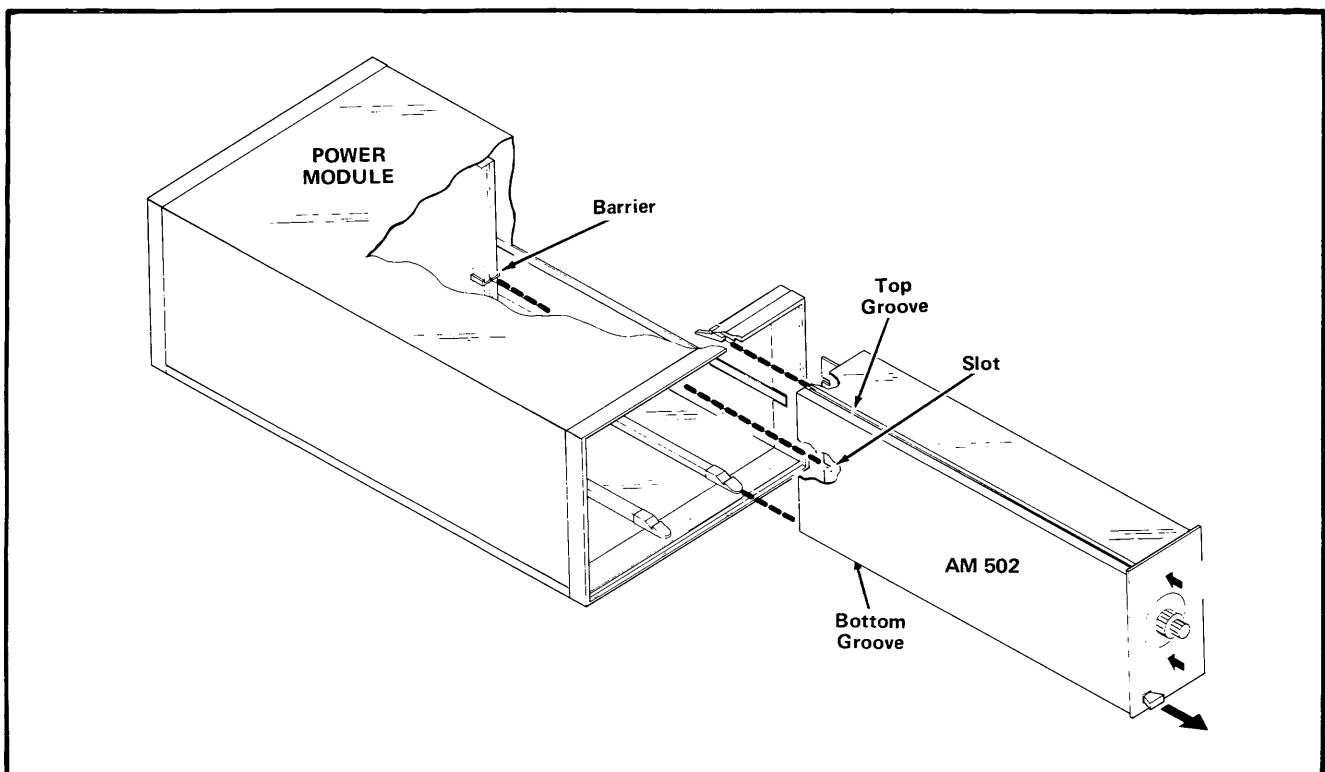


Fig. 1-1. AM 502 Installation and Removal.

INSTRUMENT OPERATION

Input Connections

Unshielded test leads can be used to connect the AM 502 to a signal source when a high-level, low-frequency signal is monitored at a low impedance point. However, when any of these factors is missing, it becomes increasingly important to use shielded signal cables. In all cases, the signal-transporting leads should be kept as short as practical.

When making single-ended input measurements (conventional amplifier operation), be sure to establish a common ground connection between the device under test and the AM 502. The shield of a coaxial cable is normally used for this purpose. Push the GND button for the input not connected to the device under test.

In some cases differential measurements require no common chassis ground connection, and therefore are less susceptible to interference by ground-loop currents.

Consider the change in the source operating characteristics due to loading by the signal input cables. The circuit at the input connectors can be represented by approximately $1\text{ M}\Omega$ to ground paralleled by approximately 47 pF . Two feet of $50\ \Omega$ coaxial cable increases the parallel capacitance by about 60 pF , which could be excessive in many situations. To minimize these effects, use a higher impedance cable or an attenuator probe.

Probes

Attenuator probes decrease the resistive-capacitive loading of a signal source. They also extend the measurement range of the AM 502 to substantially higher voltages. The Tektronix P6055 passive probe is designed specifically for differential applications. Some measurements require a higher resistance input to the AM 502, with very little source loading or signal attenuation. In such situations use a FET probe or the high-impedance input provision of the AM 502. Contact your Tektronix Representative for further information on probes.

High Impedance Input

To raise the internal input impedance of the AM 502 to about $200\text{ M}\Omega$, remove the connectors shown on the Controls and Adjustments foldout page. Make certain the attenuator is in the NORM mode. Signal source impedance now becomes an important factor. For example, a 100 pA gate current through $10\text{ M}\Omega$ produces a one-millivolt offset. This offset may result in significant error when small voltages are measured.

Input Overloading

When measuring unknown DC voltages, push the $\div 100$ button in, and start with the 100 position on the GAIN switch. Increase the GAIN switch setting and finally release the $\div 100$ pushbutton until a suitable output signal is obtained. If the input circuit of the AM 502 is overdriven, large amounts of current will flow, opening the protective fuses.

Output Connections

Make output connections using a BNC to Dual Binding Post connector (Tektronix part number 103-0035-00) or a coaxial cable with at least one BNC connector. To prevent current limiting in the output stage, do not load the output with less than $250\ \Omega$. Output current is limited to 20 mA .

Step Gain DC Balance

If this control is misadjusted, the DC output level will shift as the GAIN switch position is changed. Push both GND buttons and place the GAIN switch in the 100 position. Rotate the GAIN switch from stop to stop while adjusting the STEP GAIN DC BAL control for no DC shift at the OUTPUT terminal.

DC Offset Coarse and Fine

Use these controls to offset up to $\pm 1\text{ V}$ DC potential difference at the input connectors. The amplifier internal bias is changed to accomplish the offset. The differential rejection capabilities of the AM 502 are not affected. The LF -3 dB switch must be in the DC OFFSET position to activate these controls.

HF and LF Bandwidth Reduction

Use the HF -3 dB switch to reduce the upper bandwidth limit, as necessary, to improve the signal-to-noise ratio when using the AM 502 in low-frequency applications. The LF -3 dB control increases the lower bandwidth frequency. Use this control to reduce DC drift, when raising the lower bandwidth does not undesirably reduce the bandwidth for the signal being measured.

Pre-Charging

Use of this feature prevents surge currents, due to charging the AC coupling capacitor in the AM 502, from damaging the circuit under test. Before connecting the AM 502 to a signal containing a DC component, push the AC and GND buttons. Connect the input to the circuit under test. Wait about one second for the coupling capacitor to charge. Release the GND pushbutton and the coupling capacitor is charged to the value of the DC voltage to be measured.

Functions Available at Rear Connector

Signal out, and provisions for signal in connections, are available at the rear interface connector. See Fig. 1-2 for assignments. Signal in connections are not factory wired. If signal in connections are made, use coaxial cable. Connect one end to the pads as shown on the illustration, and the other end to the front panel BNC connector. The BNC connector need not be disconnected from the circuit.

The AM 502 has a slot between connectors 23 and 24. This identifies it as a member of the signal source family. A barrier in the corresponding position of the Power Module connector allows only signal source plug-ins to be used in that compartment. This protects the plug-in, should specialized connections be made to that compartment. Consult the Building A System section of the Power Module manual for further information.

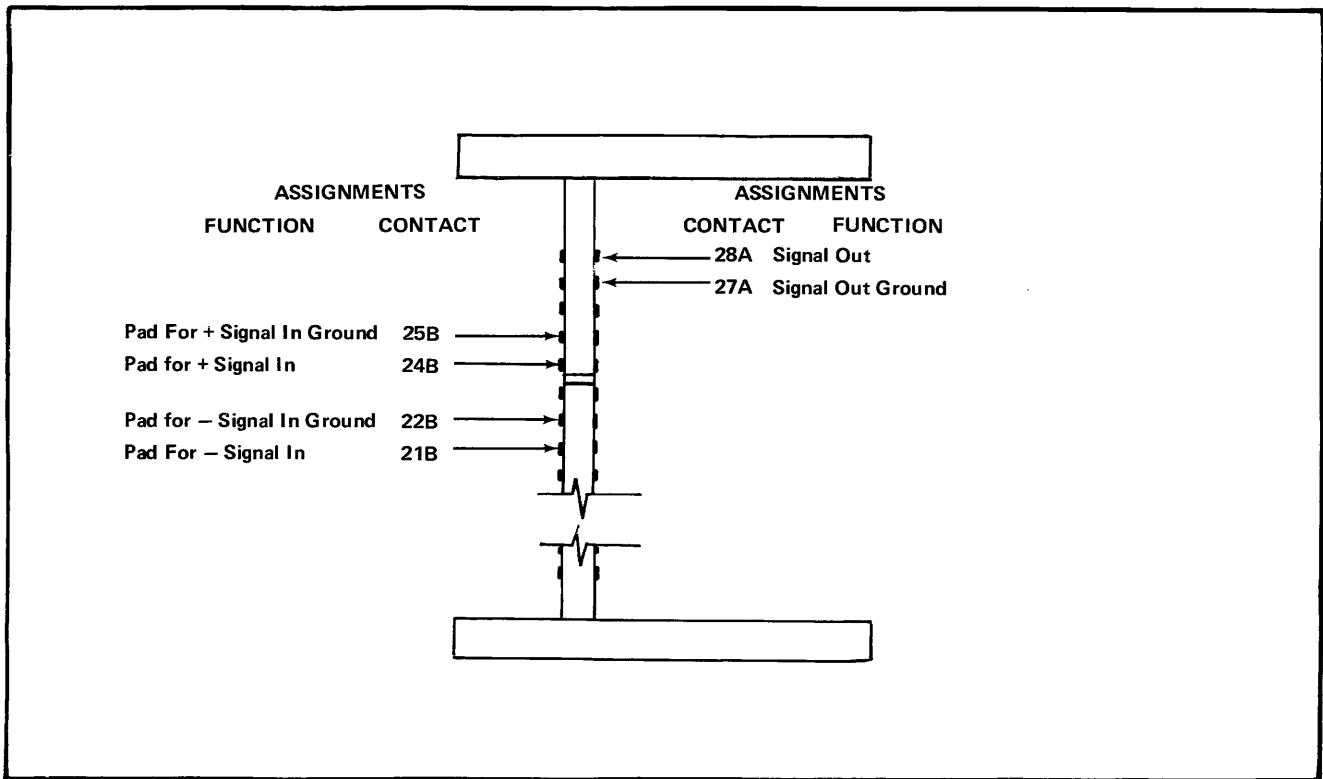


Fig. 1-2. Input-Output assignments for plug-in rear interface contacts.

MEASUREMENT TECHNIQUES

Single-Ended vs. Differential Measurements

Single-ended measurements often yield unsatisfactory results because of interference resulting from ground-loop currents between the AM 502 and the device under test. In other cases, it may be desirable to eliminate a DC voltage by means other than the use of a blocking capacitor, which could limit the low-frequency response. The limitations of single-ended measurements are effectively eliminated by using differential measurements. Fig 1-3 shows several useful examples of differential measurements.

Make differential measurements by connecting each input (+ input and - input) to selected points in the circuit under test. Since the chassis of the AM 502 need not be connected to the test circuit for differential measurements, there are few limitations to the selection of these test points. Do not exceed the maximum safe input voltages as shown in the specification section of this manual. Set the input coupling switches to the same position, AC or DC, depending on the measurements being made. In differential measurements, only the voltage difference between the two signals is amplified. Common mode signals (common in amplitude, frequency, and phase) are rejected.

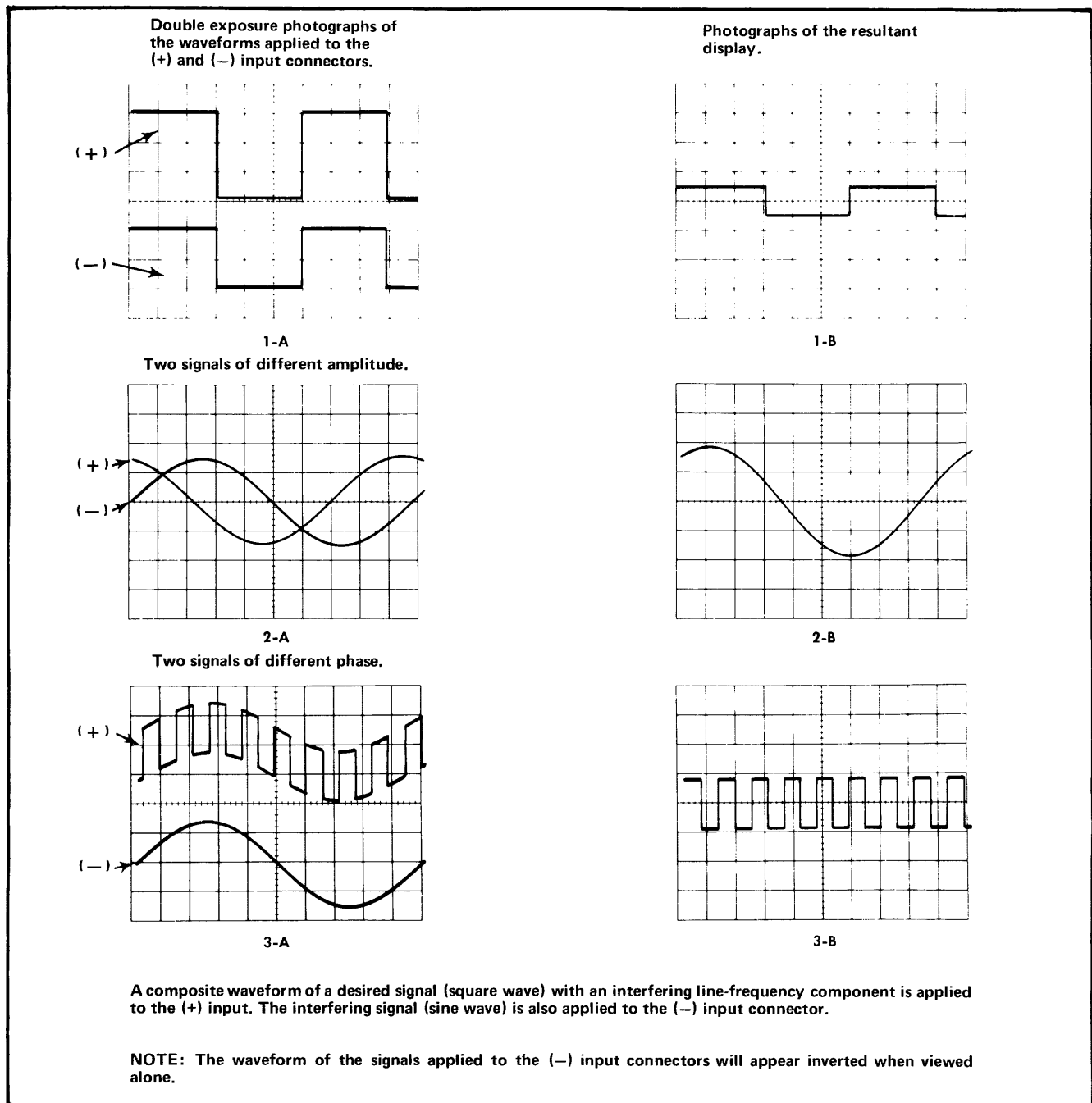


Fig. 1-3. Three examples of differential applications.

Common Mode Rejection Ratio

The ability of the AM 502 to reject common-mode signals is indicated by the common-mode rejection ratio (CMRR). For example, assume that a signal consists of unwanted 60 Hz at 10 volts peak to peak (common mode connected to both inputs), plus a desired signal at 1 mV peak to peak (differentially connected to one input). The AM 502 gain is set at 200. The output of the AM 502 shows the desired signal at an amplitude of 0.2 V

(1 mV X 200), and the 60 Hz signal is viewed at an amplitude of 0.02 V. The CMRR in this application is 100,000:1. This figure is calculated by multiplying the value of the common-mode signal (10 V) by the gain of the amplifier (200) for a product of 2000 V. This product is divided by the observed 60 Hz voltage at the output (0.02 V) and the result is the CMRR, 100,000:1. It would, of course, be impossible to view the 1 mV signal superimposed on the 60 Hz signal by using single input methods.

