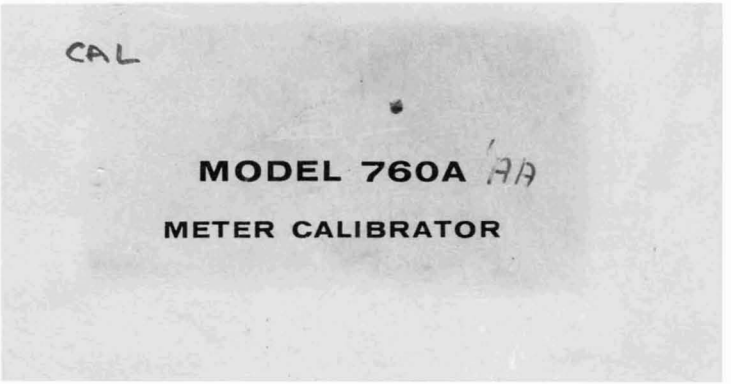
JOHN FLUKE MFG. CO., INC.
P.O. Box 7428 Seattle, Washington 98133



760A serial no. _____ and above.

ADDENDA

FLUKE MODEL 760A METER CALIBRATOR

A recent operation problem associated with the Model 760A's inability to be reset in high output voltages on rare occurences, has lead to the addition of two resistors in the ±50 Volt Power Supply, A3A1.

These resistors (R6 and R7) are shown in the Schematic diagram of Figure A. There description follows:

REFERENCE DESIGNATION	R6 and R7
DESCRIPTION	Resistor, comp, 680Ω, ±5%, 1/2w
FLUKE STOCK NUMBER	4704-178392
MFR's FED SUPPLY CODE	01121
MFR's PART NUMBER	EB6815

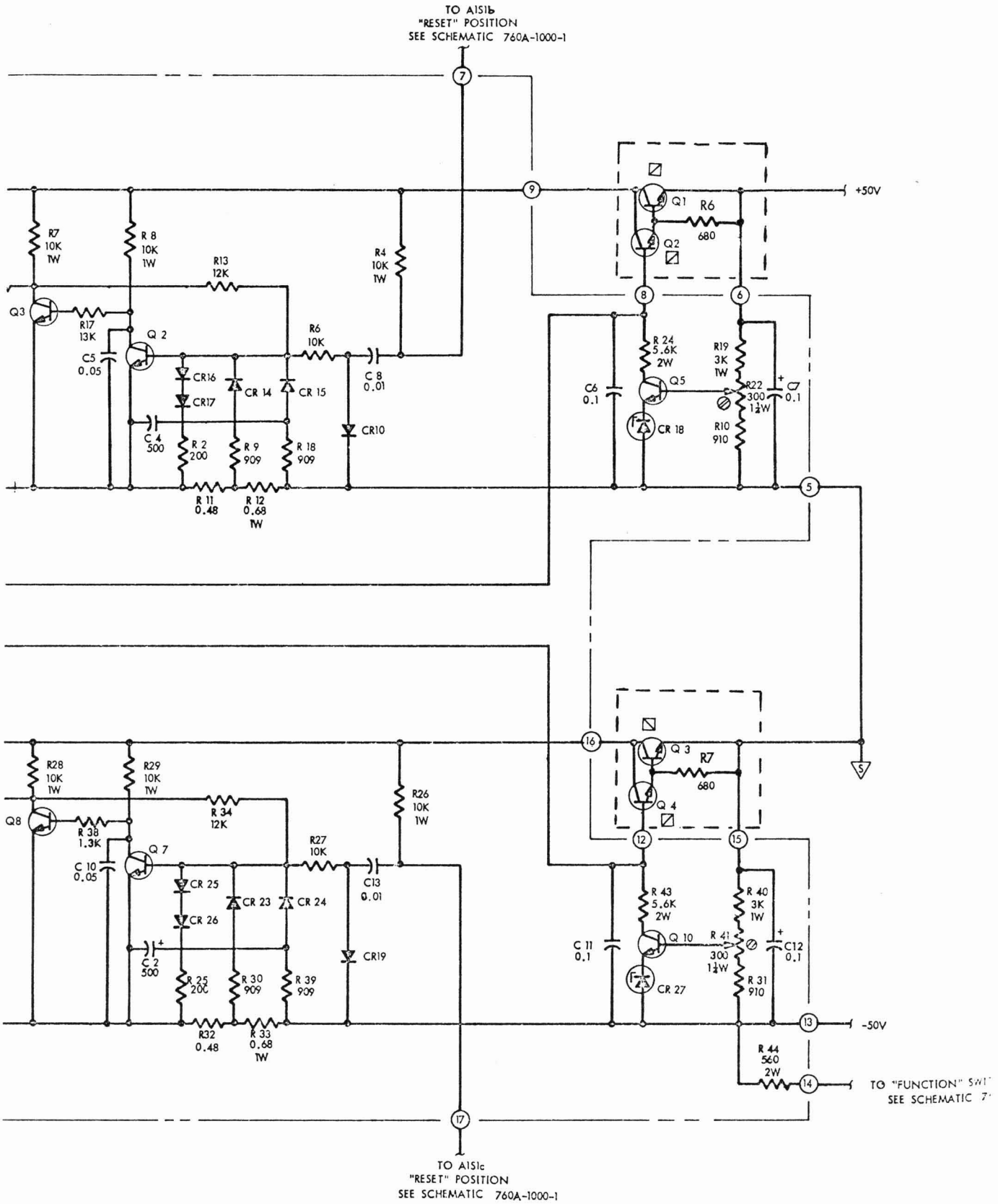


Figure A. LOCATION OF R6 AND R7 ON ±50 VOLT POWER SUPPLY SCHEMATIC

ADDENDUM

MODEL 760A/AA

INTRODUCTION

The Model 760A/AA Meter Calibrator is a modified version of the Model 760A Meter Calibrator and is capable of operating at either 50 Hz or 60 Hz line frequency. The purpose of this addendum is to describe specific differences between the two instruments, such that this manual, with the addendum, can be used to successfully operate and maintain the Model 760A/AA.

Under the following section headings, information has been given to make each section of the manual applicable to the Model 760A/AA.

SECTION I - INTRODUCTION AND SPECIFICATIONS

Change information under paragraph 1-6, AC VOLTAGE AND CURRENT as follows:

a. Delete the information under FREQUENCY and add: "50 Hz, 60 Hz, and 400 Hz".

b. Delete the information under FREQUENCY ACCURACY and add: "±1% for 400 Hz; phaselocked to power line for 50 or 60 Hz (remains locked for ±1% frequency variations, manually adjustable to cover 55 to 65 Hz for 60 Hz operation or 48 to 52 Hz for 50 Hz operation)."

Change information under paragraph 1-9, GENERAL, as follows:

a. Delete the information under LINE REGULATION and add: "0.05% of setting for a ±10% line change from nominal; less than 0.1% of setting for a 1% line frequency change at 50 or 60 Hz."

b. Delete the information under INPUT POWER and add: "115/230 vac ±10%, single-phase, 60 Hz ±5 Hz or 50 Hz ±2 Hz, approximately 200 watts full load, and 40 watts no load."

SECTION II - OPERATING INSTRUCTIONS

No changes.

SECTION III - THEORY OF OPERATION

In order to synchronize the instrument to a 50 Hz line frequency, to provide a 50 Hz output, and to allow accurate monitoring of the 50 Hz output, certain changes were effected to the Oscillator Printed Circuit Board Assembly and the AC Converter Printed Circuit Board Assembly. These changes are shown schematically at the end of this addendum. Refering to these schematics will be helpful during the following discussion.

OSCILLATOR

The addition of two resistors (R24 and R56) to the bridged-T frequency determining network allows the oscillator to operate at 50 Hz. Movable jumper leads are provided on the printed circuit board for shorting across these resistors to allow the oscillator to operate at 60 Hz.

To synchronize the oscillator to the 50 Hz line frequency, the time constant of the lowpass filter (following the clipper stage of CR9 and CR10) must be lowered. This is accomplished by connecting C18 across C13 in the filter circuit with a jumper lead. For operating at 60 Hz, the jumper lead is removed to open one side of C18.

AC CONVERTER

The low frequency response of the AC Converter is changed for proper operation at 50 Hz. This accomplished by placing C8 across C5, with a jumper lead, in the collector circuit of Q5. By disconnecting the jumper lead connection, C8 is electrically removed from the circuit. This allows optimum operation at 60 Hz.

SECTION IV - MAINTENANCE

Converting the instrument, from operation at one line frequency (50 or 60 Hz) to the other, requires the connection of four jumper leads to the four terminals corresponding to the desired line frequency. Three connection points are located on the Oscillator Printed Circuit Board Assembly (A2A1) and one connection is located on the AC Converter Printed Circuit Board Assembly (A2A5). In all four cases, two white-dashed lines originate where one end of the jumper lead is connected to the printed circuit board. Each dashed line ends in a white circle surrounding a terminal. Each terminal is designated either "50 Hz" or "60 Hz", corresponding to the power line frequency. For proper instrument operation, the jumper leads should be connected to the terminals corresponding

to your particular power line frequency requirements. The following procedure should be used for converting your instrument:

a. Place the Model 760A/AA on one side and remove the bottom cover.

b. On the Oscillator Printed Circuit Board Assembly, locate the first connection point "1 OF 4" (located near upper left corner of board) near the junction of the jumper lead and white-dashed lines.

c. Connect the jumper lead to the terminal corresponding to your frequency requirements ("50 Hz" or "60 Hz").

d. Locate the connection points "2 OF 2" (located near "1 OF 4") and "3 OF 4" (located to the right of center). Repeat step c for each connection point.

e. Replace the bottom cover and secure to the instrument chassis.

f. Place the instrument in its normal operating position, and remove the top and inner cover.

g. Carefully remove the connector to the AC Converter Printed Circuit Board Assembly (second circuit board from the front panel on the right hand side of the instrument) and remove the circuit board.

h. Locate the connection point "4 OF 4" (near bottom center of board) and connect the jumper lead to the terminal corresponding to your frequency requirements ("50 Hz" or "60 Hz").

i. Replace the circuit board and connect the connector. Replace the inner and outer covers.

SECTION V - LIST OF REPLACEABLE PARTS

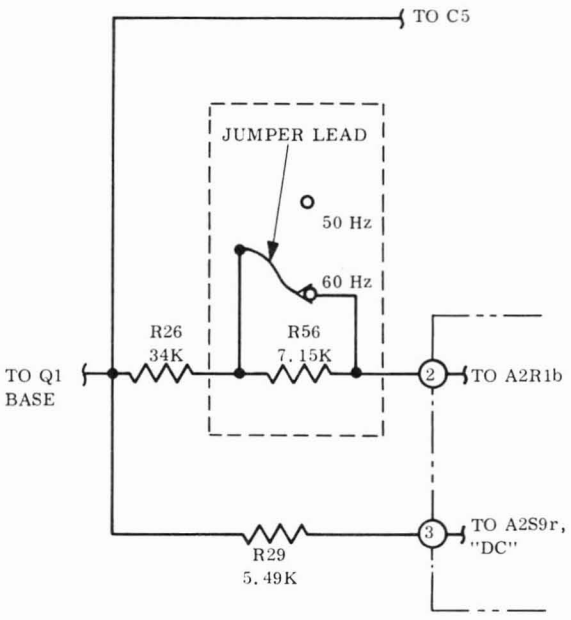
Change the list of replaceable parts for the Model 760A as follows:

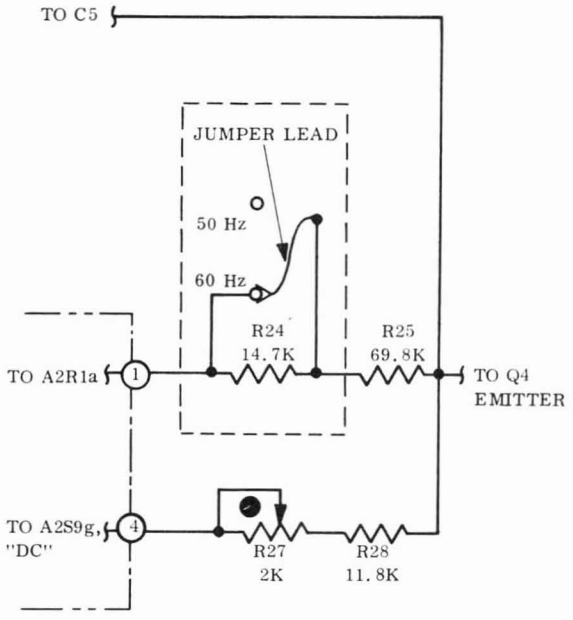
REF DESIG	CHANGE	DESCRIPTION	STOCK NO.	MFR	MFR PART NO.	TOT QTY
A2A1	Delete	Oscillator P/C Assembly	1702-237552 (760A-4005)	89536	1702-237552	REF
A2A1	Add	Oscillator P/C Assembly	1702-29996 (760A/AA-4005)	89536	1702-239996	1
C18	Add	Cap, plstc, 0.12 uf ±10%, 200v	1507-223594	56289	12492	1
R24	Add	Res, met flm, 14.7k ±1%, 1/2w	4705-162532	12400	Type CEC-TO	1
R28	Delete	Res, met flm, 11k ±1%, 1/2w	4705-222216	12400	Type CEC-TO	1
R28	Add	Res, met flm, 11.8k ±1%, 1/2w	4705-246025	12400	Type CEC-TO	1
R56	Add	Res, met flm, 7.15k ±1%, 1/2w	4705-186072	12400	Type CEC-TO	1
A2A5	Delete	AC Converter P/C Assembly	1702-23759 (760A-4002)	89536	1702-23759	REF
A2A5	Add	AC Converter P/C Assembly	1702-239988 (760A/AA-4002)	98536	1702-239988	1
C8	Add	Cap, plstc, 0.39 uf ±10%, 10v	1507-246017	84411	JF-40	1
R2	Add	Res, comp, 1.5k ±10%, 1/2w	4704-108159	01121	EB1521	1
R10	Delete	Res, comp, 5.6k ±5%, 1/2w	4704-187880	01121	EB5625	REF
R10	Add	Res, met flm, 5.11k ±1%, 1/2w	4705-159657	12400	Type CEC-TO	1
A3T1	Delete	Transformer, Power	5602-239129	89536	5602-239129	1
A3T1	Add	Transformer, Power	5602-244871	89536	5602-244871	1

FUNCTIONAL SCHEMATIC DIAGRAMS

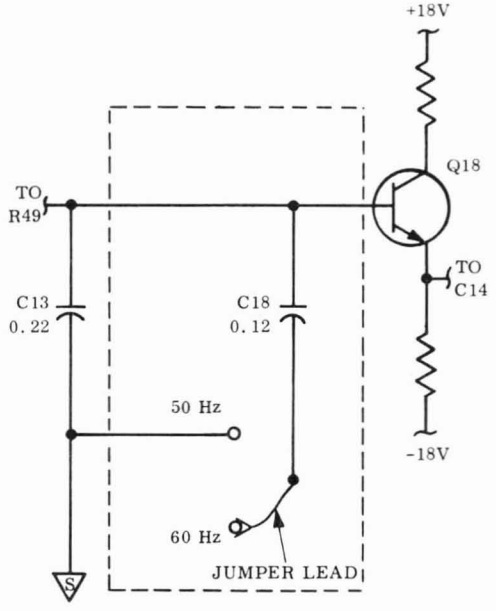
Make the following additions, within the dashed lines, to the schematic diagrams:

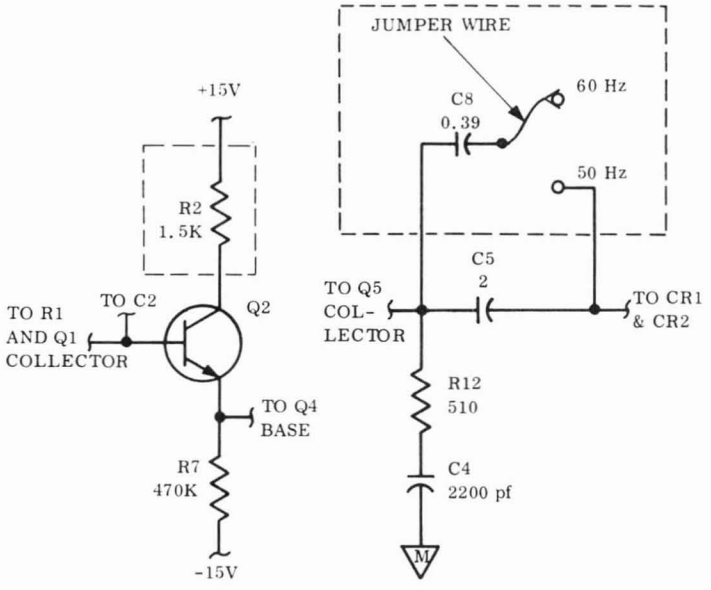
760A-1005 OSCILLATOR (A2A1)





760A-1002 AC CONVERTER (A2A5)





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(continued ii)

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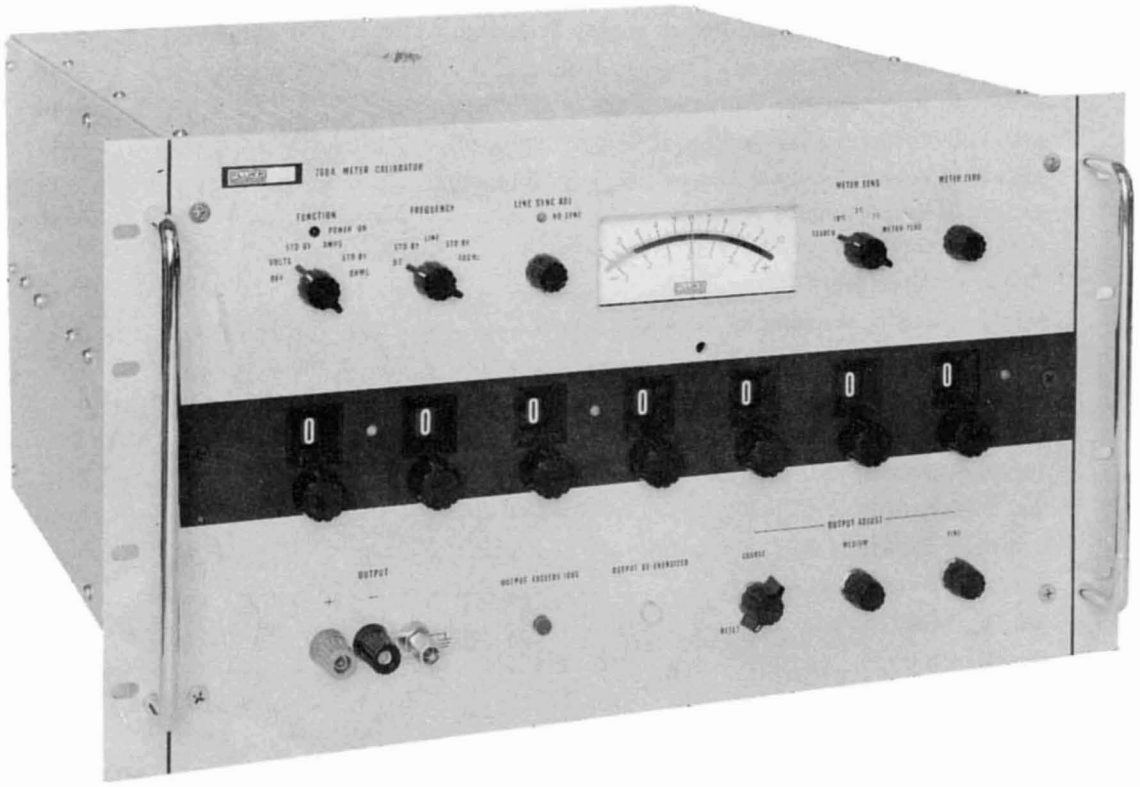
(continued iv)

List of Illustrations (continued)



MODEL 760A METER CALIBRATOR

SECTION I

INTRODUCTION AND SPECIFICATIONS

1-1. INTRODUCTION

1-2. The Model 760A Meter Calibrator is designed for the calibration of voltage, resistance, or current measuring instruments or meters having an accuracy of (or in many instances better than) one percent. The Model 760A will provide a precision voltage (1 mv to 1000v) or current (1 ua to 10a) for calibration purposes. Resistance measuring devices can be checked or calibrated by comparison with the Model 760A's precision resistance decade (0 to 10 megohms in 1 ohms steps).

1-3. The voltage or current error, of an instrument under test, can be read directly from the front panel meter of the Model 760A in terms of percent. The error in terms of volts, amperes, or ohms can be determined from the meter of the instrument under test.

1-4 ELECTRICAL SPECIFICATIONS

1-5. DC VOLTAGE AND CURRENT

VOLTAGE ACCURACY
± (0.1% of setting +25 uv) from 0.001v to 1000v, except 0.33% at 1 mv, 3 mv and 10 mv, over a temperature range of 0° C to 50° C and 1 year calibration.

IMPROVED VOLTAGE ACCURACY
± (0.05% of setting +25 uv) from 0.001v to 1000v, except ±0.33% at 1 mv, 3 mv and 10 mv, over a temperature range of 20° C to 30° C and 30 day calibration.

VOLTAGE RESOLUTION
100 uv.

OUTPUT CURRENT (Voltage Mode)
0 to 20 ma except 0.5 ohm minimum load resistance. Currents to 800 ma at certain settings (see Figure 1-2).

CURRENT RANGE
1 ua to 10a.

CURRENT ACCURACY
± (0.25% of setting +0.025 ua) over a temperature range of 0° C to 50° C and 1 year calibration.

IMPROVED CURRENT ACCURACY
± (0.1% of setting +0.01 ua) over a temperature range of 20° C to 30° C and 30 day calibration.

CURRENT RESOLUTION
1 ua.

VOLTAGE COMPLIANCE
0 to 1v minimum (5v open circuit).

RIPPLE AND NOISE (RMS)
Less than 0.5% rms of output; or 150 uv, voltage; and 0.05 ua, current; whichever is greater.

1-6. AC VOLTAGE AND CURRENT

FREQUENCY
400 Hz and 50 Hz or 60 Hz.

FREQUENCY ACCURACY
±1% for 400 Hz; phase locked to power line for 50 Hz and 60 Hz (remains locked for ±1% frequency variations, manually adjustable to cover 48 to 52 and 55 to 65 Hz).

VOLTAGE RANGE
0.001v to 1000v.

VOLTAGE ACCURACY
± (0.25% of setting +25 uv) from 0.001v to 1000v, except 0.33% at 1 mv, 3 mv and 10 mv, over a temperature range of 0° C to 50° C and 1 year calibration.

IMPROVED VOLTAGE ACCURACY
± (0.2% of setting +25 uv) from 0.001v, except 0.33% at 1 mv, 3 mv and 10 mv, over a temperature range of 20° C to 30° C and 30 day calibration.

VOLTAGE RESOLUTION
100 uv.

OUTPUT CURRENT (Voltage Mode)
0 to 20 ma except 0.5 ohm minimum load resistance. Currents to 900 ma at certain settings (see Figure 1-2).

CURENT RANGE
1 ua to 10a.

CURRENT ACCURACY
±(0.25 of setting +0.025 ua).

CURRENT RESOLUTION
1 ua.

VOLTAGE CAPABILITY
0 to 1v minimum (5v open circuit).

HARMONIC DISTORTION
Less than 0.5% of output.

NOISE
Less than 0.1% of output; or 30 uv, voltage; and 0.02 ua, current; whichever is greater.

1-7. RESISTANCE

RANGE
0 to 10 megohms.

ACCURACY
±(0.1% of setting +0.5 ohm).

RESOLUTION
1 ohm.

POWER DISSIPATION
Up to 0.25 watt from 10° C to 35° C.

1-8. PANEL METER

SEARCH
0 to 100% of voltage or current as indicated by front panel dials.

NULL
1%, 3% and 10% of front panel dial settings.

ACCURACY
±3% end-scale on SEARCH.

INPUT POWER
115/230 VAC ±10%, single-phase, 50 Hz ±2 Hz and 60 Hz ±5 Hz, approximately 200 watts full load, 40 watts no load.

FUSES
Both sides of the power line are fused.

METER RESOLUTION
0.02% per small scale division.

1-9. GENERAL

AC CONVERTER
Average responding circuit calibrated in rms.

REFERENCE
Aged, temperature compensated zener diode.

LINE REGULATION
0.05% of setting for a 10% line change from nominal; less than 0.1% of setting for a 1% line frequency change at 60 Hz.

CALIBRATION STABILITY
Within performance specifications for 12 months with no internal adjustments. Improved specifications require more frequent calibration intervals.

OUTPUT CONTROL
Coarse, medium, and fine controls.

OUTPUT RESOLUTION
Better than 0.05% of setting.

HIGH-VOLTAGE WARNING
A red front panel lamp indicates when output voltage is greater than 100v.

OVERLOAD PROTECTION
Output terminals are de-energized and indicator lamp illuminates if unit is overloaded or if COARSE OUTPUT ADJUST control is not at RESET when FUNCTION or FREQUENCY setting is changed. Setting the COARSE OUTPUT ADJUST control to RESET restores instrument operation.

OUTPUT TERMINALS
Multipurpose binding posts on 3/4 inch centers for (+), (-), and chassis ground. The (-) terminal is normally connected to chassis ground. However, a maximum of ±50 volts dc is allowable between chassis ground and (-) terminals.

1-10. ENVIRONMENTAL SPECIFICATIONS

TEMPERATURE
Operating, 0° C to +50° C. Improved specifications apply from 20° C to 30° C.
Non-operating, -62° C to +75° C.

HUMIDITY
Up to 85% and 35° C. Improved specifications apply up to 50% RH.

SHOCK
Meets MIL-T-945A and MIL-S-901C (grade B).

VIBRATION
Meets MIL-STD-167.

1-11. MECHANICAL SPECIFICATIONS

MOUNTING
Standard EIA rack mounting with chassis slides (not supplied) or bench mounted on nylon feet. See Section II of this manual for information on obtaining and mounting chassis slides.

SIZE
19" wide by 10-1/2" high by 18" deep behind panel. See Figure 1-1 for outline drawing.

WEIGHT
Approximately 77 pounds.

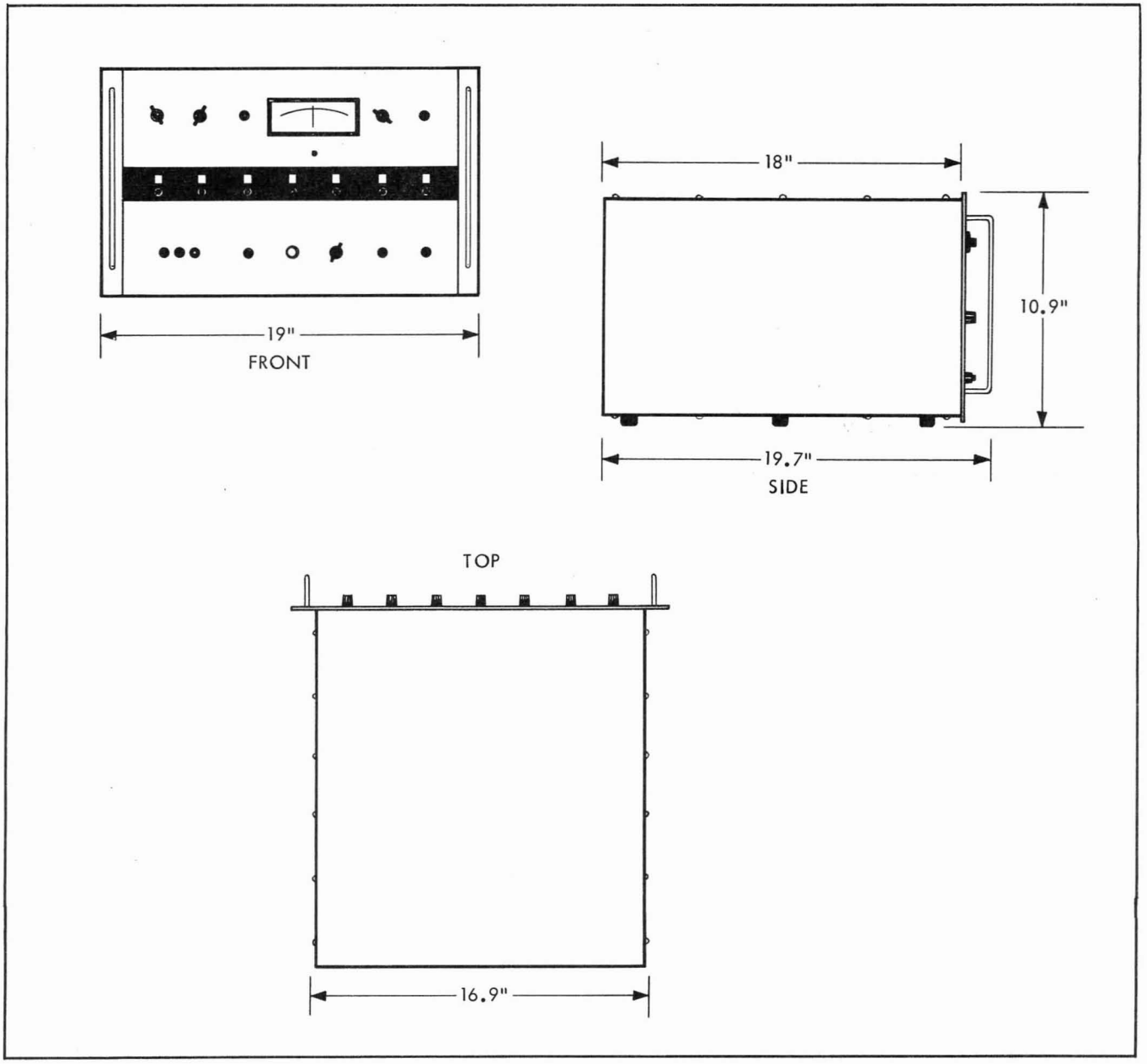


Figure 1-1. MODEL 760A OUTLINE DRAWING

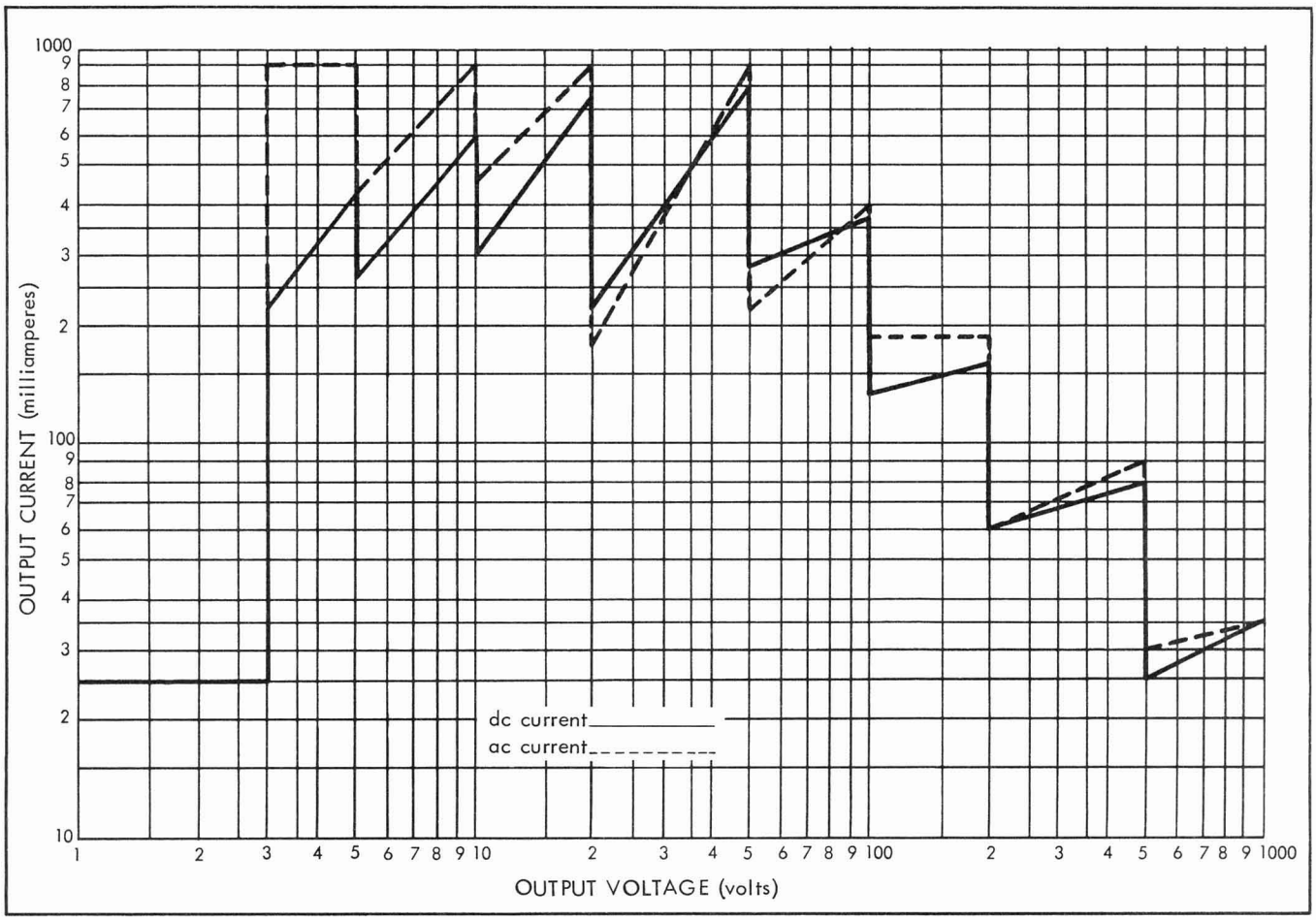


Figure 1-2. MAXIMUM OUTPUT LOAD CURRENT IN VOLTAGE MODE

SECTION II

OPERATING INSTRUCTIONS

2-1 INTRODUCTION

2-2. This section is basically composed of three parts. The first part, covered in paragraph 2-3, discusses preliminary information dealing with 115/230 volt conversion and familiarization with the controls, terminals, and indicators of the Model 760A. Operating instructions make up the second part and are covered in paragraph 2-8. The last part of this section, paragraph 2-17, deals with the installation of chassis slides.

2-3. PRELIMINARY INFORMATION

2-4. INPUT POWER

2-5. The power transformer of the Model 760A has a dual primary winding. Normally, the primary windings are connected in parallel for 115 volt ac operation. Upon request, the primary windings are connected in series for 230 volt ac operation before leaving the factory. Should you decide to change from one mode of operation to the other, refer to Section IV of this manual for conversion instructions.

2-6. CONTROLS, TERMINALS, AND INDICATORS

2-7. The name and function of the controls, terminals, and indicators of the Model 760A may be found in Figure 2-1. The numbered arrow callouts, of Figure 2-1, correspond to the reference numbers in the chart of the same figure.

2-8. MODEL 760A OPERATING INSTRUCTIONS

2-9. INTRODUCTION

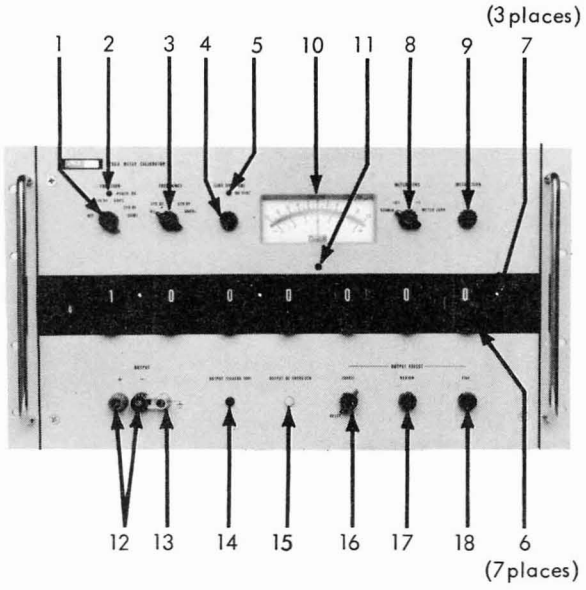
2-10. The operating instructions for the Model 760A are illustrated in three separate figures. Each figure contains a photograph of the Model 760A with arrow callouts to the various controls. At the end of the arrow callouts are numbered instruction blocks with information appropriate to the operation of the controls for a particular mode of operation. Simply follow the number sequence in a counter-clockwise direction around the photograph.

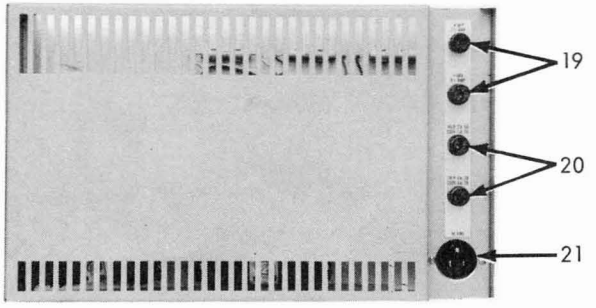
Note!

Allow approximately 10 minutes for the Model 760A to stabilize after initial turn on.

2-11. PRELIMINARY CONTROL SETTINGS

2-12. Two preliminary control settings should be performed before following the instruction block sequence of each figure. Turning the COARSE OUTPUT ADJUST control to the RESET position is the first setting. Placing the METER SENS switch to the SEARCH position is the second setting. These two preliminary settings are emphasized again at the beginning of each figure.





REFERENCE NUMBER	NAME	FUNCTION
1	FUNCTION	Allows selection of the VOLTS, AMPS, or OHMS mode of operation. Disconnects the AC line voltage from the primary circuit of the power transformer, T1, in the OFF position. The two STD BY (Stand By) positions de-energize the output when changing the mode of the operation, if the COARSE control is not in RESET position.
2	POWER ON	A lamp that illuminates when AC line power is applied to the power transformer, T1.
3	FREQUENCY	A switch that allows selection of either DC, LINE, or 400 Hz output (voltage or current) frequency. The two STD BY (Stand By) positions de-energize the output when changing the output frequency, if the COARSE control is not in the RESET position.
4	LINE SYNC ADJ	Allows the internal oscillator to be synchronized to the incoming power line frequency, when the FREQUENCY switch is in the LINE position.
5	NO SYNC	A lamp that indicates the state of synchronization between the internal oscillator of the Model 760A and the ac power line frequency, when the FREQUENCY switch is in the LINE position. At synchronization the NO SYNC lamp remains off. When the oscillator is not synchronized with the power line frequency the lamp either flashes or glows steadily.
6	Readout Dials	Provides an adjustable in-line readout of the desired voltage or current output or the desired resistance decade setting.
7	Decimal Lamps	Lamps that serve as decimal points for the readout digits. Current decimal lamp is located between the first and second readout digits. The voltage decimal lamp is located between the third and fourth readout digits. The resistance decimal lamp is located after the last or seventh readout digit.

Figure 2-1. CONTROLS, TERMINALS, AND INDICATORS (Continued)

REFERENCE NUMBER	NAME	FUNCTION
8	METER SENS	A switch that allows the meter amplifier to operate linearly (SEARCH position) or as a null detector (10%, 3%, and 1% positions). The SEARCH position indicates what percentage the voltage or current output is of the value dialed on the READOUT DIALS. The 10%, 3%, and 1% null sensitivities indicate the full scale percentage difference between the voltage or current output and the value dialed on the READ-OUT DIALS. The METER ZERO position is used when the meter electrical zero is to be checked or adjusted.
9	METER ZERO	Adjusts the meter electrical zero when the METER SENS switch is in the METER ZERO position.
10	Meter	Indicates what percentage the output, current or voltage, is of the value dialed on the READOUT DIALS when in the SEARCH position of the METER SENS switch. Indicates the percentage difference between the output, voltage or current, and the value dialed on the READOUT DIALS when in the 10%, 3% and 1% positions of the METER SENS switch.
11	Mechanical Meter Zero	Screw adjustment to mechanically set the meter needle over the zero position on the meter scale. This adjustment should be made only after the instrument has been off for at least three minutes.
12	OUTPUT	The +(red) and -(black) terminals are provided for connecting the device to be calibrated or checked.
13	⏚	The ground (chrome) terminal is connected to chassis ground. This terminal is normally connected to the -(black) terminal. However, a maximum of ±50 volts dc is allowable between the chassis ground and -(black) terminals.
14	OUTPUT EXCEEDS 100V	A lamp that illuminates when the OUTPUT voltage is 100v or greater.
15	OUTPUT DE-ENERGIZED	A lamp that illuminates when the OUTPUT is de-energized due to an overload or when the FUNCTION or FREQUENCY switches are moved to different modes of operation, while a voltage or current is present at the OUTPUT terminals. The lamp will also illumniate if the COARSE OUTPUT ADJUST switch is moved from the RESET position while the FUNCTION switch is in the OHMS mode of operation.
16	OUTPUT ADJUST COARSE	A switch that varies the voltage or current output in ten steps starting at zero in the RESET position. When the OUTPUT has been de-energized, signified by illumination of the OUT-PUT DE-ENERGIZED lamp, instrument operation can be re-established by placing the COARSE switch in the RESET position. With the COARSE switch in this position there is no output regardless of the setting of the READOUT DIALS or any other panel control.
17	OUTPUT ADJUST MEDIUM	Varies the voltage or current output between the steps of the COARSE switch.
18	OUTPUT ADJUST FINE	Provides a vernier control for the voltage or current output.

Figure 2-1. CONTROLS, TERMINALS, AND INDICATORS (Continued)

REFERENCE NUMBER	NAME	FUNCTION
19	Fuse Holder	The fuse holders are mounted on the recessed portion of the rear panel for protection and afford easy access to fuses F3 and F4. These fuses are used in conjunction with the ±50 volt Power Supply and are rated at 1-1/2 amperes each.
20	Fuse Holder	The fuse holders are mounted on the recessed portion of the rear panel for protection and afford easy access to the fuses F1 and F2. The fuses are 2 ampere slow blowing type for 115 volt operation and 1 ampere slow blowing type for 230 volt operation.
21	Power Connector	The ac power line connector.

Figure 2-1. CONTROLS, TERMINALS, AND INDICATORS

2-13. PERCENT ERROR

2-14. When checking a voltage or current measuring instrument, the percent error can be read directly from the panel meter of the Model 760A. A deflection to the right of zero indicates that the Model 760A output is higher than the value set on the readout dials. This indicates that the instrument under test measures low and denotes a negative error. Therefore, when checking a voltage or current measuring instrument, a deflection of the Model 760A meter to the right of zero corresponds to a negative error. Similarly, a deflection to the left of zero corresponds to a positive error.

2-15. INSTRUCTIONS

2-16. The operating instructions for the modes of operation of the Model 760A and the corresponding figure numbers are listed as follows:

Figure 2-2. CHECKING A VOLTAGE OR CURRENT MEASURING INSTRUMENT

Figure 2-3. CALIBRATING A VOLTAGE OR CURRENT MEASURING INSTRUMENT

Figure 2-4. CHECKING OR CALIBRATING A RESISTANCE MEASURING INSTRUMENT

2-17. CHASSIS SLIDE INSTALLATION

2-18. INTRODUCTION

2-19. Chassis slides are available through Jonathan Manufacturing Company, 720 E. Walnut, Fullerton, California. Special chassis slide mounting plates to adapt the Model 760A for installation of chassis slides are available through Fluke. The necessary parts required to equip the Model 760A with chassis slides are listed as follows:

1. 2 - chassis slide mounting plates; Fluke part number 3156-239822 (order quantity of 2).
2. 10 - #8 Philips flat head screws 3/8 inch long for attaching the Fluke chassis slide mounting plates to the Model 760A.
3. Left chassis section (see Figure 2-5) of the Jonathan type 120 QD chassis slide; Jonathan part number 120484B-L.
4. Right chassis section of the Jonathan type 120 QD chassis slide; Jonathan part number 120484 B-R.
5. 10 - #8 shallow headed screws 1/4 inch long for attaching chassis sections of the slides to the Fluke mounting plates.
6. Left cabinet section (see Figure 2-5) of the Jonathan type 120 QD chassis slide; Jonathan part number 120484A-L.
7. Right cabinet section of the Jonathan type 120 QD chassis slide; Jonathan part number 120484 A-R.
8. 4 - mounting brackets to adapt slides for rack mounting. See the Jonathan catalog or consult the manufacturer.

2-20. The cabinet sections of the Jonathan type 120 QD (Quick Disconnect) chassis slides, when ordered under the preceeding part numbers, have an 18 inch length and no mounting holes drilled into the outer channels (see Figure 2-5). The absence of the mounting holes will allow you to drill a mounting hole pattern to meet your specific requirements. Should you desire a longer cabinet section and/or pre-drilled mounting holes, consult the Jonathan Manufacturing Company.

2-21. INSTALLATION

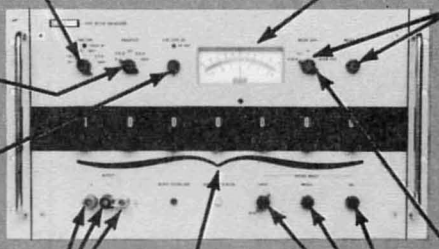
2-22. Instructions for installing chassis slides on the Model 760A will be found in Figure 2-6.

Note!

Before installing the Model 760A into a rack or cabinet, the nylon feet should be removed.

PRELIMINARY CONTROL SETTINGS

a. Turn the COARSE OUTPUT ADJUST control to the RESET position.
b. Turn the METER SENS control to the SEARCH position.



① Turn the FUNCTION switch to the VOLTS or AMPS position.

② Turn the FREQUENCY switch to the desired frequency (DC, LINE, or 400 Hz).