Degradation of CMRR

There are a number of factors which degrade common-mode rejection. The principal requirement for maximum

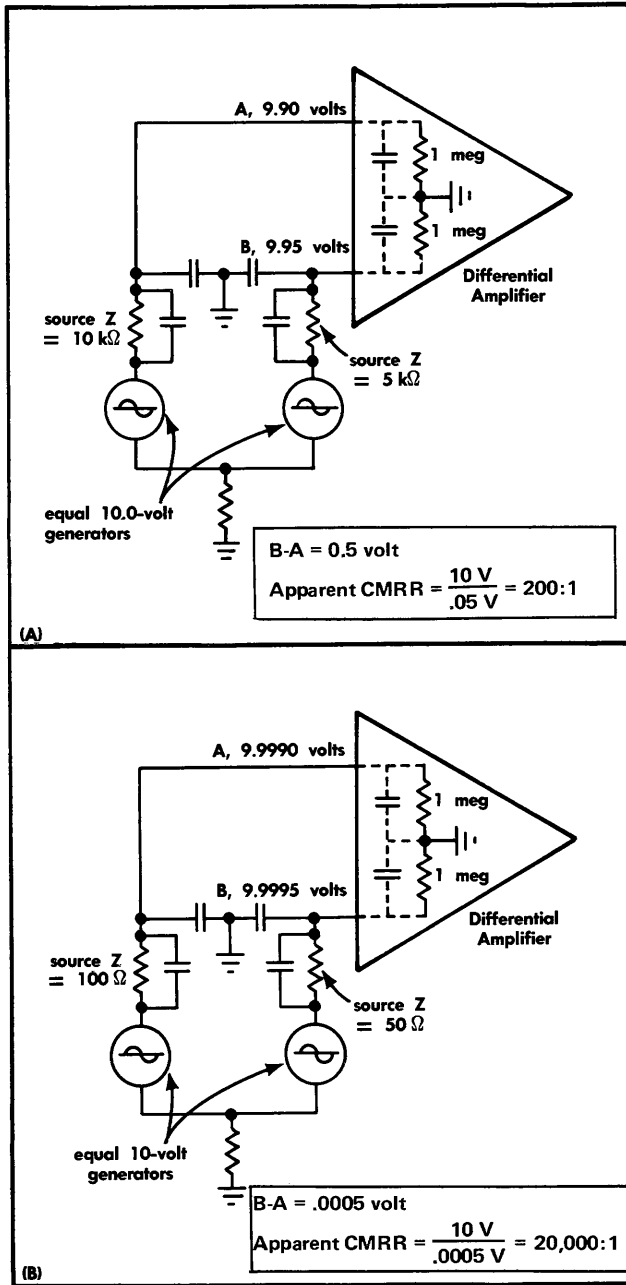


Fig. 1-4. Relationship of test point source impedance to the amplifier input impedance and the apparent CMRR caused by (A) large difference between test-point impedances and (B) low impedance test points.

rejection is for the common-mode signal to arrive at the input FET gates at the same phase and amplitude. A difference of only 0.01% in the attenuation ratios of the input attenuators will reduce the rejection ratio to 10,000 to 1. Also, any difference in source impedance will degrade the rejection ratio. Figs. 1-4 and 1-5 show CMRR degradation due to differences in source impedance. The frequency of the common mode signal also affects the CMRR. Generally, as the frequency of the input signal increases, the CMRR is more difficult to maintain.

The high frequency CMRR will also depend upon the signal source impedance, since various shunt capacitances between the source and the input gate must charge and discharge through that impedance.

Outside influences such as magnetic fields can also degrade the performance, particularly when low level signals are involved. Magnetic interference may be reduced by using identical signal transporting leads to the two inputs. Twist the two leads together over as much of their length as possible. Low-frequency measurements can be similarly protected by using a shielded cable that contains a twisted pair of conductors.

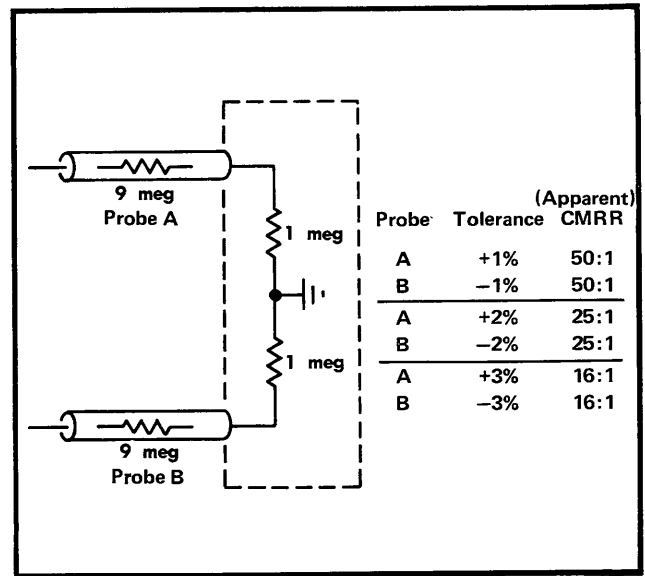


Fig. 1-5. Simplified input circuit and table showing the change in apparent CMRR due to 10X probes that are within 1, 2, and 3% of their attenuation values (with matched 1 MΩ resistors).

SPECIFICATIONS

Performance Conditions

The electrical characteristics are valid only if the AM 502 is calibrated at an ambient temperature between +20°C and +30°C and operated between 0°C and +50°C, unless otherwise noted.

ELECTRICAL CHARACTERISTICS

GAIN:

Normal Mode: 100 to 100,000 in a 1-2-5 sequence.
 ÷ 100 Mode: 1 to 1000 in a 1-2-5 sequence.
 Accuracy: All modes within 2%.

FREQUENCY RESPONSE:

Direct Coupled: With the GAIN control set to 20K (20,000) or less, the selectable HF -3 dB points are within 25% of the indicated setting.
 With the GAIN control set to 50K (50,000), the **maximum** HF -3 dB point is at least 500 kHz.
 With the GAIN control set to 100K (100,000), the **maximum** HF -3 dB point is at least 250 kHz.
 AC Coupled: LF -3 dB is 2 Hz, or less.

OUTPUT (Maximum rated):

Voltage Swing: ±5 V.
 Current: ± 20 mA.
 R_O: 5 Ω or less.
 Minimum Load Impedance: 250 Ω.

INPUT RC: 1 MΩ ±0.1% paralleled by ≈47 pF.

BANDWIDTH (Selectable):

HF -3 dB points: Selectable in 9 steps (1 - 3 sequence) from 100 Hz to 1 MHz (also limited by FREQUENCY RESPONSE at GAIN settings of 50K and 100K.
 LF -3 dB points: Selectable in 6 steps (1 - 10 sequence) from 0.1 Hz to 10 kHz when dc coupled. Each step within 25% of the indicated setting.

COMMON MODE:

Normal Mode:
 Range: ± 5 V.
 Rejection Ratio: 100 dB DC to 50 kHz, direct coupled with inputs shorted together

COMMON MODE (cont):

÷ 100 Mode

Range: ±50 V.

Rejection Ratio: 50 dB DC to 50 kHz direct coupled with ≤ 100 V p-p sine wave input.

DC OFFSET RANGE: ≥± 1 V.

MAXIMUM SAFE INPUT VOLTAGE:

Direct Coupled:

Normal Mode: 15 V (DC + Peak AC) to 5 MHz.

÷ 100 Mode: 350 V (DC + Peak AC).

AC Coupled:

350 V (DC + Peak AC) with coupling capacitor precharged.

MAXIMUM INPUT GATE CURRENT (each input):

50 pA at 25°C.

NOISE (Tangentially

Measured referred to input): 25 μV or less with 25 Ω or less source resistance, from 5 Hz to 1 MHz.

VOLTAGE DRIFT with TEMPERATURE (referred to input):

100 μV per °C.

VOLTAGE DRIFT with TIME (Referred to input):

≤10 μV (p-p) per minute
 ≤20 μV (p-p) per hour.

POWER CONSUMPTION:

6 Watts

ENVIRONMENTAL:

Temperature:

Operating: 0°C to +50°C

Storage: -40°C to +75°C

THEORY OF OPERATION

Introduction

Refer to the schematic diagrams and the block diagram, all located in the pullout pages at the back of this manual, for a complete understanding of the AM 502 circuit operation.

Input Coupling

In the DC mode, signals pass directly from the + and – input connectors to the $\div 100$ switch, which switches the $\div 100$ attenuators in or out of the circuit. In the AC mode, C10 and C20 are connected in series with the + and – inputs, respectively, as DC blocking capacitors. When C10 is being precharged, it is connected to ground through R10 (the same case exists for C20 and R20), and the input at the attenuator is grounded. R35, R38, C32, C34, C35, and C38 comprise the AC compensated $\div 100$ attenuator for the + input. C35 sets the input capacity in the attenuated mode. C30 sets the input capacitance in the normal mode. The – input attenuator and – input capacitance adjustments are identical with the + input. R40 adjusts for optimum DC CMRR when the AM 502 is operating in the $\div 100$ mode.

Input Overdrive Protection

F100, F200 and diode clamps CR108, CR109, CR208, and CR209 provide overdrive protection for Q121A and B at the ± 15 V level. The ± 15 V level is set by zeners VR438 and VR448 through isolation diodes CR438 and CR448. If the signal amplitude exceeds approximately 16.5 V, depending on duration of the excess voltage, the fuses will open.

Gate Current Compensation

Leakage current, associated with the gates of the Input FETs, through the input resistors, R100 and R200, develops an offset voltage at the input gates. At high gain settings, this offset drives the output into overrange. This leakage can be as high as 100 pA (at 25°C), although usually it is much less. (100 pA through 1 M Ω to ground will produce a DC offset of 100 μ V.) To compensate for this leakage current, the FET gates are returned to an adjustable, slightly negative voltage source through R106, R107, R206, R207, and variable R105 and R205.

Leakage current, associated with the input FET gates and the overdrive protection diodes, increases quite rapidly with temperature increase, approximately doubling every 10°C. To compensate for this temperature-dependent leak-

age, a temperature-sensitive current balancing network is included, using thermistors (RT104–RT203) as the sensing elements.

Preamp

The preamp circuit in the AM 502 is made up of two identical feedback amplifiers connected in a differential configuration. The overall gain of the preamp is approximately 42 to the output of Q152A and B.

The supply voltages for the preamp are obtained from a common power supply, which is bootstrapped to the input to improve common-mode rejection. The positive current source, Q410A and B, and Q416 and its associated circuitry, are one end of a divider string that provides the correct operating potentials for the stages in the preamp. The current sink at the bottom of the divider string is Q443. See Fig. 2-1. The current branches through parallel paths at the top of the string, and is summed back into the string via Q445. The difference in current magnitudes at the top and bottom of the string is absorbed by Q451.

Q422 A and B, Q426, and associated circuitry make up the negative current source for the input FETs. Since the current sources are very high impedances, both the negative and positive supplies 'float' with the common-mode signal swing of ± 5 volts. The common-mode signal is introduced into the supplies via Q451 in the positive supply, and via the common sources of the input FETs in the negative supply.

DC Offset

Q141 A and B, Q145 A and B, and DC OFFSET COARSE and FINE controls, R467 and R468 provide means to offset any differential DC component of the input signal. This allows observation of AC components while maintaining good differential capability.

R461, Coarse Step Gain DC Bal adjustment (on the switching diagram) provides current balance in the two sides of the amplifier on all positions of the LF -3 dB switch, except DC OFFSET.

Input Cross Neutralization

Stray capacitive coupling exists between components of the + and – input amplifiers of the preamp. If a signal is applied to the + input, capacitive coupling produces

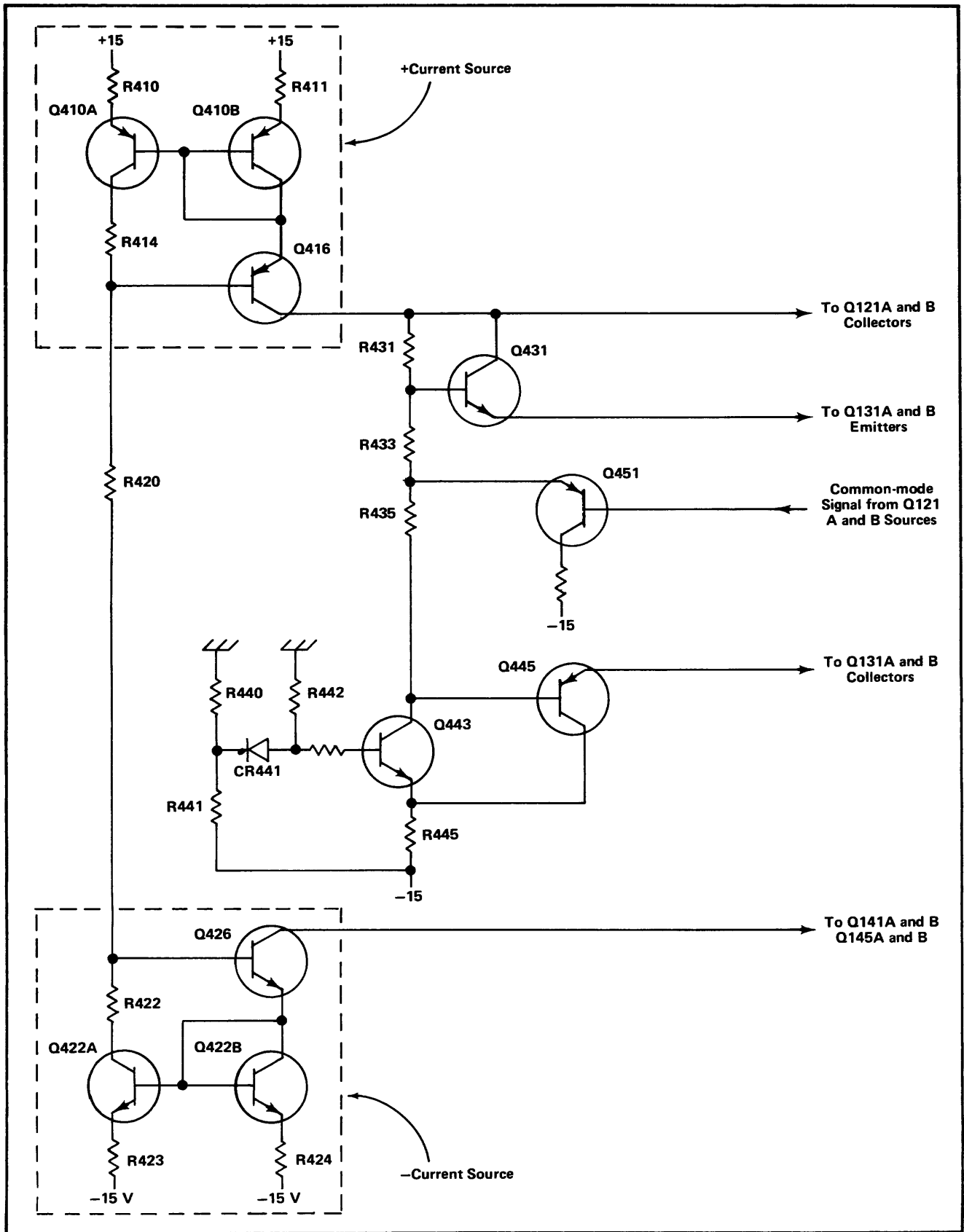


Fig. 2-1. + and - Current sources and divider.

undesirable currents in the – amplifier input. If there is any impedance between the – input and ground, the capacitive current produces a voltage across that impedance. This voltage across the – input impedance subtracts from the + input signal, producing an erroneous output.

C222 (connected in the – input amplifier) is adjusted to divert the undesirable capacitive current away from the input line, minimizing the unbalance. C122 performs the same function for signals applied to the + input.

High Frequency Common-Mode Balance

At higher frequencies, stray capacitances to ground at various points in the preamp begin to inject a significant differential current (as a result of common-mode signals) into the amplifier, producing a signal at the amplifier output. C150, connected from a common-mode signal point (the floating power supply) is adjusted to minimize this output current to extend the range of frequencies over which useful common-mode rejection can be obtained.

Preamp Output Stage

The final stage (Q152 A and B) of the preamp contributes a small amount of gain. Its primary function is to reduce the common-mode DC level to zero volts.

CR150 and CR250 rectify the input signal to drive the overrange detector circuitry. The diodes are normally conducting very slightly. When the input signal exceeds about 5 volts common-mode, the diodes turn on hard and drive the emitter of Q251 in the overrange detector circuit to light the OVERRANGE indicator.

STEP GAIN DC BAL, R158, provides a balance which prevents output DC level shift when the GAIN switch is rotated through its gain setting positions.

LF –3 dB POINT Selector

This switch selects the low frequency –3 dB point of the amplifier by switching series RC networks between the output of Q152 and the input of Q162. The selector has a range of 0.1 Hz through 10 kHz in decade steps.

Gain Switching Amplifier

The Gain Switching Amplifier is a differential feedback amplifier having a gain range of 0.48 to 480. The gain is changed by switching values of resistance between Q162 A and B sources. This amplifier configuration has high

open-loop gain in the differential mode, while offering very low common-mode gain.

R161, Step Gain AC Bal, balances the bias voltages of Q164 A and Q164 B.

Q167 and Q267 serve two functions. The base-emitter junctions of these transistors serve as reverse-bias protection for Q168 and Q268. When the stage gain is excessive, the output signal at Q167-Q267 drives the overrange indicator circuitry to indicate a differential overrange condition.

HF –3 dB POINT Selector

This switch selects the high frequency point by switching shunt capacitance across the output of the gain switching stage. The selector has a range of 100 Hz through 1 MHz in multiples of 1 and 3.

Variable Gain Stage

This stage is a feedback amplifier having a gain of approximately ten in the calibrated variable position (switch S178 closed) and a gain of approximately four with R178 set at maximum resistance (S178 open).

R269 corrects for current imbalance introduced by the previous stage (bias balancing Q164 A and B). With Q171A and Q171B source voltages identical, rotating the front-panel VARIABLE control causes no shift of the DC output level.

CR181 and CR281 act as peak detectors, providing a signal to the overrange detector circuit (Q501 emitter). A swing greater than +6 volts on the collectors of Q181 or Q281 will give an overrange indication.