③ If the output voltage or current is at line frequency, adjust the LINE SYNC ADJ control until the NO SYNC lamp goes out.

④ Connect the instrument to be checked to the OUTPUT terminals.

⑤ Set the readout dials to the value of the desired cardinal point to be checked on the instrument under test.

⑥ Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls until the instrument under test indicates the value set on the readout dials of the Model 760A.

⑦ Turn the METER SENS switch to the METER ZERO position and check the electrical zero of the Model 760A's panel meter. Adjust the METER ZERO control if necessary.

⑧ Turn the METER SENS switch to the highest meter sensitivity (10%, 3%, or 1%) that will allow an on scale indication.

⑨ The percent error of the instrument under test may be read directly from the panel meter of the Model 760A. Deflection to the right of zero denotes a negative error, while deflection to the left of zero denotes a positive error. Repeat blocks 5 through 9 for each cardinal point.

To determine the error in terms of voltage or current, follow instruction blocks 1 through 5 and substitute the following information for the remaining blocks:

⑥ With the METER SENS control in the SEARCH position, adjust the COARSE and MEDIUM OUTPUT ADJUST controls until a 100% indication is achieved on the panel meter of the Model 760A. Turn the METER SENS control to the 10%, 3%, and 1% positions while using the MEDIUM and FINE OUTPUT ADJUST controls to keep the Model 760A's meter needle near the zero center position.

⑦ Turn the METER SENS control to the METER ZERO position. Check the electrical zero of the Model 760A's panel meter and adjust the METER ZERO control if necessary.

⑧ Return the METER SENS control to the 1% position. Adjust the FINE OUTPUT ADJUST control for a zero indication on the panel meter of the Model 760A.

⑨ The voltage error may be determined by taking the difference between the value read on the instrument under test and the value indicated on the front panel readout dials of the Model 760A.

Figure 2-2. CHECKING A VOLTAGE OR CURRENT MEASURING INSTRUMENT

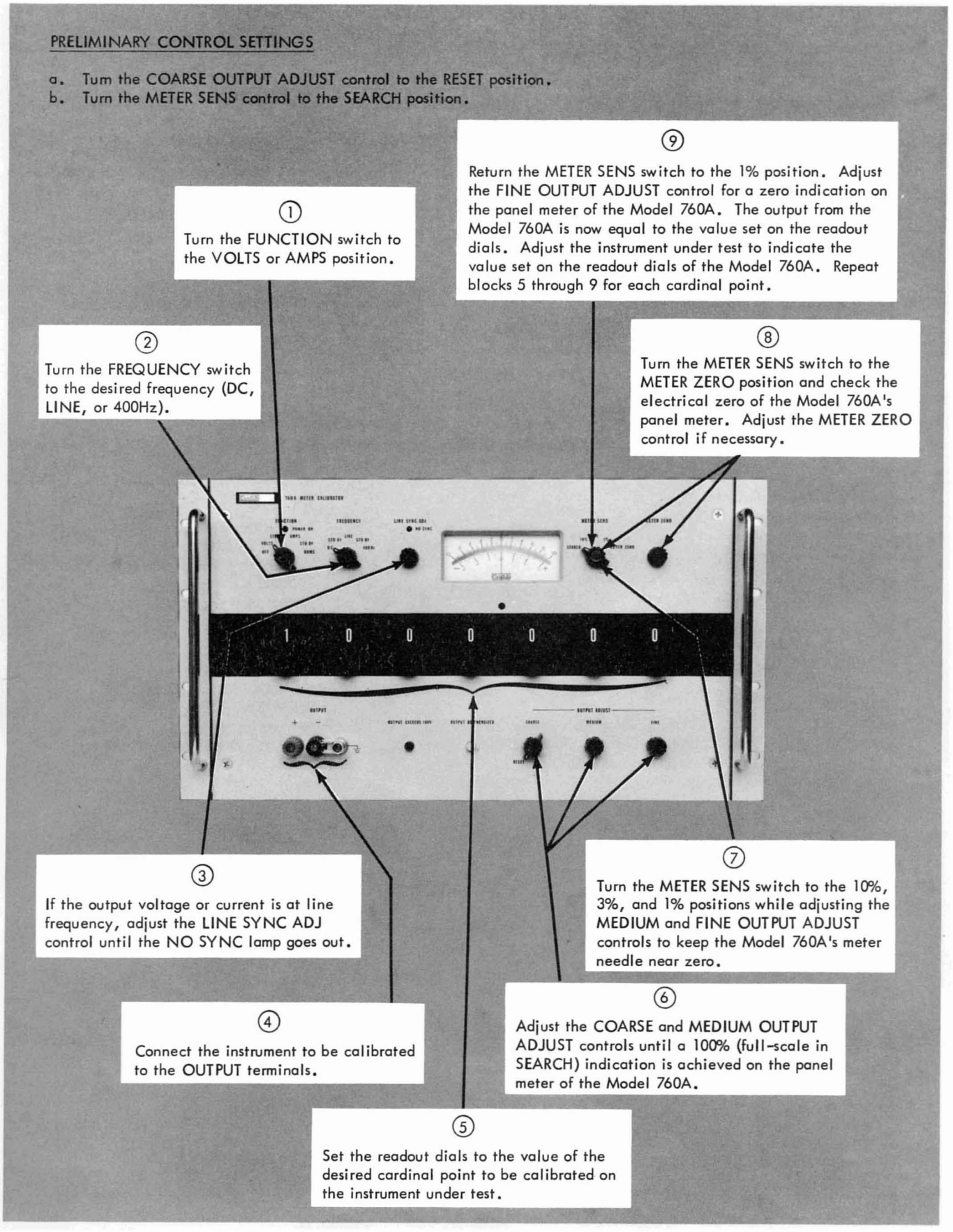
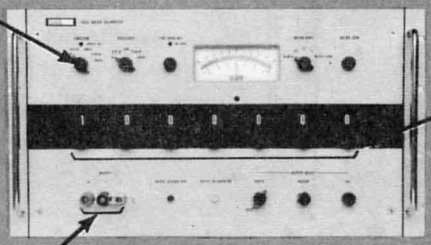


Figure 2-3. CALIBRATING A VOLTAGE OR CURRENT MEASURING INSTRUMENT

PRELIMINARY CONTROL SETTINGS

a. Turn the COARSE OUTPUT ADJUST control to the RESET position.
b. Turn the METER SENS control to the SEARCH position.

① Turn the FUNCTION switch to the OHMS position.



② Connect the instrument to be checked or calibrated to the OUTPUT terminals.

③ Set the readout dials to the value of the desired cardinal point. To determine the error of the instrument under test in terms of ohms, subtract the value set on the readout dials of the Model 760A from the value indicated on the instrument under test. For calibration, adjust the instrument under test until it indicates the value set on the readout dials of the Model 760A.

Figure 2-4. CHECKING OR CALIBRATING RESISTANCE MEASURING INSTRUMENTS

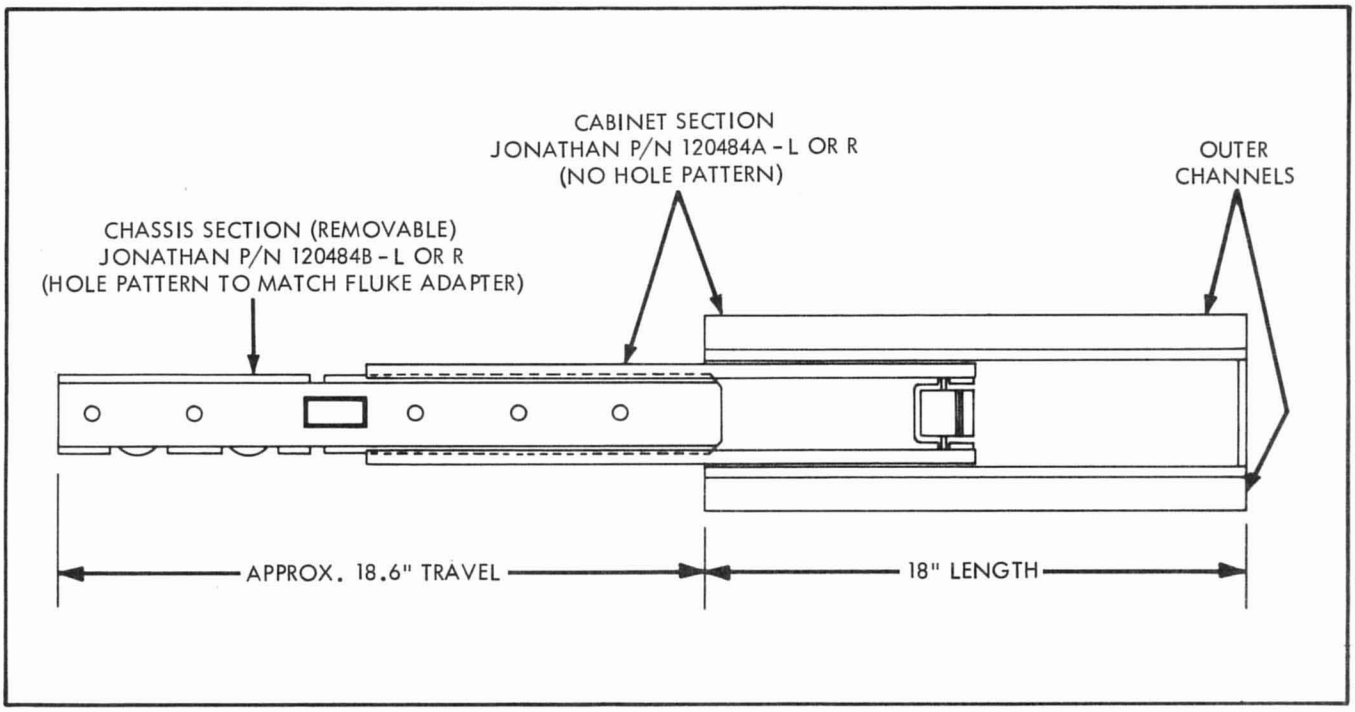
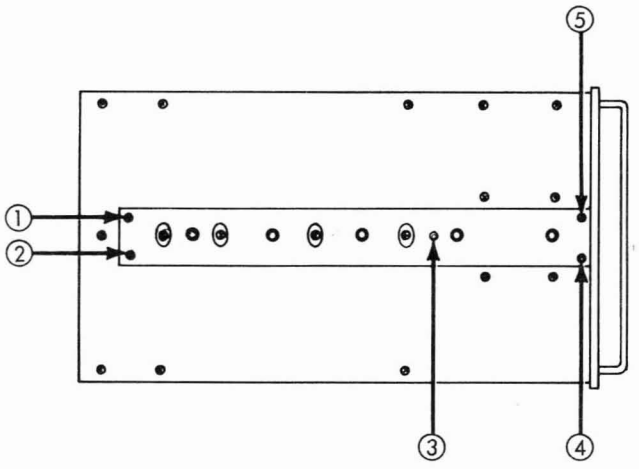
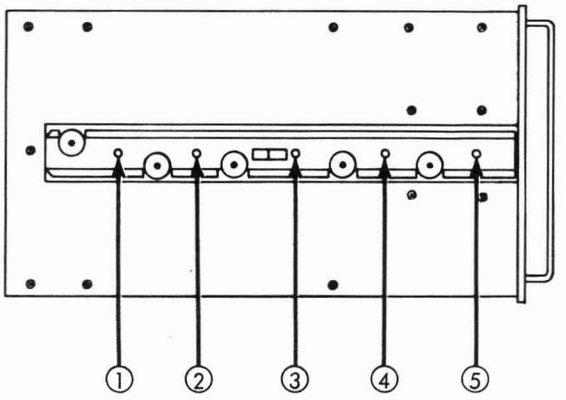


Figure 2-5. JONATHAN TYPE 120 QD CHASSIS SLIDE



Mount the Fluke chassis slide mounting plate to the Model 760A using five #8 philips flat head screws 3/8 inch long in the indicated mounting holes, ①, ②, ③, ④, ⑤. Repeat for opposite side of the Model 760A.



Remove the chassis section of the chassis slide assembly by depressing the quick disconnect mechanism located on the chassis section. Mount the chassis section on the Fluke mounting plate using five #8 shallow headed screws 1/4 inch long in the indicated mounting holes, ①, ②, ③, ④, ⑤. Repeat for opposite side of the Model 760A.

The cabinet sections of the slides may be mounted in a cabinet or, with the proper mounting brackets, in a rack. Once the cabinet sections are installed, the Model 760A should be fully inserted into the rack or cabinet until the quick disconnect mechanisms lock the chassis sections to the cabinet sections.

Figure 2-6. CHASSIS SLIDE INSTALLATION

SECTION III

THEORY OF OPERATION

3-1. INTRODUCTION

3-2. The Model 760A may be adjusted to provide a precision voltage level, current level, or resistance value at the OUTPUT terminals for calibration purposes. Through proper adjustment, the Model 760A may be used to indicate the percent error of an instrument under test. How the Model 760A accomplishes these functions will be discussed in this section.

3-3. The theory of operation of the Model 760A begins by dividing the instrument into three major sections and describing the circuitry associated with each section. This is followed by a discussion of the modes of operation of the instrument showing how these sections and their associated circuitry function together. Refer to the schematic diagrams at the end of the manual during discussions of individual circuits.

3-4. MAJOR SECTIONS

3-5. INTRODUCTION

3-6. The Model 760A may be divided into three major sections to aid in understanding the overall operation of the instrument. These major sections are the Source, Output Switching, and Measurement sections. The relationship between these sections is illustrated in Figure 3-1. Generation of the eventual output of the Model 760A originates in the Source Section. Either a 400 Hz or line frequency signal is supplied to the Output Switching Section. Depending upon the front panel control settings, the Output Switching Section provides either an ac or dc voltage (1 millivolt to 1000 volts) directly to the OUTPUT terminals or an ac or dc current (1 ua to 10A) via the Measurement Section to the OUTPUT terminals. Aside from housing a fixed and variable shunt plus associated compensation circuitry for the current function of the instrument, the Measurement Section contains the measurement circuitry for monitoring the output voltage or current level. This monitoring function allows precise adjustment of the output current or voltage level. A precision rheostat, controllable, via front panel readout switches, is also housed in the Measurement Section. Besides being used in other operating functions of the instrument, the Rheostat can be electrically placed across the OUTPUT terminals by setting the FUNCTION switch to the OHMS position. This provides a precision resistance decade from 1 ohm to 10 megohms in 1 ohm steps.

3-7. SOURCE SECTION

3-8. GENERAL. The source section consists of an oscillator, attenuator network, power amplifier, and ±50 volt power supply as illustrated in Figure 3-2. The Oscillator produces a constant amplitude output signal at either 400 Hz or line frequency. This output signal is then applied to an attenuator network consisting of the OUTPUT ADJUST controls. The signal, whose amplitude depends upon the setting of the OUTPUT ADJUST controls, is applied to the input of the Power Amplifier. The Power Amplifier amplifies this signal to supply sufficient power to drive the Output Switching Section. The ±50 Volt Power Supply provides operating voltages for the Power Amplifier. The ±50 Volt Power Supply also supplies the 100 volt indicator circuit which will be discussed later. In addition to supplying power to these circuits, it also contains the protection circuitry to de-energize the output of the instrument whenever an overload occurs or whenever the FUNCTION or FREQUENCY switches are placed in a STD BY position, when the "COARSE" control is not in the RESET position.

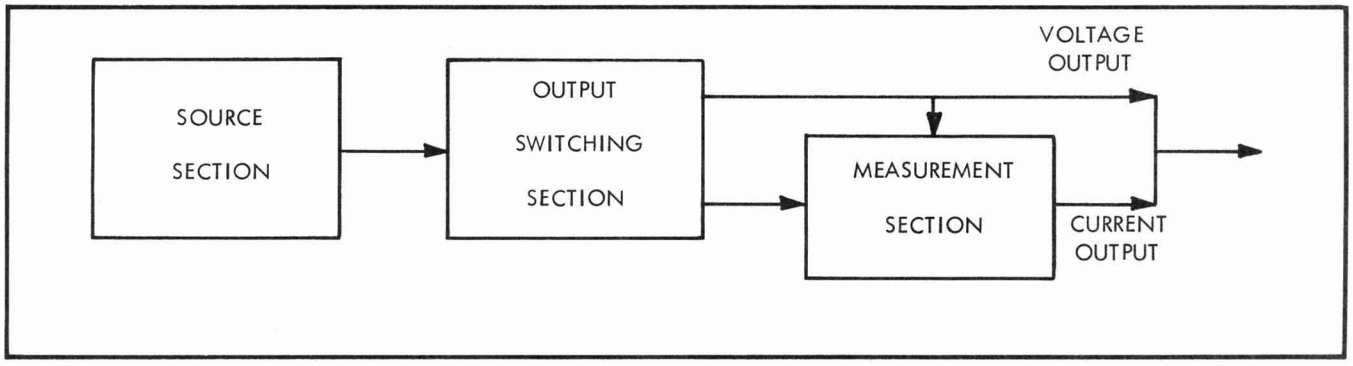


Figure 3-1. MODEL 760A BASIC BLOCK DIAGRAM

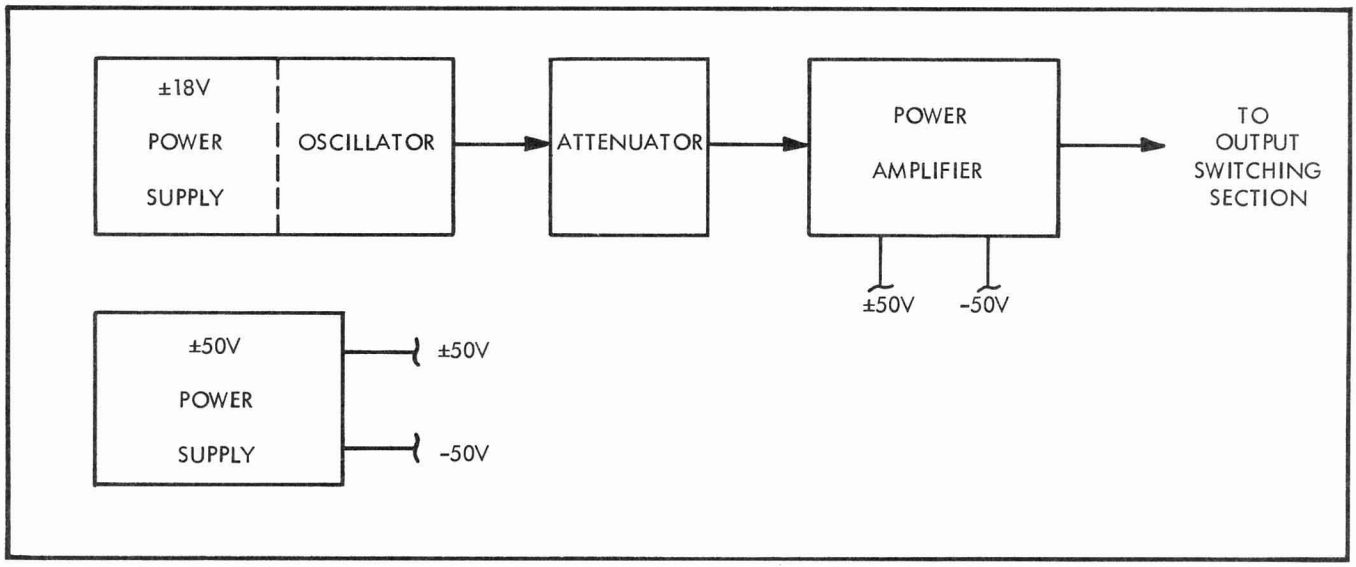


Figure 3-2. SOURCE SECTION BLOCK DIAGRAM

3-9. OSCILLATOR. The oscillator of the Model 760A consists of a two input ac amplifier with two feed back paths. One path provides a negative feedback through a frequency determining network to one input. The other path provides a positive feedback through an amplitude control circuit to the other input. Two other circuits associated with the oscillator are a line frequency synchronization circuit and the NO SYNC lamp driver circuit. Power is supplied to the oscillator and associated circuits from a ±18 volt regulated power supply located on the Oscillator Printed Circuit Board Assembly. Theory of operation of the ±18 volt power supply is identical to that of the ±15 Volt Power Supply described later.

3-10. The dual input ac amplifier consists of Q1 through Q5. The inputs of the ac amplifier are through the bases of Q1 and Q2 which make up a differential amplifier. Following Q2 is a common emitter stage Q3 which drives the emitter follower configuration of Q4. Transistor Q5 provides a constant current source for Q4. The output of the ac amplifier is taken from the emitter of Q4. This output provides a signal to both feedback loops plus the output of the oscillator through isolation resistor R30.

3-11. One portion of the output from the emitter of Q4 is applied to a bridged-tee frequency determining network. This network provides a negative feedback to the base of Q1. The bridged-tee network attenuates the desired signal, thus reducing the negative feedback to Q1, and passes unwanted harmonics which increase the negative feedback at all other frequencies assuring low harmonic distortion at the oscillator output. The bridged-tee network consists of C5 and C6 in combination with either A2R1 (SYNC ADJ control), R25, and R26 for oscillator operation at line frequency, or R27 through R29 for oscillator operation at 400 Hz. Note that when the FREQUENCY switch is in the DC position the oscillator operates at 400 Hz. The other portion of the signal from the emitter of Q4 is fed back as a positive feedback signal through a voltage divider to the base of Q2. The output level of the oscillator is held at a constant amplitude by an amplitude control circuit consisting of Q6 through Q8 and associated circuitry. This circuit corrects for any change in the preset output level of the oscillator by controlling the amount of positive feedback through the voltage divider to the base of Q2. Transistor Q6 and diode CR1 constitute a peak detector that charges C3 to a dc voltage value almost equal to the peak swing of the oscillator output. The voltage across C3 is sensed at the base Q7, whose emitter is tied to zener reference diode CR2. Any change in the charge of C3, due to output level changes of the oscillator, will cause the conduction of Q7 to change. This change in conduction of Q7 causes the voltage from Q7 collector to ground to change. Junction FET Q8 senses this voltage change between gate and source and produces a corresponding change in resistance from drain to source. This resistance change of Q8 varies the amount of positive feedback to the base of Q2. Should the output level of oscillator increase above the preset level, Q6 and CR1 charge C3 to a more positive dc level. The more positive dc level causes Q7 to decrease in conduction and develop a more negative voltage from its collector to ground. This more negative potential causes Q8 to increase in conduction and reduce its drain to source resistance. This in turn decreases the positive feedback to Q2 and brings the output level back to normal. When the oscillator output decreases, the amplitude control circuit operates in a similar manner to increase the positive feedback. This again brings the output level back to normal.

3-12. When the oscillator is operated at line frequency it may be synchronized to the powerline frequency. This is accomplished by injecting a small signal of power line frequency into the positive feedback path of the oscillator. The SYNC ADJ control, located in the frequency determining network of the oscillator, is adjusted to vary the oscillator frequency slightly to allow the oscillator to phase lock onto the injected signal. Once this is achieved the oscillator is synchronized to the power line. The injected signal must be of a constant ampli-

tude so as not to upset the balanced operating condition of the oscillator. To achieve this, a portion of the power line frequency is taken from the secondary of the power transformer and applied to a peak clipper consisting of R47, CR9, & CR10. This minimizes power line variations from affecting the injected signal. Once clipped the signal is further processed through a two section low pass filter (R48, C12 and R49, C13) to reduce the harmonic distortion, produced from clipping, from appreciably increasing the low harmonic distortion at the oscillator output. Transistor Q18 is an emitter follower used to decouple the low-pass filters from the injection point and to reduce oscillator loading on the low pass filters.

3-13. The NO SYNC lamp, A2DS5, and associated driver circuitry indicates when the oscillator is synchronized with the power line. A portion of the output signal of the oscillator is fed to the lamp driver circuitry consisting of Q19, Q20, and associated circuitry. The output signal of the oscillator is shifted in phase from the power line frequency. This is due to the low pass filter network R48, C12 and R49, C13 when processing the injected signal. This phase shifted signal is further shifted by R52, C15 and R53, C16 at the input to Q19. The additional phase shift provides a total of 180° from the power line frequency at the base of Q19. On the collectors of Q19 and Q20 is a signal from the secondary of the power transformer. With this signal on the collectors and the signal on the base of Q19 at 180° out of phase, these transistors are turned off. With Q19 and Q20 off, the NO SYNC lamp does not illuminate. This indicates that the oscillator is synchronized with the power line frequency. When the oscillator is almost out of synchronization with the power line, the phase between the base of Q19 and the collectors of Q19 and Q20 will not be 180°. This will cause Q19 and Q20 to conduct and A2DS5 will illuminate indicating that the oscillator is not properly synchronized. If the oscillator is completely out of synchronization, the phase between the base of Q19 and the collectors of Q19 and Q20 will constantly change. The changing phase causes Q19 and Q20 to periodically conduct. This will cause lamp A2DS5 to "blink", indicating that the oscillator is not synchronized with the power line frequency. Diode CR11, in the collector circuit of Q19 and Q20, is required to prevent the application of a negative potential on the collectors of Q19 and Q20. Resistors R24 and R56 in the bridged-T frequency determining network allows the oscillator to operate at 50 Hz. Movable jumper leads are provided on the printed circuit board for shorting across these resistors to allow the oscillator to operate at 60 Hz. To synchronize the oscillator to the 50 Hz line frequency, the time constant of the low pass filter (following the clipper stage of CR9 and CR10) must be lowered. This is accomplished by connecting C18 across C13 in the filter circuit with a jumper lead. For operating at 60 Hz, the jumper lead is removed to open one side of C18.

3-14. POWER AMPLIFIER. The constant output of the Oscillator is applied to the variable attenuator made up of the OUTPUT ADJUST controls. The signal from the OUTPUT ADJUST controls is coupled to the Power Amplifier. Here, the signal is amplified to provide sufficient voltage and current to the primary of the output switching transformer (A3T2) to drive the Output Switching circuitry.

3-15. Differential amplifier Q1 and Q2, common emitter stages Q3 and Q4 provide sufficient voltage gain to emitter follower stages Q5 through Q9 and the Q5 mounted off of the printed circuit board. The emitter follower stages provide proper impedance match and sufficient current gain to drive the so called single ended push-pull stage of the power transistors Q6 and Q7 (mounted off of the printed circuit board). The ac feedback ratio of R27 to R5 at the base of Q1 provides a large amount of ac feedback. This large amount of ac feedback minimizes harmonic distortion and gain changes due to temperature and transistor variations. The dc feedback ratio is set by R47 to the dc input resistance of Q1 and is considerably higher than the ac feedback ratio. Blocking capacitor C2 insures that R5 does not act as a feedback element to dc. The dc feedback provides a high dc operating point stability over wide temperature ranges.

3-16. Transistor Q3 primarily translates the dc level of Q1 to the required dc level of the base of Q4. Transistor Q4 provides, at its collector, a voltage swing approximately equal to the total Power Amplifier output voltage swing. Transistor Q4 drives emitter follower Q5 which in turn drives series connected transistors Q8 and Q9 from the voltage divider in its emitter. Transistors Q8 and Q9 provide the necessary current gain to drive power transistor Q7 (mounted off of printed circuit board). Capacitor C4, R23, and CR4 in the emitter of Q8 provide frequency stability. Also connected to the collector of Q4 through diode CR1 is emitter follower Q6. Diode CR1 places the base of Q6 +0.6 volts above the base of Q5. This sets the correct quiescent current for the two power transistors Q6 and Q7. Transistors Q6 and Q7 (mounted on printed circuit board) with constant current source Q10 provide sufficient current gain to drive intermediate power transistor Q5 (mounted off of printed circuit board). Transistor Q5 provides more current gain and drives power transistor Q6. Power transistors Q6 and Q7 operate at approximately class B and provide the necessary power to the primary of A3T2. The Power Amplifier has the capability of providing 31 volts rms at approximately 2 amperes rms.

3-17. ±50 VOLT POWER SUPPLY. The ±50 Volt Power Supply consists of two 50 volt regulated power supply's connected series aiding. The common tie point between the two is the common reference (source common) connected to the black (-) OUTPUT terminal on the front panel of the Model 760A. Each of these power supply's contains, in addition to the regulator circuitry, circuitry that de-energizes both supply's during an overload condition on either one. The theory of operation will be limited to the +50 volt power supply section since it is similar in operation to the -50 volt power supply.

3-18. The diode bridge consisting of CR1 through CR4 provides a full-wave rectified voltage to an RC-filter consisting of R1, C1 (connected between pins 1, 2 and 9) and C3. The filtered dc voltage is applied through the Darlington configuration of Q1 and Q2 (connected between pins 6, 8, and 9) to the +50 volt output of the supply. In the Darlington configuration, Q2 is the series pass element with Q1 as the driver stage. Any change in the output voltage of the supply is sensed by the base

of Q5 connected to the voltage divider of R19, R22, and R10. A change in voltage sensed at the base of Q5 is compared with the reference level at its emitter, established by zener diode CR18. Any difference voltage is amplified by Q5 and applied to the base of driver Q1 through current limiting resistor R24. Driver Q1 controls the conduction of series pass element Q2 depending upon the magnitude of the error voltage from Q5. Current is supplied to the base of driver Q1 for proper control of Q2 by a constant current source consisting of Q6, CR11, CR12, R14, and R23.

3-19. The overload protection circuitry of the Model 760A is located in the ±50 Volt Power Supply. The function of this circuitry is to sense an overload condition and de-energize the ±50 Volt Power Supply output. This results in eliminating the operating voltages of the Power Amplifier thus preventing any input to the Output Switching Section and consequently no output voltage or current will be present at the OUTPUT terminals of the instrument.

3-20. Transistors Q2 and Q3 comprise a flip-flop circuit. When not in an overload condition, Q2 is normally off and Q3 normally on. In order for the protection circuitry to turn off the power supply, Q2 must be turned on. With Q2 on, Q3 turns off and activates the rest of the protection circuitry to turn off the power supply. Overload sensing circuitry to turn on Q2 is contained in the base-emitter circuit of Q2. Resistors R11 and R12 in the base-emitter circuit of Q2 sense changes in load current. When the load current exceeds the average current drain of the supply, C4 follows the sum of the voltages dropped across R11 and R12. A sufficient charge on C4 will raise the voltage at the base of Q2 to the point at which Q2 will conduct and turn off Q3. When the load current increases rapidly and exceeds the peak current drain of the supply, CR14 couples the voltage across R11 to the base of Q2, since C4 will not charge fast enough. To keep the supply from being turned off by random transients, C5 in the collector of Q2 slows down the flip-flop action.

3-21. As mentioned previously about the flip-flop circuit of Q2 and Q3, Q2 is normally off and Q3 normally on when an overload condition does not exist. The base of Q4 is connected through R16 to the collector of normally conducting Q3. In this condition Q4 is normally off. Connected to the collector of Q4 is the OUTPUT DE-ENERGIZED lamp and the base of Q1. The OUTPUT DE-ENERGIZED lamp is connected at pin 10 through the parallel combination of R20 and R21 to the positive raw supply. The other side of the lamp is connected at pin 11 to the collector of Q4. With Q4 in its normal off condition, no path is provided to ground for the lamp and it does not illuminate. Transistor Q1 is normally on, when Q4 is normally off, and supplies the operating voltage for both constant current sources Q6 and Q11 in the -50 volt supply. When an overload condition exists, Q2 is turned on and turns off Q3. With Q3 off, Q4 turns on and illuminates the OUTPUT DE-ENERGIZED lamp. Q1 is turned off and eliminates the operating voltages for the constant current sources of both supplies. Without current supplied to the series pass drivers, the series pass elements turn off and no output is available from the supply. The supply is reset by placing the COARSE OUTPUT ADJUST control in the RESET position. This places the source common at pin 7 on the +50 volt supply. Before being reset, capacitor C8 is charged through R4 and CR10. When reset, C8 discharges placing a negative pulse through R6 on the base of Q2. This negative pulse turns Q2 off which turns on Q3 and the system resets. In the -50 volt supply, the same sequence is performed when the COARSE control is placed in RESET by shorting pin 17 to the -50 volt output at pin 13

3-22. The ±50 Volt Power Supply also provides power to the POWER ON lamp and decimal lamps. The parallel combination of R45, R46, and R47 supply power at pin 22 to the POWER ON lamp, when the FUNCTION switch is moved from the OFF position. Power is supplied through a section of the FUNCTION switch (A2S81) to the individual decimal lamps from R44, between pins 13 and 14 in the -50 volt supply.

3-23. OUTPUT SWITCHING SECTION

3-24. GENERAL. As shown in Figure 3-3, the output switching section consists of an output transformer with multi-tapped secondary windings, a rectifier circuit for dc current operation, two rectifier-filter circuits for high and low dc voltage operation, the OUTPUT EXCEEDS 100V indicator circuit, and a switching network. Referring to the schematic, the high voltage rectifier is a bridge rectifier circuit consisting of CR7 through CR18 followed by a low pass LC pi-filter. The low voltage rectifier is a four diode bridge consisting of CR3 through CR6 also followed by an LC pi-filter. Both of these bridges are located on the 100V Indicator Printed Circuit Board Assembly which also contains the 100 volt indicator circuitry. DC current is supplied from the full-wave rectifier-filter circuit of CR1, CR2, L1, and C8, all mounted on the main chassis A3. AC current is supplied by another secondary winding for the current rectifier-filter circuit. DC voltages from 100 to 999.999(10) volts (front-panel readout) are provided by the high voltage rectifier circuit and the appropriate transformer taps. DC voltages from 3 to 99.999(10) volts (front-panel readout) are provided by the low voltage rectifier-filter circuit and appropriate transformer taps. DC voltages from 1 mv to 2.999(10) volts are provided by the current rectifier-filter circuit through a resistive divider consisting of A3A3R9, and A2R2 through A2R12. AC voltages from 1 volt to 1000 volts are provided by the transformer taps. Below 1 volt ac, a tap on the transformer supplies the resistive divider A2R3 through A2R12 from which these voltages are selected. Actual tap selection, in either ac or dc voltage operation, is made automatically by the readout switch corresponding to only the first significant digit of the value to be set on the readout dials.

3-25. 100 VOLT INDICATOR. The Model 760A includes a warning circuit that indicates when the ac or dc voltage at the OUTPUT terminals exceeds 100 volts. This circuit is located in the 100 VOLT INDICATOR PCB ASSEMBLY (A3A3). The 100 volt indicator circuitry consists of an input divider network, emitter follower stage Q1, and common emitter stage Q2 which supplies the indicator lamp A2DS6. The input divider network consists of R1 through R4, R10, R11, C1, and C2. The

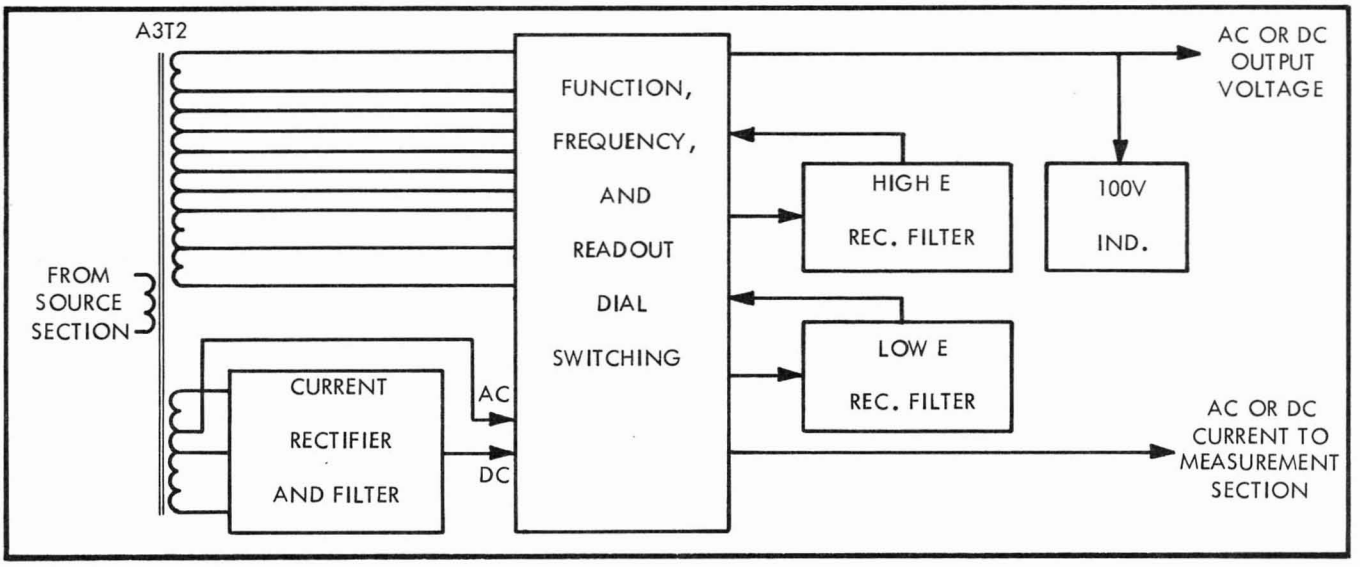


Figure 3-3. OUTPUT SWITCHING BLOCK DIAGRAM

base of Q1 is connected to the divider at the junction of R3, R4, and C1. With no voltage at the input (junction of R1 and R10), Q1 is held off through R4 connected to the -50 volt supply. Since Q1 is off Q2 will not conduct and no power is supplied to A2DS6. With a dc voltage present at the junction of R1 and R10, current flows through R1, R2, R3, and R4 to the -50 volt supply. As the dc voltage increases towards 100 volts the potential at the base of Q1 increases towards zero volts dc. When 100 volts dc is present at the junction of R1 and R10 with respect to ground, the base of Q1 becomes slightly positive and Q1 begins to conduct. This causes Q2 to begin conduction. When the voltage exceeds 100 volts, Q1 goes into saturation causing Q2 to saturate and supply sufficient power to illuminate A2DS6. With an ac voltage present at the input to the indicator circuitry, current flow is through R10, R11, C1, and R4 to the -50v supply. Some current flows through R1 and R2 but is bypassed to ground by C2 to keep it from interferring with the potential at the junction of R3, R4, and C1. Q1 will conduct on the positive half cycles and charge C3. The charge on C3 will be sufficient to cause Q2 to conduct when the ac potential at the junction of R1 and R10 exceeds 100 volts rms. This again will cause the indicator lamp to illuminate, warning that the potential across the OUTPUT terminals exceeds 100 volts.

3-26. MEASUREMENT SECTION

3-27. GENERAL. The Measurement Section is composed of the AC Converter, Null Detector, meter, and the ±15 Volt Power Supply. The relationship between these circuits is shown in Figure 3-4. Also housed in the shielded Measurement section is the Readout Rheostat, Readout Shunt, Shunt Compensator, a fixed value shunt, and a fixed value resistor. The front panel FUNCTION, FREQUENCY, and readout switches place the above listed components into particular arrangements for voltage or current operation of the instrument. These voltage or current circuit arrangements provide a current, through either the Readout Rheostat or fixed resistor, that is proportional to the output voltage or current of the instrument to the measurement circuitry. If this proportional current is dc, it is applied directly to the summing point (SP, see Figure 3-4). In the case of an ac current, the AC CONVERTER converts it to a proportional dc current and applies it to the summing point. The sum of the proportional current and the current from the reference must equal zero in order for the meter to indicate a null (zero position on meter scale). A sum different from zero at the summing point is amplified by the Null Detector and displayed on the meter. The complete Measurement Section is housed in a shield insulated from the chassis of the instrument. The Measurement Section common (Measurent Common) is connected to this shield. When the instrument is operated in the voltage mode, the measurement common, and consequently the shield, is connected to the source common (black front panel terminal). When operated in the current mode, the measurement common shield floats on the positive output side (red terminal).

3-28. AC CONVERTER. The AC Converter basically consists of an ac amplifier with two diodes in an inverse feedback network. The output of the AC Converter is taken from one of these diodes. The ac signal at the input is amplified by four cascaded stages (Q1, Q2, Q4, and Q5) and applied through C5 to CR1 and CR2. On positive half cycles CR1 conducts current through R13 and R15 to ground. A positive voltage is dropped across R15 and fed back to the input of the ac amplifier. During negative half cycles CR2 conducts. The output of CR2 is filtered by R14 and C6 then applied through R18 to the dc measuring circuitry. When CR2 is conducting, current flows up through R15, R14, and R16. This places a negative voltage drop across R15 which is fed back to the input of the ac amplifier. The feedback path is through R30 and R19 in the current mode of operation. In the voltage mode the feedback ratio is changed by switching R21 across both R19 and R30. The low frequency response of the AC Converter can be changed for optimum operation at either 50 or 60 Hz. For optimum operation at 50 Hz, C8 is connected across C5 with the jumper lead provided. For optimum operation

at 60 Hz, C8 is electrically removed from the circuit by disconnecting the jumper lead.

3-29. NULL DETECTOR. The null detector of the Model 760A is a carrier dc amplifier. The incoming dc signal is modulated by a 215 Hz square wave, amplified, demodulated, amplified again by a dc amplifier, and then drives the panel meter of the Model 760A. Transistors Q2, Q3, and associated circuitry constitute a 215 Hz multivibrator. The collector of Q2 provides a 215 Hz square wave to the base of Q1 and through C12 to the gate of the metal oxide silicon field effect transistor Q4. MOS FET Q4 acts as a voltage sensitive resistor and square wave modulates the incoming dc. Transistor Q1 supplies a small square wave signal, 180° out of phase from the drive signal, to the drain of Q4. This is done to minimize the effect of spikes created when the drive signal passes through the gate to drain capacitance of MOS FET Q4. The square wave modulated signal is then amplified by a carrier amplifier consisting of Q5 through Q8. The amplified signal is then synchronously demodulated by Q9, whose base is fed a 215 Hz square wave from the collector of Q3 that is 180° out of phase from the modulating signal. At the output of Q9 is an unfiltered, but dc, signal proportional to the input dc. This signal is applied through R22 to a dc amplifier consisting of Q10 through Q12. The dc amplifier with integrating capacitor C11 acts as an active low pass filter and drives the front panel meter of the Model 760A. A dc voltage is applied to the base of Q11 by the front panel METER ZERO control. To zero the meter, the METER ZERO control is adjusted until the dc voltage at the base of Q11 matches the dc voltage at the base of Q10 with no input voltage to the Null Detector. Transistor Q13 is a constant current source for Q12 and insures that the panel meter is driven by a high impedance source.

3-30. ±15 VOLT POWER SUPPLY. Diodes CR1 and CR4 provide a positive full-wave rectified dc voltage filtered by C1 for the +15 volt supply. Diodes CR2 and CR3 provide a negative full-wave rectified dc voltage filtered by C2 for the -15 volt supply. Transistors Q1 through Q9, CR6, and associated circuitry constitute

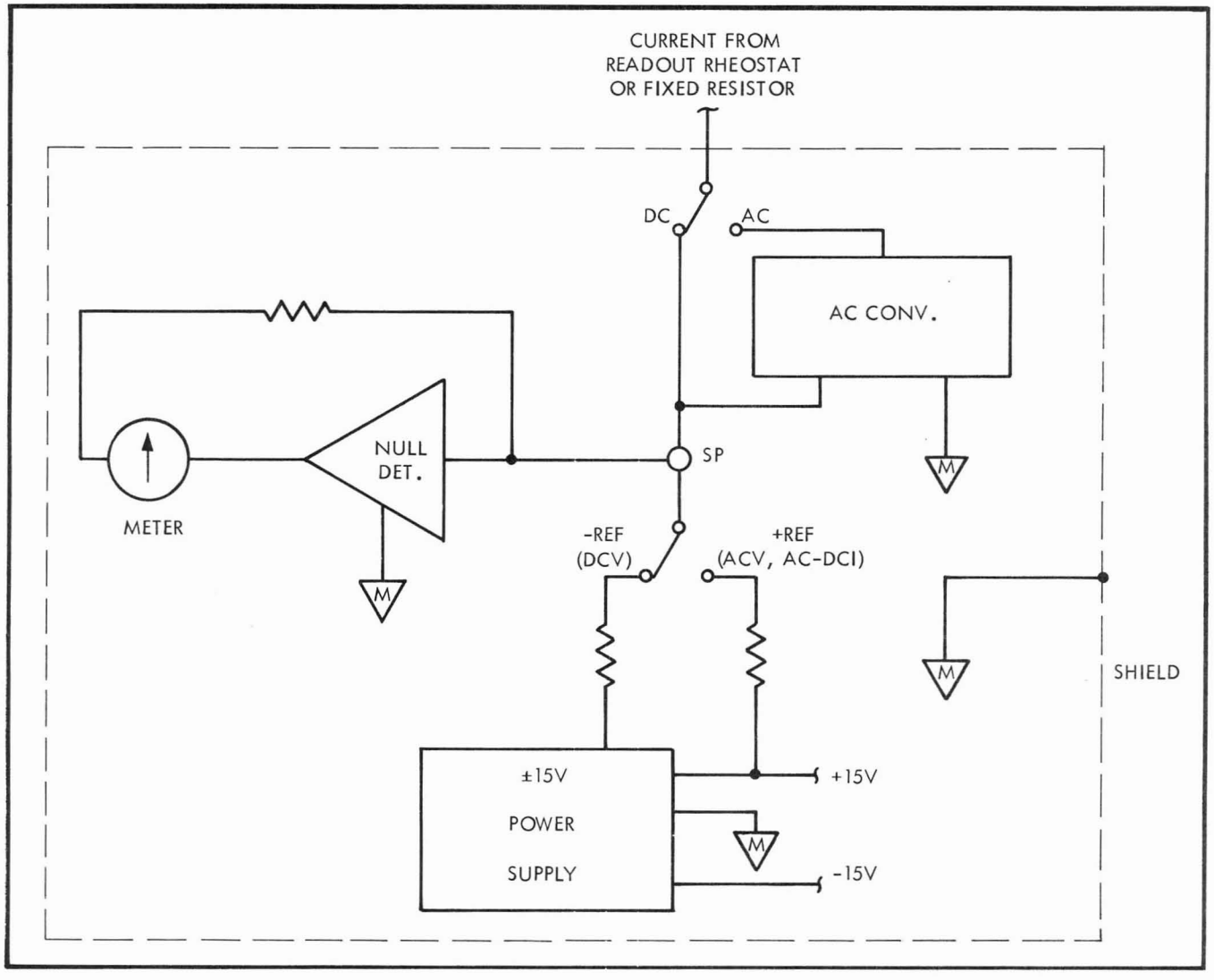


Figure 3-4. MEASUREMENT SECTION FUNCTIONAL BLOCK DIAGRAM

the regulating circuitry of both power supplies. The main reference element is CR6 along with its matched resistor R9 in the -15v supply. Transistors Q6 and Q7 makeup a differential amplifier. The base of Q7 is connected to the reference zener CR6. The base of Q6 is connected to a voltage divider across the -15 volt supply consisting of R2, R17, R18, R19, calibration adjustment R3, and R4. The base of Q6 sees a proportional amount of change whenever the -15 volt supply output deviates. Any change in the -15 volt supply shows up as a voltage difference between Q6 and Q7 which is then amplified. This amplified difference voltage is applied to the bases of Q1 and Q2 from the collectors at Q6 and Q7. Transistors Q1 and Q2 comprise another differential amplifier with Q1 driving series pass element Q3. Variation of the conduction of series pass element Q3 brings the -15 volt supply back to normal. The +15 volt supply is regulated with reference to -15 volt supply. Transistors Q8 and Q9 are another differential amplifier that looks at the difference between any change in the +15 volt supply. Any difference is amplified and applied to the base of Q5 from the collector of Q9. Transistor Q5 then drives series pass element Q4. By controlling the conduction of Q4 the +15 volt supply is also brought back to its normal output.