The common-mode level is detected at the junction of R175-R275, and is compared to ground by the comparator Q195-Q196. The comparator output is fed back to Q171A and B via Q269 to maintain the R178-R278 junction at zero volts.

The single-ended output of the variable gain stage is fed to the unity gain trans-impedance output amplifier.

Output Amplifier

The output amplifier provides a ± 5 -volt differential swing with a 0-volt DC level. The output R_O is approximately 2Ω . The output amplifier is short circuit protected to ground and to the power supply. If the current in R571

Theory of Operation—AM 502

causes the voltage at Q571B collector to fall far enough below the level of Q555 emitter, CR555 conducts, taking current from Q555 (the current source for Q561A), reducing the drive to Q571B, thus limiting the output current.

Overrange Indicator

When any of the three input transistors, Q501, Q511, or Q521, is turned on by an overrange signal from the amplifier, a turn-on current is supplied to Q532 base.

Q532 and Q541 comprise a monostable multivibrator which has a minimum on time of approximately 200 ms; thus, the indicator lamp is held on for a minimum of 200 ms, regardless of the duration of the overrange signal.

Power Supplies

Regulation of the ± 15 V is accomplished through operational amplifiers in the AM 502. These operational

amplifiers control the current to the unit through series-pass transistors located in the power module. The inputs of both integrated circuits seek common levels by varying the current supplied to the unit. Should the power supply load increase, pin 2 of U990, (in the -15 V supply) goes more positive, causing pin 6 to go more negative. This action increases current flow in the series-pass transistor and restores the voltage to the initial level. The $+15$ V supply operates in the same manner, except that the polarities are different.

Should the current increase to a level that the voltage drop across R970 is great enough to cause Q990 to conduct, current is taken from the series-pass transistor until it is turned off. This action limits the current available to the amplifier, should an overload or short circuit occur.

The minus supply is referenced to the $+15$ V; the positive supply is referenced through VR910 to $+9$ V.

DIAGRAMS, PARTS LISTS, AND ILLUSTRATIONS

Symbols and Reference Designators

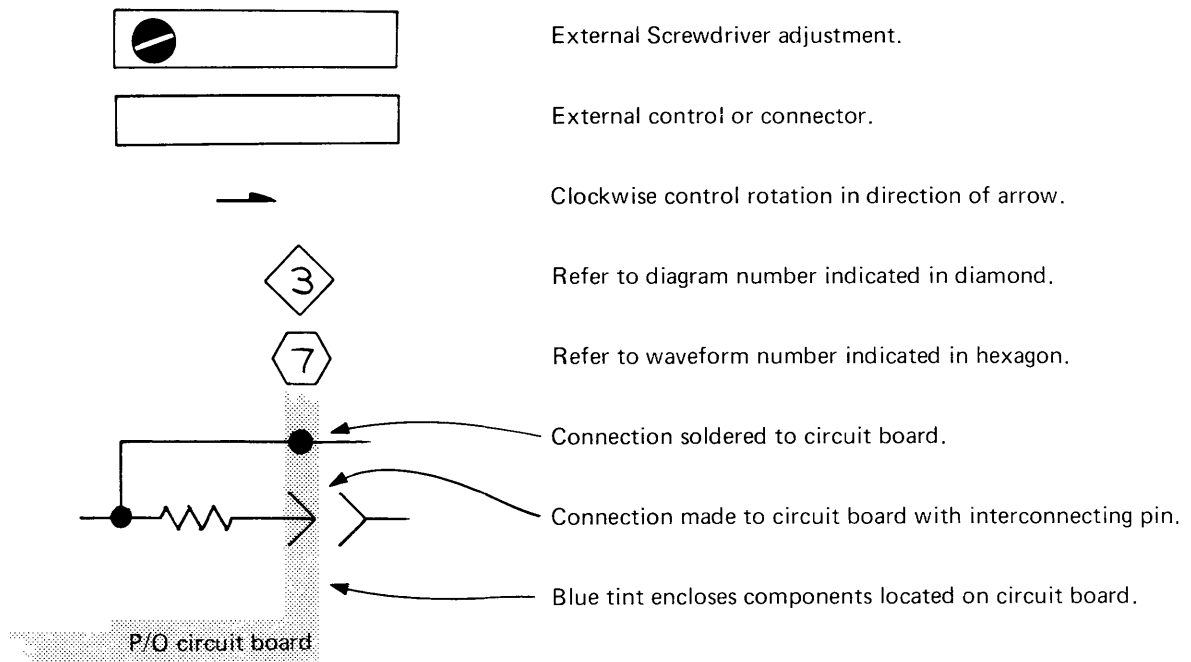
Electrical components shown on the diagrams are in the following units unless noted otherwise:

- Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μ F).
- Resistors = Ohms (Ω)

Symbols used on the diagrams are based on ANSI Y32.2 – 1970.

Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following special symbols are used on the diagrams:



REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P. O. BOX 128	PICKENS, SC 29671
01002	GENERAL ELECTRIC CO., INDUSTRIAL AND POWER CAPACITOR PRODUCTS DEPT.	JOHN ST. 1201 2ND ST. SOUTH	HUDSON FALLS, NY 12839 MILWAUKEE, WI 53204
01121	ALLEN-BRADLEY CO.		
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P. O. BOX 5012 ROUTE 202	DALLAS, TX 75222 SOMERVILLE, NY 08876
02735	RCA CORP., SOLID STATE DIVISION		
03508	GENERAL ELECTRIC CO., SEMI-CONDUCTOR PRODUCTS DEPT.	ELECTRONICS PARK	SYRACUSE, NY 13201
04713	MOTOROLA, INC., SEMICONDUCTOR PRODUCTS DIV.	5005 E. MCDOWELL RD.	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS ST. 12515 CHADRON AVE.	MOUNTAIN VIEW, CA 94042 HAWTHORNE, CA 90250
07910	TELEDYNE SEMICONDUCTOR		
11237	CTS KEENE, INC.		PASO ROBLES, CA 93446
12040	NATIONAL SEMICONDUCTOR CORP.	COMMERCE DRIVE	DANBURY, CT 06810
17537	LAMPS, INC., DIV. OF MARCO-OAK INC. DELETED, REPLACED BY: 87034		
21845	SOLITRON DEVICES, INC., TRANSISTOR DIV.	1177 BLUE HERON BLVD.	RIVIERA BEACH, FL 33404
24931	SPECIALTY CONNECTOR CO., INC.	3560 MADISON AVE.	INDIANAPOLIS, IN 46227
50157	N. L. INDUSTRIES, INC., ELECTRONICS DEPT.	P. O. BOX 787	MUSKEGON, MI 49443 NORTH ADAMS, MA 01247
56289	SPRAGUE ELECTRIC CO.		
71400	BUSSMAN MFG., DIVISION OF MCGRAW- EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	5757 N. GREEN BAY AVE.	MILWAUKEE, WI 53201
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
74970	JOHNSON, E. F., CO.	299 10TH AVE. S. W.	WASECA, MN 56093
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
78488	STACKPOLE CARBON CO.		ST. MARYS, PA 15857
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077
80294	BOURNS, INC., INSTRUMENT DIV.	6135 MAGNOLIA AVE.	RIVERSIDE, CA 92506
81483	INTERNATIONAL RECTIFIER CORP.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY CO., INC.	3029 E. WASHINGTON ST.	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NB 68601
91836	KINGS ELECTRONICS CO., INC.	40 MARBLEDALE ROAD	TUCKAHOE, NY 10707

Electrical Parts List—AM 502

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2733-00			CKT BOARD ASSY:MAIN	80009	670-2733-00
C10	295-0155-00			CAP.,MATCHED:TWO 0.1UF,10%,600V	80009	295-0155-00
C20						
C28	281-0663-00			CAP.,FXD,CER DI:10.4PF,1%,500V	72982	374-005COG01049F
C30	281-0081-00			CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C32	281-0081-00			CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C34	281-0645-00			CAP.,FXD,CER DI:8.2PF,+/-0.25PF,500V	72982	374-011COH0829C
C35	281-0081-00			CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C38	283-0626-00			CAP.,FXD,MICA D:1800PF,5%,500V	00853	D195E182J0
C48	381-0663-00			CAP.,FXD,CER DI:10.4PF,1%,500V	72982	374005COG1049F
C50	281-0081-00			CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C52	281-0081-00			CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C54	281-0645-00			CAP.,FXD,CER DI:8.2PF,+/-0.25PF,500V	72982	374-011COH0829C
C55	281-0081-00			CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C58	283-0626-00			CAP.,FXD,MICA D:1800PF,5%,500V	00853	D195E182J0
C107	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131-250651103P
C122	281-0093-00	B010100	B039999	CAP.,VAR,CER DI:5.5-18PF	72982	538-011COP092R
C122	281-0092-00	B040000		CAP.,VAR,CER DI:9-35PF	72982	538-011E2P094R
C131	281-0612-00			CAP.,FXD,CER DI:5.6PF,+/-0.5PF,500V	72982	374-001COH0569D
C146	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039651105Z
C150	281-0114-00			CAP.,VAR,AIR DI:1.3-5.4PF,750V	74970	189-0352-075
C164	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,350V	72982	301-000U2M0101M
C176	281-0618-00			CAP.,FXD,CER DI:4.7PF,+/-0.5PF,200V	72982	374-001COH0479D
C195	281-0518-00			CAP.,FXD,CER DI:47PF,+/-9.4PF,500V	72982	301-000U2J0470M
C207	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131-250651103P
C222	281-0093-00	B010100	B039999	CAP.,VAR,CER DI:5.5-18PF	72982	538-011COP092R
C222	281-0092-00	B040000		CAP.,VAR,CER DI:9-35PF	72982	538-011E2P094R
C231	281-0612-00			CAP.,FXD,CER DI:5.6PF,+/-0.5PF,500V	72982	374-001COH0569D
C264	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,350V	72982	301-000U2M0101M
C276	281-0618-00			CAP.,FXD,CER DI:4.7PF,+/-0.5PF,200V	72982	374-001COH0479D
C431	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020NLF
C433	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020NLF
C435	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020NLF
C438	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039651105Z
C443	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020NLF
C448	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039651105Z
C450	281-0613-00			CAP.,FXD,CER DI:10PF,+/-1PF,200V	72982	374-001COG0100F
C470	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C471	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C472	285-0809-00			CAP.,FXD,PLSTC:1UF,10%,50V	56289	LP66A1A105K
C473	285-0809-00			CAP.,FXD,PLSTC:1UF,10%,50V	56289	LP66A1A105K
C490	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	72982	301-000COG0220K
C491	281-0721-00			CAP.,FXD,CER DI:72PF,5%,500V	72982	301-000P3K720J
C493	283-0604-00			CAP.,FXD,MICA D:304PF,2%,300V	00853	D153F3040G0
C494	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C495	285-0627-00			CAP.,FXD,PLSTC:0.0033UF,5%,100V	56289	410P33251
C496	285-0598-00			CAP.,FXD,PLSTC:0.01UF,5%,100V	01002	61F10AC103
C497	285-0702-00			CAP.,FXD,PLSTC:0.033UF,5%,100V	56289	410P111
C498	285-0703-00			CAP.,FXD,PLSTC:0.1UF,5%,100V	56289	410P112
C499	285-0633-00			CAP.,FXD,PLSTC:0.22UF,20%,200V	56289	410P22491
C530	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C536	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1

Electrical Parts List—AM 502

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C552	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	72982	301-000COG0220K
C560	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C570	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C910	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C922	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C924	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C926	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C930	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M02ONLF
C942	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C960	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M02ONLF
C964	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C966	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C968	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
CR108	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR109	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR131	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR150	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR181	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR208	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR209	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR231	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR250	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR281	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR438	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR441	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR448	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR531	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR555	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR558	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR560	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR561	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR570	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR571	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
DS50	150-0107-00			LAMP,INCAND:12V,0.04A,T-1	17537	227
DS900	150-0107-00			LAMP,INCAND:12V,0.04A,T-1	17537	227
F100	159-0024-00			FUSE,CARTRIDGE:3AG,0.06A,250V,FAST BLOW	71400	AGC1-16
F200	159-0024-00			FUSE,CARTRIDGE:3AG,0.06A,250V,FAST BLOW	71400	AGC1-16
J10	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE	24931	28JR200-1
J15	129-0103-00			POST,BDG,ELEC:ASSEMBLY	80009	129-0103-00
J20	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE	24931	28JR200-1
J550	131-0818-00			CONNECTOR,RCPT,:BNC,FEMALE	91836	KC19-153BNC
L164	108-0409-00			COIL,RF:17.5UH	80009	108-0409-00
L264	108-0409-00			COIL,RF:17.5UH	80009	108-0409-00
L416	276-0507-00			SHIELDING BEAD,:0.6UH	78488	57-0180-7D
L426	276-0507-00			SHIELDING BEAD,:0.6UH	78488	57-0180-7D
L445	276-0507-00			SHIELDING BEAD,:0.6UH	78488	57-0180-7D
Q121A,B	151-1027-00			TRANSISTOR:SILICON,JFE,N-CHAN	80009	151-1027-00
Q131A,B	151-0261-00			TRANSISTOR:SILICON,PNP,DUAL	12040	NS7410
Q136	151-1025-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	01295	SBA8129
Q141A,B	151-0176-00			TRANSISTOR:SILICON,NPN,DUAL	04713	SD555
Q145A,B	151-0261-00			TRANSISTOR:SILICON,PNP,DUAL	12040	NS7410

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
Q152A,B	153-0586-00			TRANSISTOR:SILICON,PNP,PAIR	80009	153-0586-00
Q162A,B	151-1036-00			TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	21845	FD1551
Q164A,B	153-0586-00			TRANSISTOR:SILICON,PNP,PAIR	80009	153-0586-00
Q167	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q168	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q171A,B	151-1029-00			TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	01295	SFB8823
Q181	151-0188-00			TRANSISTOR:SILICON,PNP	04713	2N3906
Q185	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q195	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q196	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q236	151-1025-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	01295	SBA8129
Q267	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q268	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q269	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q281	151-0188-00			TRANSISTOR:SILICON,PNP	04713	2N3906
Q285	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q410A,B	153-0586-00			TRANSISTOR:SILICON,PNP,PAIR	80009	153-0586-00
Q416	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q422A,B	153-0587-00			TRANSISTOR:SILICON,NPN,PAIR	80009	153-0587-00
Q426	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q431	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q443	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q445	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q451	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q501	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q511	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q521	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q532	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q540	151-0260-00			TRANSISTOR:SILICON,NPN	02735	2N5189
Q541	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q555	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q558	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q561A,B	151-0307-00			TRANSISTOR:SILICON,PNP,DUAL	07263	SP13404
Q571A,B	151-0309-00			TRANSISTOR:SILICON,NPN,DUAL	07263	SP13378
Q910	151-0301-00	B010100	B040389	TRANSISTOR:SILICON,PNP	04713	2N2907A
Q910	151-0302-00	B040390		TRANSISTOR:SILICON,NPN	04713	2N2222A
Q940	151-0334-00			TRANSISTOR:SILICON,NPN	80009	151-0334-00
Q942	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q990	151-0302-00	B010100	B040289	TRANSISTOR:SILICON,NPN	04713	2N2222A
Q990	151-0301-00	B040390		TRANSISTOR:SILICON,PNP	04713	2N2907A
R10	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R20	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R30	322-0687-07			RES.,FXD,FILM:100.5M OHM,0.1%,0.25W	91637	MFF1421C10053B
R35	322-0624-07			RES.,FXD,FILM:990K OHM,0.1%,0.25W	75042	CEBT0-9903B
R38	321-0289-03			RES.,FXD,FILM:10K OHM,0.25%,0.125W	75042	CEAT2-1002C
R40	311-1566-00			RES.,VAR,NONWIR:200 OHM,20%,0.50W	73138	91A-200R0M
R50	322-0687-07			RES.,FXD,FILM:100.5M OHM,0.1%,0.25W	91637	MFF1421C10053B
R55	322-0624-07			RES.,FXD,FILM:990K OHM,0.1%,0.25W	75042	CEBT0-9903B
R58	321-0289-03			RES.,FXD,FILM:10K OHM,0.25%,0.125W	75042	CEAT2-1002C
R103	321-0281-00			RES.,FXD,FILM:8.25K OHM,1%,0.125W	75042	CEAT0-8251F
R105	311-1559-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	73138	91A-10001M
R106	315-0107-00			RES.,FXD,CMPSN:100M OHM,5%,0.25W	01121	CB1075
R107	315-0107-00			RES.,FXD,CMPSN:100M OHM,5%,0.25W	01121	CB1075

Electrical Parts List—AM 502

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R120	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R121	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEATO-2001F
R122	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R125	321-0114-00			RES.,FXD,FILM:150 OHM,1%,0.125W	75042	CEATO-1500F
R126	321-0927-07			RES.,FXD,FILM:125 OHM,0.1%,0.125W	91637	MFF1816C125ROB
R131	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	75042	CEATO-4021F
R136	321-0199-06			RES.,FXD,FILM:1.15K OHM,0.25%,0.125W	75042	CEAT9-1151C
R137	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R141	321-0813-07			RES.,FXD,FILM:495 OHM,0.1%,0.125W	75042	CEAT9-4950B
R145	321-0353-00			RES.,FXD,FILM:46.4K OHM,1%,0.125W	75042	CEATO-4642F
R146	321-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.125W	75042	CEATO-6651F
R152	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEATO-2001F
R154	321-0225-06			RES.,FXD,FILM:2.15K OHM,0.25%,0.125	75042	CEAT9-2151C
R155	321-0154-00	B010100	B039999	RES.,FXD,FILM:392 OHM,1%,0.125W	75042	CEATO-3920F
R155	321-0150-00	B040000		RES.,FXD,FILM:357 OHM,1%,0.125W	75042	CEATO-3570F
R157	315-0564-00			RES.,FXD,CMPSN:560K OHM,5%,0.25W	01121	CB5645
R158	311-0467-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	11237	41334
R159	311-1567-00	B010100	B039999	RES.,VAR,NONWIR:100 OHM,20%,0.50W	73138	91A-100ROM
R159	311-1566-00	B040000		RES.,VAR,NONWIR:200 OHM,20%,0.50W	73138	91A-200ROM
R160	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R161	311-1564-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	73138	91A-500ROM
R162	321-0240-00			RES.,FXD,FILM:3.09K OHM,1%,0.125W	75042	CEATO-3091F
R164	321-0309-00			RES.,FXD,FILM:16.2K OHM,1%,0.125W	75042	CEATO-1622F
R166	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	75042	CEATO-3010F
R168	321-0224-00			RES.,FXD,FILM:2.1K OHM,1%,0.125W	75042	CEATO-2101F
R170	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R171	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	75042	CEATO-7501F
R173	321-0239-07			RES.,FXD,FILM:3.01K OHM,0.1%,0.125W	75042	CEAT9-3011B
R175	321-0289-07			RES.,FXD,FILM:10K OHM,0.1%,0.125W	75042	CEAT9-1002B
R176	321-1267-03			RES.,FXD,FILM:5.97K OHM,0.25%,0.125W	75042	CEAT2-5971C
R177	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	75042	CEATO-3320F
R178 ¹	311-1494-00			RES.,VAR,NONWIR:2K OHM,10%,1W	01121	11M187
R181	321-0187-00			RES.,FXD,FILM:866 OHM,1%,0.125W	75042	CEATO-8660F
R184	321-0297-00			RES.,FXD,FILM:12.1K OHM,1%,0.125W	75042	CEATO-1212F
R185	321-0236-00			RES.,FXD,FILM:2.8K OHM,1%,0.125W	75042	CEATO-2801F
R191	311-1555-00			RES.,VAR,NONWIR:100K OHM,20%,0.5W	73138	91A-10002M
R193	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R195	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R196	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R198	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R205	311-1559-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	73138	91A-10001M
R206	315-0107-00			RES.,FXD,CMPSN:100M OHM,5%,0.25W	01121	CB1075
R207	315-0107-00			RES.,FXD,CMPSN:100M OHM,5%,0.25W	01121	CB1075
R220	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R221	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEATO-2001F
R222	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R225	321-0114-00			RES.,FXD,FILM:150 OHM,1%,0.125W	75042	CEATO-1500F
R226	321-0927-07			RES.,FXD,FILM:125 OHM,0.1%,0.125W	91637	MFF1816C125ROB
R231	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	75042	CEATO-4021F
R236	321-0199-06			RES.,FXD,FILM:1.15K OHM,0.25%,0.125W	75042	CEAT9-1151C
R237	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R241	321-0813-07			RES.,FXD,FILM:495 OHM,0.1%,0.125W	75042	CEAT9-4950B
R245	321-0353-00			RES.,FXD,FILM:46.4K OHM,1%,0.125W	75042	CEATO-4642F

¹Furnished as a unit with S178.

Electrical Parts List—AM 502

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R246	321-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.125W	75042	CEATO-6651F
R252	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEATO-2001F
R254	321-0225-06			RES.,FXD,FILM:2.15K OHM,0.25%,0.125	75042	CEAT9-2151C
R255	321-0154-00	B010100	B039999	RES.,FXD,FILM:392 OHM,1%,0.125W	75042	CEATO-3920F
R255	321-0150-00	B040000		RES.,FXD,FILM:357 OHM,1%,0.125W	75042	CEATO-3570F
R260	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R261	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	75042	CEATO-3011F
R262	321-0240-00			RES.,FXD,FILM:3.09K OHM,1%,0.125W	75042	CEATO-3091F
R264	321-0309-00			RES.,FXD,FILM:16.2K OHM,1%,0.125W	75042	CEATO-1622F
R266	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	75042	CEATO-3010F
R268	321-0224-00			RES.,FXD,FILM:2.1K OHM,1%,0.125W	75042	CEATO-2101F
R269	311-1564-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	73138	91A-500ROM
R270	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R271	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	75042	CEATO-7501F
R273	321-0239-07			RES.,FXD,FILM:3.01K OHM,0.1%,0.125W	75042	CEAT9-3011B
R276	321-1267-03			RES.,FXD,FILM:5.97K OHM,0.25%,0.125W	75042	CEAT2-5971C
R277	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	75042	CEATO-3320F
R284	321-0314-00			RES.,FXD,FILM:18.2K OHM,1%,0.125W	75042	CEATO-1822F
R285	321-0236-00			RES.,FXD,FILM:2.8K OHM,1%,0.125W	75042	CEATO-2801F
R410	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	75042	CEATO-49R90F
R411	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	75042	CEATO-49R90F
R414	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R420	322-0238-00			RES.,FXD,FILM:2.94K OHM,1%,0.25W	75042	CEBTO-2941F
R421	321-0274-00			RES.,FXD,FILM:6.98K OHM,1%,0.125W	75042	CEATO-6981F
R422	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R423	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	75042	CEATO-49R90F
R424	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	75042	CEATO-49R90F
R431	321-0182-00			RES.,FXD,FILM:768 OHM,1%,0.125W	75042	CEATO-7680F
R433	321-0179-00			RES.,FXD,FILM:715 OHM,1%,0.125W	75042	CEATO-7150F
R435	321-0233-00			RES.,FXD,FILM:2.61K OHM,1%,0.125W	75042	CEATO-2611F
R436	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R438	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R440	321-0268-00			RES.,FXD,FILM:6.04K OHM,1%,0.125W	75042	CEATO-6041F
R441	321-0247-00			RES.,FXD,FILM:3.65K OHM,1%,0.125W	75042	CEATO-3651F
R442	321-0400-00			RES.,FXD,FILM:143K OHM,1%,0.125W	75042	CEATO-1433F
R443	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R445	321-0218-00			RES.,FXD,FILM:1.82K OHM,1%,0.125W	75042	CEATO-1821F
R446	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R448	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R450	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R451	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R460	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	75042	CEATO-2371F
R461	311-1566-00			RES.,VAR,NONWIR:200 OHM,20%,0.50W	73138	91A-200ROM
R462	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	75042	CEATO-2371F
R464	321-0204-00			RES.,FXD,FILM:1.3K OHM,1%,0.125W	75042	CEATO-1301F
R466	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R467	311-1057-00			RES.,VAR,NONWIR:5K OHM,3%,1%,LIN,10 TURN	80294	3540S-420-502
R468	311-0887-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W	80009	311-0887-00
R470	316-0155-00			RES.,FXD,CMPSN:1.5M OHM,10%,0.25W	01121	CB1551
R471	316-0155-00			RES.,FXD,CMPSN:1.5M OHM,10%,0.25W	01121	CB1551
R474	321-0408-00			RES.,FXD,FILM:174K OHM,1%,0.125W	75042	CEATO-1743F
R475	321-0408-00			RES.,FXD,FILM:174K OHM,1%,0.125W	75042	CEATO-1743F
R478	321-0303-00			RES.,FXD,FILM:14K OHM,1%,0.125W	75042	CEATO-1402F

Electrical Parts List—AM 502

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R479	321-0303-00			RES.,FXD,FILM:14K OHM,1%,0.125W	75042	CEAT0-1402F
R480	321-0289-03			RES.,FXD,FILM:10K OHM,0.25%,0.125W	75042	CEAT2-1002C
R481	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	75042	CEAT9-5001B
R482	321-0222-03			RES.,FXD,FILM:2K OHM,0.25%,0.125W	75042	CEAT22KC
R483	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	75042	CEAT2-1001C
R484	321-0612-03			RES.,FXD,FILM:500 OHM,0.25%,0.125W	75042	CEAT2-5000C
R485	321-0126-03			RES.,FXD,FILM:200 OHM,0.25%,0.125%	75042	CEAT2-200ROC
R486	321-0097-03			RES.,FXD,FILM:100 OHM,0.25%,0.125%	91637	MFF1816G100ROC
R487	321-0751-06			RES.,FXD,FILM:50 OHM,0.25%,0.125W	75042	CEAT9-50R00C
R488	321-0030-02			RES.,FXD,FILM:20 OHM,0.5%,0.125W	75042	CEAT2-20R00D
R489	321-0001-01			RES.,FXD,FILM:10 OHM,0.5%,0.125W	75042	CEAT0-10R00D
R501	316-0225-00			RES.,FXD,CMPSN:2.2M OHM,10%,0.25W	01121	CB2251
R503	321-0452-00			RES.,FXD,FILM:499K OHM,1%,0.125W	75042	CEAT0-4993F
R504	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	75042	CEAT0-2493F
R507	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R510	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R511	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R513	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R521	316-0276-00			RES.,FXD,CMPSN:27M OHM,10%,0.25W	01121	CB2761
R523	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	75042	CEAT0-2493F
R524	321-0452-00			RES.,FXD,FILM:499K OHM,1%,0.125W	75042	CEAT0-4993F
R531	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R532	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R533	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R536	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R541	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R542	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R550	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R551	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R552	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R553	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R555	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R558	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R559	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R560	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R561	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R562	307-0104-00			RES.,FXD,CMPSN:3.3 OHM,5%,0.25W	01121	CB33G5
R570	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R571	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R572	307-0104-00			RES.,FXD,CMPSN:3.3 OHM,5%,0.25W	01121	CB33G5
R900	304-0102-00	B010100	B029999	RES.,FXD,CMPSN:1K OHM,10%,1W	01121	GB1021
R900	303-0511-00	B030000		RES.,FXD,CMPSN:510 OHM,5%,1W	01121	GB5115
R910	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R915	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	75042	CEAT0-9091F
R916	321-0268-00			RES.,FXD,FILM:6.04K OHM,1%,0.125W	75042	CEAT0-6041F
R920	307-0105-00			RES.,FXD,CMPSN:3.9 OHM,5%,0.25W	01121	CB39G5
R922	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R924	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R926	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R940	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R942	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R945	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R946	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225

ADJUSTMENTS

Services Available

Tektronix Inc. provides complete instrument repair and adjustment at local Field Service Centers and at the Factory Service Center. Contact your local Tektronix Field Office or representative for further information.

Test Equipment

For calibration of the AM 502, the following equipment is required:

Oscilloscope with vertical deflection factor of 100 mV/Div to 10 V/Div and bandwidth of at least 2 MHz, Tektronix 5100 or 5400 series or equivalent.

Square-wave generator with 1 kHz output frequency, output amplitude variable from +1 V to +5 V, Tektronix type FG 501 or equivalent.

Constant amplitude sine-wave generator, output amplitude at least 15 V P-P and frequency of 50 kHz, Tektronix type FG 501 or equivalent.

Standard amplitude calibrator with 5 mV output, Tektronix Calibration Fixture 067-0502-01 or equivalent.

Termination, 50 Ω , BNC connectors, Tektronix part number 011-0049-01 or equivalent.

Attenuator, 10X, BNC connectors, Tektronix part number 011-0059-01 or equivalent.

Dual Input Connector, BNC connectors, Tektronix part number 067-0525-00 or equivalent.

Input Normalizer, 47 pF, Tektronix part number 067-0541-00.

Coaxial Cable, 50 Ω , BNC connector, Tektronix part number 012-0057-01 or equivalent.

Preparation

The AM 502 can be operated either fully installed in a TM 500 Series Power Module, or connected to the Power Module via a flexible plug-in extender (Tektronix part number 067-0645-01). Remove the Power Module cabinet to make adjustments when the AM 502 is calibrated inside the Power Module. All adjustments are located on the left side of the board. Make adjustments at an ambient temperature between +20°C and +30°C.

1. Adjust Step Gain AC Balance

Set the LF -3 dB to the 10 Hz position and the HF -3 dB to the .1 KHz position. Make certain that the \div 100 pushbutton is out. Connect the test oscilloscope vertical input, DC coupled at 1.0 V/Div., to the AM 502 output. Push both GND pushbuttons. While rotating the GAIN switch from stop to stop, adjust R161, Step Gain AC Bal, for no output DC level change. Return the GAIN switch to the 100 position.

2. Adjust Variable Gain DC Balance

Using the same control settings as in the previous step, adjust R269, Var Gain DC Bal, for no output DC level change while rotating the CAL knob from stop to stop. Return the CAL knob to the fully CW detent position.

3. Adjust Output DC Level

Without changing the AM 502 control positions from those in the previous step, obtain a ground reference on the test oscilloscope in the 1.0 V/Div vertical deflection position. Adjust R191, Output DC Level, to the previously established zero reference level.

4. Adjust Coarse Step Gain DC Balance

Set the LF -3 dB to the DC position, the GAIN at 10 k, and the STEP GAIN DC BAL to midrange. Set the test oscilloscope vertical deflection factor at 1 V/Div and obtain a ground reference. Leave the other controls as in the previous step. Adjust R461, Coarse Step Gain DC Bal, for zero volts (within one volt) on the test oscilloscope.

5. Adjust + Input Gate Leakage Current Compensation

Connect the 50 Ω termination to the + Input of the AM 502 and set the GAIN to the 1 K position. Make certain that both AC pushbuttons are depressed. Set the test oscilloscope for a deflection sensitivity of 100 mV/Div and position the trace to the graticule center. Adjust R105, + Input Gate Leakage Current Comp, for minimum trace shift while alternately depressing and releasing the + GND pushbutton.

6. Adjust - Input Gate Leakage Current Compensation

Move the termination to the - input and make certain that the + input GND pushbutton is depressed. Both AC pushbuttons must be depressed. Leave the other controls as in the previous step. Adjust R205, - Input Gate Leakage Current Comp, for minimum trace shift while alternately depressing and releasing the - GND pushbutton. Release both AC pushbuttons.

7. Adjust Input Cross Neutralization

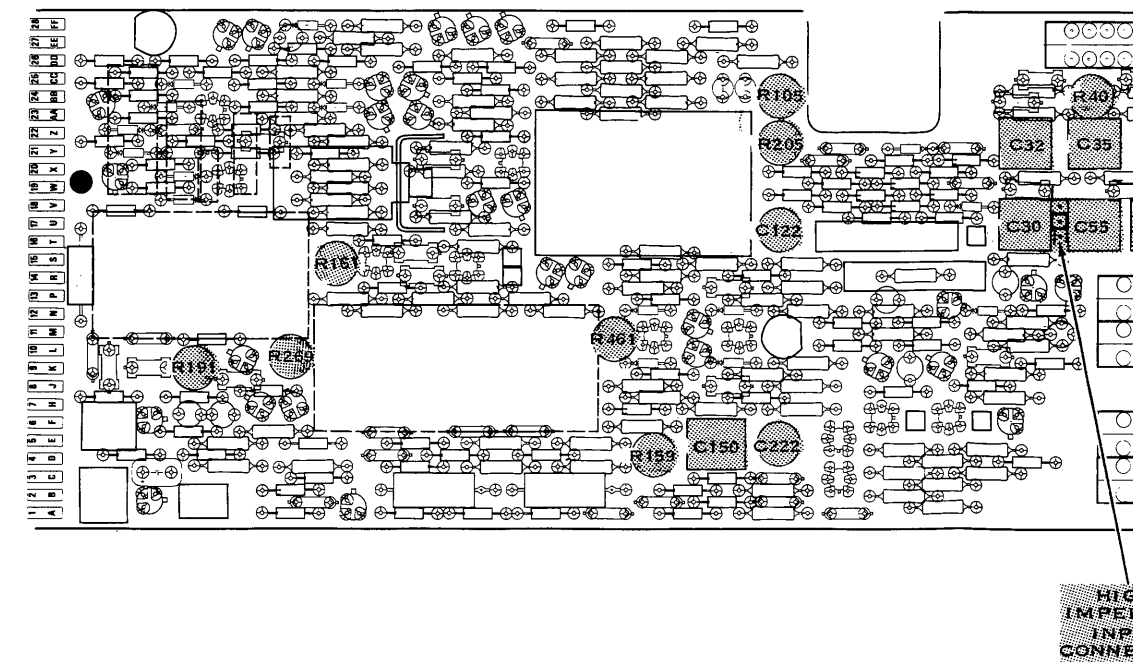
Set the GAIN to the 100 position and the HF -3 dB to 1 MHz. The LF -3 dB switch must be in the DC position. Connect the function generator (set for square-wave output, centered around ground, 1 ms period) through the 10X attenuator and 50 Ω termination to the + input of the AM 502. Release the + input GND pushbutton and make certain that the - input GND pushbutton is in and the AC pushbutton is out. Set the test oscilloscope for a vertical deflection factor of 1 V/Div, and a horizontal deflection factor of .2 ms/Div. Adjust the amplitude of the square-wave generator for a test oscilloscope display of four divisions. While pushing and releasing the - input GND pushbutton, adjust C222, + Input Cross Neutralization, for a similar-looking upper front corner on the square wave in both positions of the GND pushbutton. Change the input connection to the - input, release the - input GND button, and repeat the procedure using the + input GND pushbutton and adjusting C222, - Input Cross Neutralization adjustment.

8. Adjust I

Using the + input GND pushbutton and the - input GND pushbutton released. In both positions, maintain focus. Adjust C51, Input Cross Neutralization, looking up and down. Press the normalizer and press the procedure, best looking.