3-31. Three circuit elements in the ±15 Volt Power Supply are used only when the instrument is first turned on. These elements are R15, R16, and CR5. Resistors R15 and R16 across the series pass elements provide a current path to allow Q3 and Q4 to conduct and energize the following stages during initial turn on.

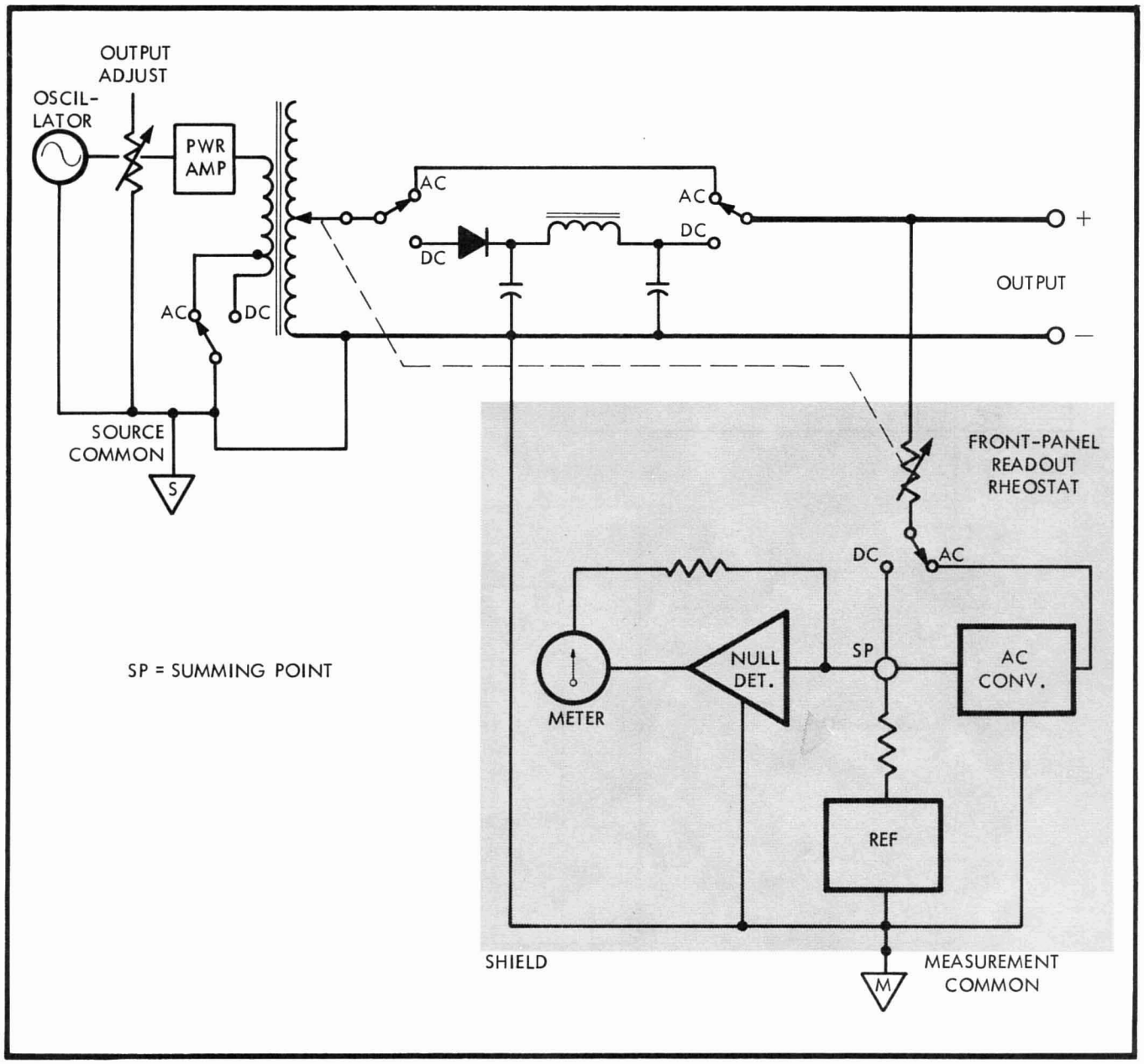


Figure 3-5. VOLTAGE ARRANGEMENT

Diode CR5 insures that the voltage between Q8 and Q9 emitters and ground does not become excessive during initial turn on. After turn on, CR5 does not conduct.

3-32. Aside from supplying power to the Null Detector and AC Converter, the ±15 Volt Power Supply provides two reference voltages for the overall measurement system. In the dc voltage mode of operation a -6.3 volt reference voltage is supplied directly from the reference diode CR6 at the base of Q7 to an external voltage divider consisting of R1 through R5 located on the Calibration Printed Circuit Assembly, A2A3. For ac voltage and ac-dc current, a +0.2 volt reference is supplied from +15 volt supply through a precision voltage divider consisting of CR1, R12, R13, R15, R16, R31, R32, and R33, also located on the Calibration Printed Circuit Assembly.

3-33. MODES OF OPERATION

3-34. AC-DC VOLTAGE

3-35. Refer to Figure 3-5 for the following discussion. The oscillator provides an ac signal (400 Hz or line frequency) which is amplified by the Power Amplifier to drive the output transformer. The amount of drive signal is controlled by the OUTPUT ADJUST controls. The readout switch corresponding to the first significant figure of the value set on the readout dials selects the proper secondary tap of the output transformer. If the desired output is an ac voltage, this tapped voltage is applied directly to the (+) OUTPUT terminal. Should a dc voltage be required, the tapped ac voltage is sent through a rectifier-filter circuit before being applied to the (+) OUTPUT terminal. Since the Readout Rheostat

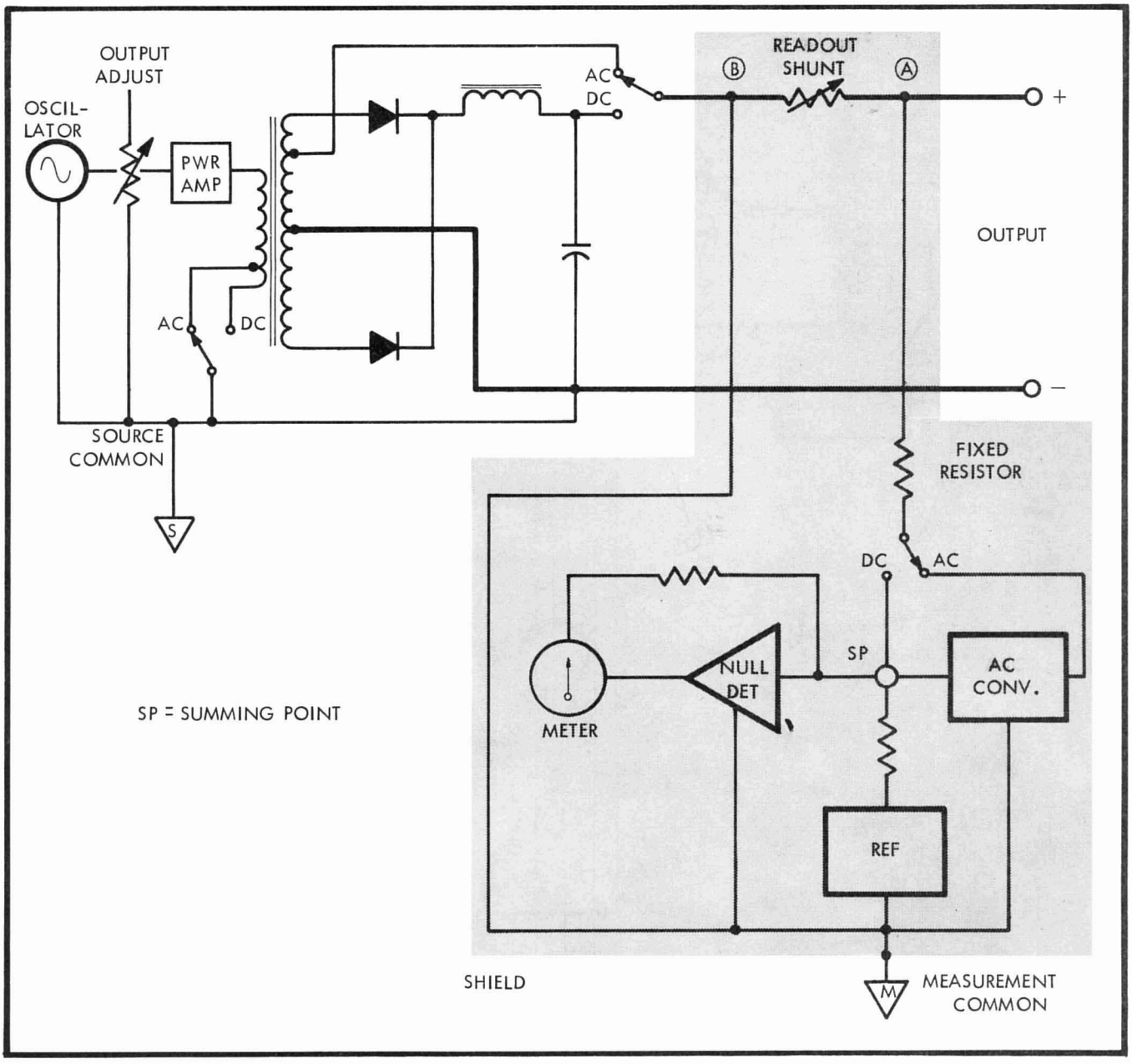


Figure 3-6. LOW CURRENT ARRANGEMENT

is controlled by the readout switches, it will automatically be set to a particular resistance value. This resistance value will allow a current to flow into the summing point that will cause an indication on the front panel meter. Only, when the output voltage (ac or dc) is equal to the value set on the readout dials, will this current be of the correct value to cause a null indication on the front panel meter. Since this current is directly proportional to the output voltage, an off-null meter indication will always be proportional to a percentage of the output voltage.

3-36. AC-DC CURRENT

3-37. LOW CURRENTS. Figure 3-6 shows the circuit arrangement for low ac-dc currents from 1 microampere to 0.09999(10) amperes. The Oscillator - Power Amplifier combination operates as in the voltage mode. However, the high current secondary of the output transformer provides the current. An ac current or dc current is supplied through the Readout Shunt to the (+) OUTPUT terminal. The complete measurement circuitry is connected across the Readout Rheostat. The input current to the measurement circuitry is through a fixed resistor composed of R25 through R27 and R35 through R34, located on the Calibration Printed Circuit Board Assembly (A2A3). The value of this fixed resistor is such that, when the voltage A to B is equal to 1 volt, a null will be indicated on the front panel meter. The Readout Shunt is controlled by the last five readout switches. When the readout dials are set to a particular value, the Readout Shunt is set to a particular resistance

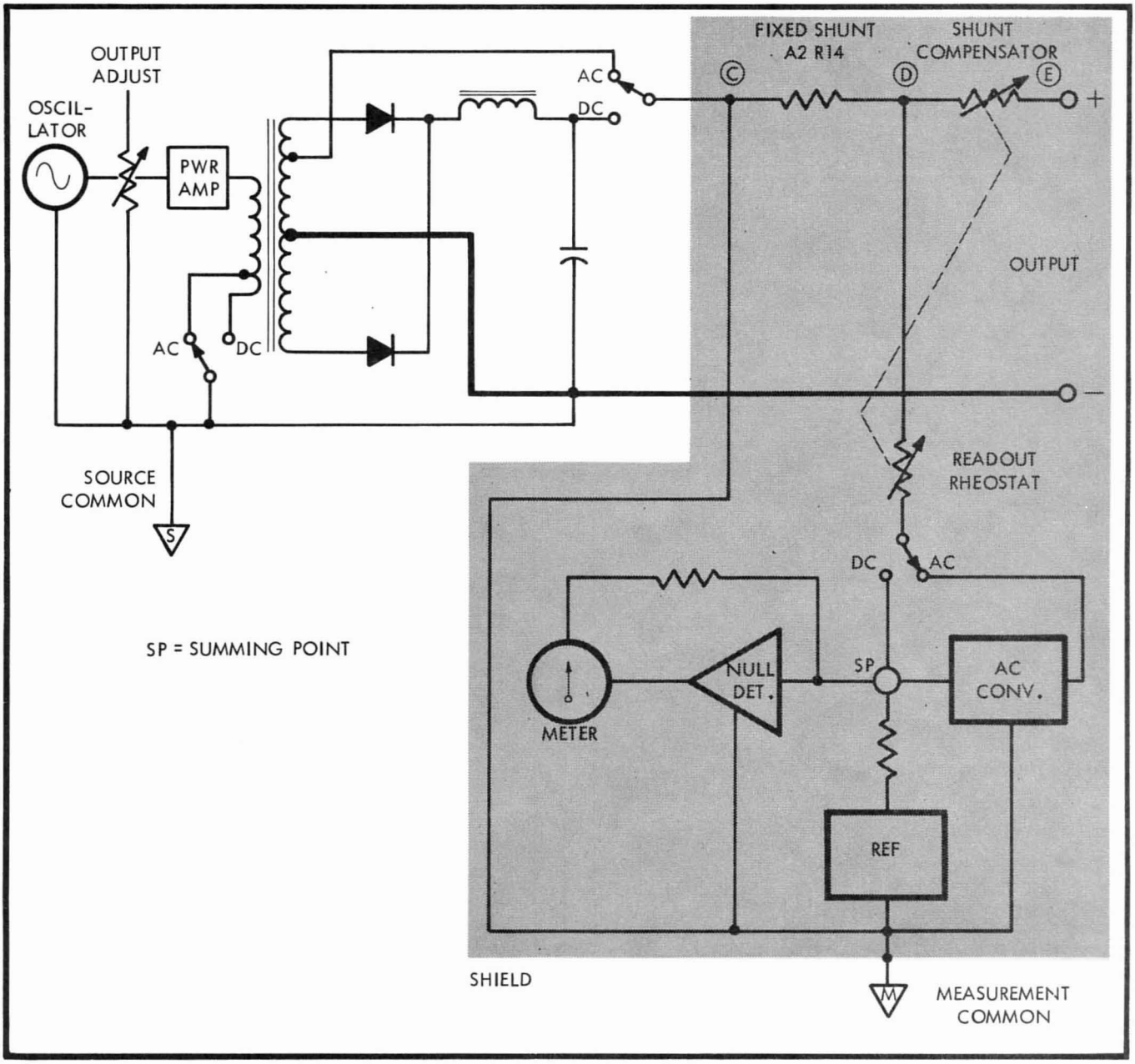


Figure 3-7. HIGH CURRENT ARRANGEMENT

value. When the output current is adjusted to such a value that a 1 volt potential exists from A to B, the meter will indicate a null. At this condition the current at the OUTPUT terminals is equal to the value set on the readout dials.

3-38. HIGH CURRENTS. Figure 3-7 shows the circuit arrangement for high ac-dc currents from 0.1 to 9.99999(10) amperes. The high current arrangement uses a fixed shunt, a shunt compensator, and the same Readout Rheostat used in the voltage mode. This time, the measurement circuitry is across the fixed shunt. The voltage across the fixed shunt is proportional to the output current. This voltage is then applied to the Readout Rheostat which operates the same as in the voltage mode. Ganged to the Readout Rheostat is the Shunt Compensator. The Shunt Compensator varies inversely as the current output to keep the voltage C to E at approximately 1 volt regardless of the voltage D to C. This minimizes the necessity for adjustment of the OUTPUT ADJUST controls.

SECTION IV

MAINTENANCE

4-1. INTRODUCTION

4-2. This section contains all instructions necessary for maintenance and calibration of the Fluke Model 760A Meter Calibrator. Information contained in this section is arranged under the headings "GENERAL INSTRUCTIONS, CALIBRATION, and TROUBLESHOOTING." No instructions for performance testing have been included because accuracy is an essential part of the performance of the Model 760A and a procedure for testing the accuracy would be almost identical to the calibration procedure and would require the same test equipment. However, a functional checkout procedure is included as a part of troubleshooting in paragraph 4-41. Satisfactory completion of this procedure, although it does not check accuracy, assures that all circuits are functioning correctly and that the instrument is capable of being calibrated to its specifications.

4-3. SERVICE INFORMATION

4-4. Each instrument manufactured by the John Fluke Manufacturing Co. is warranted for a period of one year upon delivery to the original purchaser. Complete warrantly information is contained in the Warranty page located at the rear of this manual. If any problem is encountered in operation of the instrument, contact the nearest John Fluke Sales Representative or write directly to the John Fluke Manufacturing Co. with a statement of the problem. Please include the serial number of the instrument in such correspondence.

4-5. Complete factory repair and calibration service for all Fluke instruments is available at nominal cost. A schedule of test fees will be furnished upon request. If requested, an estimate will be furnished to the customer before any repair work is begun.

4-6. GENERAL INSTRUCTIONS

4-7. REPLACEMENT OF FUSES

4-8. The fuses are located in bayonet type fuseholders mounted on an inset section at the right side of the rear panel. The correct values of fuses are listed below:

Ref Desig	Function	Type
F1	Line	2A, time delay 115V conn 1A, time delay 230V conn
F2	Line	2A, time delay 115V conn 1A, time delay 230V conn
F3	-50 vdc Supply	1-1/2A
F4	+50 vdc Supply	1-1/2A

Under no circumstances should replacement fuses with a higher current rating be installed in the instrument; nor should time delay fuses be used for F3 and F4.

4-9. REPLACEMENT OF LAMPS

4-10. The indicator lamps are located immediately behind the front panel. To gain access to the POWER ON and NO SYNC lamps it is necessary to remove the top cover and the inner shield cover of the measurement section. To gain access to the decimal lamps the bottom cover must be removed. Figure 4-1 shows the location of the decimal lamps. Any of them may be removed or installed easily with the aid of a "fishing" tool made by wrapping masking tape around the eraser end of a lead pencil as shown in Figure 4-1.

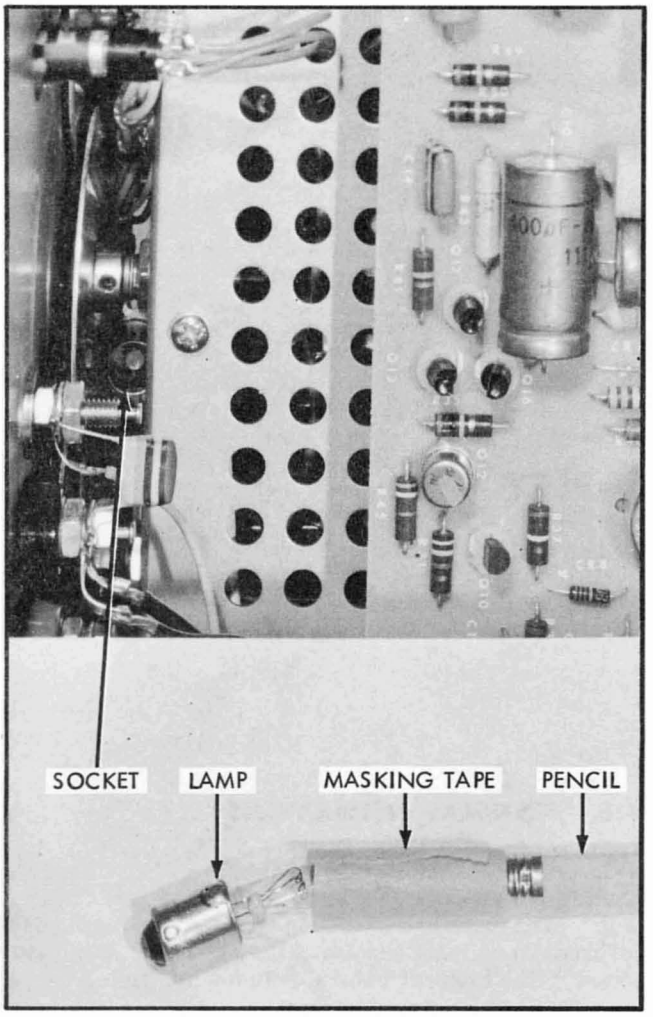


Figure 4-1. DECIMAL LAMP REPLACEMENT

4-11. CONVERSION FOR 230-VOLT OPERATION

4-12. The Model 760A may be converted easily from 115-volt operation to 230-volt operation. To perform this conversion, proceed as follows:

a. Remove the bottom cover of the instrument.

b. Locate the input terminals of the power transformer T1.

c. Remove the bare jumper wires connecting terminals 1 to terminal 2 and terminal 3 to terminal 4. (Shown by dashed lines in Figure 4-2.)

d. Cut a length of number 20 copper wire to form a jumper to connect terminal 2 to terminal 3. (Shown by a solid line in Figure 4-2.)

e. Fasten the jumper securely in place and solder it to form good electrical connections.

f. Remove the line fuses, F1 and F2 and replace them with one ampere time delay fuses.

g. Replace the cover, the 230-volt conversion is complete.

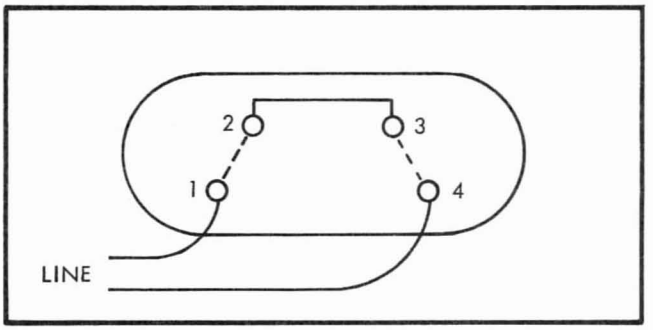


Figure 4-2. 230-VOLT CONVERSION

4-13. CONVERSION FOR 50 Hz OPERATION

4-14. Converting the instrument, from operation at one line frequency (50 or 60 Hz) to the other, requires the connection of four jumper leads to the four terminals corresponding to the desired line frequency. Three connection points are located on the Oscillator Printed Circuit Board Assembly (A2A1) and one connection is located on the AC Converter Printed Circuit Board Assembly (A2A5). In all four cases, two white-dashed lines originate where one end of the jumper lead is connected to the printed circuit board. Each dashed line ends in a white circle surrounding a terminal. Each terminal is designated either "50 Hz" or "60 Hz", corresponding to the power line frequency. For proper instrument operation, the jumper leads should be connected to the terminals corresponding to your particular power line frequency requirements. The following procedure should be used for converting your instrument:

a. With the FUNCTION switch set to OFF, place the Model 760A on one side and remove the bottom cover.

b. On the Oscillator Printed Circuit Board Assembly, locate the first connection point "1 OF 4" (located near upper left corner of board) near the junction of the jumper lead and white-dashed lines.

c. Connect the jumper lead to the terminal corresponding to your frequency requirements ("50 Hz" or "60 Hz").

d. Locate the connection points "2 OF 2" (located near "1 OF 4") and "3 OF 4" (located to the right of center). Repeat step c for each connection point.

e. Replace the bottom cover and secure to the instrument chassis.

f. Place the instrument in its normal operating position, and remove the top and inner cover.

g. Carefully remove the connector to the AC Converter Printed Circuit Board Assembly (second circuit board from the front panel on the right hand side of the instrument) and remove the circuit board.

h. Locate the connection point "4 OF 4" (near bottom center of board) and connect the jumper lead to the terminal corresponding to your frequency requirements ("50 Hz" or "60 Hz").

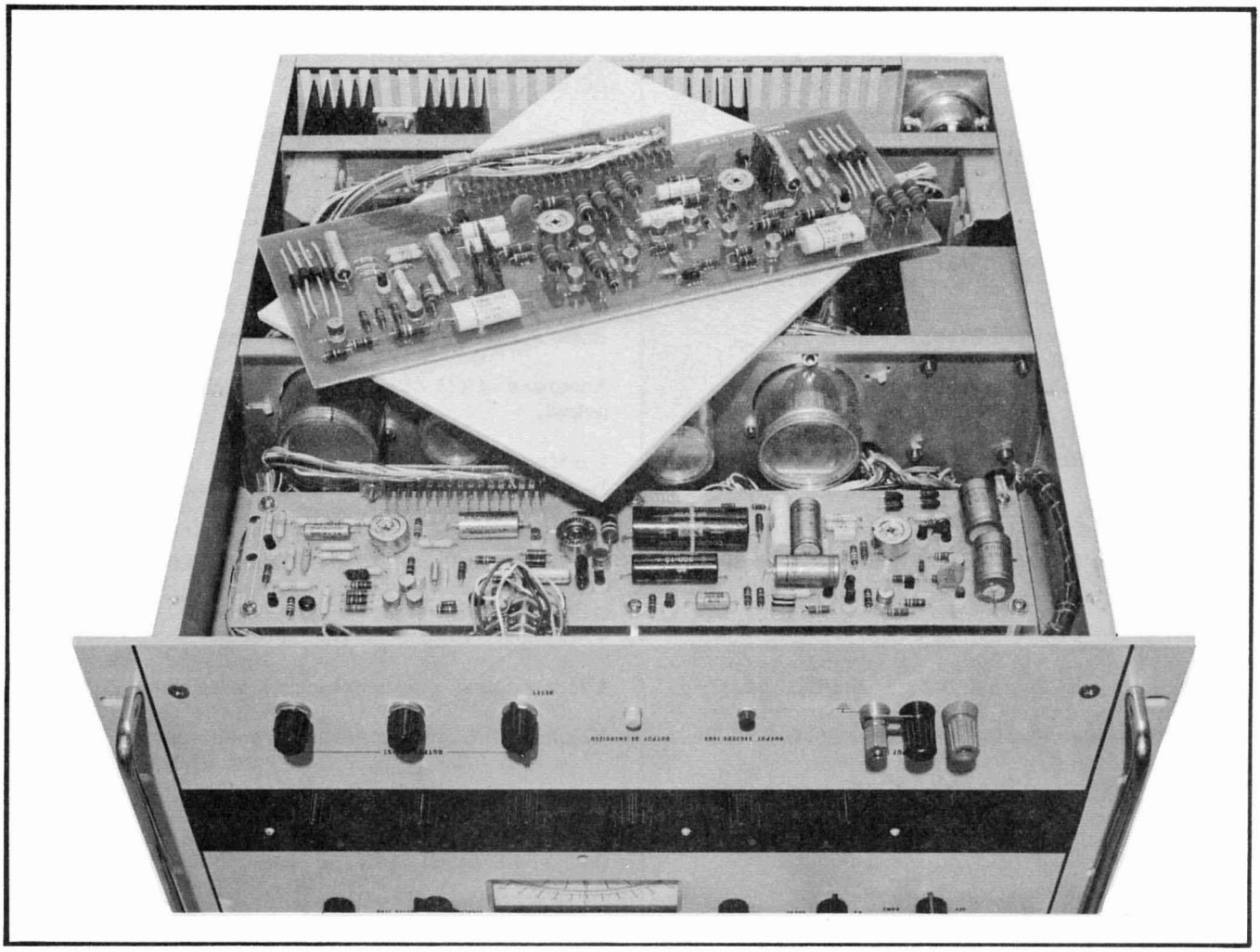


Figure 4-3. ACCESS TO CIRCUIT BOARDS

i. Replace the circuit board and connect the connector. Replace the inner and outer covers.

4-15. MAINTENANCE ACCESS

4-16. The Model 760 has been designed to permit easy access to the circuit boards for maintenance and calibration without the use of accessories. All connections are made to each of these circuit boards through a connector attached to the wiring harness of the instrument. The circuitry mounted on the board may be exposed by disconnecting the connector, pulling the circuit board from its slides, and reconnecting the connector as shown in Figure 4-3.

CAUTION!

A sheet of dielectric material should be used to avoid shorting the circuitry to the chassis.

4-17. CLEANING

4-18. Care should be exercised in cleaning the instrument. Dust may be removed with dry, oil-free air at a pressure of 15 pounds per square inch or less. To remove oily contamination from phenolic (brown) switch sections only, turn the instrument on its side, place a paper towel under the switch to catch any residue and spray the switch with freon TF degreasing agent. Circuit boards may be cleaned by removing them from the instrument and spraying them with freon TF degreasing agent. Do not use any cleaners or solvents to clean any of the silicon glass (white) switch sections.

CAUTION!

The use of other solvents, particularly ketones, is not recommended because of possible damage to dielectric materials used in the instrument.

4-19. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

4-20. The test equipment required for maintenance is listed in Figure 4-4. If the recommended units are not available, others having the required specifications may be used.

RECOMMENDED EQUIPMENT	REQUIRED SPECIFICATIONS
DC Voltmeter; Fluke Model 881A or 883A.	DC accuracy of 0.01%.
RMS AC Voltmeter; Fluke 931PB.	AC accuracy of ±0.05% at 60 Hz and 400 Hz.
Oscilloscope; Tektronix Model 541, 545 or 535.	Vertical sensitivity of 0.5v per division; 100 kHz frequency response.
Electronic Counter; H-P Model 5212A.	Accuracy of 0.1%. Frequency of 400 Hz.
Reference Divider; Fluke Model 750A.	Ratio accuracy of ±(0.001% of output + 0.5 uv).
Voltage Standard; Fluke Model 332A.	Accuracy of ±(0.003% of setting + 10 uv) at 1 volt output.
Null Detector; Fluke Model 845AB.	1 microvolt full scale sensitivity. 10 megohms input resistance. Maximum noise of 0.3 uv.
Distortion Analyzer; H-P Model 330B or 331A.	Sensitivity of 0.2% THD at 60 Hz and 400 Hz with an accuracy of ±5% or better.
Resistor, wirewound, 0.1 ohm ±0.01%, 10w.	4 terminal, 10 ppm maximum temperature coefficient.
Resistor, wirewound, 1 ohm ±0.01%, 1w.	4 terminal, 10 ppm maximum temperature coefficient.
Resistor, wirewound, 100 ohms ±0.01%, 1/2w.	10 ppm maximum temperature coefficient.
Resistor, metal film, 649 Kilohms ±1%, 1/2w.	
Resistor, metal film, 111,060 ohms ±0.15%, 1/2w.	Selected or trimmed from 1% standard value resistors (use Fluke Model 710B impedance bridge).
Resistor, wirewound, 50 kilohms ±5%, 20w.	
Resistor, 500 ohms ±5%, 1/2w.	

Figure 4-4. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

4-21. CALIBRATION

4-22. GENERAL DISCUSSION

4-23. The calibration procedure is intended to assure that the Model 760A meets its accuracy specifications. It should be performed routinely once a year; it should also be performed after the instrument has been repaired. The calibration procedure consists of a preliminary procedure to prepare the instrument for calibration, the procedure for calibration of the source section, and the procedure for calibration of the measurement section. Calibration should be accomplished in a draft-free area at an ambient temperature of 23±1°C. If the instrument has been removed from an extreme temperature environment, at least 24 hours should be allowed for the instrument to stabilize at calibration temperature.

4-24. PRELIMINARY PROCEDURE

a. If the meter does not read zero with the power OFF, remove top cover and inner shield cover and short the meter terminals. Turn the adjustment screw on the front of the meter case to bring the pointer exactly to zero, and remove the shorting jumper.

b. Connect the power plug to the ac line.

c. Set the controls of the Model 760A as follows:

(1) Turn FUNCTION switch to VOLTS,

(2) Turn FREQUENCY switch to DC,

(3) Set readout to 001.0000, and

(4) Turn OUTPUT ADJUST - COARSE to RESET.

(5) Insure that the jumper from the black OUTPUT terminal to the silver OUTPUT terminal is in place.

d. Turn on all test equipment and allow it to warm up for 30 minutes.

4-25. SOURCE SECTION CALIBRATION

4-26. The source section must be calibrated before calibration of the measurement section. The overall procedure for the source section consists of the following procedures which must be performed in order:

(1) Oscillator calibration,

(2) Adjustment of the ±50-volt power supply,

(3) Power Amplifier adjustment, and

(4) Low-voltage source calibration.

Satisfactory completion of these procedures will assure that the source section meets its specifications. If any procedure can not be completed satisfactorily, the instrument is in need of repair.

4-27. OSCILLATOR CALIBRATION. To calibrate the oscillator, proceed as follows:

a. Connect the input lead of the dc voltmeter to TP2 on the oscillator board and connect the common lead to the chassis.

b. Adjust R33 on the Oscillator circuit board to obtain and indication of -18±0.1 volts.

c. Connect the input lead of the electronic counter to pin 6 or pin 8 of the Oscillator circuit board connector and connect the common lead to the chassis.

d. Adjust R27 on the Oscillator circuit board to obtain an indication of 400 ±0.4 Hz.

e. Move the input lead of the dc voltmeter to TP1 on the oscillator board and leave the common lead connected to the chassis.

f. Adjust R19 on the oscillator board to obtain an indication of +1.8 ±0.2 volts.

g. Disconnect the test equipment; this completes the oscillator calibration.

4-28. ADJUSTMENT OF THE ±50-VOLT POWER SUPPLY. To adjust the ±50-Volt Power Supply, proceed as follows:

a. Connect the input lead of the voltmeter to pin 6 of the power supply connector and connect the common lead to the chassis.

b. Adjust R22 to obtain an indication of +50 to +50.3 volts.

c. Move the input lead of the voltmeter to pin 13 of the connector and leave the common lead connected to the chassis.

d. Adjust R41 to obtain an indication of -50 to -50.3 volts.

e. Disconnect the test equipment; this completes adjustment of the ±50-volt power supply.

4-29. POWER AMPLIFIER ADJUSTMENT. To adjust the Power Amplifier, proceed as follows:

a. Set front panel controls as follows:

(1) Turn the FUNCTION switch to VOLTS,

(2) Turn the FREQUENCY switch to 400 Hz,

(3) Set the readout dials to 999.9900, and

(4) Turn the OUTPUT ADJUST-COARSE control to RESET.

b. Connect the Model 760A and test equipment as shown in Figure 4-5.

c. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 1000 ±10 volts rms.

d. Turn R11 on the Power Amplifier circuit board to the center of its travel.

e. Measure the distortion. If it is greater than 0.5 percent, adjust R11 to obtain minimum distortion. If this cannot be done the Oscillator, or Power Amplifier is defective.

f. Disconnect test equipment; this completes the power amplifier adjustment.

4-30. LOW-VOLTAGE SOURCE CALIBRATION. To calibrate the low-voltage output proceed as follows:

a. Set front panel controls as follows:

(1) Turn FUNCTION switch to VOLTS,

(2) Turn FREQUENCY switch to DC,

(3) Set readout dials to 002.0000,

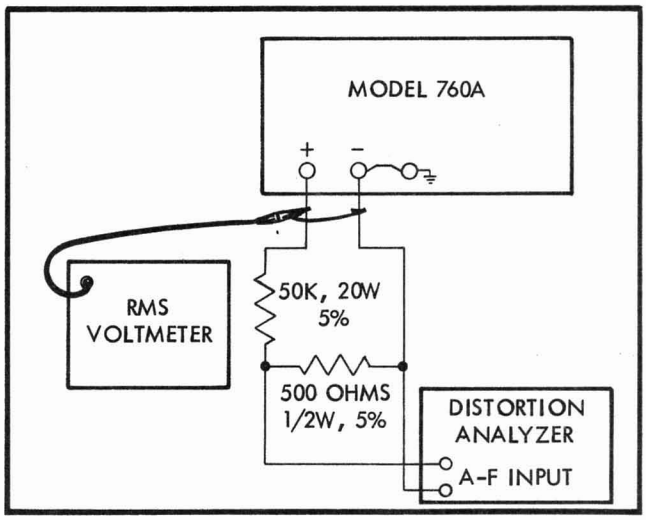


Figure 4-5. POWER AMPLIFIER DISTORTION TEST AND ADJUSTMENT SETUP

(4) Turn OUTPUT ADJUST-COARSE control fully clockwise (maximum output),

(5) Turn OUTPUT ADJUST-MEDIUM control to the center of travel, and

(6) Turn OUTPUT ADJUST-FINE control to the center of travel.

b. Connect the dc voltmeter to the OUTPUT terminals.

c. Adjust R9 on the 100V INDICATOR board to obtain and indication of 3.6 to 3.7 volts at the output.

d. Disconnect the test equipment; this completes calibration of the source section.

4-31. MEASUREMENT SECTION CALIBRATION

4-32. The overall procedure for calibration of the measurement section consists of the following procedures which must be performed in order:

(1) Adjustment of the ±15-Volt Power Supply,

(2) Null Detector adjustment,

(3) Calibration of the dc voltage output,

(4) Calibration of the dc current output,

(5) Calibration of the ac voltage output, and

(6) Calibration of the ac current output.

Satisfactory completion of these procedures will assure that the measurement section meets its accuracy specifactions.

4-33. SETTING THE METER TO ELECTRICAL ZERO. During calibration of the measurement section, the meter must be kept at electrical zero. The instructions for this operation are given in this paragraph to avoid unnecessary repetition in the calibration procedures. To set the meter to electrical zero peoceed as follows:

a. Turn the METER SENS switch to METER ZERO position.

b. Adjust the METER ZERO control to obtain an indication of zero ±0.01%.

c. Return the METER SENS to the desired operating position.

4-34. ADJUSTMENT OF THE ±15-VOLT POWER SUPPLY. To adjust the ±15-Volt Power Supply, proceed as follows:

a. Connect the input lead of the dc voltmeter to pins 11, 12, or 13 (-15v) on the ±15 volt power supply board and connect the common lead to pin 10.

b. Adjust R3 (see Figure 4-6) to obtain an indication of -15 volts ±1 millivolt.

Note!

If the zener diode reference has been changed, the procedure given in step c

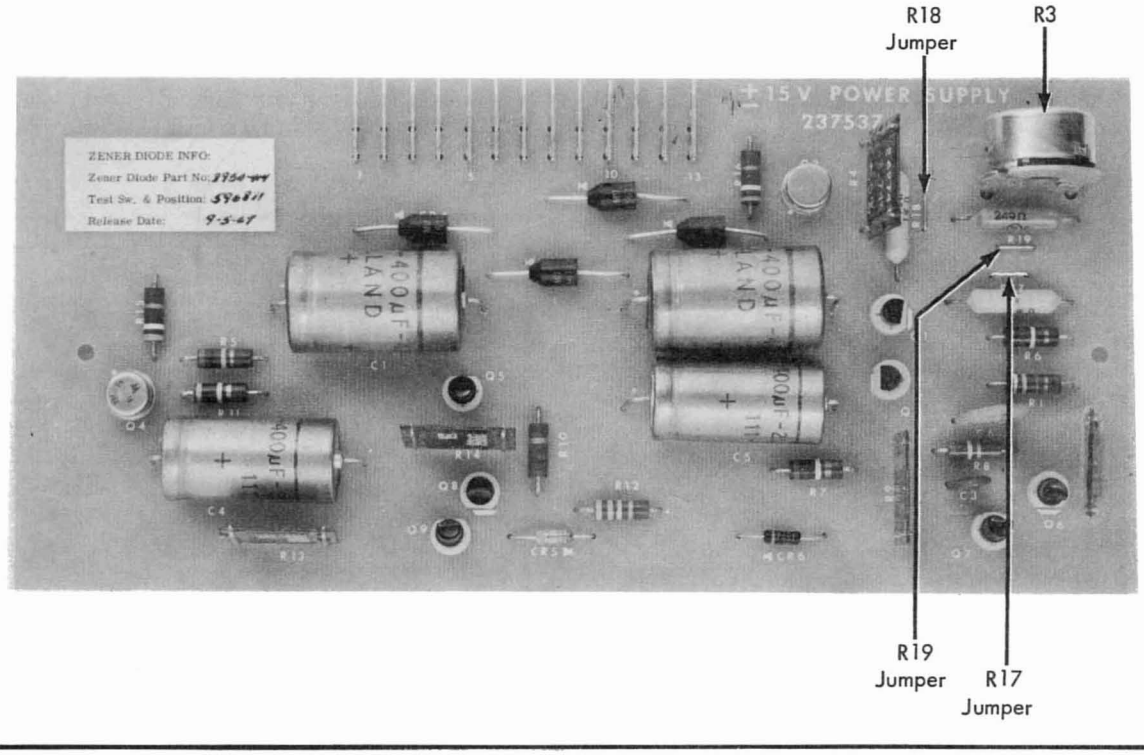


Figure 4-6. CALIBRATION JUMPERS ON ± 15 VOLT POWER SUPPLY

may be needed to bring R3 into adjustment range before completing step b.

c. Use the following procedure to bring R3 into adjustment range:

(1) Bend any cut shorting jumpers across R17, R18, and R19 into position and solder them so each resistor is shorted by a jumper. (See Figure 4-6.)

(2) Turn R3 fully counterclockwise.

(3) Measure the dc voltage between pin 13 (-15 volts) and pin 9 or 10 (common) and use the table below to determine which jumpers to cut.

VOLTAGE	CUT JUMPER WIRE ACROSS RESISTOR
-14.866 to -14.830	NONE
-14.830 to -14.671	R19
-14.671 to -14.515	R18
-14.515 to -14.362	R19, R18
-14.362 to -14.212	R17
-14.212 to -14.066	R19, R17
-14.066 to -13.935	R18, R17
-13.935 to -13.793	R19, R18, R17

4-35. NULL DETECTOR ADJUSTMENT. To adjust the null detector, proceed as follows:

a. Set front panel controls as follows:

(1) Turn FUNCTION switch to VOLTS,

(2) Turn the FREQUENCY switch to DC,

(3) Turn the METER SENS switch to METER ZERO,

(4) Set the readout dials to 001.0000, and

(5) Turn the OUTPUT ADJUST - COARSE control to RESET.

b. Connect the signal lead of the oscilloscope to TP1 on the null detector board and connect the common lead to pins 9, 10, 11, or 12.

c. Set the oscilloscope sensitivity to 0.5 volt per division.

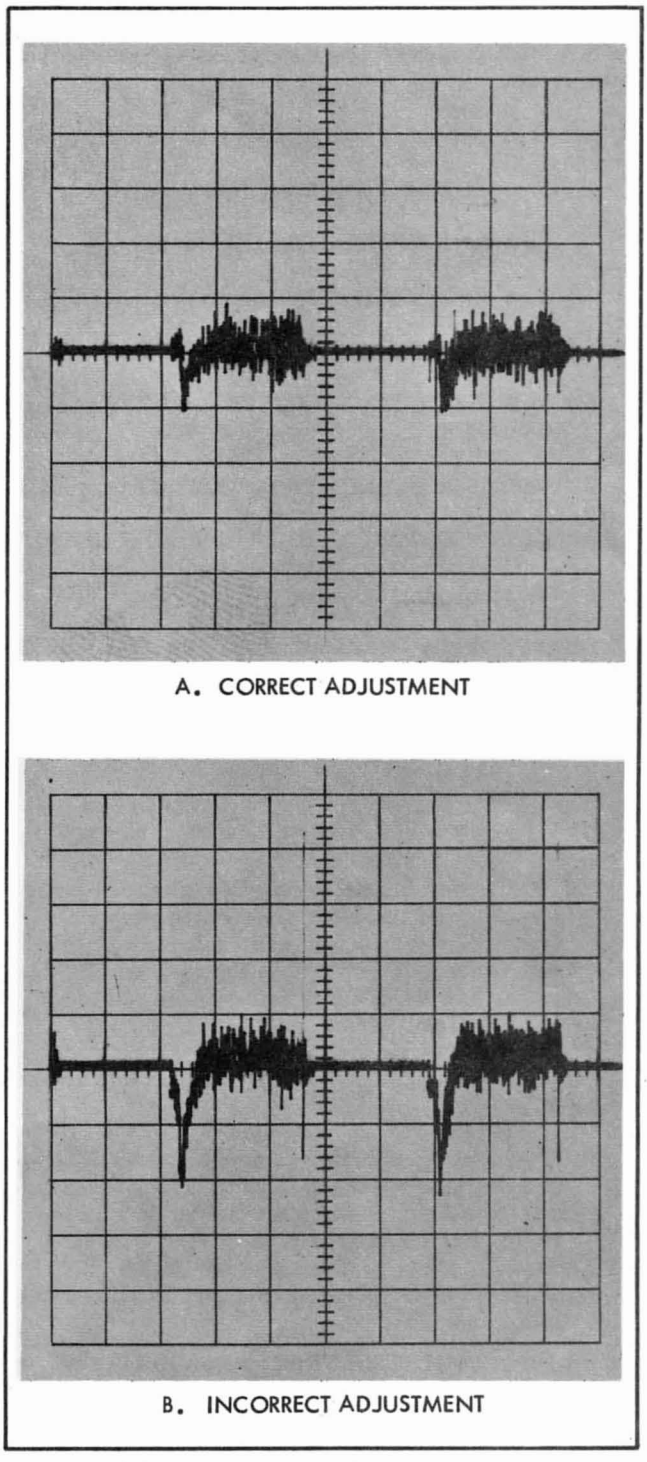
d. Adjust R2 on the Null Detector circuit board to reduce the amplitude of the leading edge spike of the chopper waveform (see Figure 4-7) to minimum value.

e. Connect the input lead of the electronic counter to TP2 on the Null Detector board and connect the common lead to pin 9, 10, 11, or 12.

f. Adjust R37 to bring the frequency to 215 ±2 Hz.

g. Set the meter to electrical zero and return the METER SENS switch to SEARCH.

h. Connect the dc voltmeter to the OUTPUT terminals.



A. CORRECT ADJUSTMENT

B. INCORRECT ADJUSTMENT

Figure 4-7. CHOPPER WAVEFORM

i. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 1.00 ±0.01 volt.

j. Adjust R9 on the Calibration circuit board to obtain a full scale indication (10) on the meter of the Model 760A.

k. Disconnect the test equipment; this completes the null detector adjustment.

4-36. DC VOLTAGE CALIBRATION. To calibrate the Model 760A for dc voltage measurement, proceed as follows:

a. Set the front panel controls as follows:

(1) Turn the FUNCTION switch to VOLTS,

(2) Turn the FREQUENCY switch to DC,

(3) Turn the METER SENS switch to SEARCH,

(4) Set the readout dials to 001.0000, and

(5) Turn the OUTPUT ADJUST-COARSE control to RESET.

b. Connect the dc voltmeter to the OUTPUT terminals.

c. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 1.00 ±0.0001 volt on the voltmeter.

d. Set the meter to electrical zero and turn the METER SENS switch to 1%.

e. Adjust R5 on the Calibration circuit board to obtain an indication of zero ±0.02% on the meter of the Model 760A.

Note!

If the zener diode reference has been changed, the procedure given in step f. may be needed to bring R5 into adjustment range before completing step e. If step e. has been successfully completed proceed directly to step g.

f. Use the following procedure to bring R5 into adjustment range:

(1) Bend any cut shorting jumpers across R2, R3, and R4, (see Figure 4-8) on the calibration circuit board into position and solder them so each resistor is shorted by a jumper.

(2) Turn R5 on the Calibration circuit board fully clockwise.

(3) Turn the METER SENS switch to 1%, 3%, or 10% as required to obtain an on-scale indication.

(4) Read the percent of error on the meter of the Model 760A and use the table below to determine which jumper wires to cut.

PERCENT ERROR	CUT JUMPER WIRES ACROSS RESISTOR
0 to 0.9	NONE
0.9 to 1.8	R4
1.8 to 2.6	R3
2.6 to 3.5	R4, R3
3.5 to 4.3	R2
4.3 to 5.2	R4, R2
5.2 to 6.1	R3
6.1 to 6.9	R4

g. Turn the METER SENS switch to SEARCH and turn the OUTPUT ADJUST-COARSE control to RESET.

h. Set the readout dials to 000.0010 (1 millivolt).

i. To minimize thermal emf, use copper leads to connect the voltage standard (Model 332A), the reference divider (Model 750A), the null detector (Model 845AB), and the Model 760A as shown in Figure 4-9.

Note!

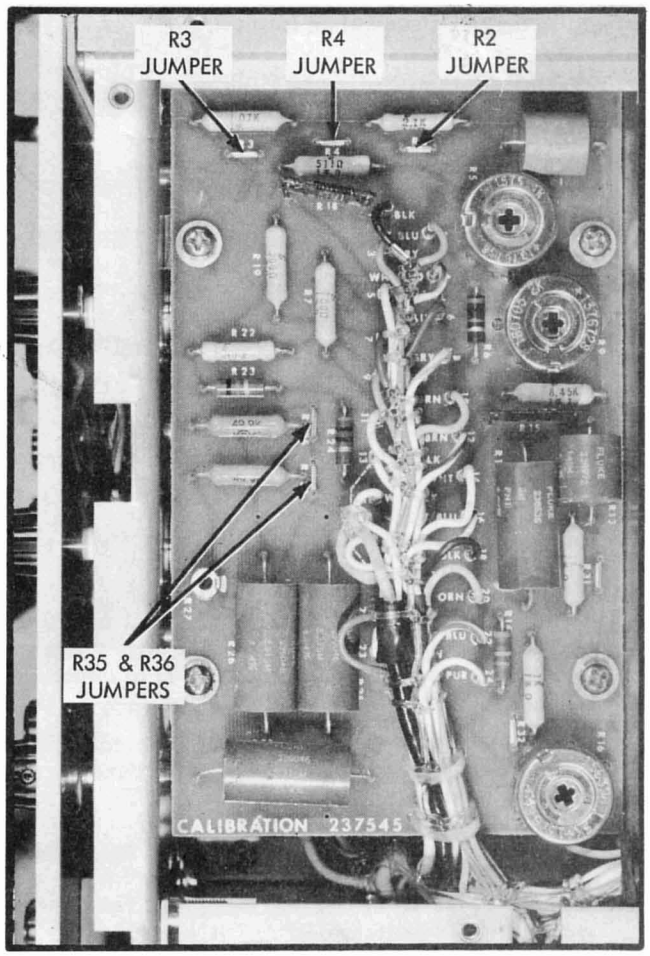
The Model 760A and all test equipment should be allowed to reach temperature equilibrium at 23±1°C to minimize thermal voltage effects, before attempting the measurement.

j. Set the reference divider for 1100 volts input and 1.1 volts output.

k. Turn the INPUT VOLTAGE-COARSE control of the reference divider fully clockwise to close the switch.

Note!

This control must remain in this position during the entire measurement.



l. Set the null detector to minimum sensitivity.

m. Set the voltage standard to 1.000000.

n. Turn on all equipment and allow it to warm up for at least 30 minutes.

Note!

With the input set to 1100 and the output set to 1.1, the reference divider functions as a 1000:1 divider. The one volt input is divided to one millivolt plus or minus 0.51 microvolts. The error in the one volt input (40 microvolts) is also divided by 1000 reducing it to 0.04 microvolts at one millivolt. Thus the total error in the one millivolt source is 0.55 microvolts, or 0.055%.

o. Adjust the null detector to obtain zero meter deflection in the zero mode and return it to the operating mode.

p. Adjust the OUTPUT ADJUST-COARSE, MEDIUM, and FINE controls of the Model 760A to obtain a null on the one microvolt range of the null detector.

q. Set the meter of the Model 760A to electrical zero and turn the METER SENS switch to 1%.

r. Adjust R1 on the compensation circuit board to obtain an indication of zero ±0.02% on the meter of the Model 760A.

Note!

Access to R1, for adjustment, is through the hole marked "R1 CAL" in the end of the Oscillator circuit board.

s. Disconnect the test equipment; dc voltage calibration is complete.

4-37. DC CURRENT CALIBRATION. To calibrate the Model 760A for dc current measurement, proceed as follows:

a. Set the front panel controls as follows:

(1) Turn the FUNCTION switch to AMPS,

(2) Turn the FREQUENCY switch to DC,

(3) Turn the METER SENS switch to SEARCH,

(4) Set the readout dials to 1.000000, and

(5) Turn the OUTPUT ADJUST-COARSE control to RESET.

b. Connect the one-ohm resistor to the OUTPUT terminals and connect the dc voltmeter across the resistor as shown in Figure 4-10.

c. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 1.0000 ±0.0001 volt on the dc voltmeter.

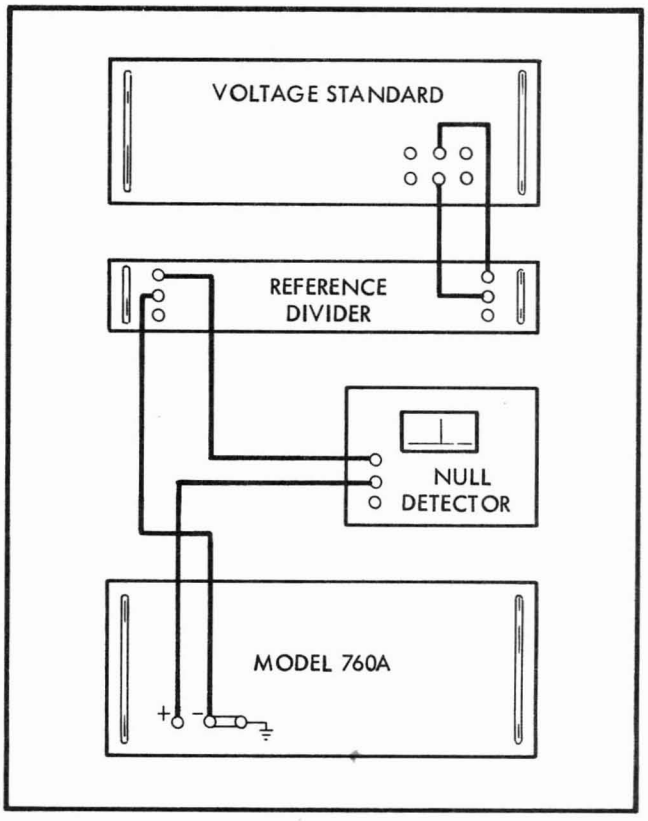


Figure 4-9. ONE MILLIVOLT MEASUREMENT SETUP

d. Set the meter of the Model 760A to electrical zero and turn the METER SENS switch to 1%.

e. Adjust R16 on the Calibration circuit board to obtain an indication of zero ±0.02% on the meter of the Model 760A.

Note!

(For instruments serial number 400 and on.) If the zener diode reference has been changed, the procedure given in step f. may be needed to bring R16 into adjustment range before completing step e. If step e. has been successfully completed proceed directly to step g.

f. Use the following procedure to bring R16 into adjustment range:

(1) Bend any cut shorting jumpers across R31, R32, and R33, (see Figure 4-8) on the calibration circuit board into position and solder them so each resistor is shorted by a jumper.

(2) Turn R16 on the Calibration circuit board fully clockwise.

(3) Turn the METER SENS switch to 1%, 3%, or 10% as required to obtain an on-scale indication.

(4) Read the percent of error on the meter of the Model 760A and use the table below to determine which jumper wire to cut.

PERCENT ERROR	CUT JUMPER WIRES ACROSS RESISTOR
0 to 0.9	NONE
0.9 to 2.0	R31
2.0 to 3.0	R32
3.0 to 3.95	R31, R32
3.95 to 4.9	R33
4.9 to 5.9	R31, R33
5.9 to 6.9	R32, R33
6.9 to 7.9	R31, R32, R33

g. Turn the METER SENS switch to SEARCH.

h. Set the readout dials to 0.010000.

i. Disconnect the one-ohm resistor and connect the 100-ohm resistor in its place.

j. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 1.0000 ±0.0001 volt on the dc voltmeter.

k. Set the meter of the Model 760A to electrical zero and turn the METER SENS switch to 1%.

l. Adjust R27 on the Calibration circuit board to obtain an indication of zero ±0.02% on the meter of the Model 760A.

m. If adjusting R27 will not bring the meter to zero, determine whether it is closer to zero when clockwise or counterclockwise. If it is clockwise proceed to step o; if it is counterclockwise continue with step m.

n. Cut the jumper across R35 (see Figure 4-8) and adjust R27. If the meter can not be adjusted to zero, continue with step n.

o. Cut the jumper across R36 and adjust R27.

p. If R27 is fully clockwise, resolder any cut jumpers across R35 or R36 and adjust R27 to obtain a zero indication.

q. Disconnect the test equipment; dc voltage calibration is complete.

4-38. AC VOLTAGE CALIBRATION. To calibrate the Model 760A for ac voltage measurement, make sure that all shield covers are in place and proceed as follows:

Note!

Ports in the shield covers permit access to the calibration adjustments.

a. Set the front panel controls as follows:

(1) Turn the FUNCTION switch to VOLTS,

(2) Turn the FREQUENCY switch to 400 Hz,

(3) Turn the METER SENS switch to SEARCH,

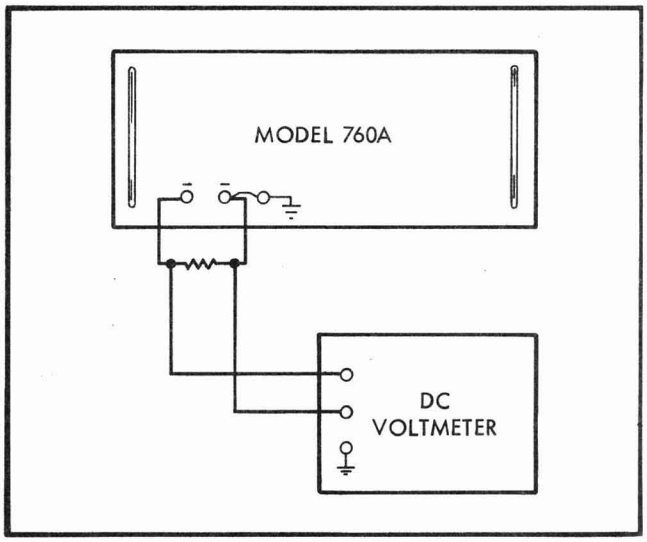


Figure 4-10. DC CURRENT CALIBRATION SETUP

(4) Set the readout dials to 001.0000 and

(5) Turn the OUTPUT ADJUST - COARSE control to RESET.

b. Connect the rms voltmeter to the OUTPUT terminals.

c. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 1.0000 ±0.0001 volt.

d. Set the meter of the Model 760A to electrical zero and turn the METER SENS switch to 1%.

e. Adjust R14 on the AC Converter circuit board to obtain an indication of zero ±0.03%.

f. Disconnect the test equipment; ac voltage calibration is complete.

4-39. AC CURRENT CALIBRATION. To calibrate the Model 760A for ac current measurement, make sure that all shield covers are in place and proceed as follows:

Note!

Ports in the shield covers permit access to the calibration adjustments.

a. Set the front panel controls as follows:

(1) Turn the FUNCTION switch to AMPS,

(2) Turn the FREQUENCY switch to 400 Hz,

(3) Turn the METER SENS switch to SEARCH,

(4) Set the readout dials to 2.000000, and

(5) Turn the OUTPUT ADJUST-COARSE control to RESET.

b. Connect the 0.1 ohm resistor to the OUTPUT terminals and connect the rms voltmeter across the resistors as shown in Figure 4-11.

c. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 0.20000 ±0.00002 volts on the rms voltmeter.

d. Set the meter of the Model 760A to electrical zero and turn the METER SENS switch to 1%.

e. Adjust R30 on the AC Converter circuit board to obtain an indication of zero ±0.03% on the meter of the Model 760A.

f. Turn the METER SENS switch to SEARCH.

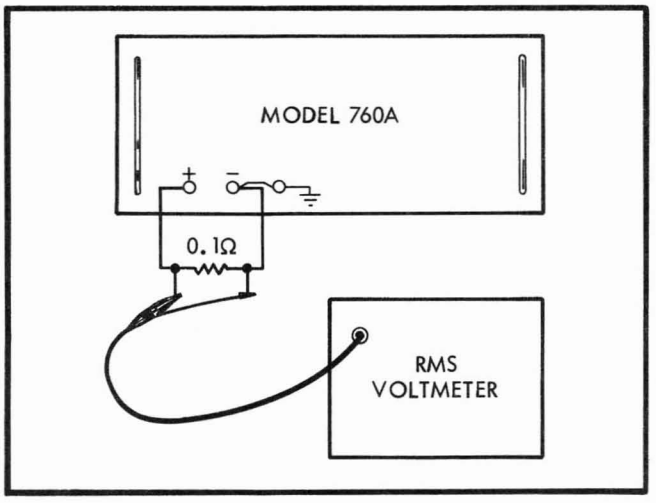


Figure 4-11. AC CURRENT CALIBRATION SETUP

g. Set the readout dials to 0.000001 (one microampere).

h. Connect the Model 760A and test equipment as shown in Figure 4-12.

i. Adjust the COARSE, MEDIUM, and FINE OUTPUT ADJUST controls to obtain an indication of 0.10000 ±0.00001 volts on the rms voltmeter.

j. Set the meter of the Model 760A to electrical zero and turn the METER SENS switch to 1%.

k. Adjust C1 on the Compensation circuit board to obtain an indication of zero ±.02% on the Model 760A. Access to C1 is through a hole in the end of the Oscillator circuit board marked "C1 CAL".

l. Disconnect the test equipment; the calibration is now complete.

4-40. TROUBLESHOOTING

4-41. GENERAL DISCUSSION

4-42. The source of any malfunction in the Model 760A can be located and repaired easily if troubleshooting is approached methodically and analytically. As the first step in troubleshooting, the functional checkout procedure given in the following paragraphs should be performed to localize the trouble to a functional section of the instrument. Once the trouble has been localized to a particular section, the source can be located by measuring voltages at significant points in the circuitry. The normal indications at all significant points are given under the heading "FUNCTIONAL SECTION TROUBLESHOOTING." The voltages listed are typical values measured with a differential voltmeter. An indication within 10% of the listed value should be considered normal. A differential voltmeter should be used to avoid circuit loading. When a disparity in a measured value is found, reference to the theory of operation and the schematic diagram should enable the technician to locate the source of the trouble by analysis. The voltages are listed in general order of signal tracing from output to input. However, measurement should not be stopped with the first out-of-tolerance indication; additional measurements should be taken to facilitate fault analysis.

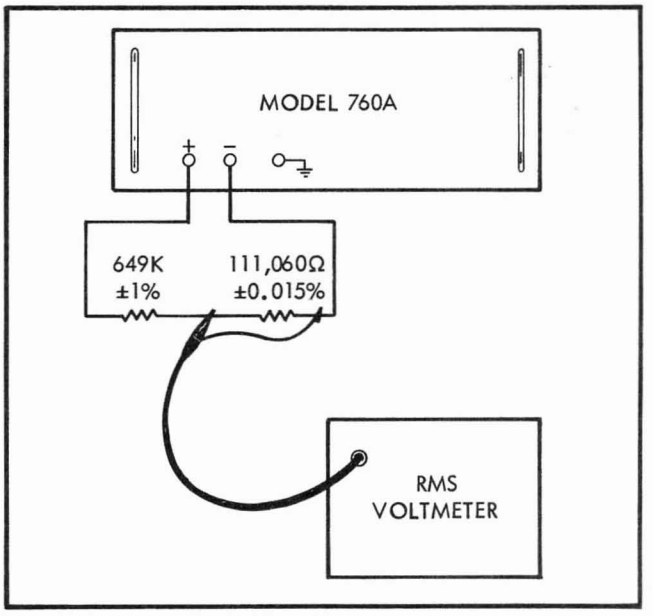


Figure 4-12. CAPACITANCE COMPENSATION SETUP

4-43. FUNCTIONAL CHECKOUT PROCEDURE

4-44. This procedure is intended to check out the instrument by determining that each functional section is operating correctly, or to discover any fault and localize it to a particular functional section. The steps should be performed in order and the fault analysis noted should be passed over until a fault is discovered. If no fault is discovered all sections are functioning correctly. This does not mean that the instrument meets its accuracy specifications, but it does mean that the instrument can be calibrated to meet them.

4-45. Before each of the following tests, turn the OUTPUT ADJUST-COARSE control to RESET, and turn the METER SENS switch to SEARCH.

Note!

If all readout dials are set at zero, the panel meter may not indicate in the exact center. This is normal.

a. AC VOLTAGE FUNCTION. To check out the ac voltage function, proceed as follows:

(1) Turn the FUNCTION switch to VOLTS and turn the FREQUENCY switch to LINE.

(2) Set the readout dials to 100. 0000.

(3) Observe the NO SYNC indicator and turn the 60 Hz SYNC ADJ control. The indicator should light and flash as the control is turned to the right and then to the left. The light should be out when the control is approximately centered.

Note!

The output voltage will vary slightly while the 60 Hz SYNC ADJ control is being adjusted. This variation can be seen only with the METER SENS switch at 3% or 1%, and is normal.

FAULT ANALYSIS

If the indicator fails to perform properly in step (3), the fault is probably in DS5, or in stages Q18, Q19, or Q20 on the oscillator circuit board.

(4) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain more than full scale deflection to the right.

(5) Observe that the OUTPUT EXCEEDS 100V indicator is lighted.

(6) If the OUTPUT EXCEED 100V indicator is not lighted measure the ac voltage at the output terminals. It should be slightly over 100 volts.

FAULT ANALYSIS

If the voltage is present at the output terminals in step (6) but the indicator does not light, the trouble is probably in the 100V Indicator circuit board. If the voltage is low or no voltage is present, the trouble is probably in either the Power Amplifier circuit board or the associated power transistors located on the heat radiators at the rear of the main chassis, the ±50 Volt Power Supply circuit board or the associated power transistors located on heat radiators at the rear of the main chassis, or the Oscillator circuit board. Also, a defect in the meter circuit could cause the meter to indicate high resulting in a low setting of the OUTPUT ADJUST-COARSE control.

If the OUTPUT EXCEEDS 100V indicator lights but meter deflection is less than full scale, the trouble is probably in the measurement section. To localize the source of trouble, proceed to step b. If full scale deflection can be obtained in step b (dc) but could not be obtained in step (6) above (ac), the fault is probably in the AC Converter circuit board.

b. DC VOLTAGE FUNCTION. To check out the dc voltage function, proceed as follows:

(1) Turn the FUNCTION switch to VOLTS and turn the FREQUENCY switch to DC.

(2) Set the readout dials to 999. 99910.

(3) Connect a load which will draw 20 ma (50, 000 ohms, 20 watts or greater) across the output terminals.

(4) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain more than full scale deflection to the right.

(5) Observe that the OUTPUT EXCEEDS 100V indicator is lighted.

FAULT ANALYSIS

If the OUTPUT EXCEEDS 100V indicator is lighted and the meter is inoperative, the trouble is probably in the ±15 Volt Power Supply circuit board, the Null Detector circuit board, or the Calibration circuit board. This trouble could also be caused by a defective switch or switch wiring in the measurement section.

If the output voltage is over 100 volts but the OUTPUT EXCEEDS 100V indicator is not lighted, the trouble probably is in the 100 Volt Indicator circuit board.

If no voltage is present at the output, the cause of the trouble is probably the high-voltage rectifier bridge (CR7 through CR18) on the 100 Volt Indicator board or the filter (C7, L2A, and R4) located on the main chassis.

If the OUTPUT DE-ENERGIZED lamp lights or the full output of 1000 volts can not be obtained, the trouble probably is in the ±50 Volt Power Supply circuit board, the Power Amplifier circuit board, the output transformer T2, or the output switches.

(6) Adjust the COARSE OUTPUT ADJUST control to reduce the meter deflection to full scale.

(7) Turn the METER SENS switch to 10%, 3%, and 1% in succession, adjusting the MEDIUM and FINE OUTPUT ADJUST controls to obtain zero meter deflection at each sensitivity.

(8) Turn the METER SENS switch to METER ZERO and adjust the METER ZERO control to obtain a zero (center) indication on the meter.

Note!

In the dc voltage mode the pointer swings the same direction the METER ZERO knob is turned; in ac and current mode, it swings the opposite direction.

FAULT ANALYSIS

If the meter can not be adjusted to zero, the trouble is probably located in the null detector circuit board or the METER SENS switch wiring.

(9) Set the readout dials to any voltage between 003.0000 and 099.00010.

(10) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain more than full scale deflection to the right.

FAULT ANALYSIS

If more than full scale deflection can not be obtained in step (10), the defect is probably in the medium voltage rectifier (CR3 through CR6) on the 100 volt indicator circuit board or the filter (C5, C6, L2B, and R3) on the main chassis.

(11) Set the readout dials to any voltage of 002.99910 or less.

(12) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain more than full scale deflection to the right.

FAULT ANALYSIS

If more than full scale deflection can not be obtained in step (12), the defect is probably the high current rectifier (CR1 and CR2) or the filter (C8, L1, and R5) located on the main chassis.

(13) Remove the load resistor from the output terminals.

c. DC CURRENT FUNCTION. To check out the dc current function, proceed as follows:

(1) Turn the FUNCTION switch to AMPS and turn the FREQUENCY switch to DC.

(2) Set the readout dials to 0.1 ampere (0.0999910) or less.

(3) Connect a load which will cause a voltage drop of one volt or less across the output terminals. For 0.1 ampere the load should be 10 ohms or less.

(4) Make sure the strap connects the black output terminal to the chassis terminal.

(5) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain more than full scale deflection.

FAULT ANALYSIS

If the OUTPUT DE-ENERGIZED indicator lights, the trouble is probably the result of a short circuit between the main chassis and the measurement section chassis which "floats" in the current modes of operation.

(6) If there is no meter deflection, determine whether current is flowing through the load by measuring the voltage drop across the load.

FAULT ANALYSIS

If there is no current through the load, the defect probably is in the readout shunt (mounted on readout switches S3 through S7), the high current rectifier (CR1 and CR2) or the filter (C8, L1, and R5) on the chassis, R9 on the 100 Volt Indicator circuit board, or in the measurement section switching.

(7) Set the readout dials to 9.9999910.

(8) Connect a 0.1 ohm, 10 watt resistor across the output terminals. This load will result in a one volt drop at 10 amperes.

(9) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain full scale deflection.

FAULT ANALYSIS

If the OUTPUT DE-ENERGIZED indicator lights the trouble is probably caused by a short between the measurement circuit shield and the main chassis, or by a short or leakage in the high current rectifier (CR1 and CR2) on the chassis or in the filter (L1, C8, and R5) on the chassis.

If the output is less than 10.0 amperes at one volt with all OUTPUT ADJUST controls fully advanced, the trouble probably is in the wiring. All conductors, solder terminals, and switches carrying the 10 amperes should be checked for unusually high voltage drops. If no defect can be found in the wiring or if the trouble persists after correction of wiring defects, the oscillator circuit, the power amplifier circuit, and the ±50 volt power supply should be checked in the effort to

find a defect which did not show up when tested at low current.

If no output current can be obtained, the defect probably is in the high current rectifier (CR1 and CR2) on the main chassis, the filter (C8, L1, and R5) on the main chassis, the secondary winding of T2 on the main chassis, R14 on the measurement section chassis, or the shunt compensator located on digit switches S1 through S3.

d. AC CURRENT FUNCTION. To check out the ac current function, proceed as follows:

(1) Turn the FUNCTION switch to AMPS and turn the FREQUENCY switch to LINE.

(2) Set the readout dials to 0.1 ampere (0.0999910) or less.

(3) Connect a load which will cause a voltage drop of one volt or less across the output terminals. For 0.1 ampere the load should be 10 ohms or less.

(4) Make sure the strap connects the black output terminal to the chassis terminal.

(5) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain more than full scale deflection.

(6) Remove the load resistor and connect a 0.1 ohm, 10 watt resistor across the OUTPUT terminals. This will result in a one volt drop at 10 amperes.

(7) Set the readout dials to 9.999910.

(8) Observe the meter and advance the OUTPUT ADJUST-COARSE control to obtain full scale deflection.

FAULT ANALYSIS

If full scale deflection can not be obtained in step (5) or step (8), the trouble probably is caused by a defective secondary winding (pins 6 and 7) on T2 or by defective contacts on the FREQUENCY switch S9. All other parts used in this mode have been checked previously in the voltage and dc current modes.

e. RESISTANCE FUNCTION. The resistance function is completely passive and will seldom need to be checked. Electrical power is used only to light one decimal readout lamp; (and the POWER ON lamp) and therefore, the instrument can be used for this function with the line cord unplugged. When the FUNCTION switch is turned to the OHMS position, the 10-megohm readout rheostat is connected directly across the OUTPUT terminals. If a defect in the rheostat is suspected it may be checked by using a resistance bridge to measure the resistance across the output terminals. If this resistance is not within ±(0.1% +0.5 ohm) of the dialed value, the rheostat is defective. Reference to the schematic diagram of the rheostat will assist in determining which resistor is faulty.

4-46. FUNCTIONAL SECTION TROUBLESHOOTING

4-47. The following paragraphs present the instructions and data necessary to find defects on the circuit boards by measuring voltages. Unless otherwise indicated measured values should be within ten percent of those listed. The instruments recommended for these measurements are: a dc differential voltmeter (Fluke Model 881A) for dc measurements, an rms differential voltmeter (Fluke Model 931PB) for ac rms measurements, and an oscilloscope (Tektronix Model 541) for ac peak-to-peak and waveform measurements. Reference to the schematic diagram and a thorough understanding of the theory of operation combined with the measurements will enable the technician to locate the defective part by analysis. When an out-of-tolerance indication is found, measurement should not be stopped; it should be continued to trace the trouble to its source. The voltages are arranged generally in order of signal flow from output to input. Care should be taken to establish the conditions given for each test because under other conditions many of the voltages will be different. During all tests the line should be at 115 volts and 60 Hz.

4-48. OSCILLATOR CIRCUIT BOARD MEASUREMENTS. Use the following procedure for oscillator circuit measurements:

a. Turn the FUNCTION switch to VOLTS.

b. Turn the FREQUENCY switch to DC.

Note!

The oscillator operates at 400 Hz with the FREQUENCY switch in the DC position.

c. Set the readout dials to 001.0000.

d. Connect the dc differential voltmeter to the OUTPUT terminals.

e. Adjust the OUTPUT ADJUST controls to obtain an indication of 1.0 volts dc.

f. Measure the voltages listed in Figure 4-13.

Note!

All oscillator voltages are measured to source common (black OUTPUT terminal) unless otherwise indicated.

g. Turn the FREQUENCY switch to LINE.

h. Connect the ac rms differential voltmeter to the OUTPUT TERMINALS.

i. Adjust the OUTPUT ADJUST controls to obtain an indication of 1.0 volts.

DC VOLTAGES		AC VOLTAGES	
TEST POINT	INDICATION	TEST POINT	INDICATION
		Q3-C	5.0
CR2 anode	+6.8	Q1-B	0.63**
C3 +	+6.1	Q1-C	Varies widely
Q7-C (TP1)	+1.8*	Q2-B	0.63**
Q2-C	+8.4	Q2-C	0.31
Q1-C	+5.8	Q8-Gate	0.08
Q3-C	+0.59	Q4-E Pin 6 and 8	5V
* ±0.2V. ** Q2-B should always be about 5mV rms higher than Q1-B.			

Figure 4-13. OSCILLATOR VOLTAGES AT 400 HZ

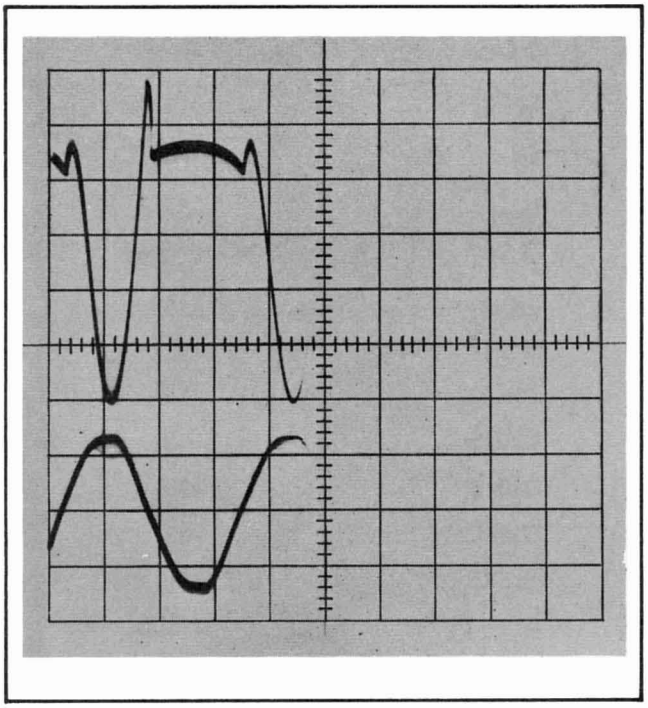


Figure 4-14. SYNCHRONIZING CIRCUIT INPUT AND OUTPUT WAVEFORMS WITH OSCILLATOR SYNCHRONIZED

j. Use the oscilloscope to measure the phase shift from pin 13 to pin 16 (across Q18). It should be approximately 4.4 milliseconds (95°). (This can be done without removing the circuit board from its mounting.)

k. Use the oscilloscope to measure the phase shift from pin 16 to the base of Q19 (or pin 8). It should be approximately 4.0 milliseconds (85°).

l. Use the oscilloscope to observe the signal at the collector of Q20. It is a 30 volt peak half wave at 60 Hz.

m. Observe the signal at the junction of R47 and R48. It should be a 45 volt peak-to-peak, clipped, 60 Hz sine wave.

n. Observe the signal at the emitter of Q8. It should be a 20 volt peak-to-peak, 60 Hz sine wave.

o. Observe the phase relationship between the signal at pin 13 and the signal at the base of Q19. It should be as shown in Figure 4-14.

p. Measure the voltage listed in Figure 4-15.

TEST POINT	INDICATION	TEST POINT	INDICATION
Q18-B	6.9V rms	Q15-B	-6.8
Q12-E and Q11-E	+25.3*	Q14-C and Q15-C	-5.0
Q9-E	-4.4	Q16-E	$<$-0.6
Q14-E	-7.2	Q17-B	0 to -0.05
* At 115V rms line voltage.			

Figure 4-15. SYNCHRONIZING CIRCUIT AND POWER SUPPLY VOLTAGES

TEST POINT	INDICATION
AC VOLTAGES	
Pin 1	4.6v p-p
Q1-B	0.02v p-p
Q1-C	0.64v p-p
Q3-C	1.8v p-p
Q4-C	32v p-p
Q8-B	32v p-p
Q7-B	16v p-p
Q9-B	16v p-p
Q6-E	32v p-p
Q9-C	0.35v p-p
Pin 5	31v p-p
DC VOLTAGES	
Q1-B	- 0.50*
Q1-C	-15.5
Q2-B	- 0.50*
Q2-C	-12**
Q3-C	-48
Q4-C	- 0.20*
Q8-B	1.2v less than pin 5
Q8-E	0.6v less than pin 5
Q8-C	-25
Q9-C	-45
Q6-E	1.2v above pin 5
Q6-C	-25
Pin 9	See Q6-E
Pin 6	0.6v above pin 5
Pin 7	Approx. 0.04v above pin 5
Pin 5	- 0.17*
Pin 8	-49.4
Pin 3	-50

* May vary from -1v to +3v

** May vary from -3v to -30v

Figure 4-16. POWER AMPLIFIER VOLTAGES

TEST POINT	INDICATION
Pin 9	+83
Pin 6	+50
Q5-B	+13
Q5-E	+12
Q5-C	+20
Pin 8	+51
Q6-C	+52
Q6-E	+82
Q6-B	+81
Q1-E	+82
Q1-B	+83
Q2-B	- 0.07
Q2-C	+11
Q2-E	- 0.15
Q3-B	+ 0.54
Q3-C	- 0.09
Q4-B	- 0.11
Pin 16	+33
Pin 13	-50
Q10-B	-38
Q10-E	-39
Q10-C	-22
Pin 12	+ 1.1
Q11-C	+ 1.8
Q11-E	+34
Q11-B	+33
Junction CR20 and R42	+35
Q7-B	-50
Q7-C	-39
Q7-E	-50
Q8-B	-49.4
Q8-C	-50
Q9-B	-50

Figure 4-17. ±50-VOLT POWER SUPPLY VOLTAGES (NORMAL CONDITION)

TEST POINT	INDICATION
Pin 9	+85
Pin 6	+ 0.39
Q5-B	+ 0.10
Q5-E	+ 0.20
Q5-C	+ 0.85
Pin 8	+ 0.80
Q6-C	+ 0.84
Q6-E	+ 0.90
Q6-B	+ 0.42
Q1-B	+ 1.3
Q1-E	+ 0.89
Q2-B	0
Q2-C	+11
Q2-E	- 0.04
Q3-B	+ 0.65
Q3-C	+ 0.01
Q4-B	- 0.01
Pin 16	+86
Pin 13	+ 0.70
Q10-B	+ 0.53
Q10-E	+ 0.70
Q10-C	+ 0.47
Pin 12	+ 0.48
Q11-C	0
Q11-E	+ 0.90
Q11-B	+0.70
Junction CR20 and R42	+ 0.90
Q7-B	+ 1.4
Q7-C	+ 0.83
Q7-E	+ 0.60
Q8-B	+ 0.83
Q8-C	+30
Q9-B	+ 1.3

Figure 4-18. ±50-VOLT POWER SUPPLY VOLTAGES (-SUPPLY TRIPPED)

TEST POINT	INDICATION
Pin 9	+84
Pin 6	+ 0.10
Q5-B	+ 0.03
Q5-E	+ 0.10
Q5-C	+ 0.63
Pin 8	+ 0.62
Q6-C	+ 0.71
Q6-E	+ 0.79
Q6-B	+ 0.29
Q1-E	+ 0.78
Q1-B	+ 1.2
Q2-B	+ 0.68
Q2-C	+ 0.11
Q2-E	- 0.04
Q3-B	+ 0.11
Q3-C	+29
Q4-B	+ 0.66
Pin 16	+86
Pin 13	0
Q10-B	0
Q10-E	0
Q10-C	+ 0.51
Pin 12	+ 0.52
Q11-C	+ 0.68
Q11-E	+ 0.76
Q11-B	+ 0.24
Junction CR20 and R42	+ 0.76
Q7-B	+ 0.04
Q7-C	+12
Q7-E	0
Q8-B	+ 0.70
Q8-C	+ 0.06
Q9-B	+ 0.03

Figure 4-19. ±50-VOLT POWER SUPPLY VOLTAGES (+SUPPLY TRIPPED)

4-49. POWER AMPLIFIER CIRCUIT MEASUREMENTS. Use the following procedure for power amplifier circuit measurements:

a. Turn the FUNCTION switch to VOLTS.

b. Turn the FREQUENCY switch to 400 Hz.

c. Set the readout dials to 001.0000.

d. Connect the ac rms differential voltmeter to the OUTPUT terminals.

e. Adjust the OUTPUT ADJUST controls to obtain an INDICATION of 1.0 volts rms.

f. Measure the voltages listed in Figure 4-16. Use the oscilloscope to measure peak-to-peak values of ac voltages; use the dc differential voltmeter to measure dc voltages.

4-50. ±50-VOLT POWER SUPPLY CIRCUIT MEASUREMENTS. The ±50-volt power supply circuit may be in normal condition or either the negative or the positive supply may be in the tripped condition. Because of this, measurement data is furnished for each of the three possible conditions. The procedure is given for establishing the standard conditions for measurement with neither supply tripped. If either supply is tripped these conditions can not be established. The power supply can be tripped deliberately by turning either the FUNCTION switch or the FREQUENCY switch to one of the STD BY positions with the OUTPUT ADJUST-COARSE control in its control range (not RESET). This may trip either the positive or negative supply. Because the effect is random, several tries may be required to trip a particular supply. Use the following procedure for ±50-volt power supply circuit measurements:

TEST POINT	INDICATION
Pin 10	19V rms*
Pin 5	19V rms*
Pins 11, 12, and 13	-15
Pins 2, 3, and 4	+15
Q9-C	+0.52
Q9-E	-0.6
Q9-B	0 to 0.05
Pin 1	-6.3 ±0.2V
Q7-C	- 4.5
Q6-C	- 4.5
Q5-C	+23.6
Q4-E	+25
Q3-E	-25
Q6-B	-6.3 ±0.2V

* Line voltage, 115V.

Figure 4-20. ±15-VOLT POWER SUPPLY VOLTAGES

a. Turn the FUNCTION switch to VOLTS.

b. Turn the FREQUENCY switch to 400 Hz.

c. Set the readout dials to 001.0000.

d. Connect the ac rms differential voltmeter to the OUTPUT terminals.

e. Adjust the OUTPUT ADJUST controls to obtain an indication of 1.0 volts rms.

f. Measure the ac input to the positive supply at pins 3 and 4 and pins 18 and 19. They should be approximately 63 volts rms with the line at 115 volts rms.

g. Turn to Figure 4-17, 4-18, or 4-19 depending on the condition of the power supply and measure the listed voltages.

4-51. ±15-VOLT POWER SUPPLY CIRCUIT MEASUREMENTS. It is not necessary to establish standard conditions for measurement of voltages in the ±15-volt power supply because the load is relatively constant.

TEST POINT	INDICATION
Pin 8	- 1.0
Q13-E	- 6.9
Q12-E	+14
Q10-E, Q11-E	- 0.55
Q11-B	- 0.05 (approx)
Q10-B	+ 0.02 (approx)
TP1	+ 0.03
Junction R19 and R20	+ 1.33
Q8-C	+ 8.9
Q7-C	+14.4
Q8-B	+14.4
Q6-C	+ 0.5 (approx)
Q6-B	+ 0.5 (approx)
Q5-E	- 0.58
Junction R16 and C7	+ 9.8
Q2-E, Q3-E	- 5.5
Junction R36 and R37	- 0.92*

*Varies with setting of R37

Note: No meaningful measurements can be made on Q4-Drain or Q5-Base

Figure 4-21. NULL DETECTOR VOLTAGES

The line voltage should be a constant 115 volts rms during measurement. Test points and indicated voltages for the ±15-volt power supply are listed in Figure 4-20.

4-52. NULL DETECTOR CIRCUIT MEASUREMENTS. Use the following procedure for null detector circuit measurements:

a. Turn the FUNCTION switch to VOLTS.

b. Turn the FREQUENCY switch to DC.

c. Turn the METER SENS switch to SEARCH.

d. Set the readout dials to 001.0000.

e. Adjust the OUTPUT ADJUST controls to obtain full scale deflection (to the right) on the meter of the Model 760A.

f. Measure the voltages listed in Figure 4-21.

g. Set the oscilloscope for dc coupling, vertical sensitivity of 2 volts per division, and horizontal sensitivity of 1 millisecond per division.

h. Center the trace in the graticule at zero volts dc.

i. Connect the signal lead to the junction of R39, R40, and C12 on the Null Detector circuit board.

j. Compare the displayed waveform to that shown in Figure 4-22.

4-53. AC CONVERTER CIRCUIT MEASUREMENTS. Use the following procedure for ac converter circuit measurments:

a. Turn the FUNCTION switch to VOLTS.

b. Turn the FREQUENCY switch to 400 Hz.

c. Set the readout dials to 001.0000.

d. Connect the ac rms differential voltmeter to the OUTPUT terminals.

e. Adjust the OUTPUT ADJUST controls to obtain an indication of 1.0 volt rms.

f. Use the differential voltmeter to measure the voltages listed below:

Q1-C	+1.1
Q2-E	+0.58
Q4-C	+7.3
Q5-E	+7.9
Q5-C	-2.33

g. Connect the signal lead of the oscilloscope to the junction of CR1 and CR2. Set the oscilloscope for internal synchronization, vertical sensitivity of 0.5 volt per division, and sweep speed of 0.5 millisecond per division.

h. Observe the diode switching waveform shown in Figure 4-23.

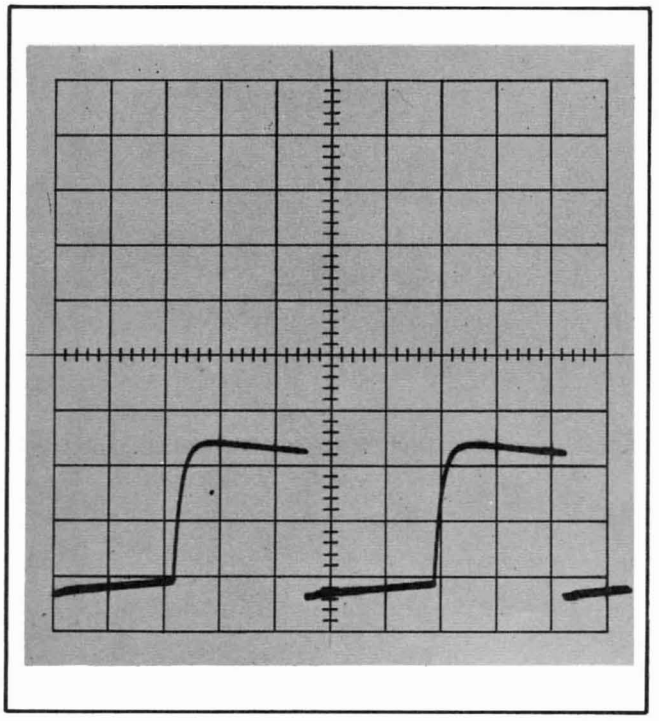


Figure 4-22. CHOPPER DRIVE SIGNAL

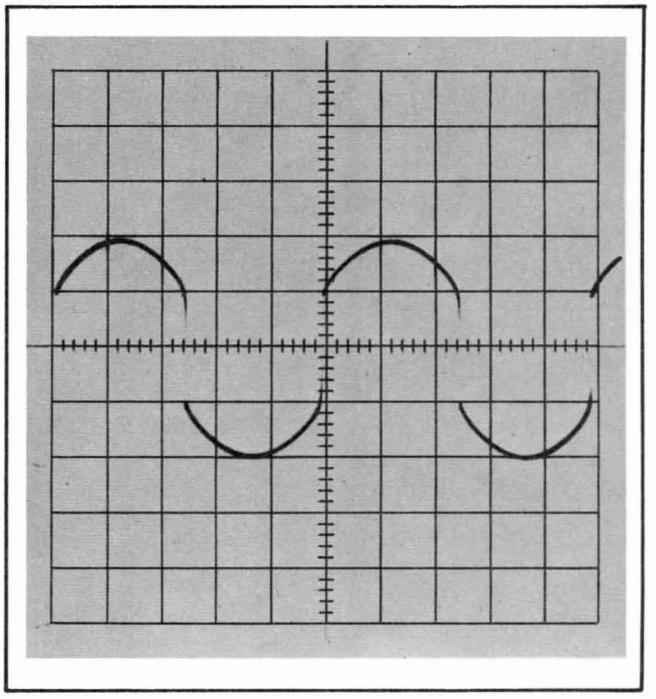


Figure 4-23. DIODE SWITCHING WAVEFORM

SECTION V

LIST OF REPLACEABLE PARTS

5-1. INTRODUCTION

5-2. This section contains complete descriptions of those parts one might normally expect to replace during the life of the instrument. The first listing is a breakdown of all of the major assemblies in the instrument. Subsequent listings itemize the components in each assembly. Every listing is accompanied by an illustration identifying each component in the listing. Assemblies and subassemblies are identified by a reference designation beginning with the letter A, (e.g., A1, etc.). Components are identified by the schematic diagram reference designation (e.g. R1, C107, DS1). Parts not appearing on the schematic diagram are numbered consecutively throughout the parts list with a whole number in arrow call-out illustrations and are identified by index number only in grid illustrations. Flagnotes are used throughout the parts list and refer to ordering explanations. The flagnote explanations appear at the end of the parts list in which they are listed.