9. Adjust A

Remove the vertical deflection pushbutton and adjust the amplitude 1



ADJUSTMENTS

5. Adjust + Input Gate Leakage Current Compensation

Connect the $50\ \Omega$ termination to the + Input of the AM 502 and set the GAIN to the 1 K position. Make certain that both AC pushbuttons are depressed. Set the test oscilloscope for a deflection sensitivity of 100 mV/Div and position the trace to the graticule center. Adjust R105, + Input Gate Leakage Current Comp, for minimum trace shift while alternately depressing and releasing the + GND pushbutton.

6. Adjust - Input Gate Leakage Current Compensation

Move the termination to the - input and make certain that the + input GND pushbutton is depressed. Both AC pushbuttons must be depressed. Leave the other controls as in the previous step. Adjust R205, - Input Gate Leakage Current Comp, for minimum trace shift while alternately depressing and releasing the - GND pushbutton. Release both AC pushbuttons.

7. Adjust Input Cross Neutralization

Set the GAIN to the 100 position and the HF -3 dB to 1 MHz. The LF -3 dB switch must be in the DC position. Connect the function generator (set for square-wave output, centered around ground, 1 ms period) through the 10X attenuator and $50\ \Omega$ termination to the + input of the AM 502. Release the + input GND pushbutton and make certain that the - input GND pushbutton is in and the AC pushbutton is out. Set the test oscilloscope for a vertical deflection factor of 1 V/Div, and a horizontal deflection factor of .2 ms/Div. Adjust the amplitude of the square-wave generator for a test oscilloscope display of four divisions. While pushing and releasing the - input GND pushbutton, adjust C222, + Input Cross Neutralization, for a similar-looking upper front corner on the square wave in both positions of the GND pushbutton. Change the input connection to the - input, release the - input GND button, and repeat the procedure using the + input GND pushbutton and adjusting C222, - Input Cross Neutralization adjustment.

8. Adjust Input Capacitance

Using the same setup as described in the previous step, add the 47 pF Normalizer between the $50\ \Omega$ termination and the - input on the AM 502. Push the + input GND pushbutton. Make certain the - input GND pushbutton is released. Increase the square-wave generator output to maintain four divisions of display on the test oscilloscope. Adjust C50, - Input Comp (Normal), for the flattest looking upper front corner on the square wave. Change the normalizer to the + input, release + input GND pushbutton, and press the - input GND pushbutton. Repeat the procedure, adjusting C30, + Input Comp (Normal), for the best looking upper front corner.

9. Adjust Attenuator Compensation

Remove the 10X attenuator. Set the test oscilloscope vertical deflection factor to .1 V/Div. Depress the ÷ 100 pushbutton, and adjust the square-wave generator output amplitude for a four division display. Make certain the -

input GND pushbutton is in. Alternately adjust C35, + Attn Input Cap, and C32, + Attn Comp, for the best looking upper front corner and flattest top on the square wave display. Change the normalizer to the - input, release the - input GND and push the + input GND pushbutton. Repeat the procedure adjusting C55, - Attn Input Cap and C52, - Attn Comp for the best looking upper front corner and flattest top on the square wave. Remove the signal from the - input.

10. Adjust Attenuator Common Mode Rejection Ratio

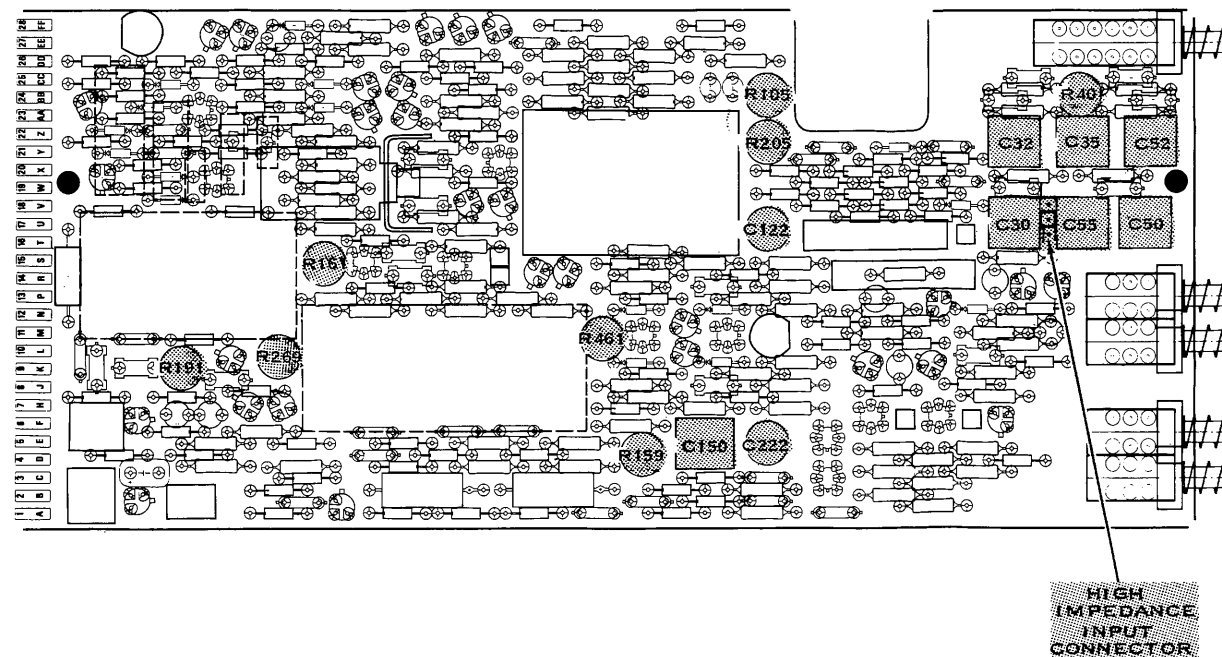
Make certain the ÷ 100 pushbutton is in, and the AC and GND pushbuttons for both channels are out. Set the GAIN switch at 10 K. Remove the $50\ \Omega$ termination and normalizer. Apply a 10 V P-P 1 kHz square wave through the dual input cable to both inputs of the AM 502. Connect the test oscilloscope, set for 2 V/Div vertical deflection, to the output of the AM 502. Adjust R140 Attn DC CMRR, for minimum display amplitude. Remove the square wave from the input of the AM 502 and connect a 50 kHz 10 V P-P sine wave to both input connectors through the dual input cable. Check that the C34, + Attn Comp, and C52, - Attn Comp, are set for minimum display amplitude. Remove the sine wave from the input.

11. Adjust Amplifier Gain

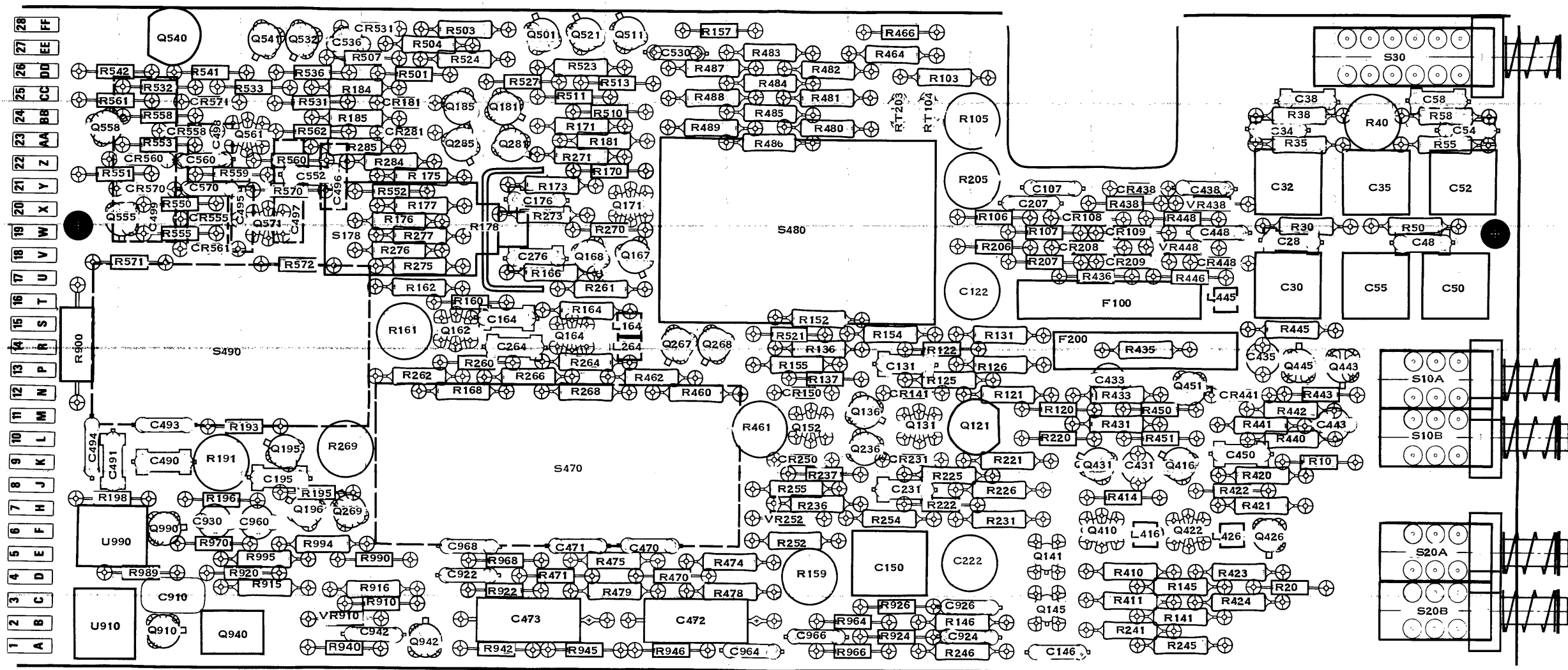
Set the GAIN switch to the 1 K position. Release the ÷ 100 pushbutton. Connect the Standard Amplitude Calibrator set for an output of 5 mV to the AM 502 + input connector. Make certain the + input AC and GND pushbuttons are out. Push the - input GND pushbutton. Check that the HF -3 dB is in the 1 MHz position and the LF -3 dB switch is in the 0.1 Hz position. Connect the test oscilloscope to the OUTPUT connector, and set the vertical deflection factor at 1 V/Div. Adjust R159, Gain Cal, for exactly five divisions of vertical deflection on the test oscilloscope.

12. Adjust High Frequency CMRR

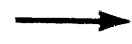
Connect the sine wave generator through a coaxial cable to the dual input connector. Set the frequency at 50 KHz and the amplitude at 10 V P-P. Connect the dual input connector to both inputs of the AM 502. Release both AC and GND pushbuttons. Set the gain switch to 100 and the LF -3 dB switch to DC. Connect the output of the AM 502 to the test oscilloscope, set for a vertical deflection factor of 20 mV/Div, and a horizontal deflection factor of 20 μ s/Div. Adjust C150, HF CMRR, for minimum amplitude displayed on the test oscilloscope.

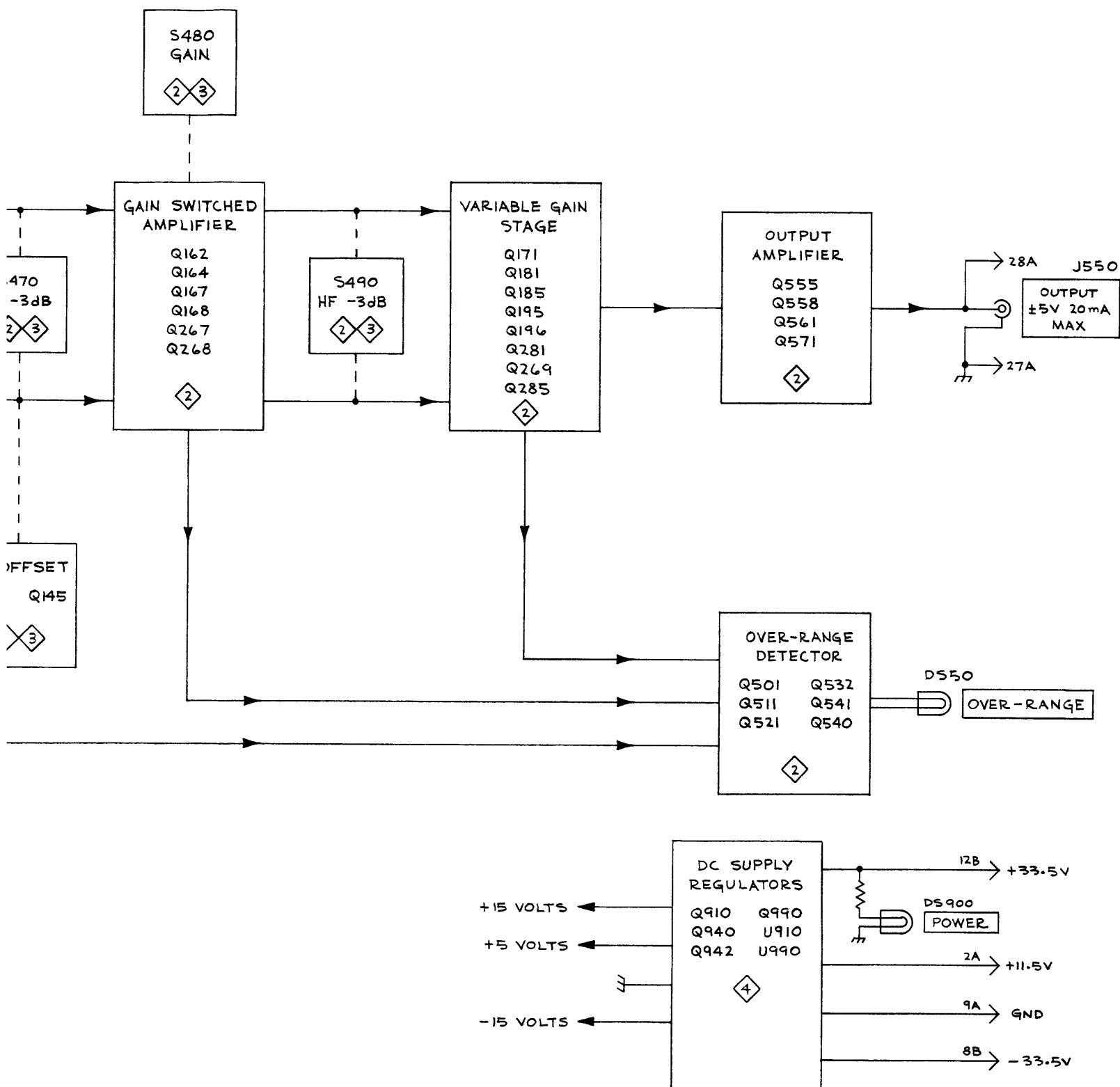


PARTS LOCATION GRID



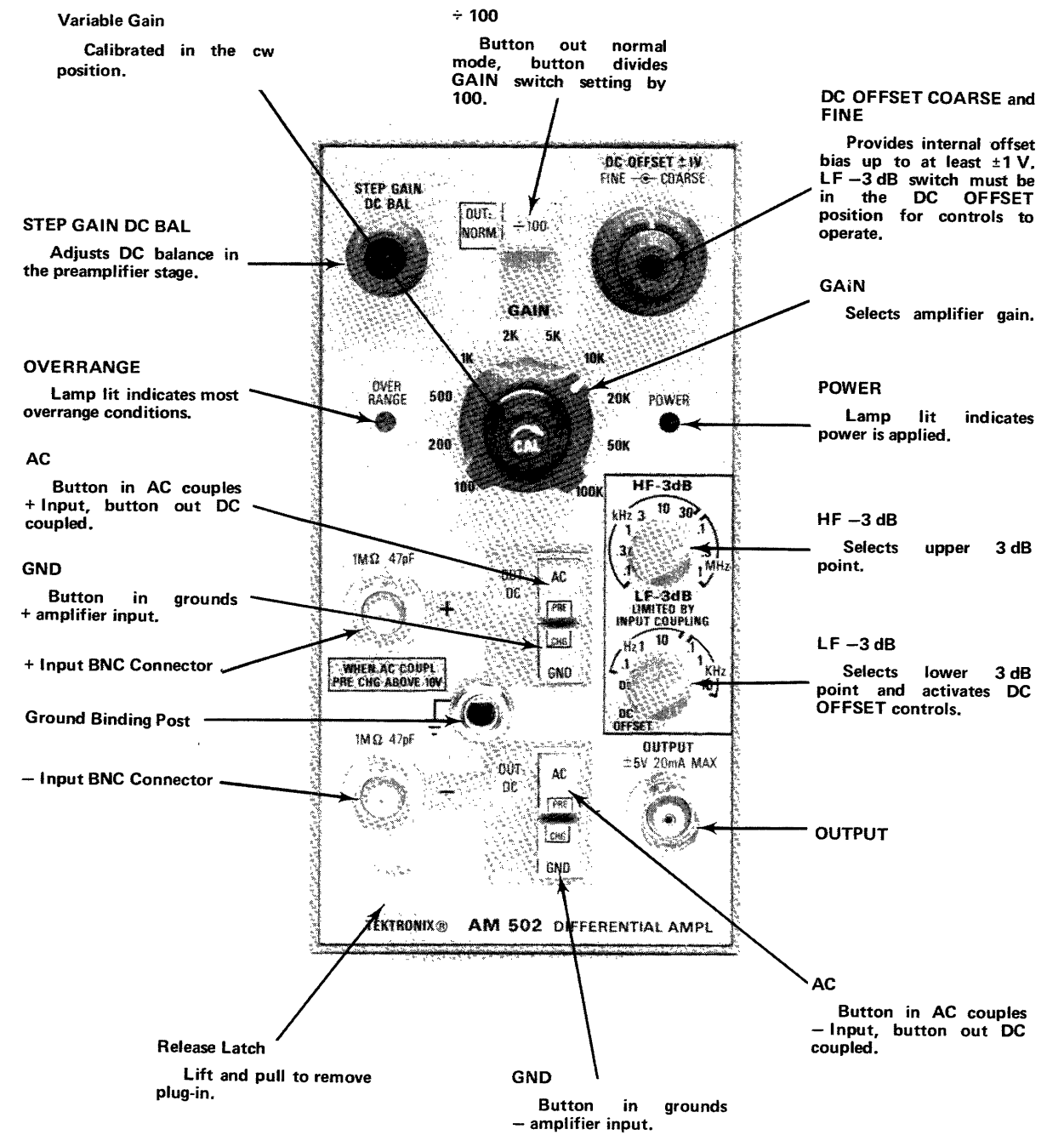
CKT NO	GRID LOC	CKT NO
C28	K3	CR108
C30	K3	CR109
C32	K2	CR141
C34	K2	CR150
C35	L2	CR181
C38	K1	CR208
C48	L3	CR209
C50	L3	CR231
C54	M2	CR250
C55	L3	CR281
C58	L1	CR438
C107	I2	CR441
C122	I3	CR448
C131	H4	CR531
C146	I6	CR555
C150	H5	CR558
C164	E3	CR560
C176	E2	CR561
C195	C5	CR570
C207	I2	CR571
C222	I5	
C231	H5	F100
C264	E4	F200
C276	E3	
C431	J4	L164
C433	J4	L264
C435	K4	L416
C438	J2	L426
C443	L4	L445
C448	K3	
C450	K4	Q121
C470	F5	Q131
C471	E5	Q136
C472	F6	Q141
C473	E6	Q145
C490	B4	Q152
C491	A4	Q162
C493	B4	Q164
C494	A4	Q167
C495	C2	Q168
C496	C2	Q171
C497	C2	Q181
C498	B2	Q185
C499	B2	Q195
C530	F1	Q196
C536	C1	Q236
C552	C2	Q267
C560	B2	Q268
C570	B2	Q269
C910	B6	Q281
C922	D5	Q285
C924	H6	Q410
C926	H6	Q416
C930	B5	Q422
C942	D6	Q426
C960	C5	Q431
C964	G6	Q443
C966	G6	Q445
C968	D5	Q451



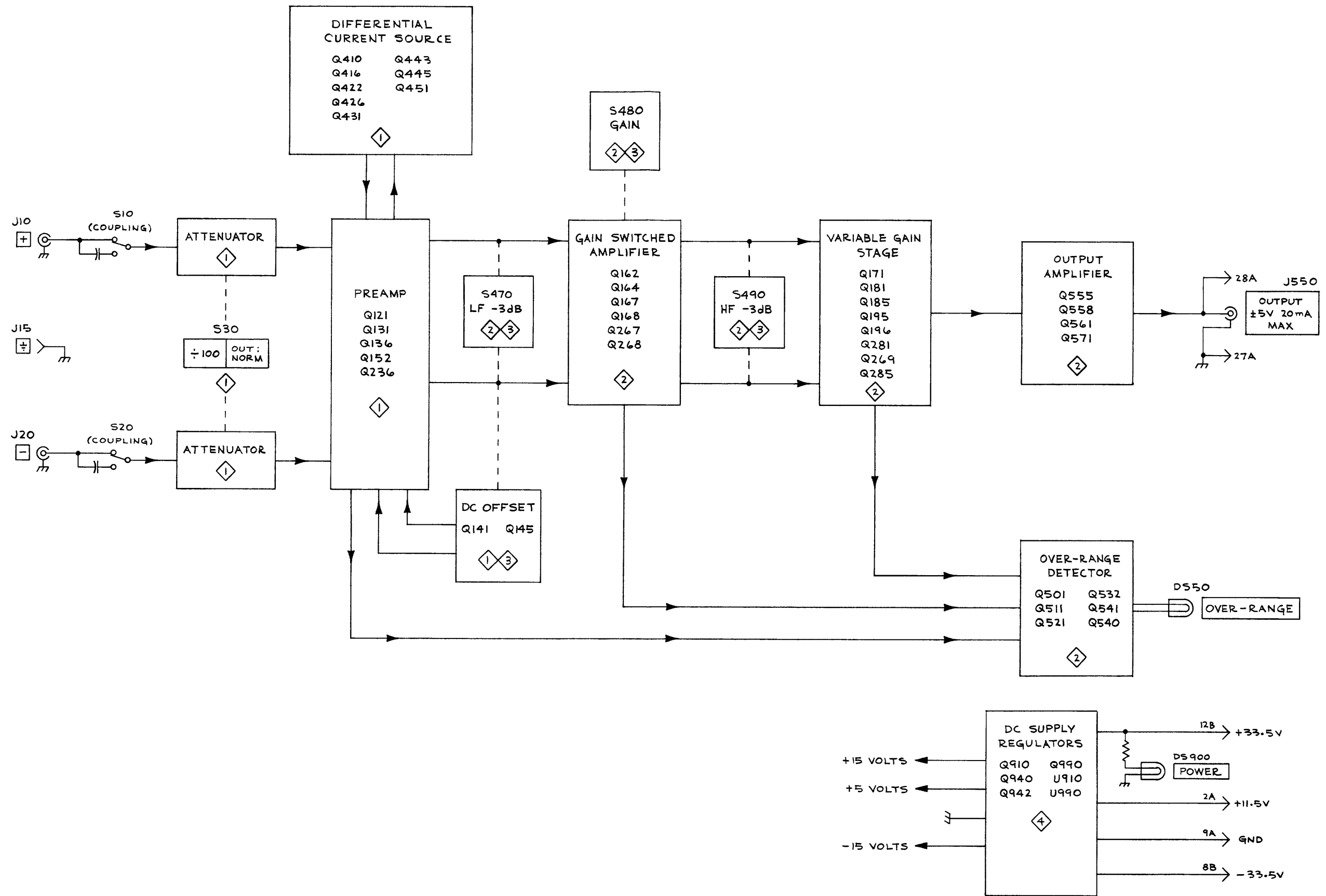


Block Diagram DEH 0573

CONTROLS AND CONNECTORS



BLOCK DIAGRAM

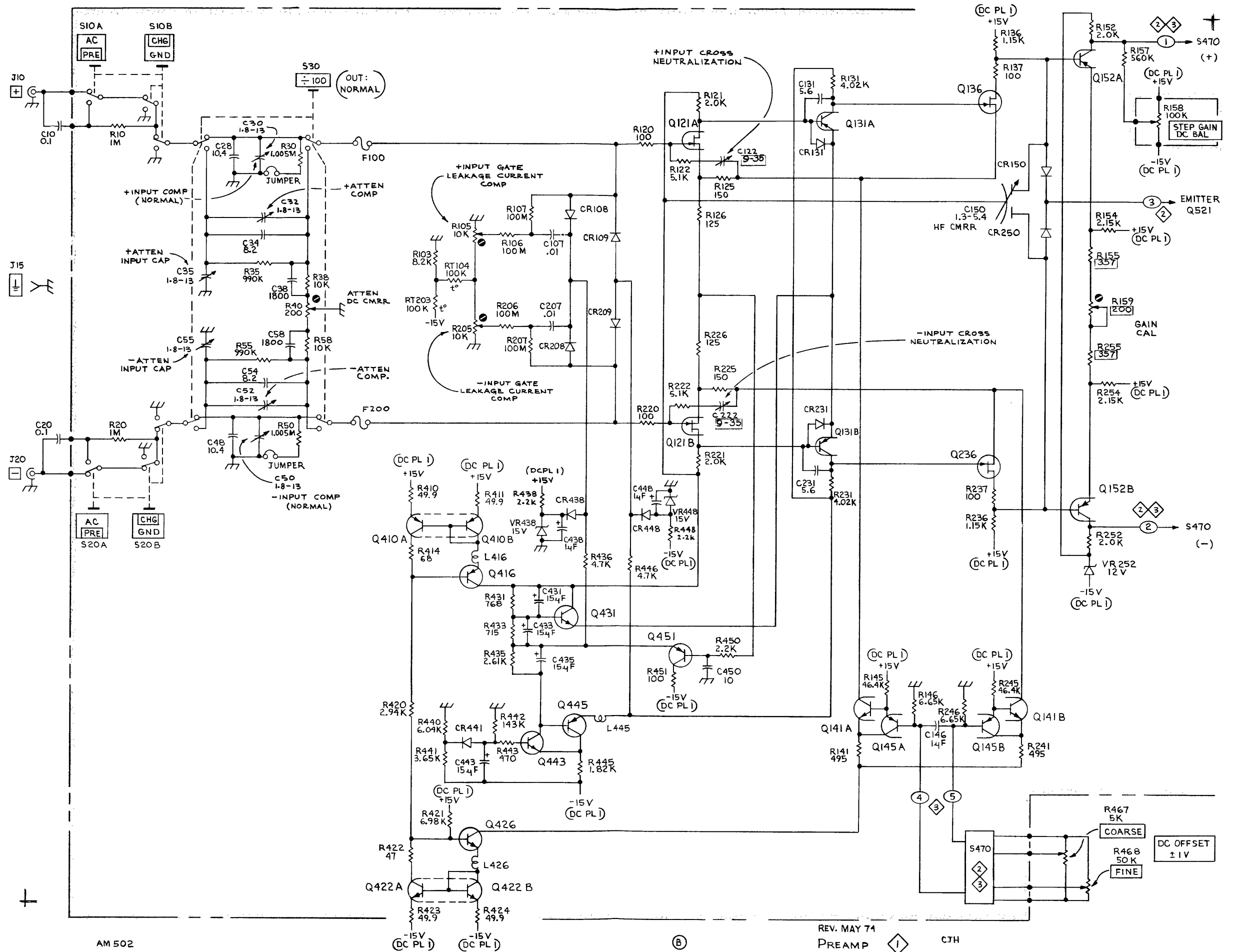


AM502

Ⓐ

BLOCK DIAGRAM DEH 0573

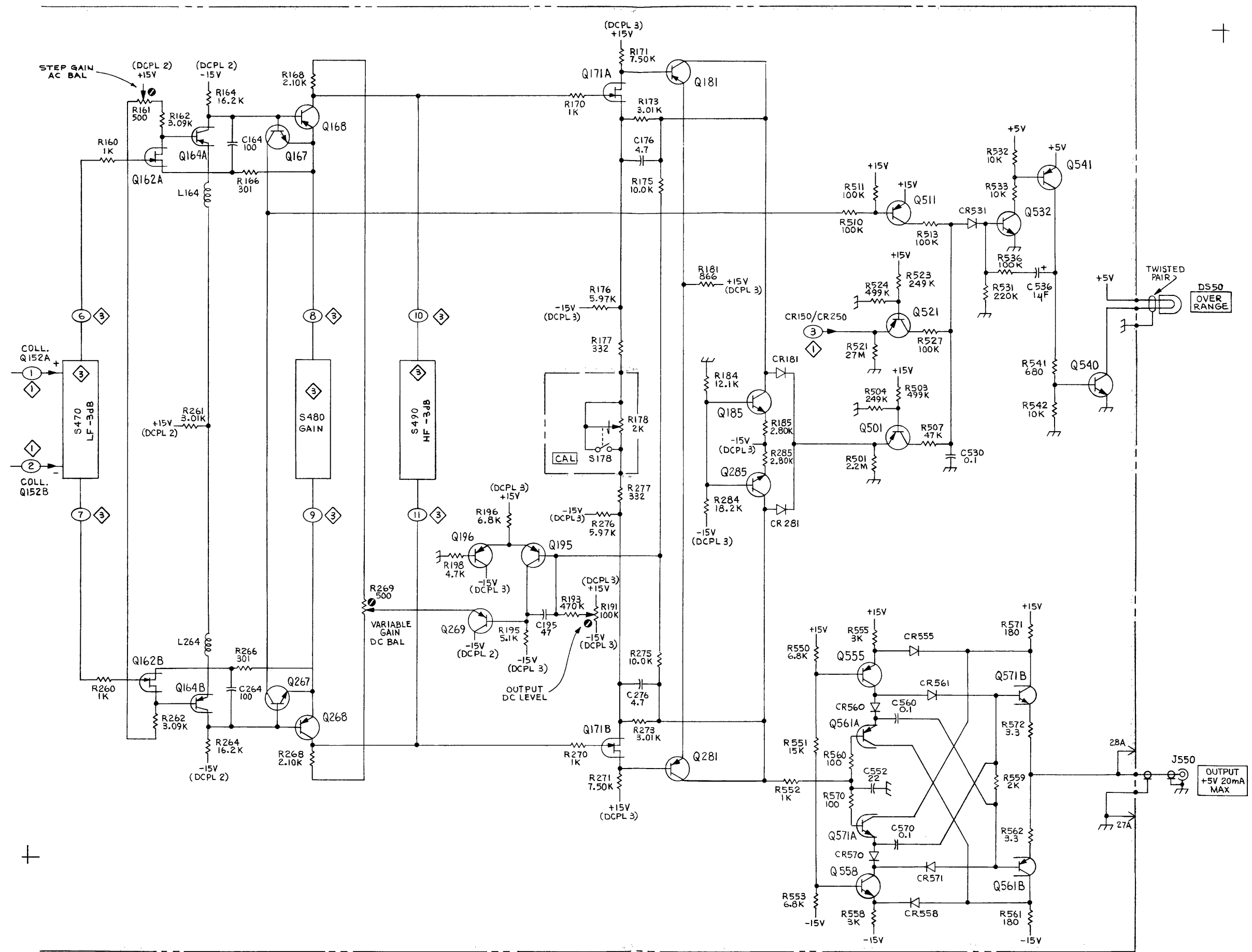
Ⓐ

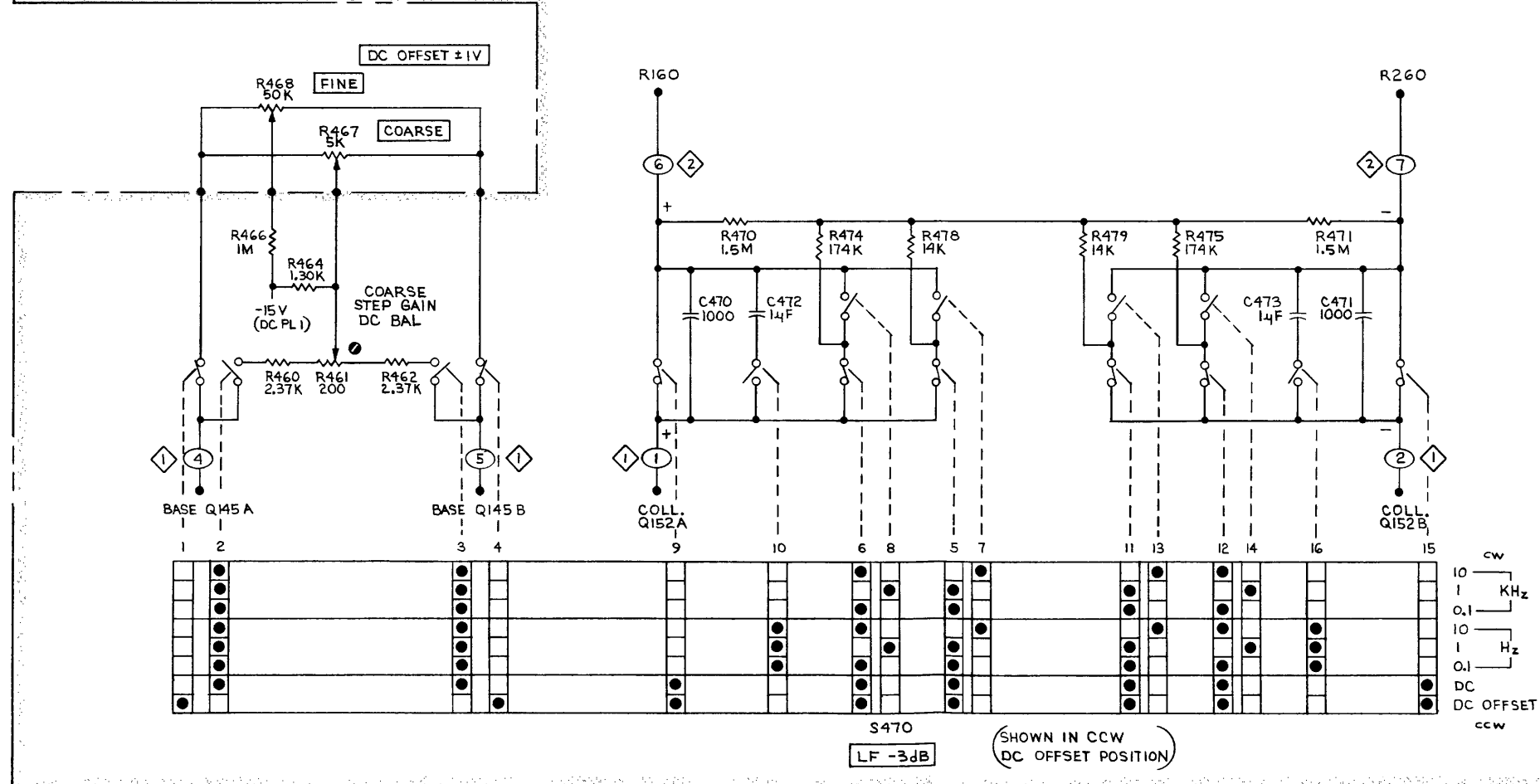
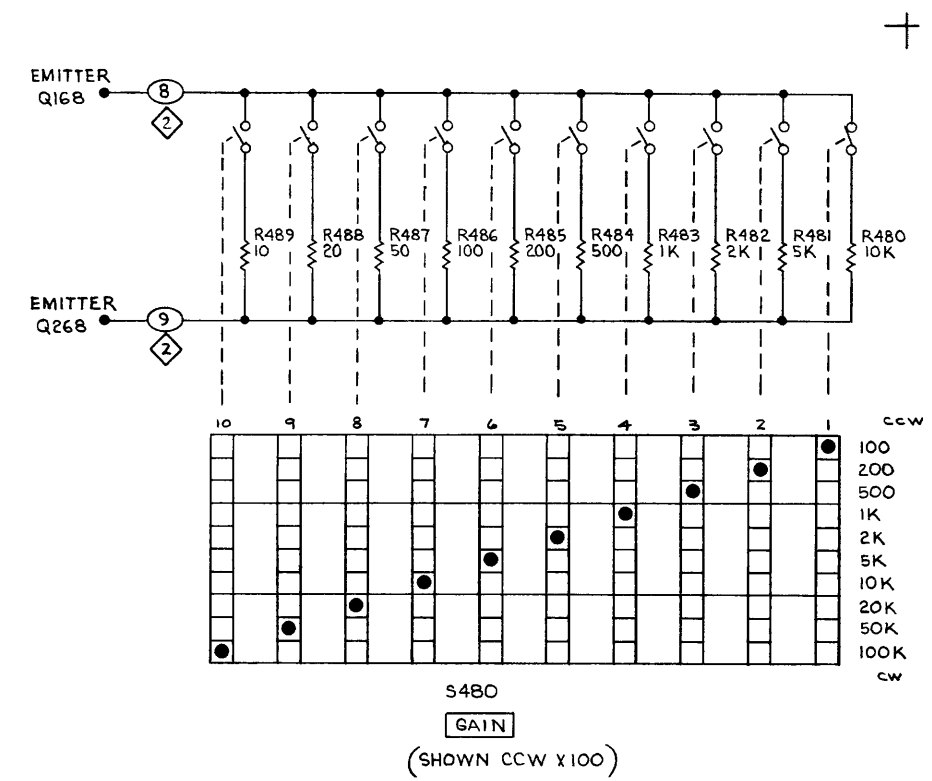
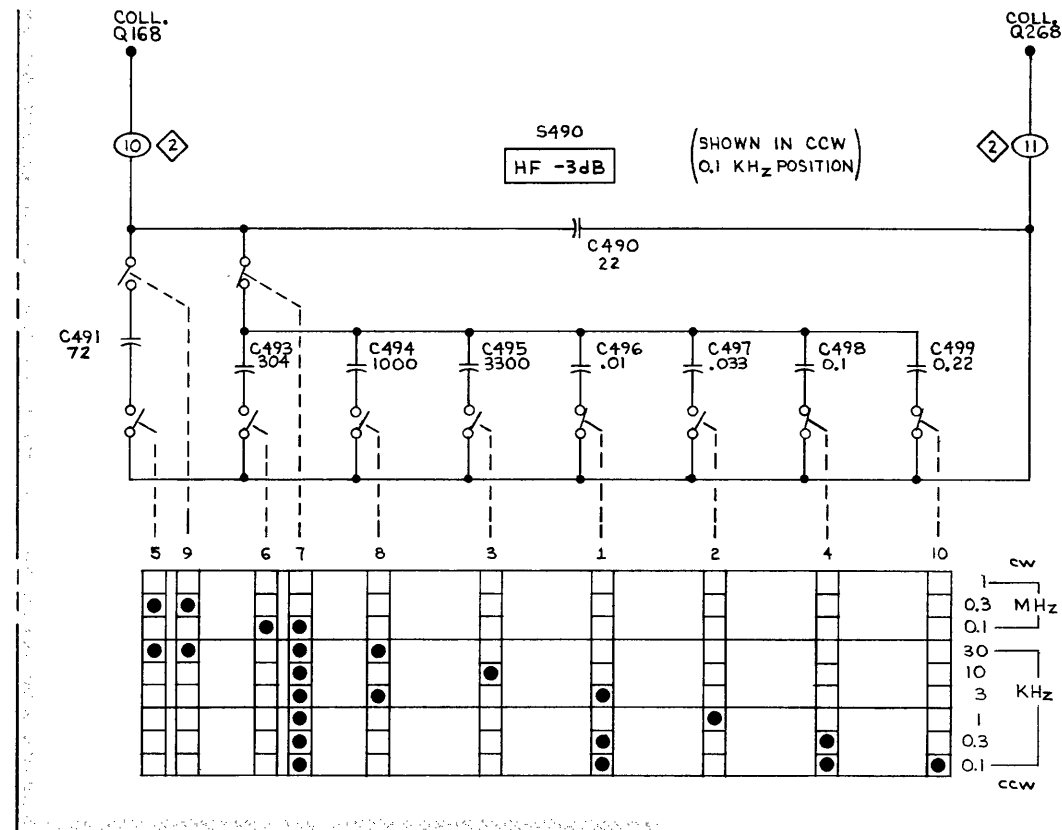