5-3. COLUMNAR INFORMATION

a. The REF DESIG column indexes the item description to the associated illustration. In general the reference designations are listed under each assembly in alpha-numeric order. Subassemblies of minor proportions are sometimes listed with the assembly of which they are a part. In this case, the reference designations for the components of the subassembly may appear out of order.

b. The INDEX NO. column lists coordinates which locate the designated part on the associated illustrations.

c. The DESCRIPTION column describes the salient characteristics of the component. Indention of the description indicates the relationship to other assemblies, components, etc. In many cases it is necessary to abbreviate in this column. For abbreviations and symbols used, see the following page.

d. The ten-digit part number by which the item is identified at the John Fluke Mfg. Co. is listed in the STOCK NO. column. Use this number when ordering parts from the factory or authorized representatives.

e. The Federal Supply Code for the item manufacturer is listed in the MFR column. An abbreviated list of Federal Supply Codes is included in the Appendix.

f. The part number which uniquely identifies the item to the original manufacturer is listed in the MFR PART NO column. If a component must be ordered by description, the type number is listed.

g. The TOT QTY column lists the total quantity of the item used in the instrument. Second and subsequent listing of the same item are referenced to the first listing with the abbreviation REF. In the case of optional subassemblies, plug ins, etc. that are not always part of the instrument, the TOT QTY column lists the total quantity of the item in that particular assembly.

h. Entries in the REC QTY column indicate the recommended number of spare parts necessary to support one to five instruments for a period of two years. This list presumes an availability of common electronic parts at the maintenance site. For maintenance for one year or more at an isolated site, it is recommended that at least one of every part in the instrument be stocked.

i. The USE CODE column identifies certain parts which have been added, deleted or modified during the production of the instrument. Each part for which a Use Code has been assigned may be identified with a particular instrument serial number by consulting the Serial Number Effectivity List at the end of the parts list. As Use Codes are added to the list, the TOT QTY column listings are changed to reflect the most current information. Sometimes when a part is changed, the new part can and should be used as a replacement for the original part. In this event a parenthetical note is added in the DESCRIPTION column.

5-4 HOW TO OBTAIN PARTS

5-5. Standard components have been used wherever possible. Standard components may be ordered directly from the manufacturer by using the manufacturer's part number, or parts may be ordered from the John Fluke Mfg. Co. factory or authorized representative by using the Fluke part number. In the event the part you order has been replaced by a new or improved part, the replacement will be accompanied by an explanatory note and installation instructions, if necessary.

5-6. You can insure prompt and efficient handling of your order to the John Fluke Mfg. Co. if you include the following information:

a. Quantity.

b. FLUKE Stock Number.

c. Description.

d. Reference Designation.

e. Instrument model and serial number.

Example; 2 each, 4805-177105, Transistors, 2N3565, Q107-108 for 845AR, s/n 168.

If you must order structural parts not listed in the parts list, describe the part as completely as possible. A sketch of the part showing its location to other parts of the instrument is usually most helpful.

5-7. LIST OF ABREVIATIONS

ac	alternating current
Al	Aluminum
amp	ampere
assy	assembly
cap	capacitor
car flm	carbon film
C	centigrade
cer	ceramic
comp	composition
conn	connector
db	decibel
dc	direct current
dpdt	double-pole, double-throw
dpst	double-pole, single-throw
elect	electrolytic
F	fahrenheit
Ge	germanium
gmv	guaranteed minimum value
h	henry
Hz	hertz
hf	high frequency
IC	integrated circuit
if	intermediate frequency
k	kilohm
kHz	kilohertz
kv	kilovolt
lf	low frequency
MHz	megahertz
M	megohm
met flm	metal film
ua	microampere
uf	microfarad
uh	microhenry
usec	microsecond
uv	microvolt
ma	milliampere
mh	millihenry
m	millohms
msec	millisecond
mv	millivolt
mw	milliwatt
na	nanoampere
nsec	nanosecond
nv	nanovolt
Ω	ohm
ppm	parts per million
piv	peak inverse voltage
p-p	peak to peak
pf	picofarad
plstc	plastic
p	pole
pos	position
P/C	printed circuit
rf	radio frequency
rfi	radio frequency interference
res	resistor
rms	root mean square
rtry	rotary
sec	second
sect	section
S/N	serial number
Si	silicon
scr	silcon controlled rectifier
spdt	single-pole, double-throw
spst	single-pole, single-throw
sw	switch
Ta	tantalum
tstr	transistor
tvm	transistor voltmeter
uhf	ultr high frequency
vtvm	vacuum tube voltmeter
var	variable
vhf	very high frequency
vlf	very low frequency
v	volt
va	voltampere
vac	volts, alternating current
vdc	volts, direct current
w	watt
ww	wire wound

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
		METER CALIBRATOR - Figure 5-1	760A					
A1		Front-Panel Assembly (See Figure 5-2)						
A2		Measurement Chassis Assembly (See Figure 5-3 through 5-10)						
A3		Main Chassis Assembly (See Figure 5-17)						
A4		Rear-Panel Assembly (See Figure 5-21)						
1		Cover, bottom (not illustrated)	3156-236034	89536	3156-236034	1		
2		Cover, top (not illustrated)	3156-236042	89536	3156-236042	1		
3		Foot, nylon (not illustrated)	2819-234286	89536	2819-234286	6		
4		Line cord (not illustrated)	6005-161638	91934	SVT, 107-1	1		

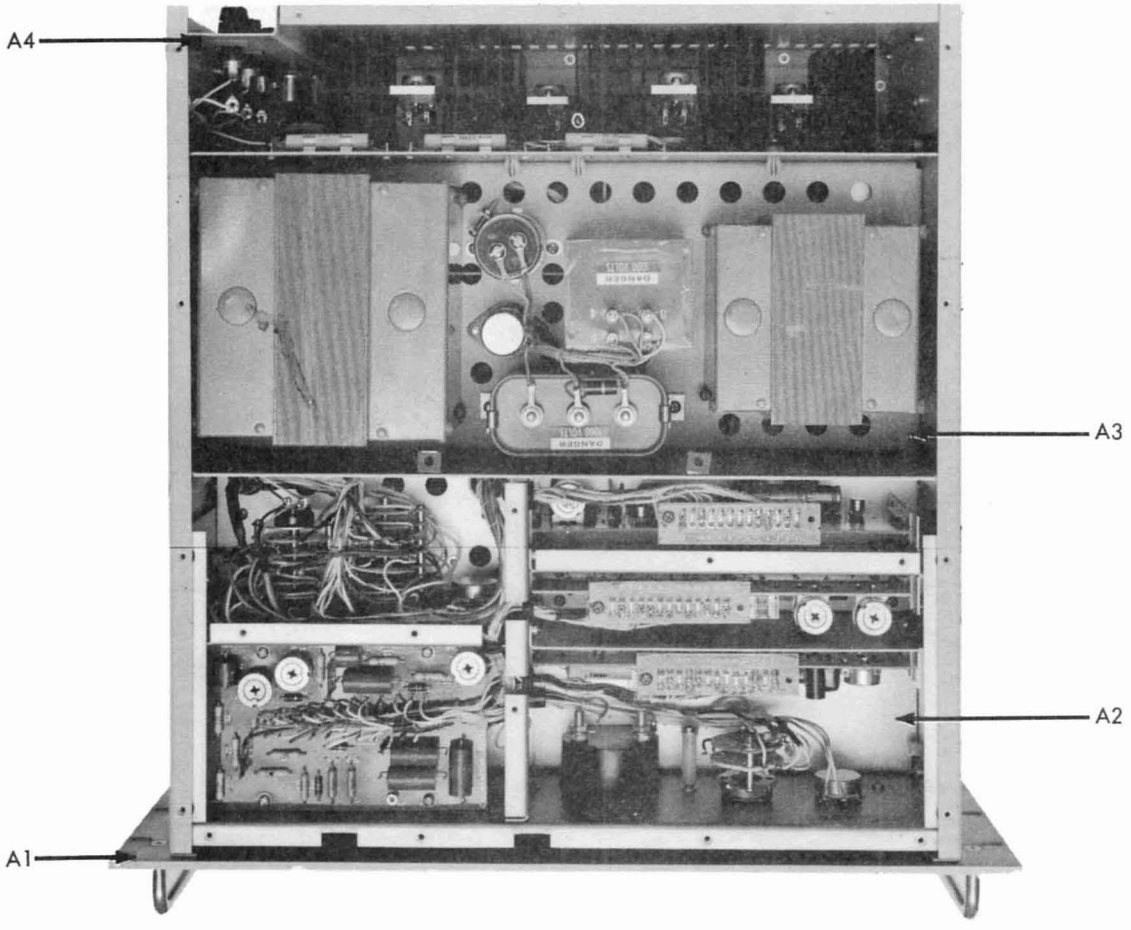


Figure 5-1. 760A METER CALIBRATOR

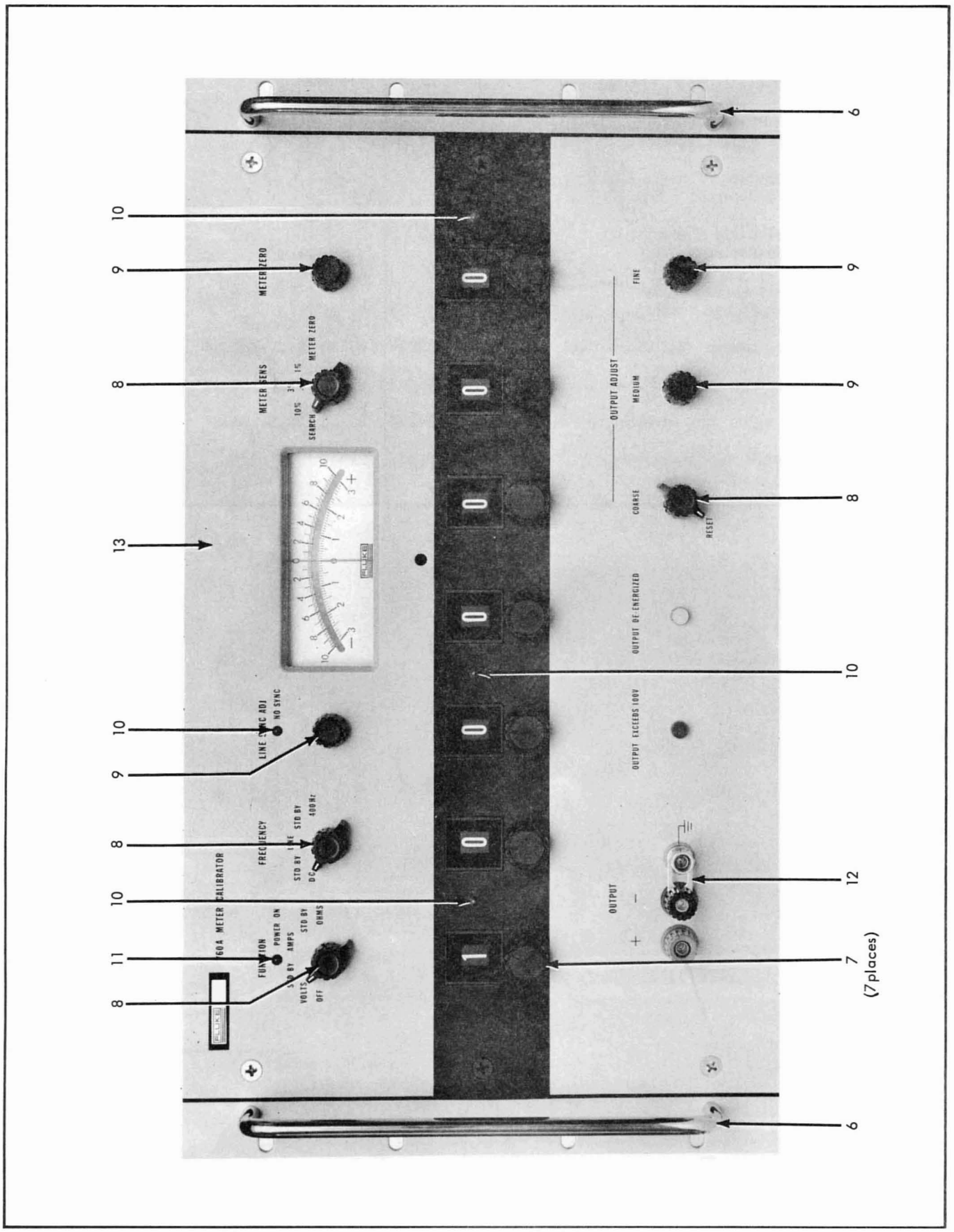


Figure 5-2. FRONT-PANEL ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A1		**FRONT PANEL ASSEMBLY** Figure 5-2						
C1		Cap, plstc, 0.1 uf ±20%, 250v	1507-161992	73445	C280AE/P100K	2		
DS1		Lamp cartridge, incandescent	3903-228825	03797	CF03-ATS-1762	1		
DS2		Lamp cartridge, incandescent	3903-228817	03797	CF03-RTS-1762	1		
J1		Binding post, red, + OUTPUT	2811-149856	58474	BHB-10208-G22	1		
J2		Binding post, black, - OUTPUT	2811-149864	58474	BHB-10208-G21	1		
J3		Binding post, silver, GROUND	2811-155911	58474	GP30NC	1		
R1a, R1b		Res, var, ww, dual, 500Ω ±10%, 2w	4702-219766	71450	Type 2-252	1		
R2		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	9		
R3		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R4		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R5		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R6		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R7		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R8		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R9		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R10		Res, comp, 390Ω ±5%, 1/2w	4704-109082	01121	EB3915	REF		
R11		Res, var, ww, 300Ω ±10%, 2w	4702-220392	71450	Type 252	1		
S1		Switch, OUTPUT ADJUST COARSE, rotary, 5p, 11 pos, 4 sect	5105-240606	89536	5105-240606	1		
XDS1		Socket, lamp cartridge (not illustrated)	2110-229336	03797	2K	2		
XDS2		Socket, lamp cartridge (not illustrated)	2110-229336	03797	2K	REF		
5		Clip, lamp cartridge	3904-222356	03797	10905-01	2		
6		Handle, chrome-plated brass	2404-229344	15849	1018-13	2		
7		Knob, DIGITS 1-7	2405-246041	89536	2405-246041	7		
8		Knob, COARSE, FREQUENCY, FUNCTION, METER SENS	2405-158956	89536	2405-158956	4		
9		Knob, FINE, LINE SYNC, MEDIUM, METER ZERO	2405-190249	89536	2405-190249	4		
10		Lens, clear	3155-222596	89536	3155-222596	4		
11		Lens, red	3155-228056	89536	3155-228056	1		
12		Link, shorting	2811-101220	24655	938L	1		
13		Panel, front	1406-236299	89536	1406-236299	1		

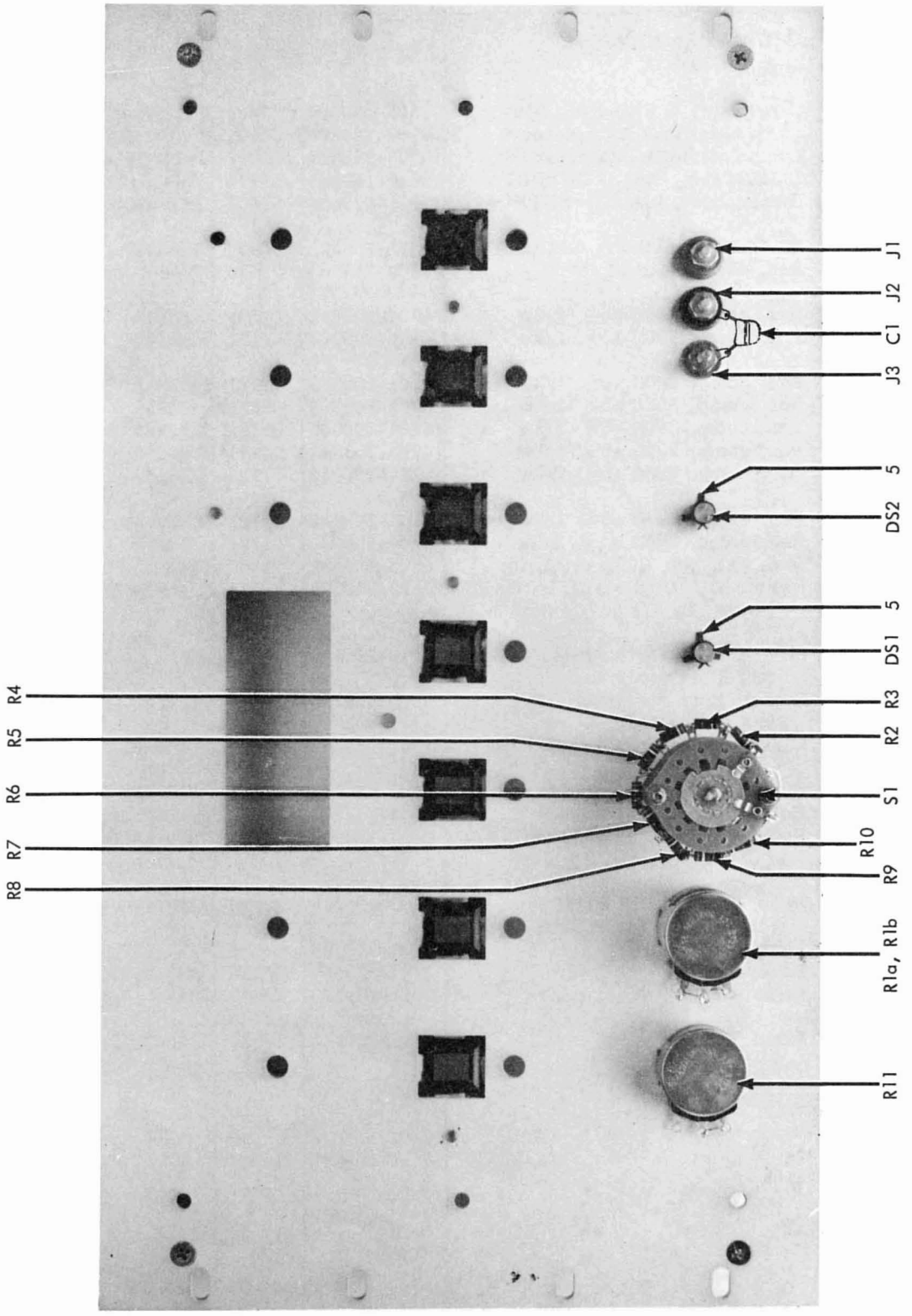


Figure 5-2. FRONT-PANEL ASSEMBLY (continued)

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2		**MEASUREMENT CHASSIS ASSEMBLY Figures 5-3 through 5-10**						
		FIGURE 5-3						
A2A1		Oscillator P/C Assembly (See Figure 5-11)	1702-237552 (760A-4005)	89536	1702-237552	1		F
		Oscillator P/C Assembly (See Figure 5-11)	1702-239996 (760A/AA-4005)	89536	1702-239996	1		G
A2A2		Compensation P/C Assembly (See Figure 5-12)	1702-237594 (760A-4009)	89536	1702-237594	1		
A2A3		Calibration P/C Assembly (See Figure 5-13)	1702-237545 (760A-4004)	89536	1702-237545	1		
A2A4		Null Detector P/C Assembly (See Figure 5-14)	1702-237511 (760A-4001)	89536	1702-237511	1		
A2A5		AC Converter P/C Assembly (See Figure 5-15)	1702-237529 (760A-4002)	89536	1702-237529	1		F
		AC Converter P/C Assembly (See Figure 5-15)	1702-239988 (760A/AA-4002)	89536	1702-239988	1		G
A2A6		±15 Volt Power Supply P/C Assembly (See Figure 5-16)	1702-237537 (760A-4003)	89536	1702-237537	1		F
		±15 Volt Power Supply P/C Assembly (See Figure 5-16)	1702-240077 (760A/AA-4003)					
DS1		Lamp, incandescent, 28v, Type 1819	3901-186346	89730	1819	4		
DS2		Lamp, incandescent, 28v, Type 1819	3901-186346	89730	1819	REF		
DS3		Lamp, incandescent, 28v, Type 1819	3901-186346	89730	1819	REF		
DS4		Lamp, incandescent, 28v, Type 1819	3901-186346	89730	1819	REF		
DS5		Lamp, incandescent, 6.3v, Type 47	3901-102855	89730	Type 47	1		
M1		Meter, 100-0-100 ua, 750Ω	2901-234393	89536	2901-234393	1		
R1a, R1b		Res, comp, ww, dual, 12.5k/25k ±20%, 3w	4701-233130	71450	Type 320-2	1		
R2		Res, comp, 9.1Ω ±5%, 1/2w (not illustrated) (located on S9)	4704-218768	01121	EB91G5	2		
R13		Res, comp, 10k ±10%, 1w (not illustrated) (located on S8)	4704-109389	01121	GB1031	7		
R14		Res, ww, 0.1Ω ±0.1%, 10w, 4 term, shunt (not illustrated)	4707-218453	89536	4707-218453	1		
R104		Res, comp, ww, 100k ±10%, 3w	4701-220699	71450	321S104A	1		
R105		Res, met flm, 1k ±1%, 1/2w	4705-151324	12400	Type CEC-TO	3		
R106		Res, met flm, 3.92k ±1%, 1/2w	4705-160713	12400	Type CEC-TO	1		
S1		Switch, 1st DIGIT, front, rotary, 10 pos, 6 sect	5105-238121	89536	5105-238121	1		
		Switch, 1st DIGIT, rear, rotary, 4 sect	5105-237388	89536	5105-237388	1		
S2		Switch, 2nd DIGIT, front, rotary, 10 pos, 7 sect	5105-238139	89536	5105-238139	1		
		Switch, 2nd DIGIT, rear, rotary, 2 sect	5105-237404	89536	5105-237404	1		

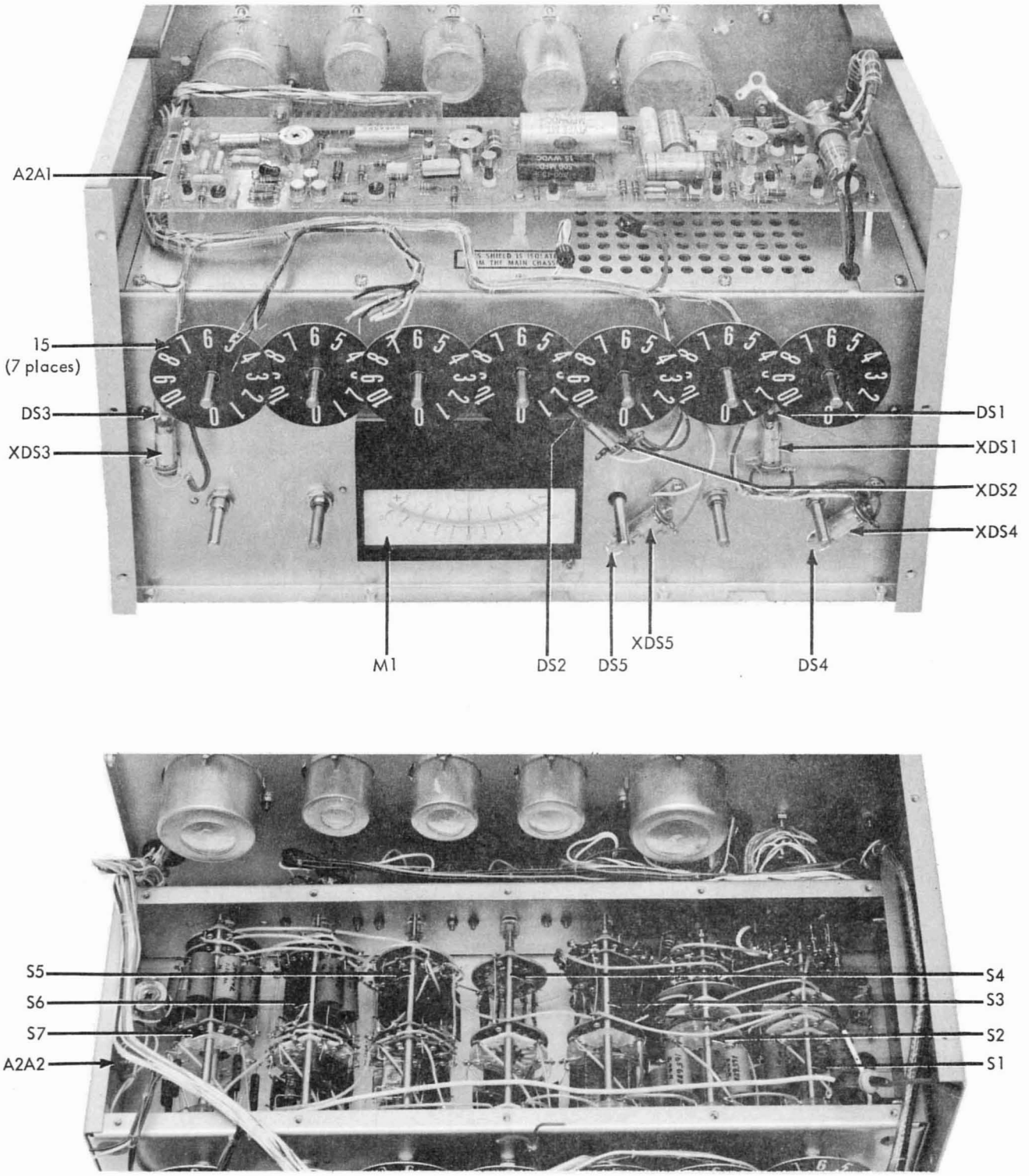


Figure 5-3. MEASUREMENT CHASSIS ASSEMBLY

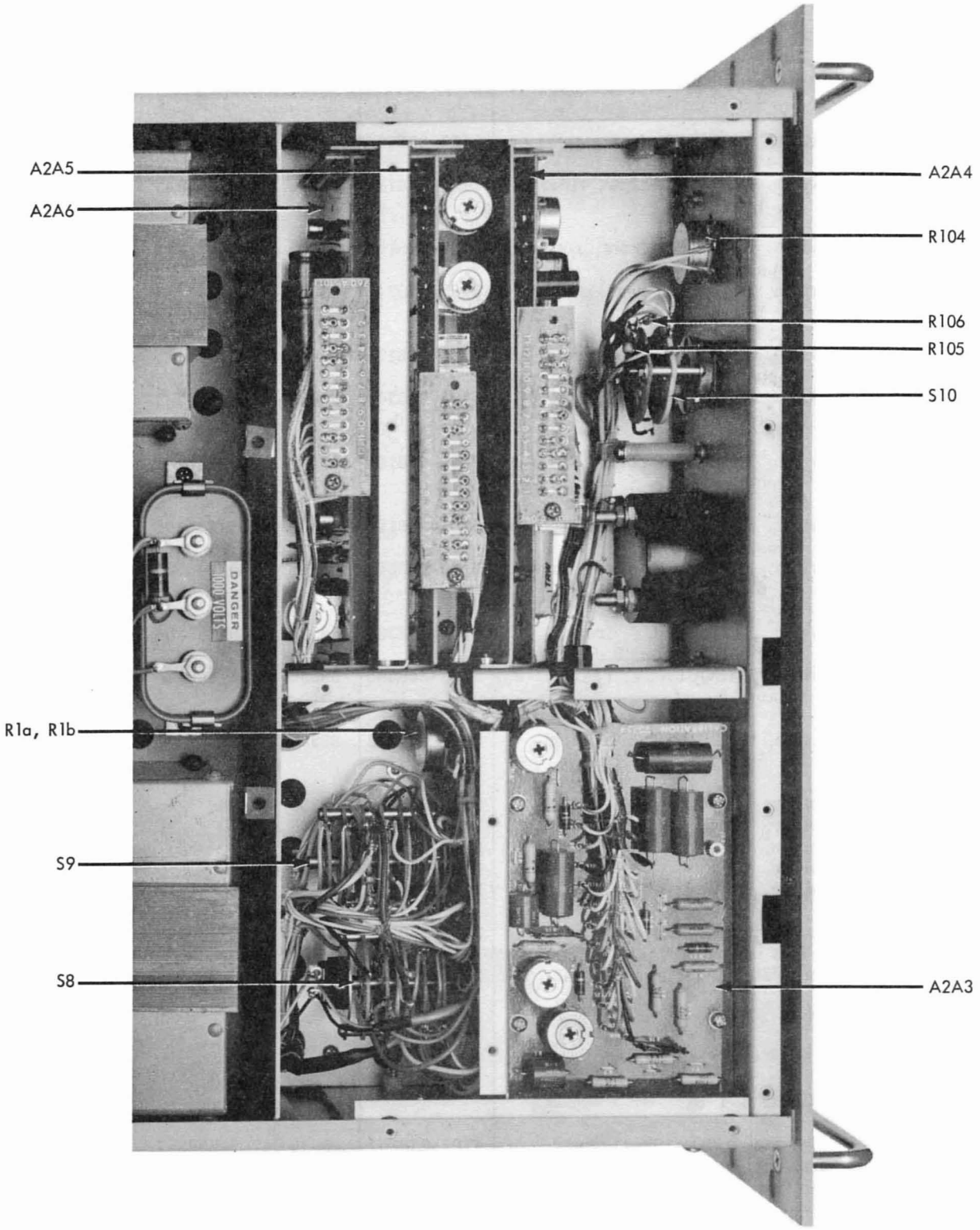


Figure 5-3. MEASUREMENT CHASSIS ASSEMBLY (continued)

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
S3		Switch, 3rd DIGIT, front, rotary, 10 pos, 5 sect	5105-238147	89536	5105-238147	1		
		Switch, 3rd DIGIT, rear, rotary, 3p, 2 sect	5105-237420	89536	5105-237420	1		
S4		Switch, 4th DIGIT, front, rotary, 10 pos, 4 sect	5105-238154	89536	5105-238154	1		
		Switch, 4th DIGIT, rear, rotary, 2p, 1 sect	5105-240747	89536	5105-240747	3		
S5		Switch, 5th DIGIT, front, rotary, 10 pos, 5 sect	5105-238162	89536	5105-238162	1		
		Switch, 5th DIGIT, rear, rotary, 2p, 1 sect	5105-240747	89536	5105-240747	REF		
S6		Switch, 6th DIGIT, front, rotary, 10 pos, 5 sect	5105-238170	89536	5105-238170	1		
		Switch, 6th DIGIT, rear, rotary 2p, 1 sect	5105-240747	89536	5105-240747	REF		
S7		Switch, 7th DIGIT, rotary, 11 pos, 6 sect	5105-238188	89536	5105-238188	1		
S8		Switch, FUNCTION, front, rotary, 6 pos, 7 sect	5105-238196	89536	5105-238196	1		
		Switch, FUNCTION, rear, rotary, 8p, 6 sect	5105-240564	89536	5105-240564	1		
S9		Switch, FREQUENCY, front, rotary, 8p, 5 pos, 5 sect	5105-238204	89536	5105-238204	1		
		Switch, FREQUENCY, rear, rotary, 8 sect	5105-240580	89536	5105-240580	1		
S10		Switch, METER SENS, rotary, 3p, 5 pos, 2 sect	5105-238212	89536	5105-238212	1		
XDS1		Holder, lamp	2110-240838	95263	10-00	5		
XDS2		Holder, lamp	2110-240838	95263	10-00	REF		
XDS3		Holder, lamp	2110-240838	95263	10-00	REF		
XDS4		Holder, lamp	2110-240838	95263	10-00	REF		
XDS5		Holder, lamp	2110-240838	95263	10-00	REF		
14		Coupler, dial plate (not illustrated)	2402-130252	89536	2402-130252	7		
15		Dial plate, 0-10	2403-236984	89536	2403-236984	7		
		FIGURE 5-4 S1						
R15		Res, ww, 0.7Ω ±10%, 1/2w	4707-238857	89536	4707-238857	1		
R16		Res, ww, 0.25 Ω ±10%, 1w	4707-238865	89536	4707-238865	1		
R17		Res, ww, 0.11Ω ±10%, 1w	4707-238873	89536	4707-238873	1		
R18		Res, ww, 0.063Ω ±10%, 1w	4707-238881	89536	4707-238881	1		
R19		Res, ww, 0.04Ω ±10%, 1w	4707-238899	89536	4707-238899	1		

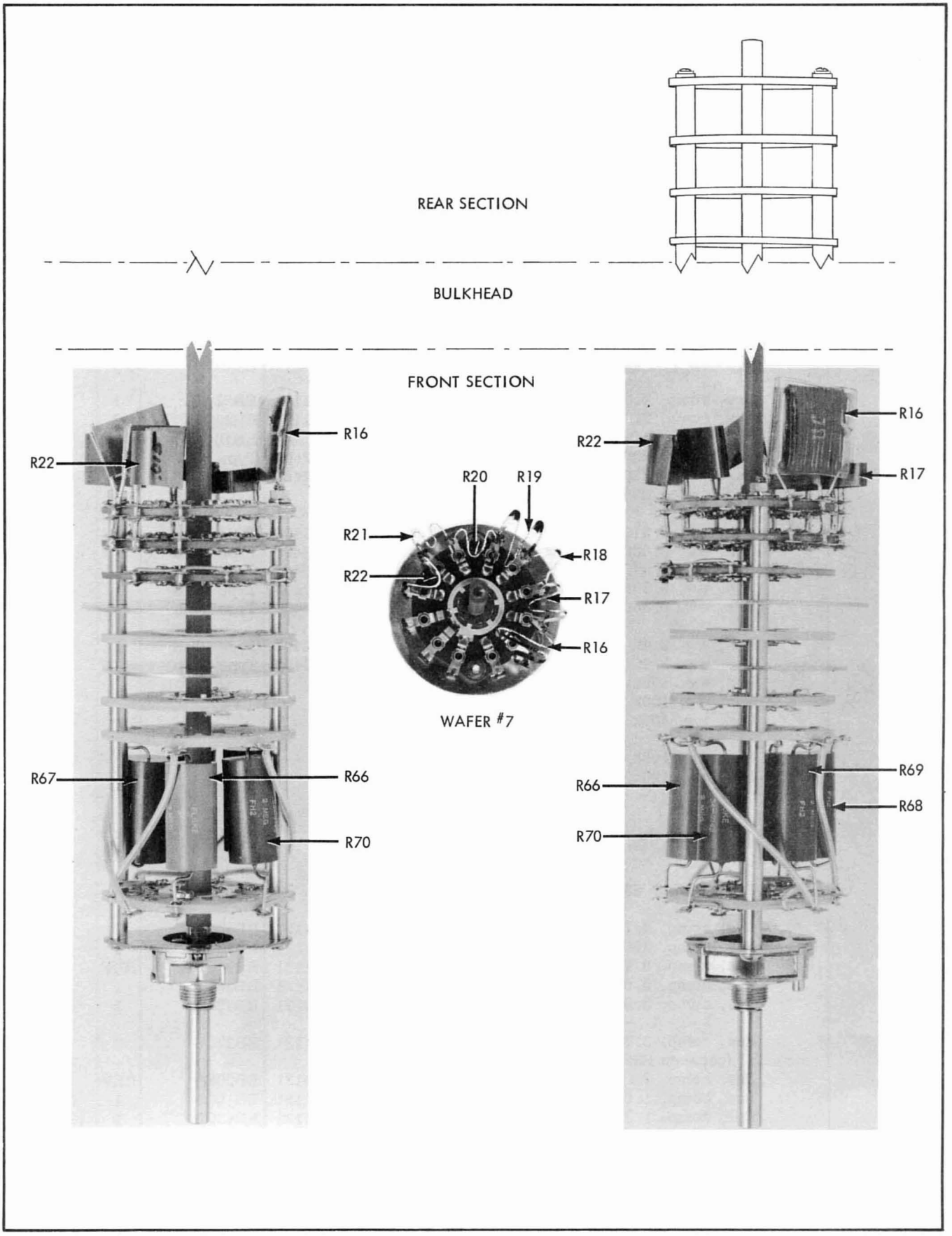


Figure 5-4. 1st DIGIT SWITCH

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R20		Res, ww, 0.028Ω ±15%, 1w	4707-238907	89536	4707-238907	1		
R21		Res, ww, 0.021Ω ±20%, 1w	4707-238915	89536	4707-238915	1		
R22		Res, ww, 0.015Ω ±20%, 1w	4707-238923	89536	4707-238923	1		
R66		Res, ww, 1M, matched	1					
R67		Res, ww, 2M, matched	1					
R68		Res, ww, 2M, matched	1					
R69		Res, ww, 2M, matched	1					
R70		Res, ww, 2M, matched	1					
		FIGURE 5-5 S2						
R23		Res, comp, 6.2Ω ±5%, 1/2w	4704-218750	01121	EB62G5	1		
R24		Res, comp, 2Ω ±5%, 1/2w	4704-218735	01121	EB20G5	2		
R25		Res, comp, 1Ω ±5%, 1/2w	4704-218693	01121	EB10G5	1		
R26		Res, ww, 0.62Ω ±5%, 2w	4706-219352	12400	Type BWH	1		
R27		Res, ww, 0.39Ω ±5%, 2w (between R26 and R28)	4706-219386	12400	Type BWH	1		
R28		Res, ww, 0.27Ω ±5%, 2w	4706-219428	12400	Type BWH	2		
R29a		Res, ww, 0.43Ω ±5%, 2w	4706-219378	12400	Type BWH	1		
R29b		Res, ww, 0.47Ω ±5%, 2w	4706-219360	12400	Type BWH	2		
R30a		Res, ww, 0.33Ω ±5%, 2w	4706-219402	12400	Type BWH	1		
R30b		Res, ww, 0.36Ω ±5%, 2w	4706-219394	12400	Type BWH	1		
R31a		Res, ww, 2.4Ω ±5%, 2w	4706-219337	12400	Type BWH	2		
R31b		Res, ww, 2.4Ω ±5%, 2w	4706-219337	12400	Type BWH	REF		
R71		Res, ww, 100k, matched	1					
R72		Res, ww, 100k, matched	1					
R73		Res, ww, 100k, matched	1					
R74		Res, ww, 100k, matched	1					
R75		Res, ww, 100k, matched	1					
		FIGURE 5-6 S3						
R3		Res, comp, 4.7Ω ±5%, 1/2w	4704-188870	01121	EB47G5	2		
R32		Res, comp, 20Ω ±5%, 1/2w	4704-218776	01121	EB2005	1		
R33		Res, comp, 9.1Ω ±5%, 1/2w	4704-218768	01121	EB91G5	REF		
R34		Res, comp, 5.6Ω ±5%, 1/2w	4704-222208	01121	EB56G5	1		
R35		Res, comp, 3.9Ω ±5%, 1/2w	4704-188490	01121	EB39G5	1		
R36		Res, comp, 2.7Ω ±5%, 1/2w (between R35 and R37)	4704-218743	01121	EB27G5	2		
R37		Res, comp, 2Ω ±5%, 1/2w	4704-218735	01121	EB20G5	REF		
R38		Res, comp, 1.6Ω ±5%, 1/2w	4704-218727	01121	EB16G5	1		
R39		Res, comp, 1.3Ω ±5%, 1/2w	4704-218719	01121	EB13G5	1		
R40		Res, comp, 12Ω ±5%, 1/2w	4704-187831	01121	EB1205	1		
R41		Res, ww, 100Ω, matched	2					
R42		Res, ww, 50Ω, matched	2					
R43		Res, ww, 50Ω, matched	2					
R44		Res, ww, 25Ω, matched	2					