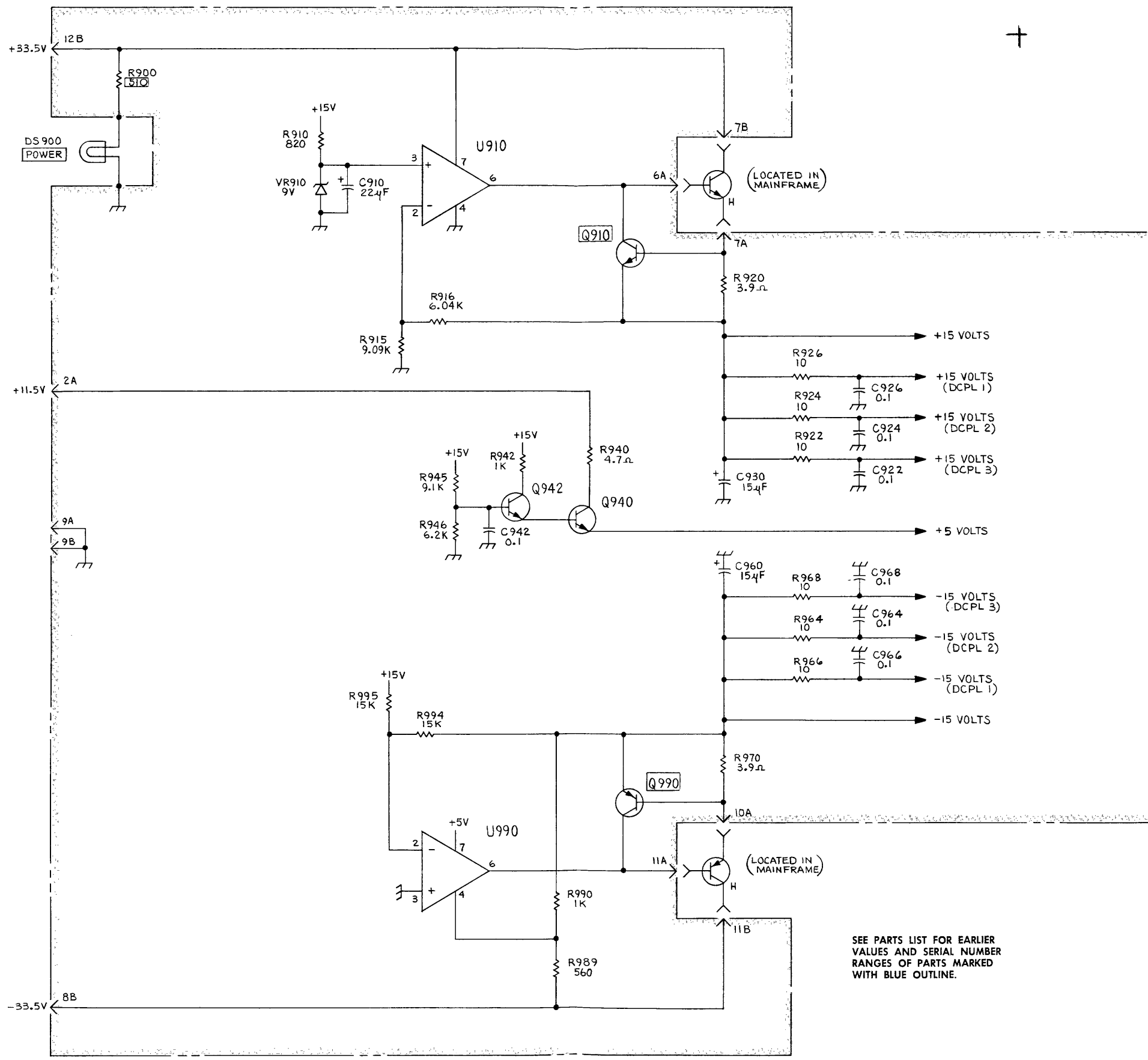
AM 502

REV. MAY 71
PREAMP

CJH







REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
    --- * ---
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
    --- * ---
Parts of Detail Part
Attaching parts for Parts of Detail Part
    --- * ---
  
```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol --- * --- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCLTL	ELECTROLYTIC	INSUL	INSULATOR	SEMICON	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
02107	SPARTA MFG. CO.	ROUTE NO. 2, BOX 128	DOVER, OH 44622
12327	FREEWAY CORP.	9301 ALLEN DR.	CLEVELAND, OH 44125
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
23499	GAVITT WIRE AND CABLE, DIVISION OF RSC INDUSTRIES, INC.	455 N. QUINCE ST.	ESCONDIDO, CA 92025
24931	SPECIALTY CONNECTOR CO., INC.	3560 MADISON AVE.	INDIANAPOLIS, IN 46227
45722	USM CORP., PARKER-KALON FASTENER DIV.	1 PEEKAY DRIVE	CLIFTON, NJ 07014
70276	ALLEN MFG. CO.	P. O. DRAWER 570	HARTFORD, CT 06101
71159	BRISTOL SOCKET SCREW, DIV. OF AMERICAN CHAIN AND CABLE CO., INC.	40 BRISTOL ST.	WATERBURY, CT 06720
71785	TRW ELECTRONIC COMPONENTS, CINCH CONNECTOR OPERATIONS	1501 MORSE AVE.	ELK GROVE VILLAGE, IL 60007
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78471	TILLEY MFG. CO.	900 INDUSTRIAL RD.	SAN CARLOS, CA 94070
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077
82647	TEXAS INSTRUMENTS, INC., CONTROL PRODUCTS DIV.	34 FOREST ST.	ATTLEBORO, MA 02703
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
91836	KINGS ELECTRONICS CO., INC.	40 MARBLEDALE ROAD	TUCKAHOE, NY 10707
97464	INDUSTRIAL RETAINING RING CO.	57 CORDIER ST.	IRVINGTON, NJ 07111

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	Name & Description					Mfr Code	Mfr Part Number
				1	2	3	4	5		
1-1	337-1399-01		2	SHLD,ELECTRICAL:SIDE					80009	337-1399-01
-2	366-0494-00		1	KNOB:GRAY WITH SETSCREW					80009	366-0494-00
	213-0153-00		1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD
-3	366-1518-00	B010100 B040799	1	KNOB:GRAY WITH SETSCREW					80009	366-1518-00
	213-0153-00	B010100 B040799	1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD
	366-1084-00	B040800 B049999	1	KNOB:GRAY WITH SETSCREW					80009	366-1084-00
	213-0725-00	B040800 B049999	1	. SETSCREW:3-48 X 0.94",HEX,SOC STL					70276	OBD
	366-1023-00	B050000	1	KNOB:GRAY PLASTIC					80009	366-1023-00
	213-0246-00	B050000	1	. SETSCREW:5-40 X 0.093 INCH LONG,HEX SOC					71159	OBD
-4	366-1101-00		1	KNOB:GRAY WITH SETSCREW					80009	366-1101-00
	213-0153-00		1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD
-5	366-1317-00		1	KNOB:RED WITH SETSCREW					80009	366-1317-00
	213-0153-00		1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD
-6	366-1001-00		1	KNOB:GRAY WITH SETSCREW					80009	366-1001-00
	213-0153-00		2	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD
-7	366-1163-00		2	KNOB:LIGHT GRAY WITH SETSCREW					80009	366-1163-00
	213-0153-00		1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD
-8	366-1257-11		2	PUSH BUTTON:GRAY--AC PRE					80009	366-1257-11
-9	366-1257-12		2	PUSH BUTTON:GRAY--CHG GND					80009	366-1257-12
-10	366-1489-31		1	PUSH BUTTON:GRAY--DIVIDE 10					80009	366-1489-31
-11	426-0681-00		5	FR,PUSH BUTTON:GRAY PLASTIC					80009	426-0681-00
-12	214-1840-00		1	PIN,KNOB SECRG:					80009	214-1840-00
-13	366-1422-01		1	KNOB:LATCH 80009 366-1422-01						
-14	129-0103-00		1	POST,BDG,ELEC:ASSEMBLY					80009	129-0103-00
				(ATTACHING PARTS)						
-15	210-0455-00		1	NUT,PLAIN,HEX.:0.25-28 X 0.375 INCH,BRASS					73743	3089-402
-16	210-0223-00		1	TERMINAL,LUG:0.25 INCH DIA,SE					78189	2101-14-03-2520N
				- - - * - -						
				POST ASSEMBLY INCLUDES:						
	200-0103-00		1	. NUT,PLAIN,KNURL:0.25-28 X 0.375"OD BRASS					80009	200-0103-00
	129-0077-00		1	. STUD,SHOULDERED:0.938 INCH LONG,BRASS					80009	129-0077-00
-17	131-0955-00		2	CONNECTOR,RCPT,:BNC,FEMALE					24931	28JR200-1
-18	131-0818-00		1	CONNECTOR,RCPT,:BNC,FEMALE					91836	KC19-153BNC
-19	384-1221-00	B010100 B049999	1	EXTENSION SHAFT:0.081 DIA X 3.0 INCH L,SST					80009	384-1221-00
	384-0415-01	B050000	1	EXTENSION SHAFT:3.18 L X 0.08 OD STL					80009	384-0415-01
-20	- - - - -		1	RESISTOR,VARIABLE:(SEE R468 EPL)						
				(ATTACHING PARTS)						
-21	210-0583-00		1	NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS					73743	2X20319-402
-22	210-0940-00		1	WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL					79807	OBD
				- - - * - -						
-23	- - - - -		1	RESISTOR,VARIABLE:(SEE R158 EPL)						
				(ATTACHING PARTS)						
-24	210-0583-00		1	NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS					73743	2X20319-402
-25	210-0940-00		1	WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL					79807	OBD
				- - - * - -						
-26	358-0378-00		2	BUSHING,SLEEVE:PRESS MOUNT					80009	358-0378-00
-27	358-0029-00		1	BSHG,MACH.THD:HEX,0.375-32 X 0.438"LONG					80009	358-0029-00
				(ATTACHING PARTS)						
-28	210-0590-00		1	NUT,PLAIN,HEX.:0.375 X 0.438INCH,STL					73743	2X28269-402
-29	210-0978-00		1	WASHER,FLAT:0.375 ID X 0.50 INCH OD STL					78471	OBD
				- - - * - -						
-30	333-1711-00		1	PANEL,FRONT:AM502					80009	333-1711-00
-31	214-1513-01		1	LCH,PLUG-IN RET:					80009	214-1513-01
				(ATTACHING PARTS)						
-32	213-0254-00		1	SCR,TPG,THD CTG:2-56X0.25"100 DEG,FLH STL					45722	OBD
				- - - * - -						
-33	200-0935-00		2	BASE,LAMPHOLDER:0.29 OD X 0.19" L,BK PLSTC					80009	200-0935-00
-34	378-0602-01		1	LENS,LIGHT:AMBER					80009	378-0602-01
-35	378-0602-00		1	LENS,LIGHT:GREEN					80009	378-0602-00
-36	352-0157-00		2	LAMPHOLDER:WHITE PLASTIC					80009	352-0157-00
-37	386-2529-00	B010100 B049999	1	SUBPANEL,FRONT:PLASTIC					80009	386-2529-00

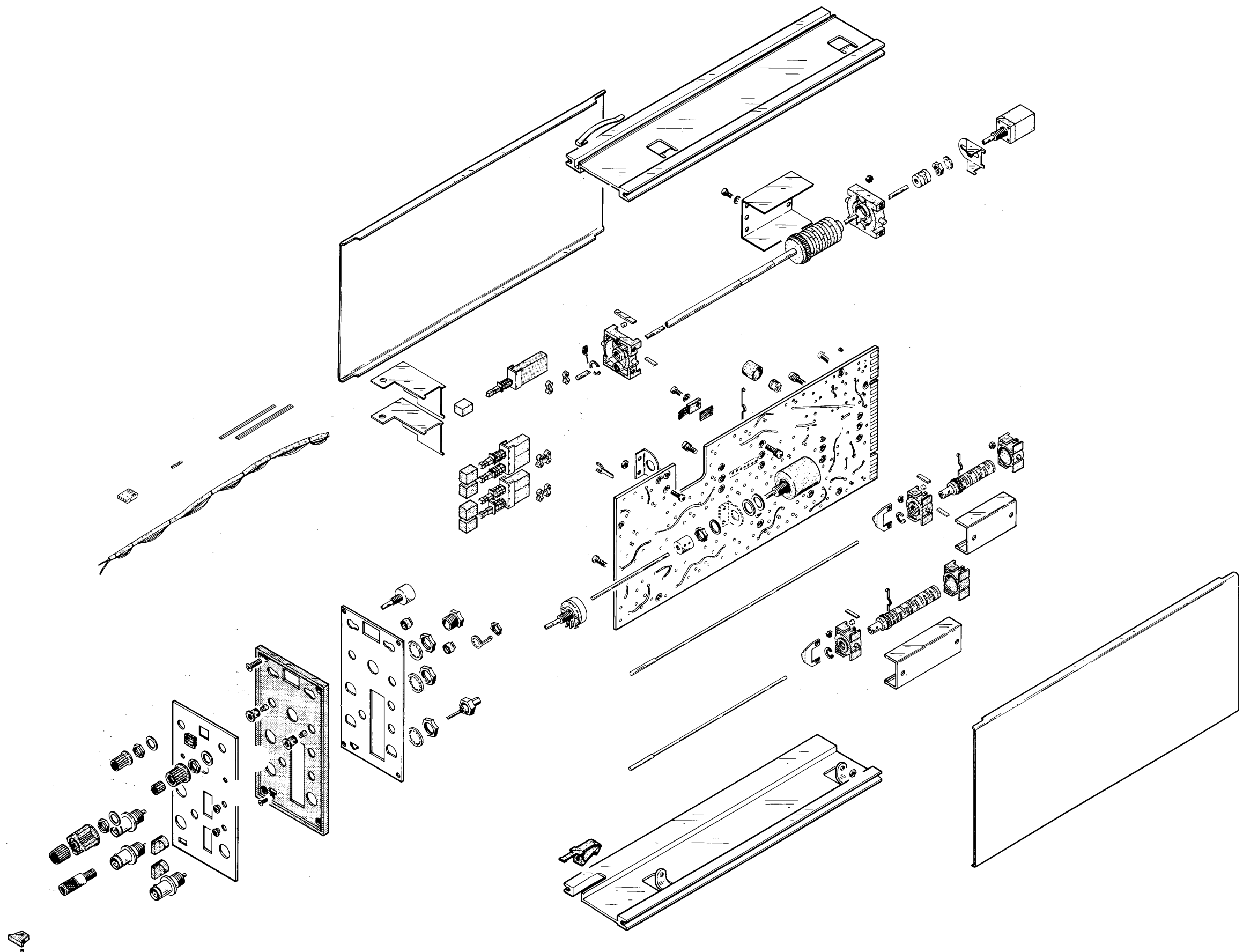
Mechanical Parts List—AM 502

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty	1 2 3 4 5					Name & Description	Mfr Code	Mfr Part Number
1-	386-2529-01	B050000		1	SUBPANEL,FRONT:PLASTIC					80009	386-2529-01	
					(ATTACHING PARTS)							
-38	213-0229-00			4	SCR,TPG,THD FOR:6-20X0.375 100 DEG,FLH STL					83385	OBD	
					- - - * - - -							
-39	337-1782-00	B010100	B049999	1	SHLD,ELECTRICAL:FRONT SUBPANEL					80009	337-1782-00	
	337-1782-01	B050000		1	SHLD,ELECTRICAL:FRONT SUBPANEL					80009	337-1782-01	
-40	214-1061-00			1	SPRING,GROUND:FLAT					80009	214-1061-00	
-41	426-0725-00			1	FR SECT,PLUG-IN:TOP					80009	407-0725-00	
					(ATTACHING PARTS)							
-42	213-0146-00			2	SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL					83385	OBD	
					- - - * - - -							
-43	426-0724-00			1	FR SECT,PLUG-IN:BOTTOM					80009	407-0724-00	
					(ATTACHING PARTS)							
-44	213-0146-00			1	SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL					83385	OBD	
-45	211-0012-00			1	SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL					83385	OBD	
-46	210-0406-00			1	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS					73743	2X12161-402	
					- - - * - - -							
-47	376-0039-00			1	CPLG,SHAFT RIGI:0.438 INCH LONG W/SETSCREW					80009	376-0039-00	