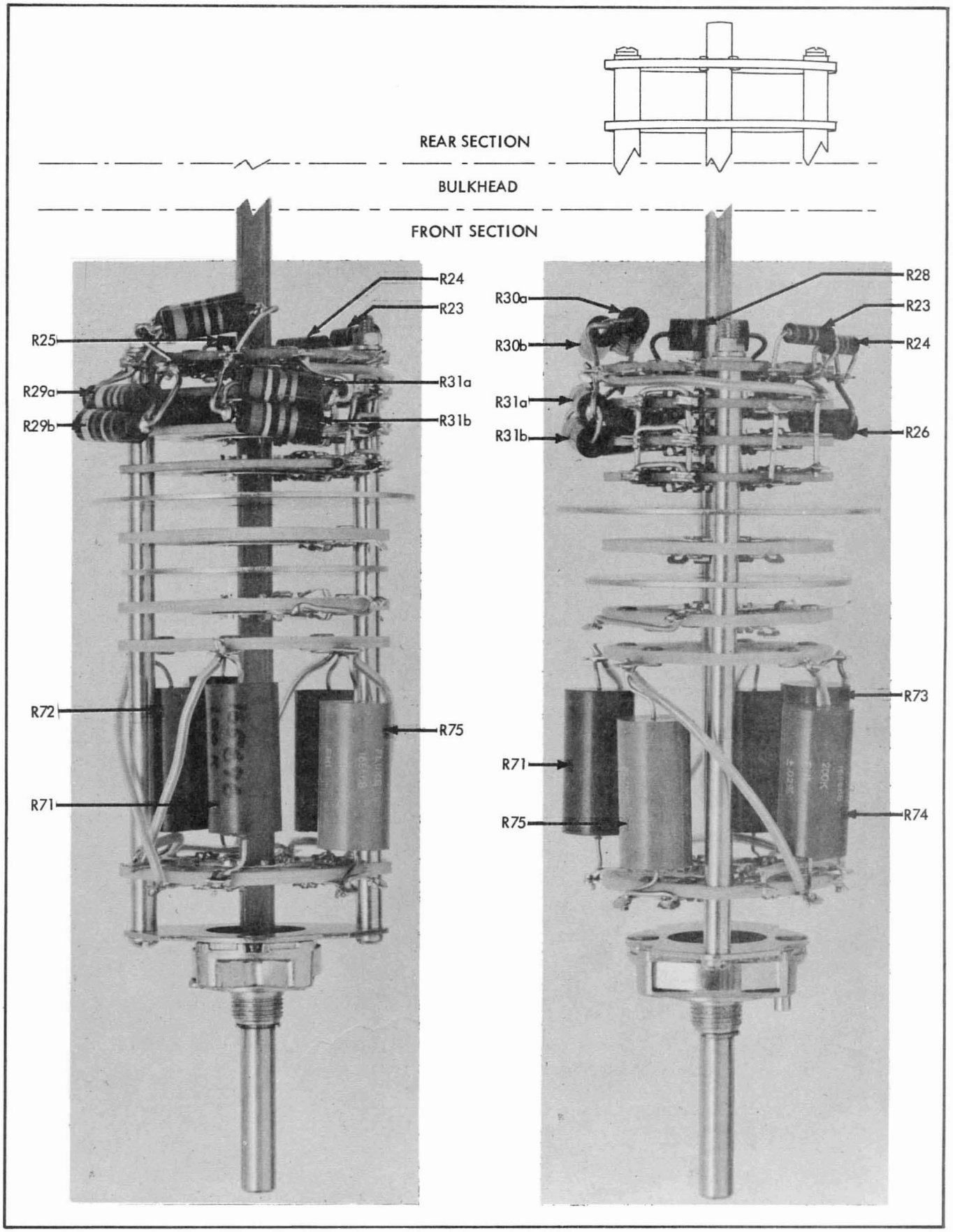


Figure 5-5. 2nd DIGIT SWITCH

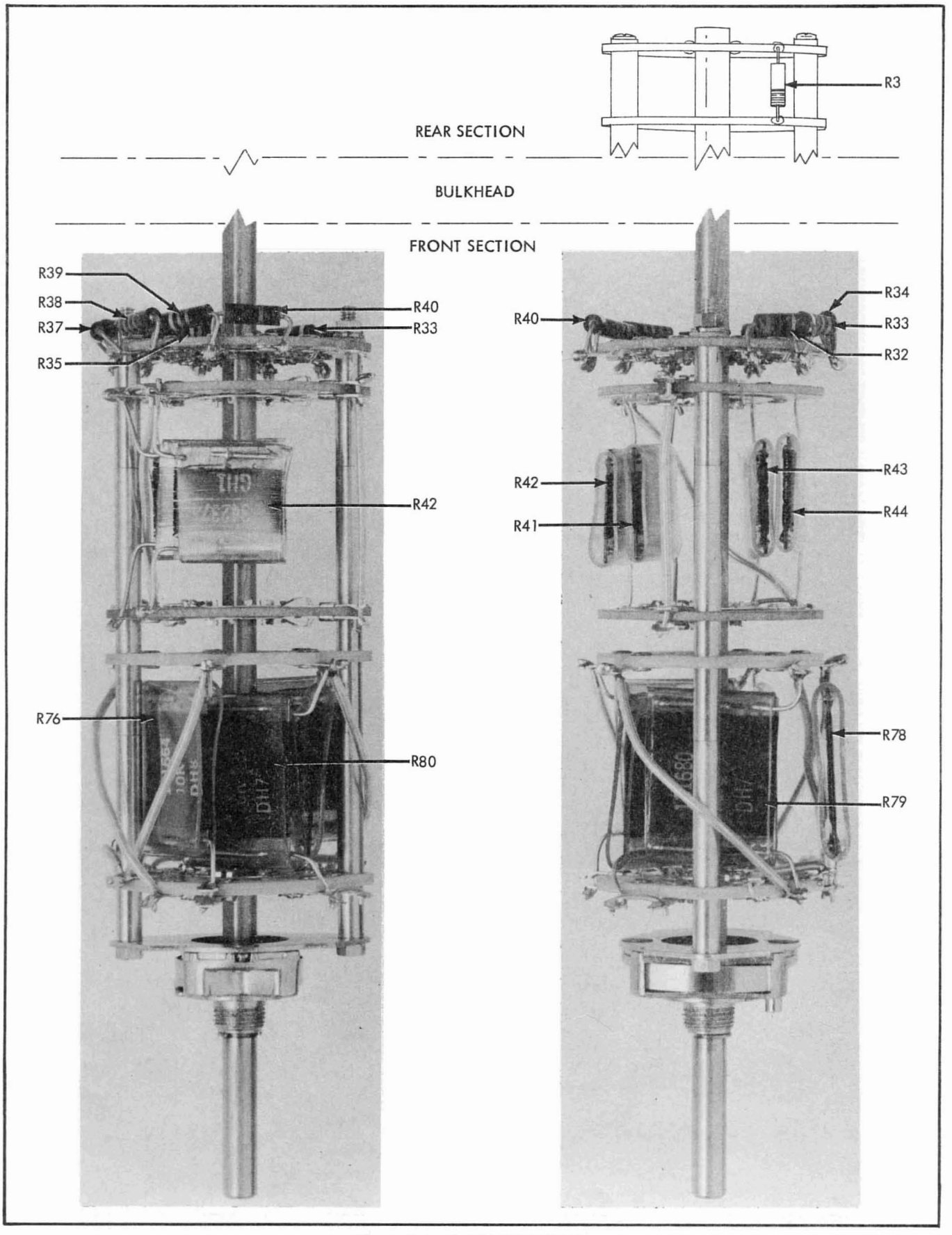


Figure 5-6. 3rd DIGIT SWITCH

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R76		Res, ww, 10k, matched	1					
R77		Res, ww, 20k, matched (between R76 and R78)	1					
R78		Res, ww, 20k, matched	1					
R79		Res, ww, 20k, matched	1					
R80		Res, ww, 20k, matched	1					
		FIGURE 5-7 S4						
R4		Res, comp, 4.7Ω ±5%, 1/2w	4704-188870	01121	EB47G5	REF		
R5		Res, comp, 2.7Ω ±5%, 1/2w	4704-218743	01121	EB27G5	REF		
R6		Res, ww, 0.91Ω ±5%, 2w	4706-219345	12400	Type BWH	1		
R45		Res, ww, 1k, matched	2					
R46		Res, ww, 500Ω, matched	2					
R47		Res, ww, 500Ω, matched	2					
R48		Res, ww, 250Ω, matched	2					
R81		Res, ww, 1k, matched	1					
R82		Res, ww, 2k, matched	1					
R83		Res, ww, 2k, matched	1					
R84		Res, ww, 2k, matched	1					
R85		Res, ww, 2k, matched	1					
		FIGURE 5-8 S5						
R7		Res, ww, 0.47Ω ±5%, 2w	4706-219360	12400	Type BWH	REF		
R8		Res, ww, 0.27Ω ±5%, 2w	4706-219428	12400	Type BWH	REF		
R9		Res, ww, 0.091Ω ±10%, 0.1w	4707-238980	89536	4707-238980	1		
R49		Res, ww, 10k, matched	2					
R50		Res, met flm, 10Ω ±1%, 1/2w (not illustrated)	4705-151043	12400	Type CEC-TO	5		
R51		Res, ww, 10k, matched	2					
R52		Res, ww, 5k, matched	2					
R53		Res, ww, 5k, matched	2					
R54		Res, ww, 2.5k, matched	2					
R86		Res, ww, 100Ω, matched	1					
R87		Res, ww, 200Ω, matched	1					
R88		Res, ww, 200Ω, matched	1					
R89		Res, ww, 200Ω, matched	1					
R90		Res, ww, 200Ω, matched	1					
R91		Res, ww, 99.9Ω, matched	1					

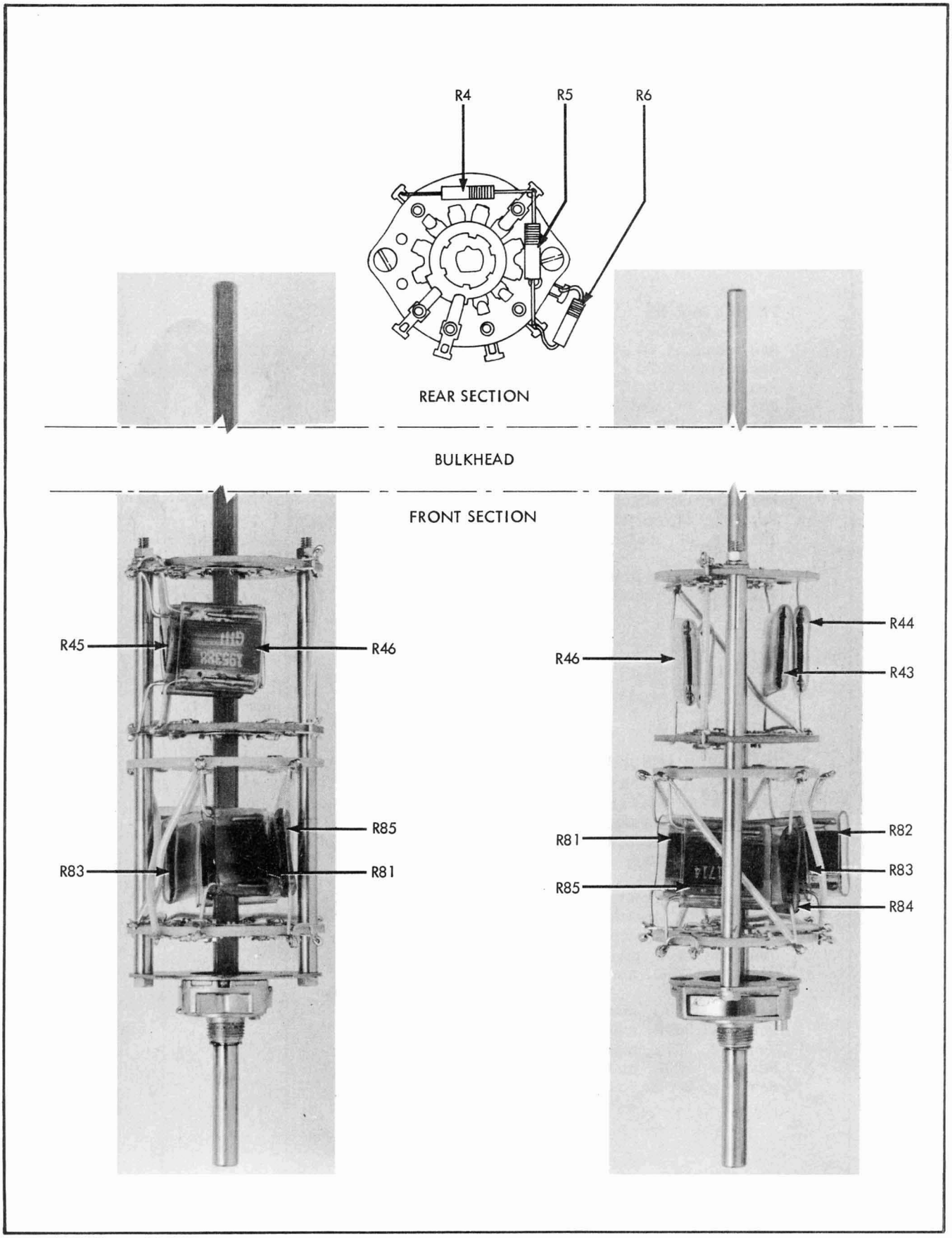


Figure 5-7. 4th DIGIT SWITCH

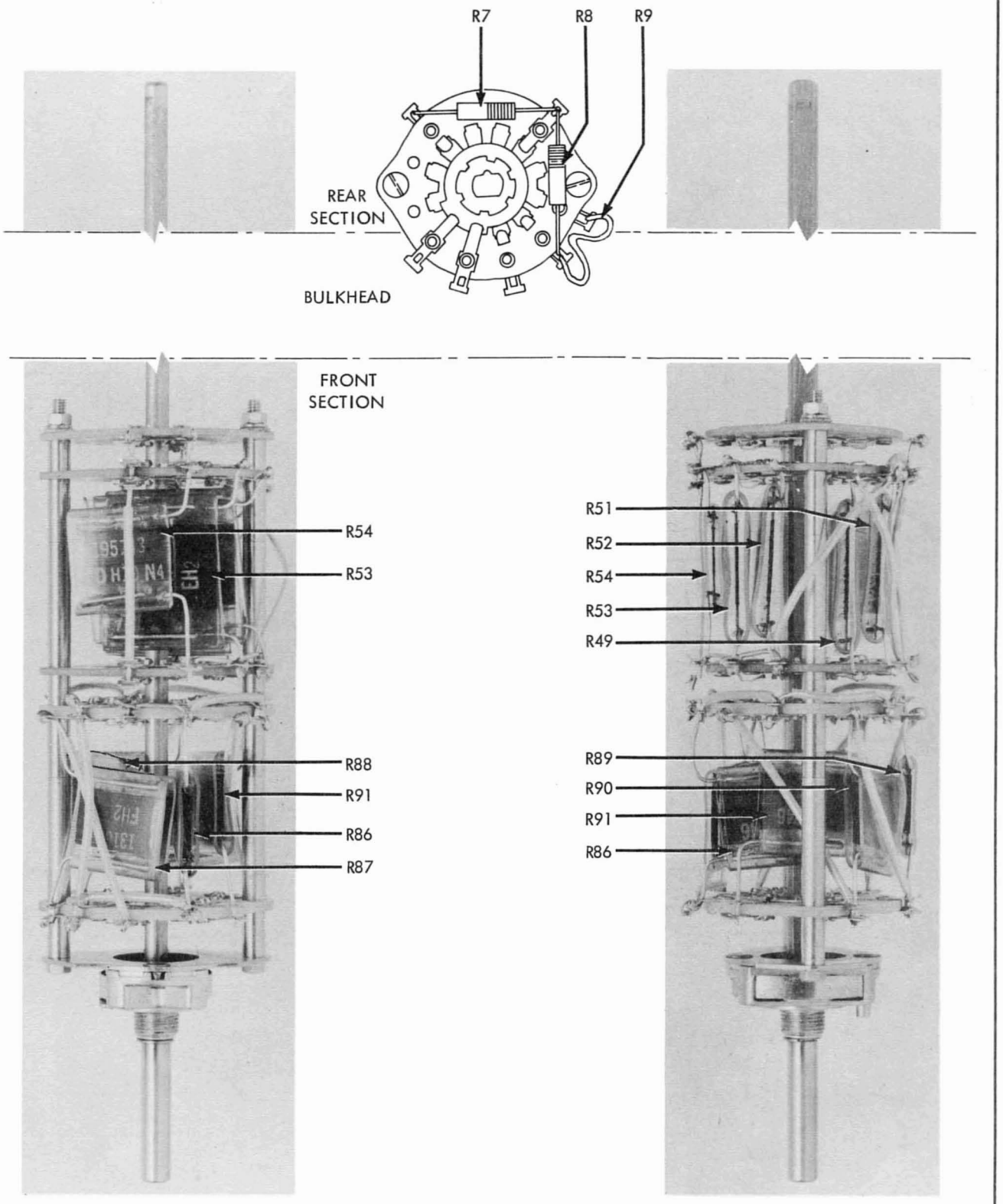


Figure 5-8. 5th DIGIT SWITCH

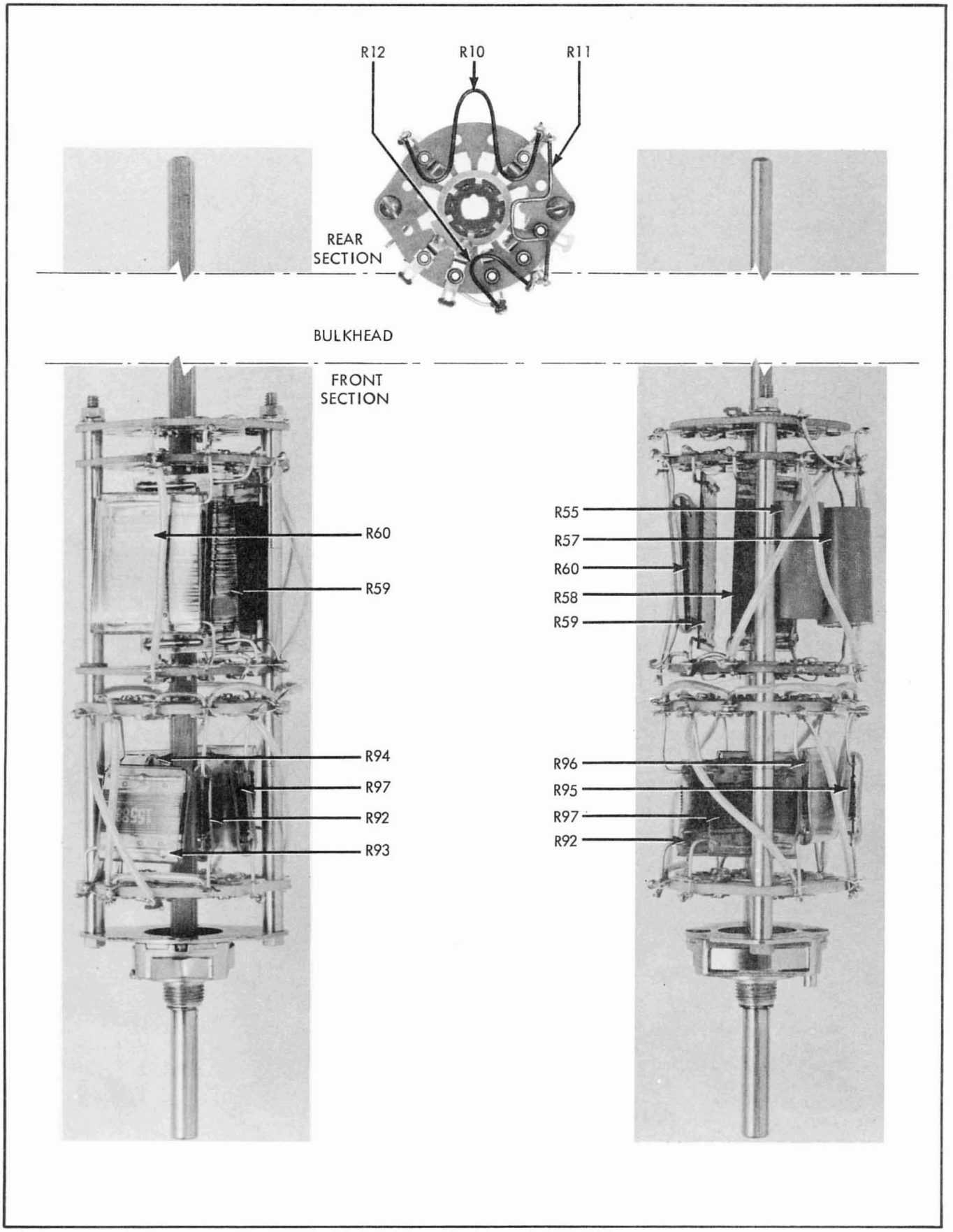


Figure 5-9. 6th DIGIT SWITCH

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
		FIGURE 5-9 S6						
R10		Res, ww, 0.047Ω ±10%, 0.1w	4707-238998	89536	4707-238998	1		
R11		Res, ww, 0.027Ω ±10%, 0.1w	4707-239004	89536	4707-239004	1		
R12		Res, ww, 0.018Ω ±10%, 0.1w	4707-239012	89536	4707-239012	1		
R55		Res, ww, 100k, matched	2					
R56		Res, met flm, 1k ±1%, 1/2w (not illustrated)	4705-151324	12400	Type CEC-TO	REF		
R57		Res, ww, 100k, matched	2					
R58		Res, ww, 50k, matched	2					
R59		Res, ww, 50k, matched	2					
R60		Res, ww, 25k, matched	2					
R92		Res, ww, 10Ω, matched	1					
R93		Res, ww, 20Ω, matched	1					
R94		Res, ww, 20Ω, matched	1					
R95		Res, ww, 20Ω, matched	1					
R96		Res, ww, 20Ω, matched	1					
R97		Res, ww, 10Ω, matched	1					
		FIGURE 5-10 S7						
R61		Res, ww, 1.11M, matched	1					
R62		Res, ww, 1M, matched	1					
R63		Res, ww, 500k, matched	1					
R64		Res, ww, 500k, matched	1					
R65		Res, ww, 250k, matched	1					
R98		Res, ww, 1Ω ±1%, 2w	4706-229534	12400	Type AS-2	1		
R99		Res, ww, 2Ω ±1%, 2w	4706-229542	12400	Type AS-2	5		
R100		Res, ww, 2Ω ±1%, 2w	4706-229542	12400	Type AS-2	REF		
R101		Res, ww, 2Ω ±1%, 2w	4706-229542	12400	Type AS-2	REF		
R102		Res, ww, 2Ω ±1%, 2w	4706-229542	12400	Type AS-2	REF		
R103		Res, ww, 2Ω ±1%, 2w	4706-229542	12400	Type AS-2	REF		

1 These resistors are a factory matched set, part number 4707-238220. If replacement is required, include all information stamped on the resistor along with the information described in paragraph 5-6. Should the information on the resistor not be discernible, include all of the above information about the adjacent resistors.

2 These resistors are a factory matched set, part number 4707-238238. If replacement is required, include all information stamped on the resistor along with the information described in paragraph 5-6. Should the information on the resistor not be discernible, include all of the above information about the adjacent resistors.

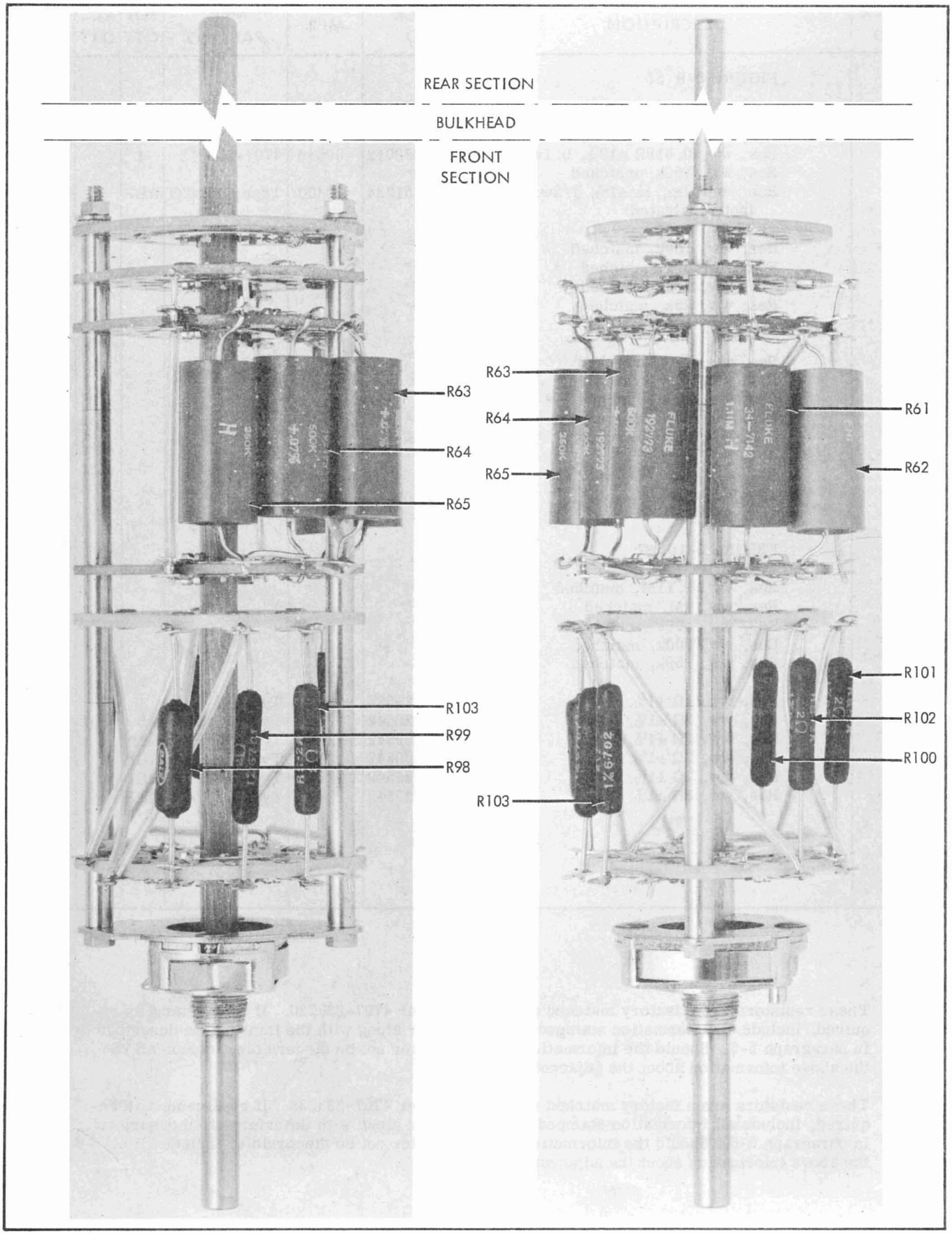


Figure 5-10. 7th DIGIT SWITCH

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2A1		**OSCILLATOR P/C ASSEMBLY** **Figure 5-11**	1702-237552 (760A-4005)	89536	1702-237552	REF		F
			1702-239996 (760A/AA-4005)	89536	1702-239996	REF		G
C1	J4-R1	Cap, mica, 27 pf ±5%, 500v	1504-177998	88419	CD15E270J	1		
C2	I4-R1	Cap, Ta, 10 uf ±10%, 20v	1508-160259	05397	K10C20K	2		
C3	F3-R5	Cap, elect, 2,000 uf +100/-10%, 6v	1502-106286	88419	BR-2000-6	1		
C4	F3-R1	Cap, elect, 500 uf +150/-10%, 15v	1502-160101	88419	BR-500-15	1		
C5	K2-R5	Cap, plstc, 0.015 uf ±2%, 50v	1507-219774	56289	238P-1532-R5S2	1		
C6	H5-R5	Cap, plstc, 0.15 uf ±2%, 50v	1507-219782	56289	238P-1542-R5S2	1		
C7	B1-R1	Cap, elect, 400 uf +50/-10%, 40v	1502-185868	73445	C437ARG400	4		
C8	B1-S1	Cap, elect, 400 uf +50/-10%, 40v	1502-185868	73445	C437ARG400	REF		
C9	B5-R5	Cap, cer, 2,700 pf, gmv, 600v	1501-106211	72982	851-000-Z5U0-272P	2		
C10	D5-R1	Cap, elect, 400 uf +50/-10%, 25v	1502-168153	73445	C437ARF400	4		
C11	D4-R5	Cap, elect, 400 uf +50/-10%, 25v	1502-168153	73445	C437ARF400	REF		
C12	E1-R4	Cap, plstc, 2 uf ±20%, 100v	1507-106963	84411	Type X663FR	2		
C13	E5-Q4	Cap, plstc, 0.22 uf ±10%, 80v	1507-159392	56289	2249R8	1		
C14	E1-Q3	Cap, plstc, 0.1 uf ±20%, 250v	1507-161992	73445	C280AE/P100K	REF		
C15	H1-R1	Cap, plstc, 0.47 uf ±20%, 250v	1507-184366	73445	C280AE/P470K	1		
C16	G4-R1	Cap, plstc, 0.068 uf ±10%, 100v	1507-182170	37942	PVC1168	1		
C17	B4-Q5	Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	7		
C18	E5-N4	Cap, plstc, 0.12 uf ±10%, 200v	1507-223594	56289	12492	1		G
CR1	I5-Q5	Diode, Type IN277	4802-150342	93332	IN277	3		
CR2	I3-Q4	Diode, zener, 6.8v, C.D. Type CD36554	4803-187195	07910	CD36554	2		
CR3	B5-S4	Diode, Type 1N4817	4802-116111	05277	1N4817	12		
CR4	C2-S4	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR5	C2-S3	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR6	B5-S3	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR7	D1-R3	Diode, Type 1N277	4802-150342	93332	1N277	REF		
CR8	C1-R2	Diode, zener, 6.8v, C.D. Type CD36554	4803-187195	07910	CD36554	REF		
CR9	E4-S3	Diode, zener, 20v, Type 1N968B	4803-180463	07910	1N968B	2		
CR10	E2-S3	Diode, zener, 20v, Type 1N968B	4803-180463	07910	1N968B	REF		
CR11	G4-S2	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
Q1	K5-R4	Tstr, Type 2N3391	4805-168708	03508	2N3391	22		
Q2	K4-Q4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q3	K2-Q3	Tstr, Type 2N3638	4805-203364	07263	2N3638	2		
Q4	J2-Q3	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	9		
Q5	J1-Q5	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
Q6	I5-Q3	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
Q7	I1-Q4	Tstr, Type 2N3638	4805-203364	07263	2N3638	REF		
Q8	H2-R4	Tstr, Siliconix Type PF169	4805-229799	16856	PF169	1		
Q9	B4-Q4	Tstr, Motorola Type MPS3638	4805-241141	04713	MPS3638	4		
Q10	C2-Q5	Tstr, Motorola Type MPS3638	4805-241141	04713	MPS3638	REF		
Q11	B4-R2	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
Q12	C4-Q4	Tstr, Motorola Type SM4144	4805-190389	04713	SM4144	5		
Q13	D1-Q4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q14	C1-R5	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q15	B4-R4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		

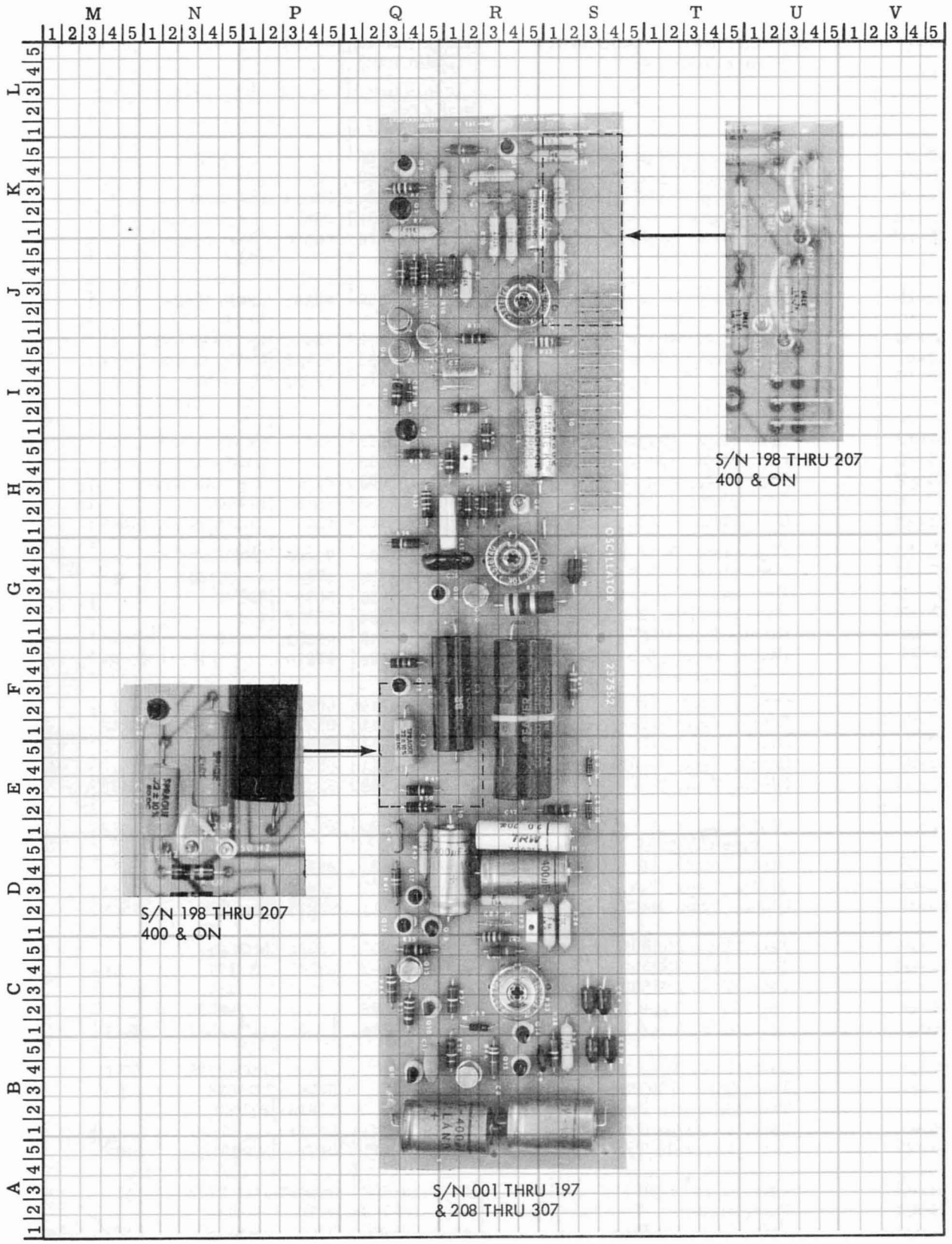


Figure 5-11. OSCILLATOR P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
Q16	D1-Q5	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q17	D3-Q4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q18	F3-Q3	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q19	G3-Q5	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q20	G3-R2	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
R1	K5-R1	Res, comp, 220k ±5%, 1/2w	4704-109025	01121	EB2245	2		
R2	K3-Q4	Res, comp, 390k ±5%, 1/2w	4704-222190	01121	EB3945	1		
R3	K4-R3	Res, met flm, 10Ω ±1%, 1/2w	4705-151043	12400	Type CEC-TO	REF		
R4	K3-Q5	Res, met flm, 10Ω ±1%, 1/2w	4705-151043	12400	Type CEC-TO	REF		
R5	K3-R3	Res, met flm, 200k ±1%, 1/2w	4705-177196	12400	Type CEC-TO	2		
R6	J4-Q3	Res, comp, 62k ±5%, 1/2w	4704-108522	01121	EB6235	4		
R7	K1-Q4	Res, met flm, 4.99k ±1%, 1/2w	4705-148890	12400	Type CEC-TO	1		
R8	J4-R2	Res, met flm, 6.34k ±1%, 1/2w	4705-218636	12400	Type CEC-TO	1		
R9	J4-Q4	Res, comp, 6.8k ±5%, 1/2w	4704-187906	01121	EB6825	3		
R10	J4-Q5	Res, comp, 4.7k ±5%, 1/2w	4704-108886	01121	EB4725	5		
R11	J4-Q5	Res, comp, 1.1k ±5%, 1/2w	4704-160432	01121	EB1125	2		
R12	I3-Q3	Res, comp, 3k ±5%, 1/2w	4704-109090	01121	EB3025	2		
R13	J1-R2	Res, comp, 30k ±5%, 1/2w	4704-186015	01121	EB3035	3		
R14	H5-R1	Res, comp, 20k ±5%, 1/2w	4704-109041	01121	EB2035	3		
R15	H5-Q4	Res, comp, 1.5k ±10%, 1/2w	4704-108159	01121	EB1521	2		
R16	H2-R2	Res, comp, 1M ±5%, 1/2w	4704-108639	01121	EB1055	4		
R17	H2-R3	Res, comp, 1M ±5%, 1/2w	4704-108639	01121	EB1055	REF		
R18	H2-R3	Res, comp, 820Ω ±5%, 1/2w	4704-109066	01121	EB8215	1		
R19	G4-R4	Res, var, ww, 10k ±20%, 1-1/4w	4702-112862	71450	Type 110	1		
R20	K1-R3	Res, met flm, 4.42k ±1%, 1/2w	4705-218628	12400	Type CEC-TO	1		
R21	K1-R4	Res, met flm, 17.8k ±1%, 1/2w	4705-162545	12400	Type CEC-TO	2		
R22	I4-R4	Res, met flm, 17.8k ±1%, 1/2w	4705-162545	12400	Type CEC-TO	REF		
R23	I5-S1	Res, comp, 330k ±5%, 1/2w	4704-150201	01121	EB3345	3		
R24	J3-U3	Res, met flm, 14.7k ±1%, 1/2w	4705-162532	12400	Type CEC-TO	1		G
R25	K3-S1	Res, met flm, 69.8k ±1%, 1/2w	4705-162057	12400	Type CEC-TO	1		
R26	K5-S1	Res, met flm, 34k ±1%, 1/2w	4705-151241	12400	Type CEC-TO	1		
R27	J2-R5	Res, var, ww, 2k ±5%, 1-1/4w	4702-160705	71450	Type 110	3		
R28	J5-S1	Res, met flm, 11k ±1%, 1/2w	4705-222216	12400	Type CEC-TO	2		
R29	L1-S1	Res, met flm, 5.49k ±1%, 1/2w	4705-222224	12400	Type CEC-TO	1		
R30	I2-R1	Res, comp, 100Ω ±5%, 1/2w	4704-188508	01121	EB1015	5		
R31	C2-Q4	Res, comp, 4.7k ±5%, 1/2w	4704-108886	01121	EB4725	REF		
R32	D1-S1	Res, met flm, 7.5k ±1%, 1/2w	4705-192161	12400	Type CEC-TO	1		
R33	C3-R5	Res, var, ww, 2k ±5%, 1-1/4w	4702-160705	71450	Type 110	REF		
R34	D1-S2	Res, met flm, 15k ±1%, 1/2w	4705-151498	12400	Type CEC-TO	3		
R35	C5-Q4	Res, comp, 10k ±5%, 1/2w	4704-190165	01121	EB1035	11		
R36	B5-R1	Res, comp, 150k ±5%, 1/2w	4704-150177	01121	EB1545	5		
R37	C3-R1	Res, comp, 150k ±5%, 1/2w	4704-150177	01121	EB1545	REF		
R38	B5-S1	Res, comp, 120k ±10%, 1/2w	4704-108779	01121	EB1241	2		
R39	B5-S2	Res, met flm, 10k ±1%, 1/2w	4705-151274	12400	Type CEC-TO	1		
R40	C5-R3	Res, comp, 7.5k ±5%, 1/2w	4704-108910	01121	EB7525	3		
R41	D3-Q3	Res, comp, 750k ±5%, 1/2w	4704-188789	01121	EB7545	2		
R42	D1-R3	Res, comp, 330k ±5%, 1/2w	4704-150201	01121	EB3345	REF		
R43	D5-Q5	Res, met flm, 15k ±1%, 1/2w	4705-151498	12400	Type CEC-TO	REF		
R44	D2-R4	Res, met flm, 15k ±1%, 1/2w	4705-151498	12400	Type CEC-TO	REF		
R45	C3-Q3	Res, comp, 3.9k ±5%, 1/2w	4704-180596	01121	EB3925	4		
R46	B5-R3	Res, comp, 3.9k ±5%, 1/2w	4704-180596	01121	EB3925	REF		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R47	F3-S2	Res, comp, 330Ω ±5%, 1/2w	4704-108936	01121	EB3315	1		
R48	E2-S1	Res, comp, 2k ±5%, 1/2w	4704-169854	01121	EB2025	2		
R49	E3-Q4	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R50	E2-Q4	Res, comp, 20k ±5%, 1/2w	4704-109041	01121	EB2035	REF		
R51	F4-Q3	Res, comp, 6.8k ±5%, 1/2w	4704-187906	01121	EB6825	REF		
R52	I1-R3	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R53	H2-Q5	Res, comp, 33k ±5%, 1/2w	4704-108761	01121	EB3335	2		
R54	G5-Q3	Res, comp, 220k ±5%, 1/2w	4704-109025	01121	EB2235	REF		
R55	G2-R5	Res, comp, 33Ω ±10%, 2w	4704-110031	01121	HB3301	1		
R56	K3-U4	Res, met flm, 7.15k ±1%, 1/2w	4705-186072	12400	Type CEC-TO	1		G
TP1	H5-R2	Test point, yellow	2109-149138	74970	105-0757	4		
TP2	D1-R5	Test point, yellow	2109-149138	74970	105-0757	REF		
	I2-S3	Connector, female, 16 contacts	2816-187724	91662	02-016-013-5-200	1		
		Transipad, nylon, small	2814-225714	07047	10171-N	34		
		Transipad, nylon, large	2814-225722	07047	10204-N	31		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2A2		COMPENSATION P/C ASSEMBLY Figure 5-12	1702-237594 (760A-4009)	89536	1702-237594	REF		
C1	D4-N3	Cap, var, 7 pf - 25 pf +3.5/-2.5%, 350v	1509-229948	72982	538-006- B2P0-93R	1		
C2	C3-K2	Cap, plstc, 0.18 uf ±10%, 200v	1507-105874	56289	148P18492	1		
C3	C3-N3	Cap, mica, 12 pf ±5%, 500v	1504-175224	88419	CD15E120J	1		
R1	E2-K2	Res, var, ww, 500Ω ±10%, 1-1/4w	4702-113258	71450	Type 110	1		
R2	D5-I2	Res, met flm, 604Ω ±1%, 1/2w	4705-177154	12400	Type CEC-TO	1		
R3	D1-H5	Res, comp, 2.4k ±5%, 1/2w	4704-108902	01121	EB2425	1		
R4	D1-M2	Res, comp, 680k ±10%, 1/2w	4704-108340	01121	EB6841	1		

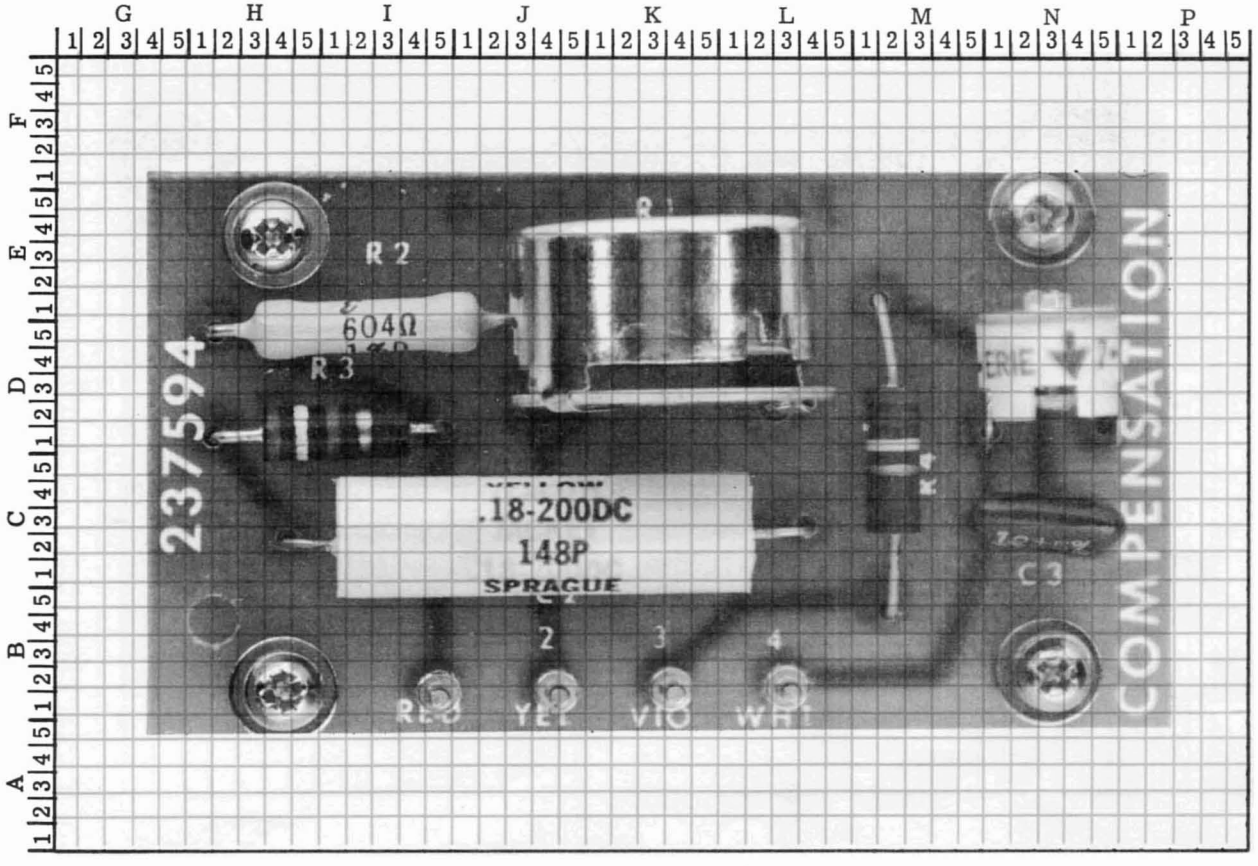


Figure 5-12. COMPENSATION P/C ASSEMBLY

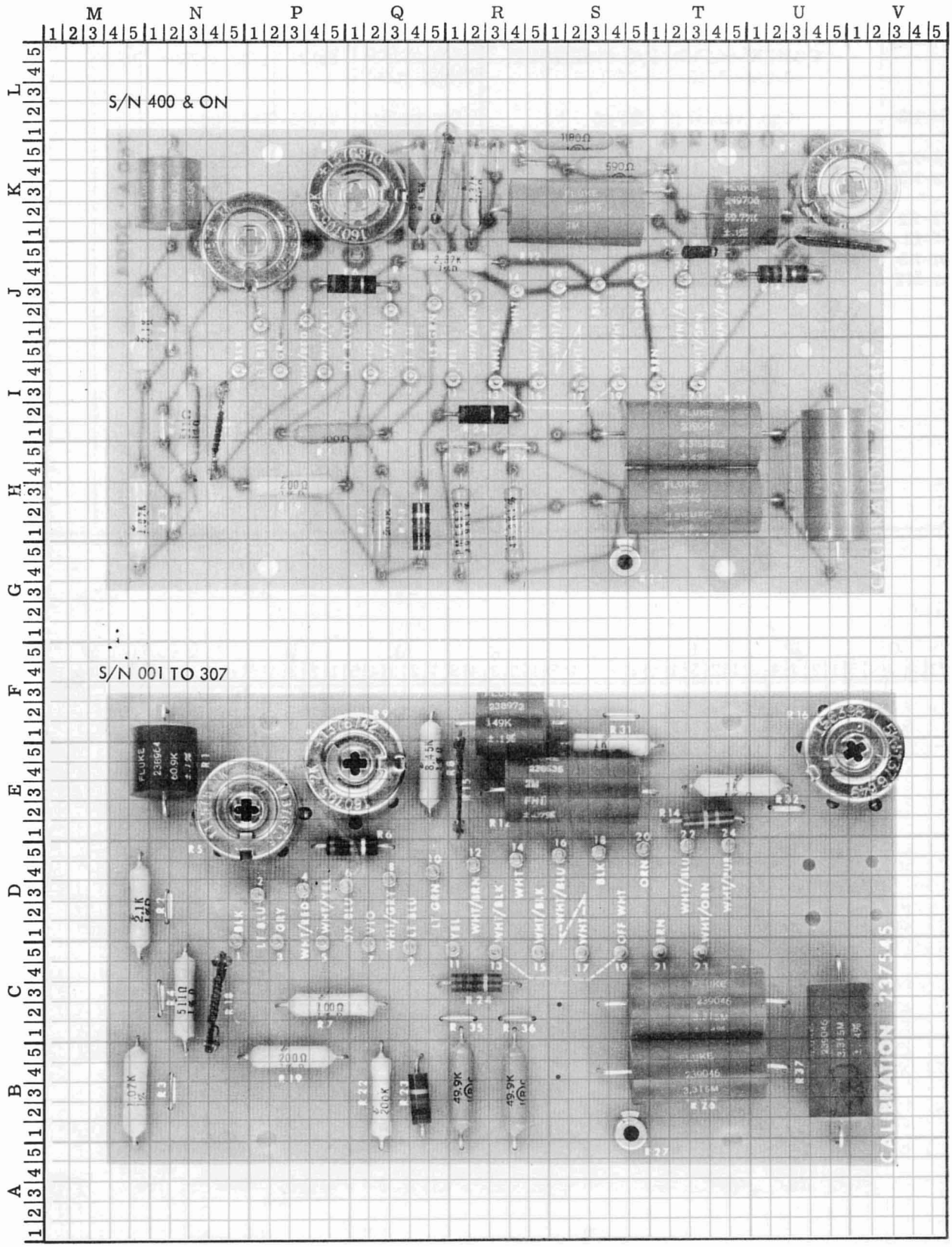


Figure 5-13. CALIBRATION P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2A3		**CALIBRATION P/C ASSEMBLY Figure 5-13, S/N 001 to 307**	1702-237545 (760A-4004)	89536	1702-237545	REF		
R1	E4-N1	Res, ww, 60.9k ±0.1%, 1/2w	4707-238964	89536	4707-238964	1		
R2	D2-M5	Res, met flm, 2.1k ±1%, 1/2w	4705-193276	12400	Type CEC-TO	1		
R3	B3-M5	Res, met flm, 1.07k ±1%, 1/2w	4705-187930	12400	Type CEC-TO	1		
R4	C3-N3	Res, met flm, 511Ω ±1%, 1/2w	4705-150789	12400	Type CEC-TO	1		
R5	E1-N5	Res, var, ww, 1k ±20%, 1-1/4w	4702-111575	71450	Type 110	1		
R6	D5-P5	Res, comp, 1k ±10%, 1/2w	4704-108563	01121	EB1021	1		
R7	C2-P4	Res, met flm, 100Ω ±1%, 1/2w	4705-167486	12400	Type CEC-TO	1		
R8	E4-Q5	Res, met flm, 8.45k ±1%, 1/2w	4705-159475	12400	Type CEC-TO	1		
R9	E5-Q1	Res, var, ww, 2k ±5%, 1-1/4w	4702-160705	71450	Type 110	REF		
R12	E3-S1	Res, ww, 2M ±0.1%, 1w	4707-238535	89536	4707-238535	1		
R13	F1-R3	Res, ww, 149k ±0.1%, 1/2w	4707-238972	89536	4707-238972	1		
R14	E1-T3	Res, comp, 62k ±5%, 1/2w	4704-108522	01121	EB6235	REF		
R15	E3-R1	Res, ww, 2,039.5Ω ±0.1%, 1/2w	4707-239061	89536	4707-239061	1		
R16	E5-U5	Res, var, ww, 1.5k ±10%, 1-1/4w	4702-156398	71450	Type 110	1		
R18	C2-N4	Res, ww, 2Ω ±0.1%, 1/4w	4707-131870	89536	4707-131870	1		
R19	B4-P2	Res, met flm, 200Ω ±1%, 1/2w	4705-151480	12400	Type CEC-TO	3		
R22	B2-Q2	Res, met flm, 200k ±1%, 1/2w	4705-177196	12400	Type CEC-TO	REF		
R23	B2-Q4	Res, comp, 100Ω ±5%, 1/2w	4704-188508	01121	EB1015	REF		
R24	C3-R2	Res, comp, 10Ω ±10%, 1/2w	4704-108092	01121	EB1001	1		
R25	C2-T3	Res, ww, 3.315M ±0.4%, 1w	4707-239046	89536	4707-239046	3		
R26	B3-T3	Res, ww, 3.315M ±0.4%, 1w	4707-239046	89536	4707-239046	REF		
R27	B1-S5	Res, var, comp, 100k ±30%, 1/2w	4701-193045	73138	62P-R100K	1		
R31	E5-S3	Res, met flm, 1k ±1%, 1/2w	4705-151324	12400	Type CEC-TO	2		
R32	E3-T4	Res, met flm, 1k ±1%, 1/2w	4705-151324	12400	Type CEC-TO	REF		
R35	B3-R1	Res, met flm, 49.9k ±1%, 1/2w	4705-233247	12400	Type CEC-T9	2		
R36	B3-R4	Res, met flm, 49.9k ±1%, 1/2w	4705-233247	12400	Type CEC-T9	REF		
R37	B5-U5	Res, ww, 3.315M ±0.4%, 1w	4707-239046	89536	4707-239046	REF		
A2A3		**CALIBRATION P/C ASSEMBLY Figure 5-13, S/N 400 and on**	1702-237545	89536	1702-237545	REF		
CR1	J5-T3	Diode, zener, matched	▷3					
R1	K3-N2	Res, ww, 60.9k ±0.1%, 1/2w	4707-238964	89536	4707-238964	1		
R2	J1-M5	Res, met flm, 2.1k ±1%, 1/2w	4705-193276	12400	Type CEC-TO	1		
R3	H2-M5	Res, met flm, 1.07k ±1%, 1/2w	4705-187930	12400	Type CEC-TO	1		
R4	I1-N3	Res, met flm, 511Ω ±1%, 1/2w	4705-150789	12400	Type CEC-TO	1		
R5	J5-N5	Res, var, ww, 1k ±20%, 1-1/4w	4702-111575	71450	Type 110	2		
R6	J4-Q1	Res, comp, 1k ±10%, 1/2w	4704-108563	01121	EB1021	1		
R7	I1-P5	Res, met flm, 100Ω ±1%, 1/2w	4705-167486	12400	Type CEC-TO	1		
R8	K3-Q4	Res, met flm, 8.45k ±1%, 1/2w	4705-159475	12400	Type CEC-TO	1		
R9	K3-Q2	Res, var, ww, 2k ±5%, 1-1/4w	4702-160705	71450	Type 110	REF		
R10	J5-V1	Res, ww, matched	▷3					
R11	J5-R1	Res, met flm, 2.37k ±1%, 1/2w	4705-182519	12400	Type CEC-TO	3		
R12	K2-S2	Res, ww, 2M ±0.1%, 1w	4707-238535	89536	4707-238535	1		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R13	K2-T5	Res, ww, 59.77k ±0.1%, 1/2w	4707-249706	89536	4707-249706	1		
R14	J4-U2	Res, comp, 62k ±5%, 1/2w	4704-108522	01121	EB6235	REF		
R15	K3-Q5	Res, ww, 2,039.5Ω ±0.1%, 1/2w	4707-239061	89536	4707-239061	1		
R16	K4-U5	Res, var, ww, 1k ±1%, 1-1/4w	4707-111575	71450	Type 110	REF		
R18	I1-N4	Res, ww, 2Ω ±0.1%, 1/4w	4707-131870	89536	4707-131870	1		
R19	H3-P3	Res, met flm, 200Ω ±1%, 1/2w	4705-151480	12400	Type CEC-TO	3		
R22	H1-Q2	Res, met flm, 200k ±1%, 1/2w	4705-177196	12400	Type CEC-TO	REF		
R23	H1-Q4	Res, comp, 100Ω ±5%, 1/2w	4704-188508	01121	EB1015	REF		
R24	I2-R2	Res, comp, 10Ω ±10%, 1/2w	4704-108092	01121	EB1001	1		
R25	I1-T3	Res, ww, 3.315M ±0.4%, 1w	4707-239046	89536	4707-239046	3		
R26	H2-T3	Res, ww, 3.315M ±0.4%, 1w	4707-239046	89536	4707-239046	REF		
R27	G4-S5	Res, var, comp, 100k ±30%,1/2w	4701-193045	73138	62P-R100K	1		
R31	K4-S4	Res, met flm, 590Ω ±1%, 1/2w	4705-150755	12400	Type CEC-TO	1		
R32	K5-S2	Res, met flm, 1.18k ±1%, 1/2w	4705-223446	12400	Type CEC-TO	1		
R33	K3-R2	Res, met flm, 2.37k ±1%, 1/2w	4705-182519	12400	Type CEC-TO	REF		
R35	H1-R1	Res, met flm, 49.9k ±1%, 1/2w	4705-233247	12400	Type CEC-T9	2		
R36	H1-R4	Res, met flm, 49.9k ±1%, 1/2w	4705-233247	12400	Type CEC-T9	REF		
R37	H5-U5	Res, ww, 3.315M ±0.4%, 1w	4707-239046	89536	4707-239046	REF		

3 CR1 and R10 are factory matched. For replacement, order matched zener resistor set 4807-228718. Include all information on Zener Diode Label.

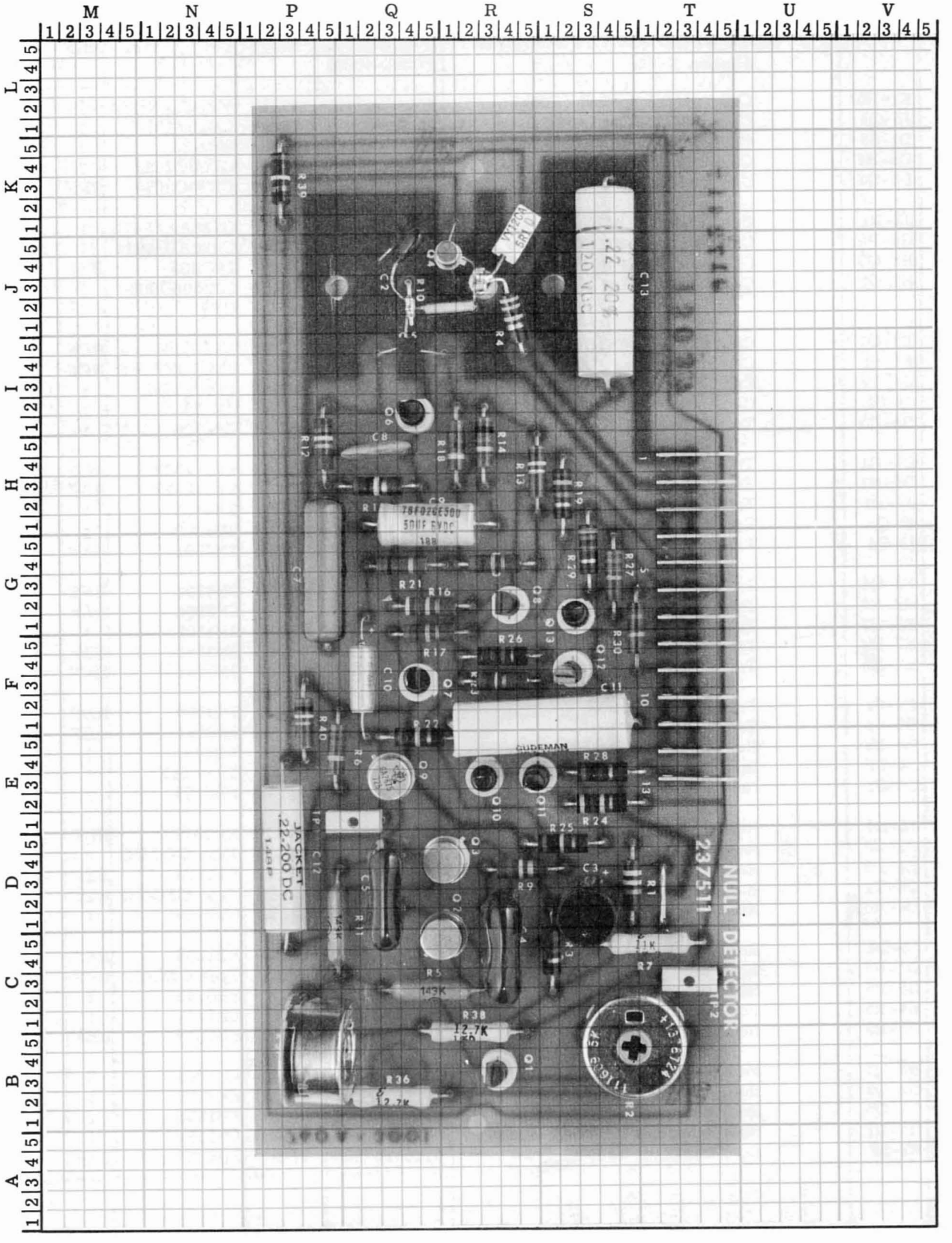


Figure 5-14. NULL DETECTOR P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2A4		**NULL DETECTOR P/C ASSEMBLY** Figure 5-14	1702-237511 (760A-4001)	89536	1702-237511	REF		
C1	K1-R5	Cap, cer, 5.1 ±10%, 500v	1501-242180	05275	VY10CA5R1KA	1		
C2	J5-Q4	Cap, mica, 150 pf ±5%, 500v	1504-148478	88419	CD15F151J	1		
C3	D1-S3	Cap, elect, 100 uf +100/-10%, 6v	1502-105148	56289	89D133	1		
C4	C5-R4	Cap, mica, 0.02 uf ±5%, 100v	1504-233486	88419	CD30C203J	2		
C5	D3-Q3	Cap, mica, 0.02 uf ±5%, 100v	1504-233486	88419	CD30C203J	REF		
C6	J2-R1	Cap, plstc, 0.047 uf ±20%, 250v	1507-162008	73445	C280AE/P47K	1		
C7	G4-P5	Cap, plstc, 1 uf ±20%, 250v	1507-190330	73445	C280AE/P1M	1		
C8	H5-Q3	Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	REF		
C9	H1-Q5	Cap, elect, 50 uf +75/-10%, 6v	1502-187641	56289	30D506G006-CB4	1		
C10	F3-Q2	Cap, Ta, 10 uf ±10%, 20v	1508-160259	05397	K10C20K	REF		
C11	F1-S1	Cap, plstc, 2 uf ±20%, 100v	1507-106963	84411	Type X663FR	REF		
C12	D4-P3	Cap, plstc, 0.22 uf ±10%, 200v	1507-105767	56289	148P22492	1		
C13	J4-S4	Cap, plstc, 0.22 uf ±20%, 120v	1507-167452	84411	JF-39	1		
Q1	B4-R3	Tstr, Type 2N3906	4805-195974	04713	2N3906	4		
Q2	C5-R1	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
Q3	D4-R1	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
Q4	J5-R1	Tstr, Type 2N4065	4805-229674	07263	2N4065	1		
Q5	I5-Q4	Tstr, Type 2N5089	4805-242065	04713	2N5089	1		
Q6	I2-Q4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q7	F3-Q4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q8	G2-R4	Tstr, Type 2N3906	4805-195974	04713	2N3906	REF		
Q9	E3-Q3	Tstr, Type 2N1302	4805-182691	01295	2N1302	1		
Q10	E3-R3	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q11	E3-R5	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q12	F4-S2	Tstr, Type 2N3906	4805-195974	04713	2N3906	REF		
Q13	G2-S2	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
R1	D3-S5	Res, comp, 240k ±5%, 1/2w	4704-108449	01121	EB2445	1		
R2	B4-S5	Res, var, ww, 5k ±5%, 2w	4702-111609	71450	Type 115	1		
R3	C4-S1	Res, comp, 5.1k ±5%, 1/2w	4704-109108	01121	EB5125	1		
R4	J2-R4	Res, comp, 33k ±5%, 1/2w	4704-108761	01121	EB3335	REF		
R5	C3-Q5	Res, met flm, 143k ±1%, 1/2w	4705-151506	12400	Type CEC-TO	2		
R6	E4-P5	Res, comp, 7.5k ±5%, 1/2w	4704-108910	01121	EB7525	REF		
R7	C5-T1	Res, met flm, 11k ±1%, 1/2w	4705-222216	12400	Type CEC-TO	REF		
R9	D4-R5	Res, comp, 27k ±5%, 1/2w	4704-186023	01121	EB2735	1		
R10	J3-Q4	Res, comp, 1M ±5%, 1/2w	4704-108639	01121	EB1055	REF		
R11	D1-P5	Res, met flm, 143k ±1%, 1/2w	4705-151506	12400	Type CEC-TO	REF		
R12	H5-P5	Res, comp, 510k ±5%, 1/2w	4704-109033	01121	EB5145	2		
R13	H4-R5	Res, comp, 820k ±10%, 1/2w	4704-108357	01121	EB8241	1		
R14	H5-R3	Res, comp, 100Ω ±5%, 1/2w	4704-188508	01121	EB1015	REF		
R15	H3-Q2	Res, comp, 100k ±5%, 1/2w	4704-168054	01121	EB1045	3		
R16	G2-Q5	Res, comp, 47k ±5%, 1/2w	4704-108738	01121	EB4735	1		
R17	G1-Q5	Res, comp, 15k ±10%, 1/2w	4704-108530	01121	EB1531	2		
R18	H5-R1	Res, comp, 1.2M ±10%, 1/2w	4704-108407	01121	EB1251	1		
R19	H3-S2	Res, comp, 6.8k ±5%, 1/2w	4704-187906	01121	EB6825	REF		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R20	G4-R3	Res, comp, 15k ±10%, 1/2w	4704-108530	01121	EB1531	REF		
R21	G4-Q4	Res, comp, 1k ±5%, 1/2w	4704-108597	01121	EB1025	3		
R22	E5-Q5	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R23	F3-R3	Res, comp, 75k ±5%, 1/2w	4704-108928	01121	EB7535	1		
R24	E2-S4	Res, comp, 36k ±5%, 1/2w	4704-185991	01121	EB3635	1		
R25	D5-S2	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R26	F4-R4	Res, comp, 560Ω ±5%, 1/2w	4704-109124	01121	EB5615	1		
R27	G4-S4	Res, comp, 680Ω ±5%, 1/2w	4704-178392	01121	EB6815	3		
R28	E4-S4	Res, comp, 1M ±5%, 1/2w	4704-108639	01121	EB1055	REF		
R29	G5-S3	Res, comp, 8.2k ±5%, 1/2w	4704-147777	01121	EB8225	1		
R30	G1-S5	Res, comp, 5.6k ±5%, 1/2w	4704-187880	01121	EB5625	1		
R36	B2-Q3	Res, met flm, 12.7k ±1%, 1/2w	4705-187914	12400	Type CEC-TO	2		
R37	B4-P4	Res, var, ww, 3k ±20%, 1-1/4w	4702-149781	71450	Type 110	1		
R38	C1-R2	Res, met flm, 12.7k ±1%, 1/2w	4705-187914	12400	Type CEC-TO	REF		
R39	K3-P3	Res, comp, 150k ±5%, 1/2w	4704-150177	01121	EB1545	REF		
R40	F1-P4	Res, comp, 100k ±5%, 1/2w	4704-168054	01121	EB1045	REF		
TP1	E1-Q2	Test point, yellow	2109-149138	74970	105-0757	REF		
TP2	C3-T4	Test point, yellow	2109-149138	74970	105-0757	REF		
	F5-T3	Connector, female, 13 contacts	2816-233759	91662	02-013-013-5-200	3		
		Shield, component (not illustrated)	3156-235945	89536	3156-235945	1		
		Transipad, nylon, small	2814-225714	07047	10171-N	REF		
		Transipad, nylon, large	2814-225722	07047	10204-N	REF		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2A5		**AC CONVERTER P/C ASSEMBLY** Figure 5-15	1702-237529 (760A-4002)	89536	1702-237529	REF		F
			1702-239988 (760A/AA-4002)	89536	1702-239988	REF		G
C1	H2-S4	Cap, elect, 640 uf +50/-10%, 6.4v	1502-178608	73445	C437ARC640	1		
C2	I5-P4	Cap, mica, 56 pf ±5%, 500v	1504-148528	88419	CD15F560J	1		
C3	F1-R4	Cap, Ta, 68 uf ±10%, 15v	1508-182824	05397	K68C15K	1		
C4	G5-Q4	Cap, mica, 2200 pf ±5%, 500v	1504-148346	88419	CD19F222J	1		
C5	H1-M4	Cap, plstc, 2 uf ±10%, 200v	1507-106443	84411	Type X663F	4		
C6	E2-P4	Cap, plstc, 2 uf ±10%, 200v	1507-106443	84411	Type X663F	REF		
C7	K2-R5	Cap, mica, 47 pf ±5%, 500v	1504-148536	88419	CD15E470J	1		
C8	H4-N1	Cap, plstc, 0.39 uf ±10%, 200v	1507-246017	84411	Type X663F	1		G
CR1	E4-R1	Diode, Transistron Type SG5658	4802-161810	03877	SG5658	2		
CR2	E2-Q4	Diode, Transistron Type SG5658	4802-161810	03877	SG5658	REF		
CR3	F3-S1	Diode, C.D. Type CD13161	4802-113308	07910	CD13161	5		
Q1	K2-P4	Tstr, Fairchild Type S19254	4805-168716	07263	S19254	1		
Q2	J3-P4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q4	I3-P4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q5	I2-Q5	Tstr, Type 2N3906	4805-195974	04713	2N3906	REF		
R1	J5-P4	Res, comp, 1.5M ±10%, 1/2w	4704-108175	01121	EB1551	1		
R2	J1-N2	Res, comp, 1.5k ±10%, 1/2w	4704-108159	01121	EB1521	REF		G
R3	G2-S2	Res, comp, 100k ±5%, 1/2w	4704-168054	01121	EB1045	REF		
R4	J3-N3	Res, comp, 1k ±5%, 1/2w	4704-108597	01121	EB1025	REF		
R5	J2-R2	Res, comp, 560k ±10%, 1/2w	4704-108795	01121	EB5641	1		
R7	I5-Q3	Res, comp, 470k ±5%, 1/2w	4704-108969	01121	EB4745	1		
R8	I3-R5	Res, comp, 510k ±5%, 1/2w	4704-109033	01121	EB5145	REF		
R9	I3-S2	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R10	I3-R3	Res, comp, 5.6k ±5%, 1/2w	4704-187880	01121	EB5625	REF		F
R10	I3-R3	Res, met flm, 5.11k ±1%, 1/2w	4705-159657	12400	Type CEC-TO	1		G
R11	H1-R5	Res, comp, 3k ±5%, 1/2w	4704-109090	01121	EB3025	REF		
R12	H2-R1	Res, comp, 510Ω ±5%, 1/2w	4704-108951	01121	EB5115	2		
R13	E4-S1	Res, comp, 1.1k ±5%, 1/2w	4704-160432	01121	EB1125	REF		
R14	D2-T3	Res, var, ww, 25Ω ±10%, 1-1/4w	4702-113431	71450	Type 110	1		
R15	E5-S4	Res, ww, 50Ω ±0.1%, 1/4w	4707-238931	89536	4707-238931	2		
R16	D2-R4	Res, ww, 1.1k ±0.1%, 1/2w	4707-238949	89536	4707-238949	1		
R17	C5-Q5	Res, ww, 500k ±0.1%, 1w	4707-192773	89536	4707-192773	2		
R18	G1-Q5	Res, ww, 500k ±0.1%, 1w	4707-192773	89536	4707-192773	REF		
R19	J5-S1	Res, ww, 99.5k ±0.1%, 1/2w	4707-239053	89536	4707-239053	1		
R21	E5-T2	Res, ww, 50Ω ±0.1%, 1/4w	4707-238931	89536	4707-238931	REF		
R30	B4-T3	Res, var, ww, 1k ±20%, 1-1/4w	4702-113266	71450	Type 110	1		
	H3-T3	Connector, female, 13 contacts	2816-233759	91662	02-013-013-5-200	REF		
		Transipad, nylon, small	2814-225714	07047	10171-N	REF		

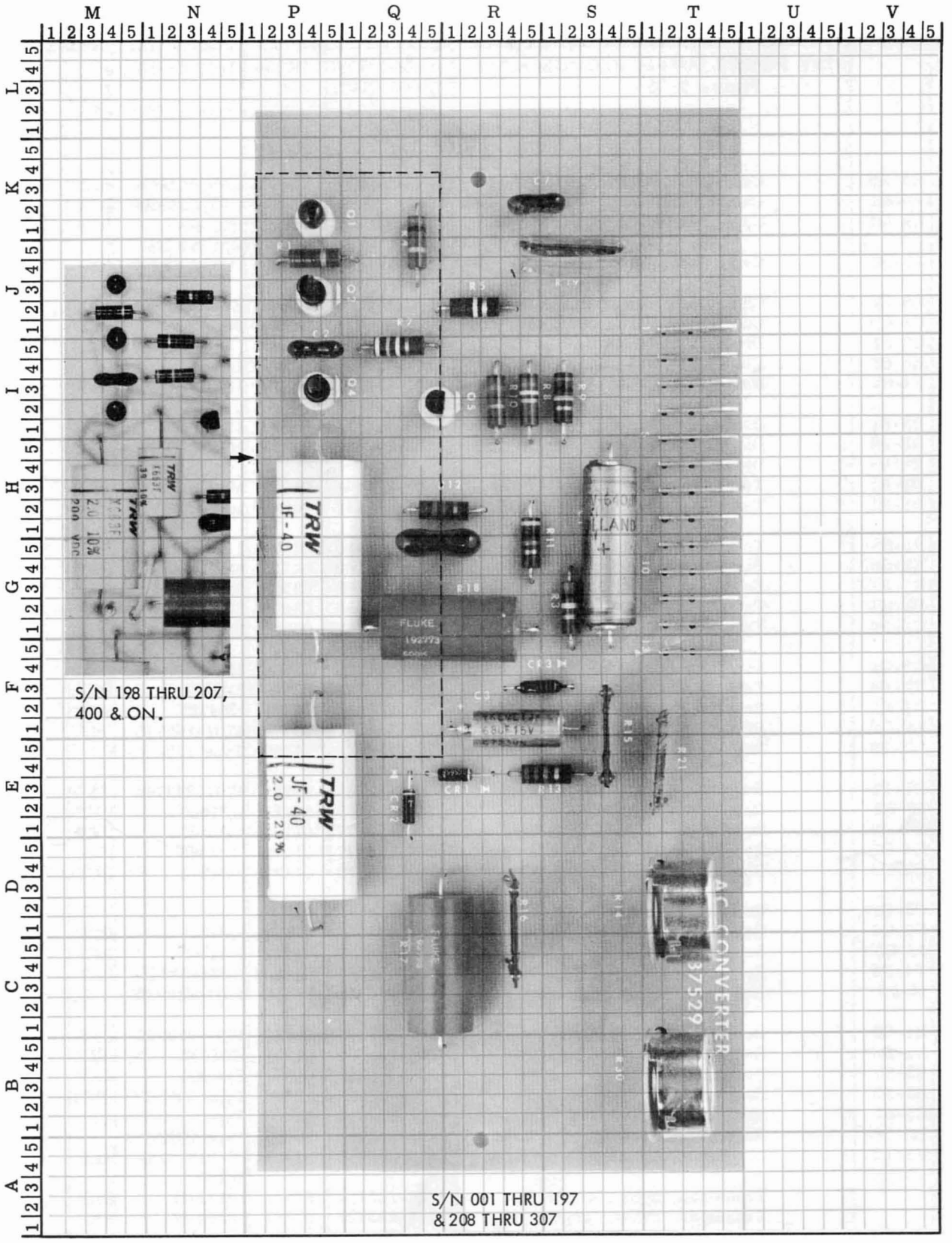


Figure 5-15. AC CONVERTER P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A2A6		**15V POWER SUPPLY P/C ASSEMBLY Figure 5-16**	1702-237537 (760A-4003)	89536	1702-237537	REF		F
			1702-240077 (760A/AA-4003)	89536	1702-240077	REF		G
C1	H5-R5	Cap, elect, 400 uf +50/-10%, 40v	1502-185868	73445	C437ARG400	REF		
C2	E4-R5	Cap, elect, 400 uf +50/-10%, 40v	1502-185868	73445	C437ARG400	REF		
C3	C2-Q1	Cap, cer, 2,700 pf, gmv, 600v	1501-106211	72982	851-000-Z5U0-272P	REF		
C4	J1-Q2	Cap, elect, 400 uf +50/-10%, 25v	1502-168153	73445	C437ARF400	REF		
C5	E3-Q5	Cap, elect, 400 uf +50/-10%, 25v	1502-168153	73445	C437ARF400	REF		
C6	C1-Q5	Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	REF		
CR1	G2-S1	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR2	E5-S3	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR3	F4-S5	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR4	H3-S3	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR5	G2-P4	Diode, Type 1N277	4802-150342	93332	1N277	REF		
CR6	E1-P4	Diode, zener, matched	4					
Q1	D1-R5	Tstr, Motorola Type MPS3638	4805-241141	04713	MPS3638	REF		
Q2	D1-R1	Tstr, Motorola Type MPS3638	4805-241141	04713	MPS3638	REF		
Q3	D5-S5	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
Q4	K2-Q5	Tstr, Motorola Type SM4144	4805-190389	04713	SM4144	REF		
Q5	H1-R1	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q6	B3-Q1	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q7	C1-P4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q8	G5-Q1	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q9	H2-P4	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
R1	B4-R1	Res, comp, 4.7k ±5%, 1/2w	4704-108886	01121	EB4725	REF		
R2	B1-Q2	Res, ww, 10k ±0.5%, 1/2w	4707-195776	89536	4707-195776	1		
R3	B3-T3	Res, var, ww, 300Ω ±10%, 1-1/4w	4702-154583	71450	Type 110	1		
R4	D1-T1	Res, ww, 12.74k ±0.5%, 1/2w	4707-242743	89536	4707-242743	1		
R5	J3-R2	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R6	B4-R3	Res, comp, 150k ±5%, 1/2w	4704-150177	01121	EB1545	REF		
R7	D4-Q2	Res, comp, 150k ±5%, 1/2w	4704-150177	01121	EB1545	REF		
R8	C2-Q3	Res, comp, 120k ±10%, 1/2w	4704-108779	01121	EB1241	REF		
R9	C5-Q1	Res, ww, matched	4					
R10	G2-Q3	Res, comp, 7.5k ±5%, 1/2w	4704-108910	01121	EB7525	REF		
R11	J3-Q5	Res, comp, 750k ±5%, 1/2w	4704-188789	01121	EB7545	REF		
R12	F4-P5	Res, comp, 330k ±5%, 1/2w	4704-150201	01121	EB3345	REF		
R13	I4-P3	Res, ww, 15k ±0.1%, 1/2w	4707-238956	89536	4707-238956	2		
R14	H1-Q3	Res, ww, 15k ±0.1%, 1/2w	4707-238956	89536	4707-238956	REF		
R15	K1-R3	Res, comp, 3.9k ±5%, 1/2w	4704-180596	01121	EB3925	REF		
R16	E3-S5	Res, comp, 3.9k ±5%, 1/2w	4704-180596	01121	EB3925	REF		
R17	B5-R5	Res, met flm, 1k ±1%, 1/2w	4705-151324	12400	Type CEC-TO	REF		
R18	C5-S3	Res, met flm, 499Ω ±1%, 1/2w	4705-151514	12400	Type CEC-TO	1		
R19	B5-S4	Res, met flm, 249Ω ±1%, 1/2w	4705-241281	12400	Type CEC-TO	1		
	F3-T3	Connector, female, 13 contacts	2816-233759	91662	02-013-013-5-200	REF		
		Transipad, nylon, small	2814-225714	07047	10171-N	REF		
		Transipad, nylon, large	2814-225722	07047	10204-N	REF		

4 CR6 and R9 are factory matched. For replacement, order matched zener resistor set 4807-228718. Include all information on Zener Diode Label.

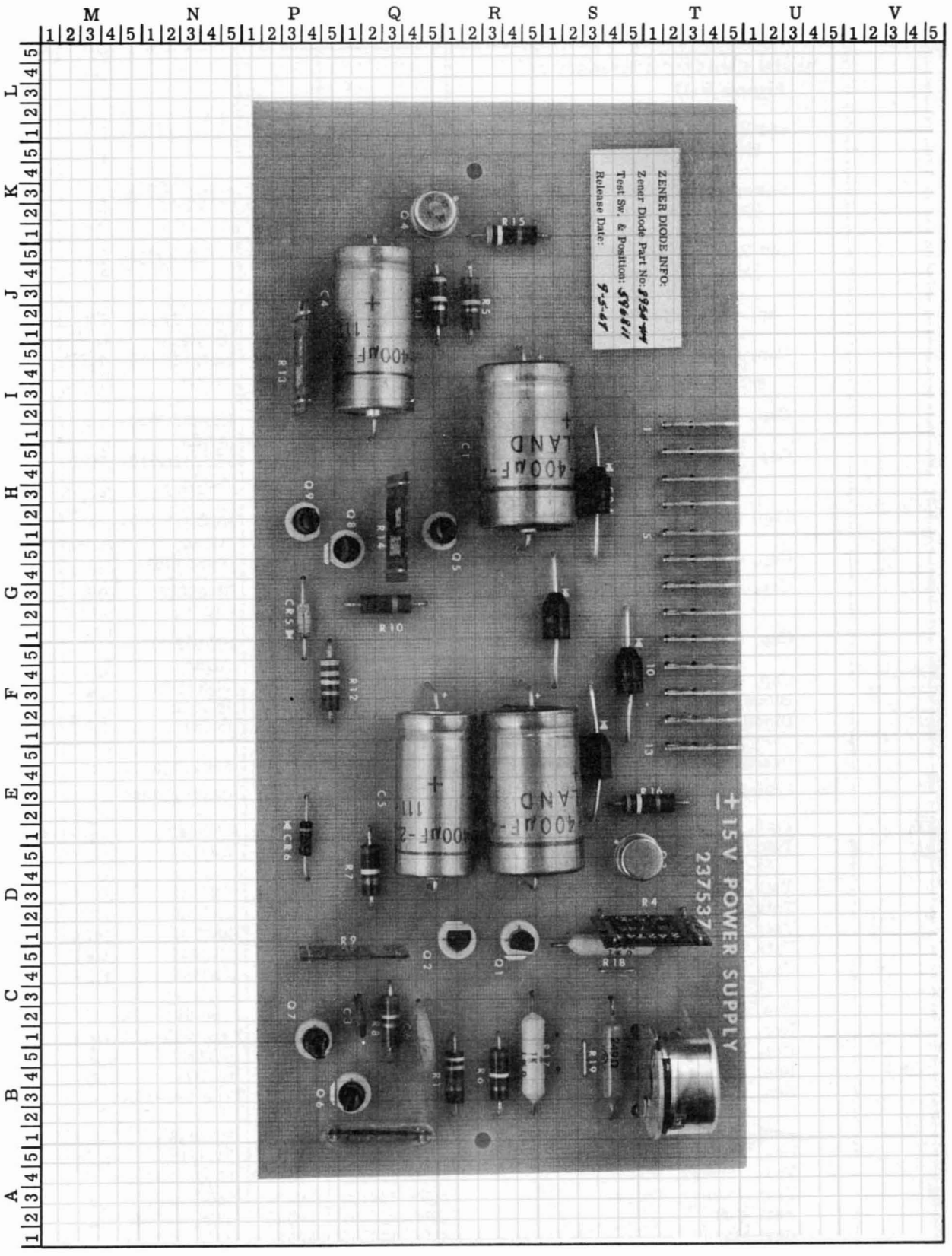


Figure 5-16. ±15V POWER SUPPLY P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A3		**MAIN CHASSIS ASSEMBLY** Figure 5-17						
A3A1		±50 Volt Power Supply P/C Assembly (See Figure 5-18)	1702-237578 (760A-4007)	89536	1702-237578	1		
A3A2		Power Amplifier P/C Assembly (See Figure 5-19)	1702-237560 (760A-4006)	89536	1702-237560	1		
A3A3		100 Volt Indicator P/C Assembly (See Figure 5-20)	1702-237586	89536	1702-237586	1		
C1		Cap, elect, 2,100 uf +50/-10%, 150v	1502-223172	56289	36D212F150-BC6A	2		
C2		Cap, elect, 2,100 uf +50/-10%, 150v	1502-223172	56289	36D212F150-BC6A	REF		
C3		Cap, elect, 2,600 uf +75/-10%, 50v	1502-223164	56289	36D262G050-AB6A	2		
C4		Cap, elect, 2,600 uf +75/-10%, 50v	1502-223164	56289	36D262G050-AB6A	REF		
C5		Cap, elect, 240 uf +50/-10%, 300v	1502-223180	56289	36D241F300-AB6A	1		
C6		Cap, elect, 20 uf +100/-10%, 250v	1502-105817	56289	Type 60D	1		
C7a, C7b		Cap, oil, 2 uf/2 uf ±20%, 2,000v	1505-163782	56289	P-49988	1		
C8		Cap, elect, 9,300 uf +75/-10%, 15v	1502-223198	56289	36D932G015-AD6A	1		
C9		Cap, cer, 0.0033 uf ±20%, 1000v	1501-106674	56289	5GA-D33	1		D
CR1		Diode, Type IN1612	4802-218461	03508	IN1612	2		
CR2		Diode, Type IN1612	4802-218461	03508	IN1612	REF		
L1		Inductor, 4 mh	5602-239111	89536	5602-239111	1		
L2a, L2b		Inductor, 3.5h/0.35h	5602-239095	89536	5602-239095	1		
Q1		Tstr, Type 2N3442	4805-223602	95303	2N3442	4		
Q2		Tstr, Type 2N3739	4805-190710	04713	2N3739	3		
Q3		Tstr, Type 2N3442	4805-223602	95303	2N3442	REF		
Q4		Tstr, Type 2N3739	4805-190710	04713	2N3739	REF		
Q5		Tstr, Type 2N3739	4805-190710	04713	2N3739	REF		
Q6		Tstr, Type 2N3442	4805-223602	95303	2N3442	REF		
Q7		Tstr, Type 2N3442	4805-223602	95303	2N3442	REF		
R1		Res, ww, 3Ω ±5%, 11w	4706-221291	03615	Type 995-10A	2		
R2		Res, ww, 3Ω ±5%, 11w	4706-221291	03615	Type 995-10A	REF		
R3		Res, comp, 22k ±10%, 2w	4704-109975	01121	HB2231	1		
R4		Res, comp, 1.5M ±10%, 2w	4704-110130	01121	HB1551	1		
R5		Res, ww, 4Ω ±5%, 11w	4706-221283	03615	Type 995-10A	1		
R6		Res, comp, 680Ω ±5%, 1/2w	4704-178392	01121	EB6815	REF		E
R7		Res, comp, 680Ω ±5%, 1/2w	4704-178392	01121	EB6815	REF		E
T1		Transformer, Power	5602-239129	89536	5602-239129	1		
T2		Transformer, Output	5602-239103	89536	5602-239103	1		
16		Heat sink	4806-236067	89536	4806-236067	3		
17		Heat sink	4806-236059	89536	4806-236059	1		

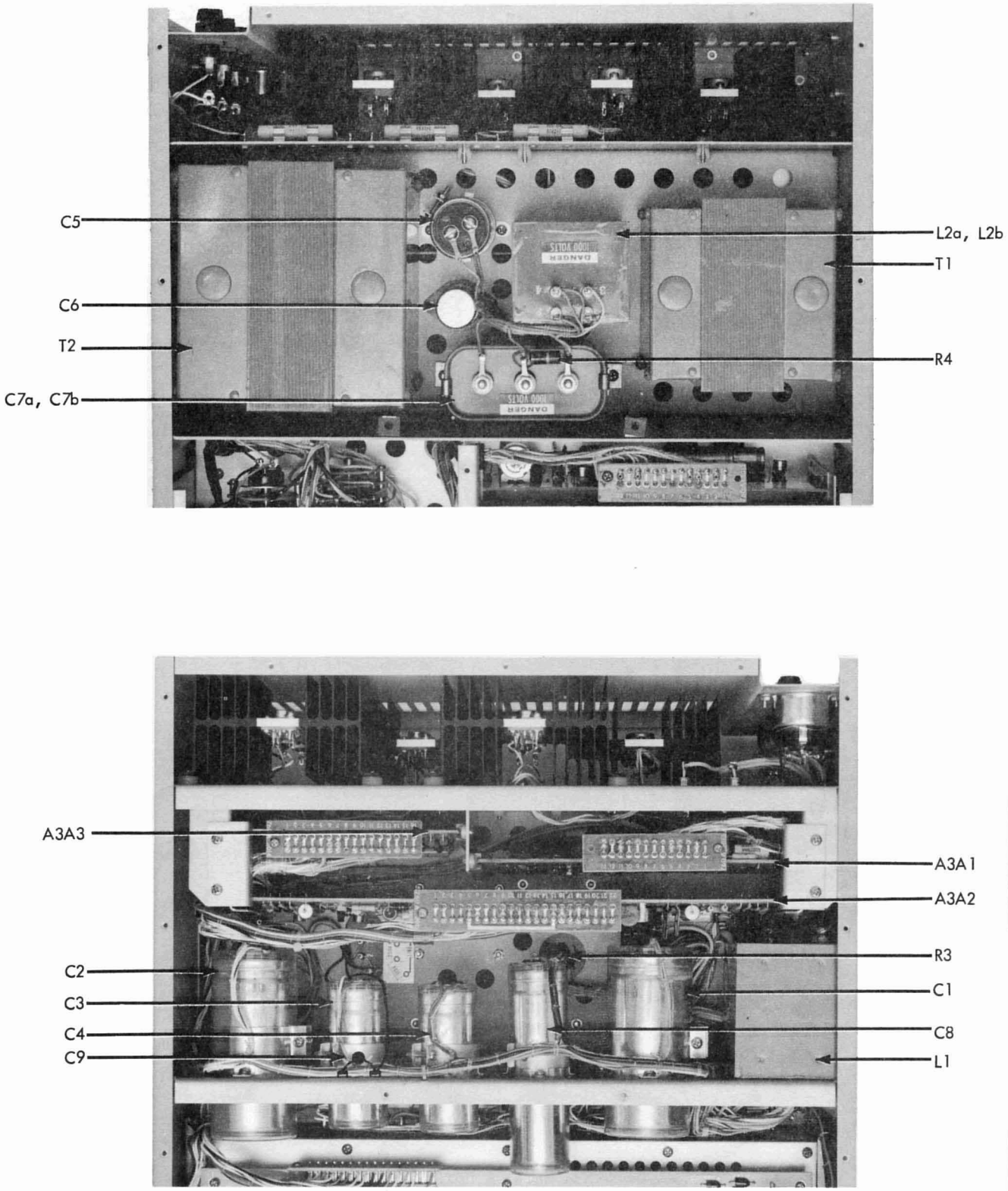


Figure 5-17. MAIN CHASSIS ASSEMBLY

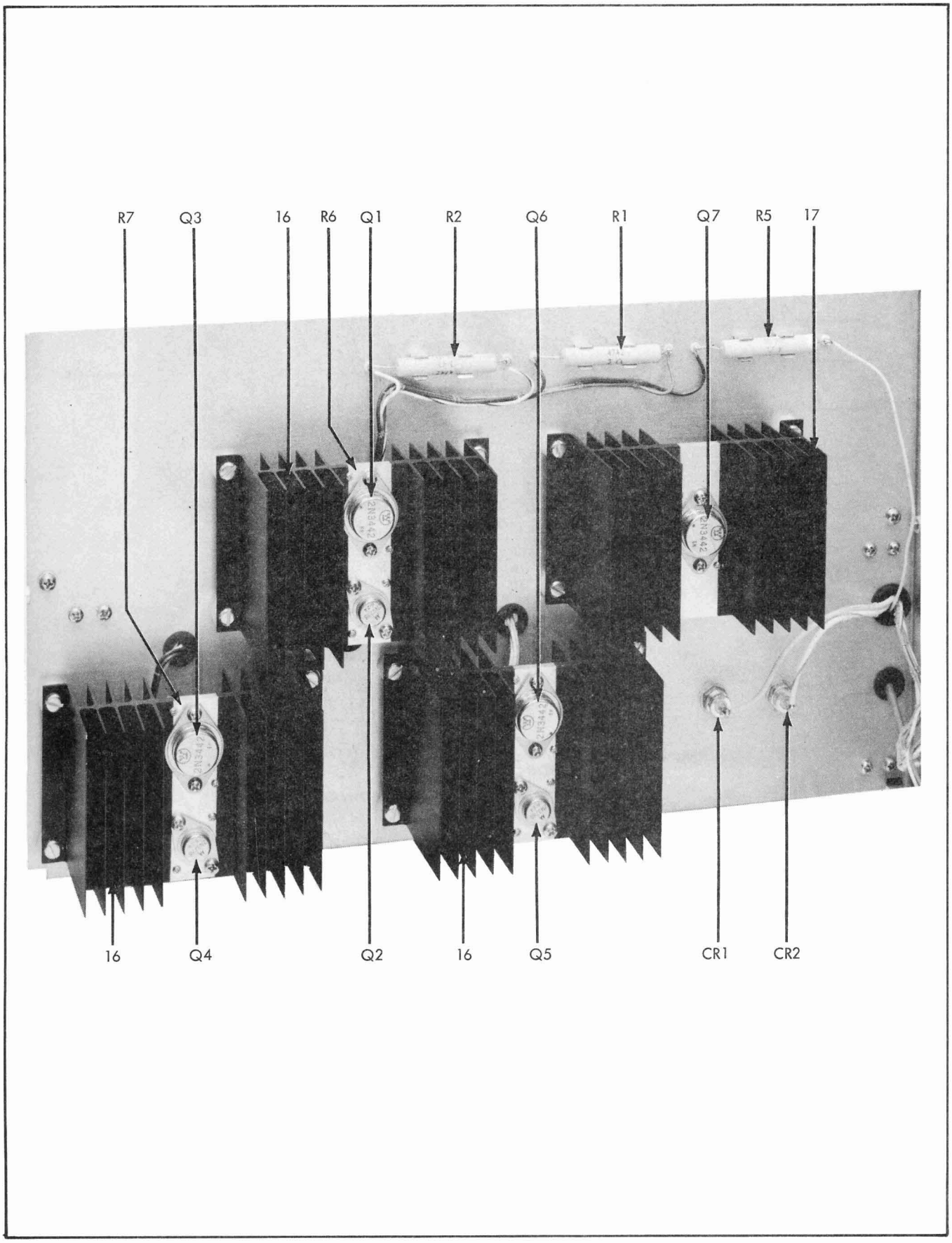


Figure 5-17. MAIN CHASSIS ASSEMBLY (continued)