	213-0075-00			2	SETSCREW:4-40 X 0.094 INCH,HEX SOC STL					70276	OBD	
-48	- - - - -			1	CKT BOARD ASSY:--MAIN(SEE EPL)							
	- - - - -			-	CKT BOARD ASSY INCLUDES:							
-49	- - - - -			1	TRANSISTOR:(SEE Q940 EPL)							
	- - - - -			-	TRANSISTOR INCLUDES:							
-50	210-1122-00			1	WASHER,LOCK:DISHD,0.12 ID X 0.375"OD,STL					78189	OBD	
-51	210-0910-00			1	WASHER,NONMETAL:0.188 ID X 0.313"OD,TEFLON					02107	1704B863	
-52	131-0604-00			36	CONTACT,ELEC:CAM SWITCH					80009	131-0604-00	
-53	136-0252-04	B010100	B030294	72	SOCKET PIN CON:0.188 INCH LONG					22526	75060-001	
	136-0252-04	B030295		56	SOCKET PIN CON:0.188 INCH LONG					22526	75060-001	
	136-0514-00	B030295		2	SOCKET,PLUG-IN:MICROCIRCUIT,8 CONTACT					82647	C93802	
-54	200-0687-01			1	COV,TRANSISTOR:					80009	200-0687-01	
-55	136-0235-00			1	SOCKET,SEMICON:6 PIN					71785	133-96-12-062	
-56	- - - - -			1	RESISTOR,VARIABLE:(SEE R467 EPL)							
					(ATTACHING PARTS)							
-57	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS					73743	2X20319-402	
-58	210-0046-00			1	WASHER,LOCK:INTL,0.261 ID X 0.40" OD,STL					78189	1214-05-00-0541C	
-59	210-1025-00			2	WASHER,FLAT:0.50 ID X 0.312 INCH OD,BRS					12327	OBD	
					- - - * - - -							
-60	407-1337-00			1	BRACKET,RES,MTG:					80009	407-1337-00	
					(ATTACHING PARTS)							
-61	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL					83385	OBD	
-62	210-0551-00			2	NUT,PLAIN,HEX:4-40 X 0.25 INCH,STL					83385	OBD	
					- - - * - - -							
-63	337-1883-00			2	SHLD,ELECTRICAL:					80009	337-1883-00	
-64	260-1207-00			2	SWITCH,PUSH:DOUBLE					80009	260-1207-00	
-65	361-0385-00			8	SPACER,SLEEVE:GREEN,0.164 INCH LONG					80009	361-0385-00	
-66	260-1209-00			1	SWITCH,PUSH:SINGLE					80009	260-1209-00	
-67	361-0383-00			2	SPACER,SLEEVE:CHARCOAL,0.330 INCH LONG					80009	361-0383-00	
-68	344-0154-00			4	CLIP,ELECTRICAL:FUSEHOLDER					80009	344-0154-00	
-69	384-0173-00			1	EXTENSION SHAFT:6.438 INCHES LONG					80009	384-0173-00	
-70	384-0348-01			1	EXTENSION SHAFT:9.161 INCHES LONG					80009	384-0348-01	
	263-1004-00			1	ACTUATOR ASSY:(S470)					80009	263-1004-00	
					(ATTACHING PARTS)							
-71	211-0116-00			4	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS					83385	OBD	
					- - - * - - -							
	- - - - -			-	ACTUATOR ASSY INCLUDES:							
-72	200-1598-00			1	COVER,CAM SW:					80009	200-1598-00	
-73	354-0219-00			1	RING,RETAINING:					79136	5103-25-MD-R	
-74	401-0155-00			1	BEARING,CAM SW:FRONT					80009	401-0155-00	
-75	131-0840-00			1	CONTACT,ELEC:GROUNDING					80009	131-0840-00	
-76	214-1704-01			2	SPRING,FLAT:CAM SW DETENT,0.008 INCH THK					80009	214-1704-01	
-77	214-1127-00			2	ROLLER,DETNET:0.125 OD X 0.125"LONG,SST					80009	214-1127-00	
-78	105-0498-00			1	DRUM,CAM SWITCH:					80009	105-0498-00	
-79	401-0156-00			1	BEARING,CAM SW:REAR					80009	401-0156-00	
-80	210-0406-00			4	NUT,PLAIN,HEX:4-40 X 0.187 INCH,BRS					73743	2X12161-402	

Mechanical Parts List—AM 502

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5					Name & Description	Mfr Code	Mfr Part Number
1-	263-1003-00		1					ACTUATOR ASSY: (S490)	80009	263-1003-00	
								(ATTACHING PARTS)			
-81	211-0116-00		4					SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD	
								- - - * - - -			
			-					ACTUATOR ASSY INCLUDES:			
-82	200-1597-00		1					COVER,CAM SW:	80009	200-1597-00	
-83	354-0219-00		1					RING,RETAINING:	79136	5103-25-MD-R	
-84	401-0155-00		1					BEARING,CAM SW:FRONT	80009	401-0155-00	
-85	131-1248-00		1					CONTACT,ELEC:GROUNDING	80009	131-1248-00	
-86	214-1704-00		1					SPRING,FLAT:CAM SW DETENT,0.006 INCH THK	80009	214-1704-00	
-87	214-1704-01		1					SPRING,FLAT:CAM SW DETENT,0.008 INCH THK	80009	214-1704-01	
-88	214-1127-00		2					ROLLER DETENT:0.125 OD X 0.125"LONG,SST	80009	214-1127-00	
-89	105-0502-00		1					DRUM,CAM SWITCH:	80009	105-0502-00	
-90	401-0156-00		1					BEARING,CAM SW:REAR	80009	401-0156-00	
-91	210-0406-00		4					NUT,PLAIN,HEX:4-40 X 0.187 INCH,BRS	73743	2X12161-402	
	263-1005-00		1					ACTUATOR ASSY: (S480)	80009	263-1005-00	
								(ATTACHING PARTS)			
-92	211-0116-00		4					SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD	
								- - - * - - -			
			-					ACTUATOR ASSY INCLUDES:			
-93	200-1596-00		1					COVER,CAM SW:	80009	200-1596-00	
								(ATTACHING PARTS)			
-94	211-0008-00		4					SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD	
-95	210-0004-00		4					WASHER,LOCK:INTL,0.12 ID X 0.26"OD,STL	78189	1204-00-00-0541C	
-96	210-0406-00		3					NUT,PLAIN,HEX:4-40 X 0.188 INCH,BRS	73743	2X12161-402	
-97	131-0963-00		1					CONTACT,ELEC:GROUNDING	80009	131-0963-00	
								- - - * - - -			
-98	354-0391-00		1					RING,RETAINING:	97464	3100-43-CD	
-99	401-0081-02		1					BEARING,CAM SW:FRONT	80009	401-0081-02	
-100	214-1139-03		1					SPRING,FLAT:CAM SW DETENT,0.010 INCH THK	80009	214-1139-03	
-101	214-1139-02		1					SPRING,FLAT:CAM SW DETENT,0.008 INCH THK	80009	214-1139-02	
-102	214-1127-00		2					ROLLER,DETENT:0.125 OD X 0.125"LONG,SST	80009	214-1127-00	
-103	105-0503-00		1					DRUM,CAM SWITCH:	80009	105-0503-00	
-104	401-0115-00		1					BEARING,CAM SW:REAR	80009	401-0115-00	
	210-0406-00		3					NUT,PLAIN,HEX:4-40 X 0.188 INCH,BRS	73743	2X12161-402	
	131-0963-00		1					CONTACT,ELEC:GROUNDING	80009	131-0963-00	
-105	384-1220-00		1					EXTENSION SHAFT:8.038 INCHES LONG	80009	384-1220-00	
-106	376-0029-00		1					CPLG,SHAFT,RIGI:	80009	376-0029-00	
	213-0075-00		2					SETScrew:4-40 X 0.094 INCH,HEX SOC STL	70276	OBD	
-107			1					RESISTOR,VARIABLE:(SEE R178/S178 EPL)			
								(ATTACHING PARTS)			
-108	210-0583-00		1					NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20319-402	
-109	210-0046-00		1					WASHER,LOCK:INTL,0.261 ID X 0.40"OD,STL	78189	1214-05-00-0541C	
-110	407-0803-00		1					BRACKET,RES MTG:	80009	407-0803-00	
								- - - * - - -			
-111	175-0825-00		FT					WIRE,ELECTRICAL:2 WIRE RIBBON	23499	TEK-175-0825-00	
-112	175-0826-00		FT					WIRE,ELECTRICAL:3 WIRE RIBBON	23499	TEK-175-0826-00	
-113	131-0707-00		4					CONNECTOR,TERM:0.50 INCH LONG(22-26 AWG)	22526	47439	
-114	352-0162-02		1					HOLDER,TERM CON:4 WIRE(RED)	80009	352-0162-02	
-115	179-2028-00		1					WIRING HARNESS:MAIN	80009	179-2028-00	

+



+⊕



ACCESSORIES

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	Name & Description	Mfr	
		Eff	Dscont			Code	Part Number
	070-1582-00			1	MANUAL, INSTRUCTION	80009	070-1582-00

REPACKAGING

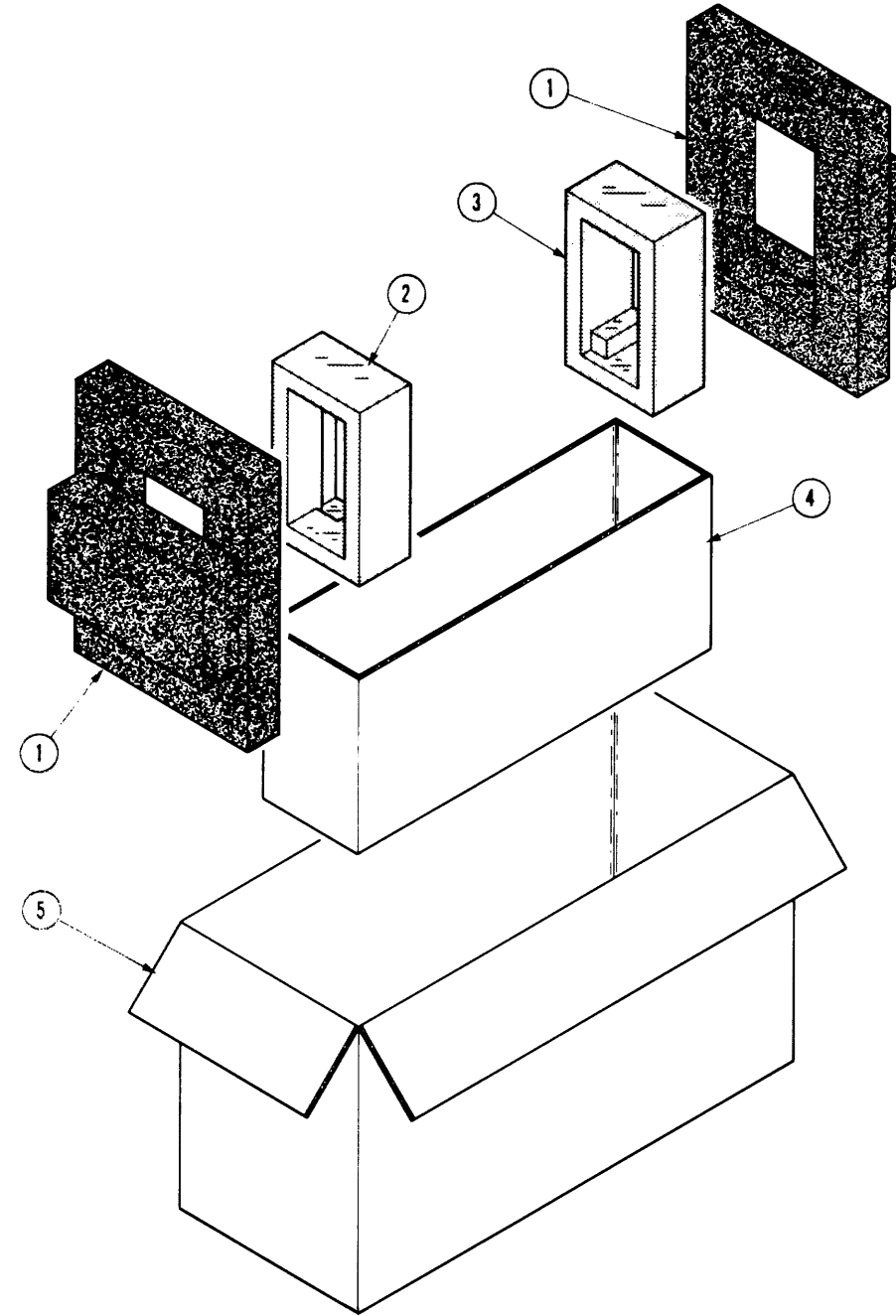


Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	Name & Description	Mfr	
		Eff	Dscont			Code	Part Number
2-	065-0151-00			1	CARTON ASSEMBLY:	80009	065-0151-00
-	-	-	-	-	CARTON ASSEMBLY INCLUDES:		
-1	004-0282-00			2	FRAME: PLASTIC FOAM	80009	004-0282-00
-2	004-0243-00			1	PAD, CUSHIONING: FRONT	80009	004-0243-00
-3	004-0242-00			1	PAD, CUSHIONING: REAR	80009	004-0242-00
-4	004-1093-00			1	PAD, CUSHIONING: 13.375 X 3.25 X 5.625"	80009	004-1093-00
-5	004-0612-00			1	CARTON: 16.50 X 6.625 X 9.125 INCHES	80009	004-0612-00