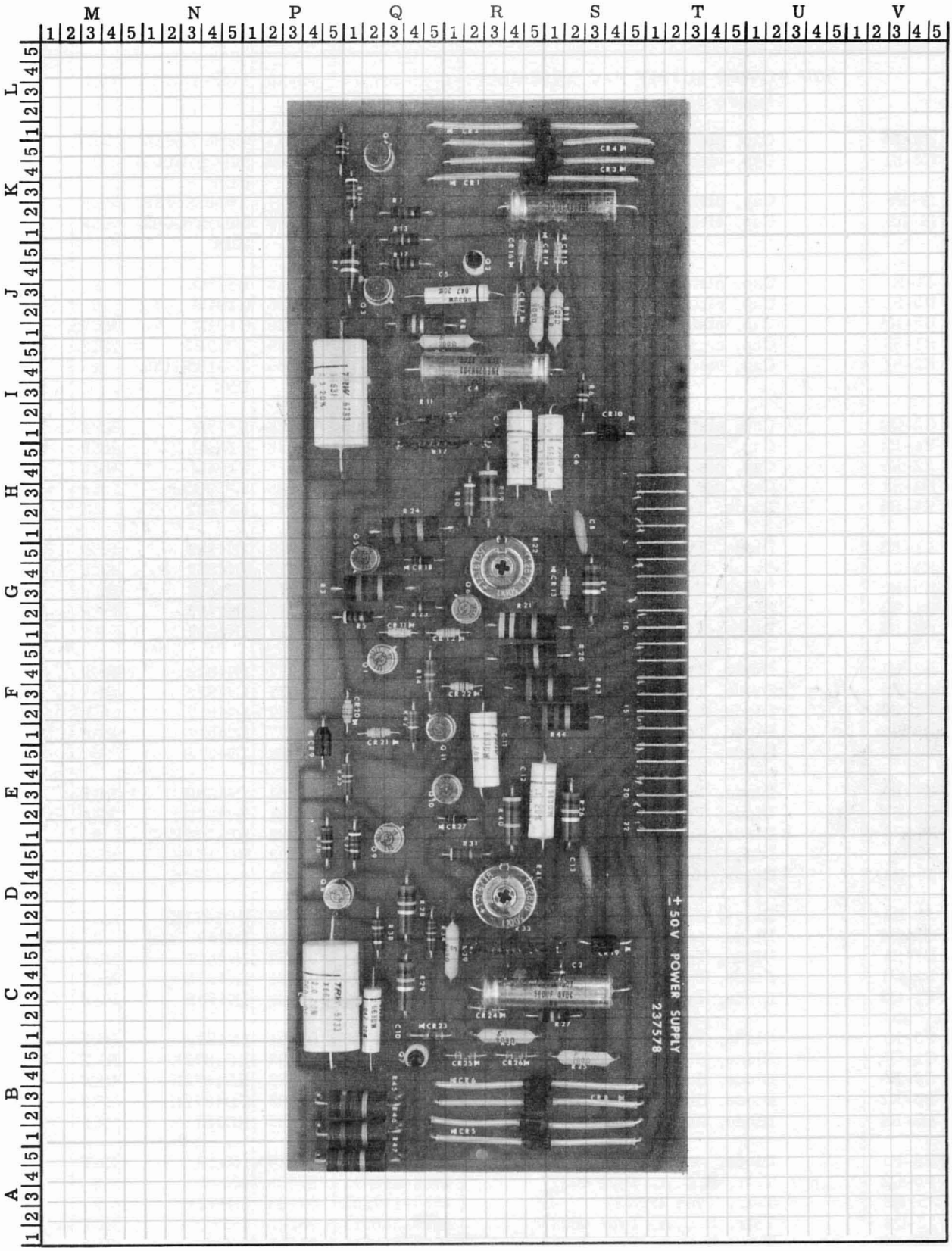
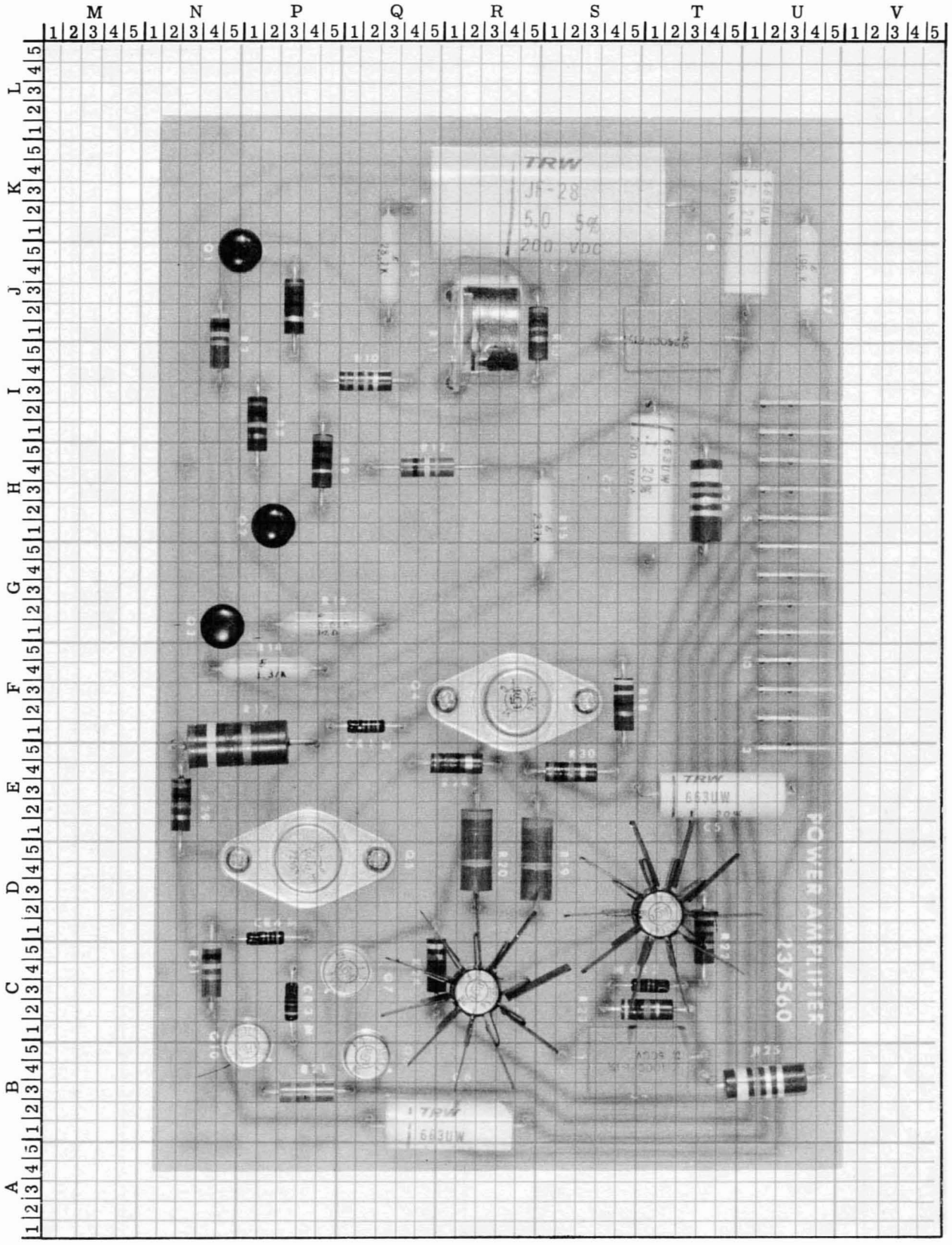


Figure 5-18. ±50V POWER SUPPLY P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A3A1		**50V POWER SUPPLY P/C ASSEMBLY Figure 5-18**	1702-237578 (760A-4007)	89536	1702-237578	REF		
C1	C3-P5	Cap, plstc, 2 uf ±10%, 200v	1507-106443	84411	Type X663F	REF		
C2	C3-S1	Cap, elect, 500 uf +75/-10%, 3v	1502-106328	56289	30D507G003-DH4	2		
C3	I3-P5	Cap, plstc, 2 uf ±10%, 200v	1507-106443	84411	Type X663F	REF		
C4	I4-R2	Cap, elect, 500 uf +75/-10%, 3v	1502-106328	56289	30D507G003-DH4	REF		
C5	J3-R1	Cap, plstc, 0.047 uf ±20%, 80v	1507-106096	72928	B473M	2		
C6	H5-S1	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	8		
C7	H5-R4	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
C8	H1-S2	Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	REF		
C9	K2-S1	Cap, elect, 10 uf +75/-10%, 150v	1502-106351	56289	30D106G150-DF4	1		
C10	C2-Q2	Cap, plstc, 0.047 uf ±20%, 80v	1507-106096	72928	B473M	REF		
C11	F1-R3	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
C12	E2-R5	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
C13	D4-S3	Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	REF		
CR1	K4-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	24		
CR2	L1-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR3	K4-S1	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR4	K5-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR5	B1-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR6	B4-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR7	B2-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR8	B3-R5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR9	F1-P5	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR10	I1-S4	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR11	G1-Q3	Diode, Type 1N483B	4802-154799	01281	1N483B	6		
CR12	G1-R1	Diode, Type 1N483B	4802-154799	01281	1N483B	REF		
CR13	G3-S2	Diode, Type 1N483B	4802-154799	01281	1N483B	REF		
CR14	J5-R5	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	8		
CR15	J5-S1	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR16	J5-R4	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR17	J3-R4	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR18	G5-Q4	Diode, zener, 12v, Type 1N759	4803-159780	07910	1N759	2		
CR19	D1-S4	Diode, Type 1N4817	4802-116111	05277	1N4817	REF		
CR20	F2-Q1	Diode, Type 1N483B	4802-154799	01281	1N483B	REF		
CR21	F1-Q2	Diode, Type 1N483B	4802-154799	01281	1N483B	REF		
CR22	F3-R1	Diode, Type 1N483B	4802-154799	01281	1N483B	REF		
CR23	C1-Q5	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR24	C2-R3	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR25	B5-R2	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR26	B5-R4	Diode, Hughes Type HD1872K	4802-233197	73293	HD1872K	REF		
CR27	E2-R1	Diode, zener, 12v, Type 1N759	4803-159780	07910	1N759	REF		
Q1	F5-Q2	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	8		
Q2	J5-R2	Tstr, Type 2N3721	4805-117267	03508	2N3721	2		
Q3	J3-Q2	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		
Q4	K5-Q2	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
Q5	G5-Q2	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		
Q6	G2-R2	Tstr, R.C.A. Type 38654	4805-218537	95303	38654	6		
Q7	B5-Q4	Tstr, Type 2N3721	4805-117267	03508	2N3721	REF		
Q8	D3-P5	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		
Q9	E1-Q3	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		
Q10	E3-R1	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		
Q11	F1-Q5	Tstr, R.C.A. Type 38654	4805-218537	95303	38654	REF		
R1	K2-Q3	Res, comp, 510Ω ±5%, 1/2w	4704-108951	01121	EB5115	REF		
R2	J1-R1	Res, met flm, 200Ω ±1%, 1/2w	4705-151480	12400	Type CEC-TO	REF		
R3	G3-Q1	Res, comp, 5.6k ±5%, 2w	4704-218842	01121	HB5625	3		
R4	G4-S3	Res, comp, 10k ±10%, 1w	4704-109389	01121	GB1031	REF		
R5	G2-Q1	Res, comp, 9.1k ±5%, 1/2w	4704-160028	01121	EB9125	3		
R6	I3-S2	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R7	J5-Q1	Res, comp, 10k ±10%, 1w	4704-109389	01121	GB1031	REF		
R8	J2-Q4	Res, comp, 10k ±10%, 1w	4704-109389	01121	GB1031	REF		
R9	J2-R5	Res, met flm, 909Ω ±1%, 1/2w	4705-178053	12400	Type CEC-TO	4		
R10	H3-R2	Res, comp, 910Ω ±5%, 1/2w	4704-170704	01121	EB9115	2		
R11	I2-Q5	Res, ww, 0.48Ω ±0.5%, 1/2w	4707-239020	89536	4707-239020	2		
R12	H5-Q5	Res, ww, 0.68Ω ±0.5%, 1w	4707-239038	89536	4707-239038	2		
R13	K1-Q3	Res, comp, 12k ±5%, 1/2w	4704-108514	01121	EB1235	2		
R14	F4-Q5	Res, comp, 62k ±5%, 1/2w	4704-108522	01121	EB6235	REF		
R15	K5-P5	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R16	K3-Q1	Res, comp, 9.1k ±5%, 1/2w	4704-160028	01121	EB9125	REF		
R17	J4-Q3	Res, comp, 1.3k ±5%, 1/2w	4704-109157	01121	EB1325	2		
R18	J2-S1	Res, met flm, 909Ω ±1%, 1/2w	4705-178053	12400	Type CEC-TO	REF		
R19	H3-R3	Res, comp, 3k ±5%, 1w	4704-218800	01121	GB3025	2		
R20	F5-R5	Res, comp, 2.2k ±10%, 2w	4704-109967	01121	HB2221	1		
R21	G1-R4	Res, comp, 3.3k ±5%, 2w	4704-218859	01121	HB3325	1		
R22	G5-R3	Res, var, ww, 300Ω ±10%, 1-1/4w	4702-112870	71450	Type 110	2		
R23	G2-Q4	Res, comp, 120Ω ±10%, 1/2w	4704-108696	01121	EB1211	2		
R24	H1-Q4	Res, comp, 5.6k ±5%, 2w	4704-218842	01121	HB5625	REF		
R25	B5-S2	Res, met flm, 200Ω ±1%, 1/2w	4705-151480	12400	Type CEC-TO	REF		
R26	E2-S2	Res, comp, 10k ±10%, 1w	4704-109389	01121	GB1031	REF		
R27	C2-S1	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R28	D3-Q4	Res, comp, 10k ±10%, 1w	4704-109389	01121	GB1031	REF		
R29	C4-Q4	Res, comp, 10k ±10%, 1w	4704-109389	01121	GB1031	REF		
R30	C1-R4	Res, met flm, 909Ω ±1%, 1/2w	4705-178053	12400	Type CEC-TO	REF		
R31	D5-R1	Res, comp, 910Ω ±5%, 1/2w	4704-170704	01121	EB9115	REF		
R32	C4-R5	Res, ww, 0.48Ω ±0.5%, 1/2w	4707-239020	89536	4707-239020	REF		
R33	C5-R4	Res, ww, 0.68Ω ±0.5%, 1w	4707-239038	89536	4707-239038	REF		
R34	D1-Q5	Res, comp, 12k ±5%, 1/2w	4704-108514	01121	EB1235	REF		
R35	E4-Q1	Res, comp, 62k ±5%, 1/2w	4704-108522	01121	EB6235	REF		
R36	E1-P5	Res, comp, 10k ±5%, 1/2w	4704-109165	01121	EB1035	REF		
R37	E1-Q1	Res, comp, 9.1k ±5%, 1/2w	4704-160028	01121	EB9125	REF		
R38	D1-Q2	Res, comp, 1.3k ±5%, 1/2w	4704-109157	01121	EB1325	REF		
R39	C5-R1	Res, met flm, 909Ω ±1%, 1/2w	4705-178053	12400	Type CEC-TO	REF		
R40	E2-R4	Res, comp, 3k ±5%, 1w	4704-218800	01121	GB3025	REF		
R41	D3-R3	Res, var, ww, 300Ω ±10%, 1-1/4w	4702-112870	71450	Type 110	REF		
R42	F2-Q4	Res, comp, 120Ω ±10%, 1/2w	4704-108696	01121	EB1211	REF		
R43	F3-S1	Res, comp, 5.6k ±5%, 2w	4704-218842	01121	HB5625	REF		

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R44	F2-S1	Res, comp, 560Ω ±5%, 2w	4704-218818	01121	HB5615	1		
R45	B3-Q1	Res, comp, 5.1k ±5%, 2w	4704-222182	01121	HB5125	3		
R46	B1-Q1	Res, comp, 5.1k ±5%, 2w	4704-222182	01121	HB5125	REF		
R47	A5-Q1	Res, comp, 5.1k ±5%, 2w	4704-222182	01121	HB5125	REF		
	F2-T1	Connector, female, 22 contacts	2816-223305	91662	02-022-014-5-200	1		
		Transipad, nylon, small	2814-225714	07047	10171-N	REF		
		Transipad, nylon, large	2814-225722	07047	10204-N	REF		
A3A2		**POWER AMPLIFIER P/C ASSEMBLY** **Figure 5-19**	1702-237560 (760A-4006)	89536	1702-237560	REF		
C1	J1-T2	Cap, mica, 2,500 pf ±1%, 500v	1504-106252	53021	CM-20F-252F	1		
C2	K3-S1	Cap, plstc, 5 uf ±5%, 200v	1507-106997	84411	JF-28	1		
C3		Cap, plstc, 5 uf ±5%, 200v	1507-106997	84411	JF-28	1		A
C4	B5-S5	Cap, mica, 1,000 pf ±1%, 500v	1504-106260	53021	CM-20E-102F	1		
C5	E3-T4	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
C6	B1-Q5	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
C7	H4-T1	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
C8	K1-U1	Cap, plstc, 0.1 uf ±20%, 200v	1507-106435	72928	C104M	REF		
CR1	F1-Q2	Diode, C.D. Type CD13161	4802-113308	07910	CD13161	REF		
CR2	C3-T1	Diode, C.D. Type CD13161	4802-113308	07910	CD13161	REF		
CR3	C2-P3	Diode, C.D. Type CD13161	4802-113308	07910	CD13161	REF		
CR4	D1-P2	Diode, C.D. Type CD13161	4802-113308	07910	CD13161	REF		
Q1	J5-N5	Tstr, Motorola Type SM4144	4805-190389	04713	SM4144	REF		
Q2	H1-P2	Tstr, Motorola Type SM4144	4805-190389	04713	SM4144	REF		
Q3	G1-N4	Tstr, Motorola Type SM4144	4805-190389	04713	SM4144	REF		
Q4	F3-R3	Tstr, R.C.A. Type 40424	4805-178525	95303	40424	2		
Q5	D4-P4	Tstr, R.C.A. Type 40424	4805-178525	95303	40424	REF		
Q6	B5-Q2	Tstr, R.C.A. Type 38654	4805-218537	95303	38654	REF		
Q7	C4-Q1	Tstr, R.C.A. Type 38654	4805-218537	95303	38654	REF		
Q8	D2-T1	Tstr, R.C.A. Type 38654	4805-218527	95303	38654	REF		
Q9	C3-R2	Tstr, R.C.A. Type 38654	4805-218537	95303	38654	REF		
Q10	B5-N5	Tstr, R.C.A. Type 40327	4805-218511	95303	40327	REF		
R1		Res, met flm, 665k ±1%, 1/2w	4705-187922	12400	Type CEC-TO	2		A
R2		Res, met flm, 1M ±1%, 1/2w	4705-161075	12400	Type CEC-TO	2		A
R3	J1-N4	Res, comp, 30k ±5%, 1/2w	4704-186015	01121	EB3035	REF		
R4	J2-P3	Res, met flm, 10Ω ±1%, 1/2w	4705-151043	12400	Type CEC-TO	REF		
R5	J5-Q3	Res, met flm, 28.7k ±1%, 1/2w	4705-193987	12400	Type CEC-TO	1		
R6		Res, met flm, 665k ±1%, 1/2w	4705-187922	12400	Type CEC-TO	REF		A
R7		Res, met flm, 1M ±1%, 1/2w	4705-161075	12400	Type CEC-TO	REF		A
R8	I2-P1	Res, comp, 30k ±5%, 1/2w	4704-186015	01121	EB3035	1		B
R8	I2-P1	Res, comp, 20k ±5%, 1/2w	4704-109041	01121	EB2035	REF		C
R9	H5-P4	Res, met flm, 10Ω ±1%, 1/2w	4705-151043	12400	Type CEC-TO	REF		
R10	I4-Q1	Res, met flm, 16.5k ±1%, 1/2w	4705-162529	12400	Type CEC-TO	1		
R11	J2-R3	Res, var, ww, 10k ±10%, 1-1/4w	4702-162115	71450	Type 110	1		
R12	H4-Q4	Res, met flm, 28.7k ±1%, 1/2w	4705-193987	12400	Type CEC-TO	1		B
R12	H4-Q4	Res, comp, 200k ±5%, 1/2w	4704-245332	01121	EB2045	1		C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A B C D E F G H I J K L
TRW
JH-28
5.0 SA
200 VDC
POWER AMPLIFIER
237500

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
R13	J1-R5	Res, comp, 1k ±5%, 1/2w	4704-108597	01121	EB1025	REF		
R14	F4-P2	Res, met flm, 1.37k ±1%, 1/2w	4705-148874	12400	Type CEC-TO	1		
R15	H1-R5	Res, met flm, 2.37k ±1%, 1/2w	4705-182519	12400	Type CEC-TO	REF		
R16	G1-P5	Res, met flm, 6.81k ±1%, 1/2w	4705-162552	12400	Type CEC-TO	1		
R17	F1-P1	Res, comp, 2.4k ±5%, 2w	4704-218834	01121	HB2425	1		
R18	F3-S5	Res, comp, 47Ω ±5%, 1/2w	4704-159608	01121	EB4705	1		
R19	D5-R5	Res, comp, 1.2k ±5%, 1w	4704-109892	01121	GB1225	2		
R20	D5-R2	Res, comp, 1.2k ±5%, 1w	4704-109892	01121	GB1225	REF		
R21	B3-P3	Res, comp, 160Ω ±5%, 1/2w	4704-192187	01121	EB1615	1		
R22	D1-T4	Res, comp, 470Ω ±5%, 1/2w	4704-108787	01121	EB4715	2		
R23	C2-T1	Res, comp, 750Ω ±5%, 1/2w	4704-108894	01121	EB7515	1		
R24	C4-Q5	Res, comp, 470Ω ±5%, 1/2w	4704-108787	01121	EB4715	REF		
R25	B3-U1	Res, ww, 0.47Ω ±10%, 2w	4707-112888	89536	4707-112888	2		
R26	H3-T4	Res, ww, 0.47Ω ±10%, 2w	4707-112888	89536	4707-112888	REF		
R27	J4-U4	Res, met flm, 196k ±1%, 1/2w	4705-161513	12400	Type CEC-TO	1		
R28	E4-R1	Res, comp, 15Ω ±5%, 1/2w	4704-109132	01121	EB1505	1		
R29	E2-N2	Res, comp, 100Ω ±5%, 1/2w	4704-188508	01121	EB1015	REF		
R30	E4-S2	Res, comp, 100Ω ±5%, 1/2w	4704-188508	01121	EB1015	REF		
R31	C4-N4	Res, comp, 30k ±5%, 1/2w	4704-186015	01121	EB3035	REF		
	G1-U4	Connector, female, 13 contacts	2816-223321	91662	02-013-014-5-200	1		
	D3-S4	Heat sink	4806-104562	05820	NF-209	3		
	C3-R4	Heat sink	4806-104562	05820	NF-209	REF		
		Transipad, nylon, large	2814-225722	07047	10204-N	REF		

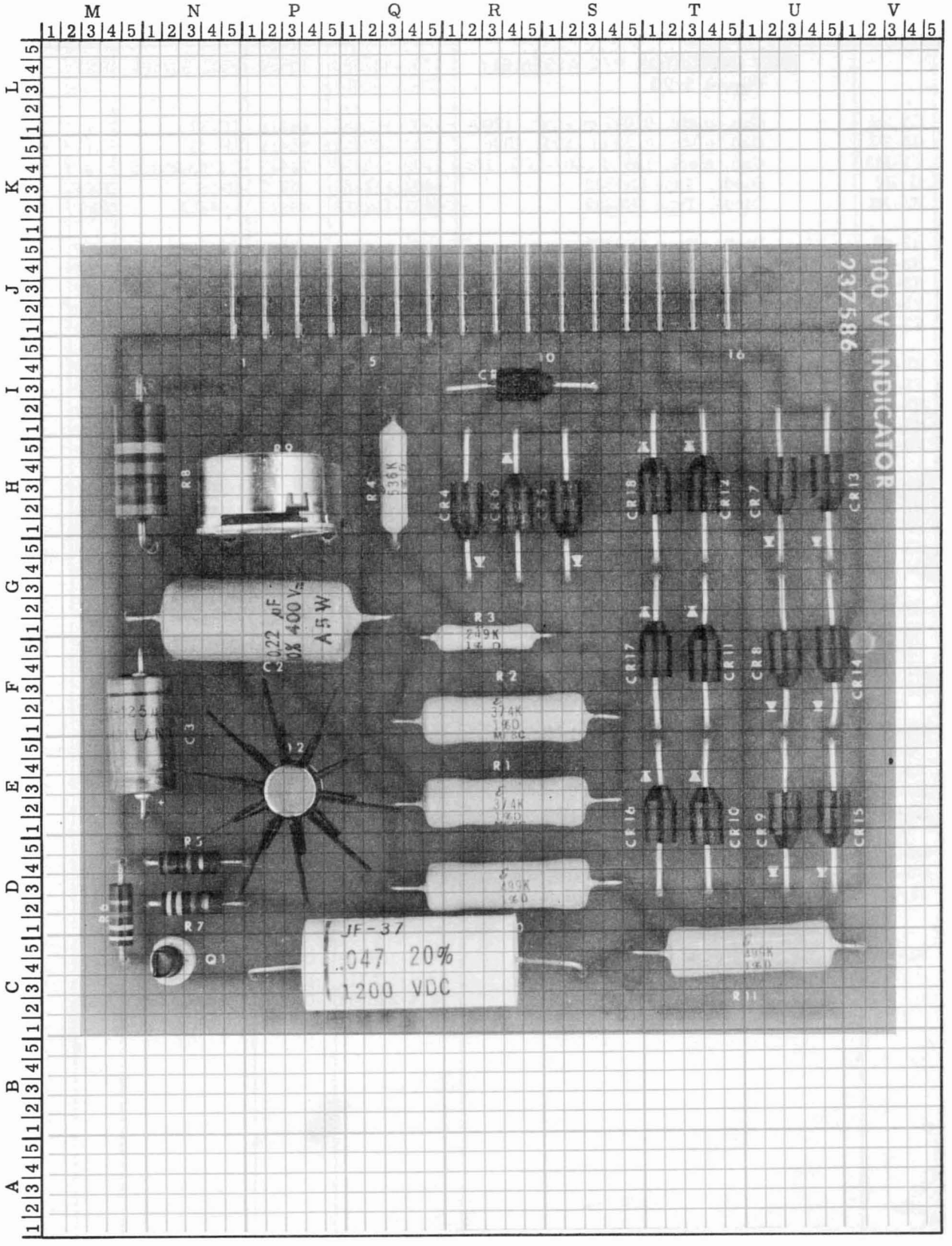

Figure 5-20. 100V INDICATOR P/C ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A3A3		**100V INDICATOR P/C ASSEMBLY** **Figure 5-20**	1702-237586 (760A-4008)	89536	1702-237586	REF		
C1	C4-Q4	Cap, plstc, 0.047 uf ±20%, 1200v	1507-182683	84411	JF-37	1		
C2	G2-P2	Cap, plstc, 0.22 uf ±10%, 400v	1507-105452	84411	JF-23	1		
C3	F1-M5	Cap, elect, 125 uf +50/-10%, 16v	1502-186296	73445	C426ARE125	1		
CR3	I3-R4	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR4	H2-R2	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR5	H2-S2	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR6	H2-R4	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR7	H3-U2	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR8	F5-U3	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR9	E2-U3	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR10	E2-T4	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR11	F5-T4	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR12	H3-T4	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR13	H3-U5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR14	F5-U5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR15	E2-U5	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR16	E2-T1	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR17	F5-T1	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
CR18	H3-T1	Diode, Type 1N4822	4802-112383	05277	1N4822	REF		
Q1	C4-N2	Tstr, Type 2N3391	4805-168708	03508	2N3391	REF		
Q2	E3-P3	Tstr, G.E. Type 11C-2322	4805-203489	03508	11C-2322	REF		
R1	E2-R4	Res, met flm, 374k ±1%, 2w	4705-220400	95712	Type MFF-1	2		
R2	F1-R4	Res, met flm, 374k ±1%, 2w	4705-220400	95712	Type MFF-1	REF		
R3	G1-R3	Res, met flm, 249k ±1%, 1/2w	4705-218685	12400	Type CEC-TO	1		
R4	H3-Q3	Res, met flm, 536k ±1%, 1/2w	4705-233874	12400	Type CEC-TO	1		
R5	D4-N3	Res, comp, 2k ±5%, 1/2w	4704-169854	01121	EB2025	REF		
R6	D2-M4	Res, comp, 4.7k ±5%, 1/2w	4704-108886	01121	EB4725	REF		
R7	N2-N3	Res, comp, 4.7k ±5%, 1/2w	4704-108886	01121	EB4725	REF		
R8	H4-M5	Res, comp, 620Ω ±5%, 2w	4704-222174	01121	HB6215	1		
R9	H3-P3	Res, var, ww, 25Ω ±10%, 1-1/4w	4702-113431	71450	Type 110	1		
R10	D3-R4	Res, met flm, 499k ±1%, 2w	4705-220418	95712	Type MFF-1	2		
R11	C5-U1	Res, met flm, 499k ±1%, 2w	4705-220418	95712	Type MFF-1	REF		
	J3-Q5	Connector, female, 16 contacts	2816-223313	91662	02-016-014-5-200	1		
R12		RES met. flm 100 1% 1/2w						
	E1-P5	Heat sink	4806-104562	05820	NF209	REF		
		Transipad, nylon, small	2814-225714	07047	10171-N	REF		
		Transipad, nylon, large	2814-225722	07047	10204-N	REF		

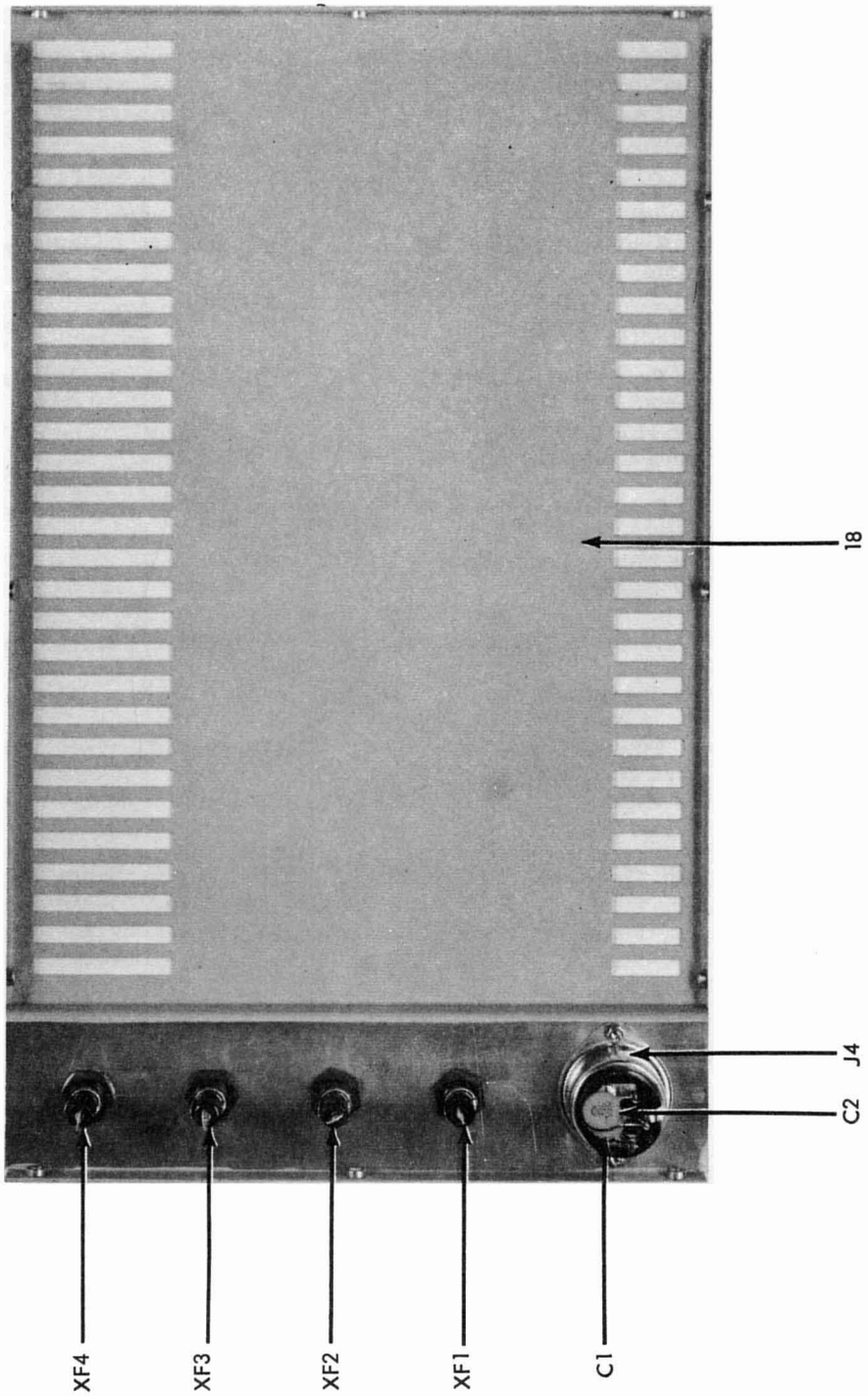

Figure 5-21. REAR-PANEL ASSEMBLY

REF DESIG	INDEX NO	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
A4		**REAR PANEL ASSEMBLY** **Figure 5-21**						
C1		Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	REF		
C2		Cap, cer, 0.01 uf +80/-20%, 500v	1501-105668	56289	29C9B5	REF		
F1		Fuse, Type MDX, slow blow, 2 amp, 250v (for 115v operation) (not illustrated)	5101-109181	71400	Type MDX	2		
		Fuse, Type MDL, slow blow, 1 amp, 250v (for 230v operation) (not illustrated)	5101-109272	71400	Type MDL	2		
F2		Fuse, Type MDX, slow blow, 2 amp, 250v (for 115v operation) (not illustrated)	5101-109181	71400	Type MDX	REF		
		Fuse, Type MDL, slow blow, 1 amp, 250v (for 230v operation) (not illustrated)	5101-109272	71400	Type MDL	REF		
F3		Fuse, Type AGC, fast act, 1-1/2 amp, 250v (not illustrated)	5101-109330	71400	Type AGC	2		
F4		Fuse, Type AGC, fast act, 1-1/2 amp, 250v (not illustrated)	5101-109330	71400	Type AGC	REF		
J4		Connector, male, 3 contacts	2109-223263	02660	160-5	1		
XF1		Holder, Fuse	2102-100107	71400	HKP	4		
XF2		Holder, Fuse	2102-100107	71400	HKP	REF		
XF3		Holder, Fuse	2102-100107	71400	HKP	REF		
XF4		Holder, Fuse	2102-100107	71400	HKP	REF		
18		Panel, Rear	3156-236026	89536	3156-236026	1		

5-8. SERIAL NUMBER EFFECTIVITY

5-9. A Use Code column is provided to identify certain parts that have been added, deleted, or modified during production of the Model 760A. Each part for which a use code has been assigned may be identified with a particular instrument serial number by consulting the Use Code Effectivity List below. All parts with no code are used on all instruments with serial numbers above 001. New codes will be added as required by instrument changes.

USE CODE	EFFECTIVITY
No Code	Model 760A serial number 001 and on.
A	Model 760A; deleted after serial number 122.
B	Model 760A serial number 001 thru 122.
C	Model 760A serial number 123 and on.
D	Model 760A serial number 208 and on.
E	Model 760A serial number 260, 262, 264, 267, 271, 273, and on.
F	Model 760A serial number 001 thru 197 and 208 thru 307.
	Model 760A serial number 198 thru 207, 400 and on.

APPENDIX A

FEDERAL SUPPLY CODE FOR MANUFACTURERS

A-1. CODE TO NAME

A-2. The following five-digit code numbers are listed in numerical sequence along with the manufacturer's name and address to which the code has been assigned. The Federal Supply Code has been taken from Cataloging Handbook H 4-2, Code to Name.

00213	Sage Electronics Corp. Rochester, New York
00327	Welwyn International, Inc. Westlake, Ohio
00656	Aerovox Corp. New Bedford, Massachusetts
00779	AMP Inc. Harrisberg, Pennsylvania
01121	Allen-Bradley Co. Milwaukee, Wisconsin
01281	TRW Semiconductors Lawndale, California
01295	Texas Instruments, Inc. Semiconductor Components Div. Dallas, Texas
01686	RCL Electronics Inc. Manchester, New Hampshire
01730	Deleted
01884	Dearborn Electronics Inc. Orlando, Florida
02114	Ferroxcube Corp. Saugerties, New York
02606	Replaced by 15801
02660	Amphenol-Borg Elect. Corp. Broadview, Illinois
02799	Arco Capacitors, Inc. Los Angeles, California
03614	Replaced by 71400
03651	Replaced by 44655
03797	Eldema Corp. Compton, California
03877	Transitron Electronic Corp. Wakefield, Massachusetts
03888	Pyrofilm Resistor Co., Inc. Cedar Knolls, New Jersey
03911	Clairex Corp. New York, New York
03980	Muirhead Instruments, Inc. Mountainside, New Jersey
04009	Arrow Hart and Hegemen Electronic Company Hartford, Connecticut
04062	Replaced by 72136
04202	Replaced by 81312
04217	Essex Wire Corp. Wire & Cable Div. Anaheim, California
04221	Aemco Div. of Midtex Inc. Mankato, Minnesota
04645	Replaced by 75376
04713	Motorola Semiconductor Products Inc. Phoenix, Arizona
05082	Replaced by 94154
05236	Jonathan Mfg. Co. Fullerton, California
05277	Westinghouse Electric Corp. Semiconductor Dept. Youngwood, Pennsylvania
05278	Replaced by 43543
05397	Union Carbide Corp. Electronics Div. Cleveland, Ohio
05571	Sprague Electric Co Pacific Div. Los Angeles, California
05704	Alac, Inc. Glendale, California
05820	Wakefield Engineering Ind. Wakefield, Massachusetts
06001	General Electric Company Capacitor Department Irmo, South Carolina
06136	Replaced by 63743
06473	Amphenol Space & Missile Sys. Chatsworth, California
06555	Beede Electrical Instrument Co. Penacook, New Hampshire
06739	Electron Corp. Littletown, Colorado
06743	Clevite Corp. Cleveland, Ohio
06751	Semcor Div. Components Phoenix, Arizona
06860	Gould National Batteries Inc. City of Industry, California
06980	Eitel-McCullough, Inc. San Carlos, California
07115	Replaced by 14674
07138	Westinghouse Electric Corp. Electronic Tube Div. Elmira, New York
07263	Fairchild Semiconductor Div. of Fairchild Camera & Instrument Corp. Mountain View, California
07344	Bircher Co., Inc. Rochester, New York
07792	Lerma Engineering Corp. Northampton, Massachusetts
07910	Continental Device Corp. Hawthorne, California
08530	Reliance Mica Corp. Brooklyn, New York
08792	CBS Electronics Semiconductor Operations-Div. of CBS Inc. Lowell, Massachusetts
08806	General Electric Co. Miniature Lamp Dept. Cleveland, Ohio
08863	Nylomatic Corp. Norrisville, Pennsylvania
08988	Skottie Electronics Inc. Archbald, Pennsylvania
09922	Burndy Corp. Norwalk, Connecticut
11237	Chicago Telephone of Calif. Inc. South Pasadena, California
11358	CBS Electronics Div. of CBS Inc. Newburyport, Massachusetts
11403	Best Products Co. Chicago, Illinois
11503	Keystone Mfg Div. of Avis Industrial Corp. Warren, Michigan
12014	Chicago Rivet & Machine Co. Bellwood, Illinois
12040	National Semiconductor Corp. Danburry, Connecticut
12060	Diodes, Inc. Chatsworth, California
12136	Philadelphia Handle Co. Camden, New Jersey
12323	Presin Co., Inc. Shelton, Connecticut
12327	Freeway Washer & Stamping Co. Cleveland, Ohio
12400	Replaced by 75042
12617	Hamlin Inc. Lake Mills, Wisconsin
12697	Clarostat Mfg. Co. Dover, New Hampshire
12749	James Electronics Chicago, Illinois

12856	Micrometals Sierra Madre, California
12954	Dickson Electronics Corp. Scottsdale, Arizona
13606	Sprague Electric Co. Transistor Div. Concord, New Hampshire
13839	Replaced by 23732
14099	Semtech Corp. Newbury Park, California
14193	California Resistor Corp. Santa Monica, California
14298	American Components, Inc. Conshohocken, Pennsylvania
14655	Cornell-Dubilier Electronics Newark, New Jersey
14674	Corning Glass Works Corning, New York
14752	Electro Cube Inc. San Gabriel, California
14869	Replaced by 96853
15636	Elec-Trol Inc. Northridge, California
15801	Fenwal Electronics Inc. Framingham, Massachusetts
15818	Amelco Semiconductor Div. of Teledyne Inc. Mountain View, California
15849	Useco, Inc. Mt. Vernon, New York
15909	Replaced by 17870
16332	Replaced by 28478
16473	Cambridge Scientific Ind. Inc. Cambridge, Maryland
16742	Paramount Plastics Downey, California
16758	Delco Radio Div. of General Motors Kokomo, Indiana
17069	Circuit Structures Lab. Upland, California
17856	Siliconix, Inc. Sunnyvale, California
17870	Daven-Div. of Thomas A. Edison Ind. --McGraw-Edison Co. Manchester, New Hampshire
18083	Deleted
18178	Vactec Inc. Maryland Heights, Missouri
18736	Voltronics Corp. Hanover, New Jersey
19429	Montronics, Inc. Seattle, Washington
19451	Perine Machinery & Supply Co. Seattle, Washington
19701	Electra Mfg. Co. Independence, Kansas
20584	Enochs Mfg. Co. Indianapolis, Indiana
22767	ITT Semiconductors Div. of ITT Palo Alto, California
23732	Tracor Rockville, Maryland
24248	Southco Div. of South Chester Corp. Lester, Pennsylvania
24655	General Radio Co. West Concord, Massachusetts
25403	Amperex Electronic Corp Semiconductor & Receiving Tube Division Slatersville, Rhode Island
28478	Deltrol Controls Corp. Milwaukee, Wisconsin
28520	Heyman Mfg. Co. Kenilworth, New Jersey
30323	Illinois Tool Works Inc. Chicago, Illinois
33173	General Electric Co. Tube Dept. Owensboro, Kentucky
37942	Mallory, P. R., & Co., Inc. Indianapolis, Indiana
38315	Honeywell Inc. Precision Meter Div. Manchester, New Hampshire
42498	National Company Melrose, Massachusetts
43543	Nytronics Inc. Transformer Co. Div. Alpha, New Jersey
44655	Ohmite Mfg. Co. Skokie, Illinois
49671	Radio Corp. of America New York, New York
49956	Raytheon Company Lexington, Maine
53021	Sangamo Electric Co. Springfield, Illinois
55026	Simpson Electric Company Chicago, Illinois
56289	Sprague Electric Co. North Adams, Massachusetts
58474	Superior Electric Co. Bristol, Connecticut
60399	Torrington Mfg. Co. Torrington, Connecticut
62460	Deleted
63743	Ward Leonard Electric Co. Mount Vernon, New York
64834	West Mfg. Co. San Francisco, California
65092	Weston Instruments Inc. Newark, New Jersey
66150	Winslow Tele-Tronics Inc. Asbury Park, New Jersey
70563	Amperite Company Union City, New Jersey
70903	Belden Mfg. Co. Chicago, Illinois
71002	Birnbach Radio Co., Inc. New York, New York
71400	Bussmann Mfg. Div. of McGraw-Edison Co. St. Louis, Missouri
71450	CTS Corp. Elkhart, Indiana
71468	ITT Cannon Electric Inc. Los Angeles, California
71482	Clare, C P. & Co. Chicago, Illinois
71590	Centralab Div. of Globe Union Inc. Milwaukee, Wisconsin
71707	Coto Coil Co., Inc. Providence, Rhode Island
71744	Chicago Miniature Lamp Works Chicago, Illinois
71785	Cinch Mfg. Co. & Howard B. Jones Div. Chicago, Illinois
72005	Driver, Wilber B., Co. Newark, New Jersey
72092	Replaced by 06980
72136	Electro Motive Mfg. Co. Willimantic, Connecticut
72259	Nytronics Inc. Berkeley Heights, New Jersey
72354	Deleted
72619	Dialight Corp Brooklyn, New York
72653	G. C. Electronics Rockford, Illinois
72665	Replaced by 90303
72794	Dzus Fastener Co., Inc. West Islip, New York
72928	Gudeman Co. Chicago, Illinois
72982	Erie Tech. Products Inc. Erie, Pennsylvania
73138	Beckman Instruments Inc. Helipot Division Fullerton, California
73293	Hughes Aircraft Co. Electron Dynamics Div. Newport Beach, California
73445	Amperex Electronic Corp. Hicksville, New York
73559	Carling Electric Inc. Hartford, Connecticut
73586	Circle F Industries Trenton, New Jersey
73734	Federal Screw Products, Inc. Chicago, Illinois
73743	Fischer Special Mfg. Co. Cincinnati, Ohio
73899	JFD Electronics Co. Brooklyn, New York
73949	Guardian Electric Mfg. Co. Chicago, Illinois
74199	Quam Nichols Co. Chicago, Illinois
74217	Radio Switch Corp. Marlboro, New Jersey
74276	Signalite Inc. Neptune, New Jersey
74306	Piezo Crystal Co. Carlisle, Pennsylvania
74542	Hoyt Elect. Instr. Works Penacook, New Hampshire
74970	Johnson, E. F., Co. Waseca, Minnesota
75042	IRC Inc. Philadelphia, Pennsylvania
75376	Kurz-Kasch, Inc. Dayton, Ohio
75382	Kulka Electric Corp. Mt. Vernon, New York
75915	Littlefuse Inc. Des Plaines, Illinois
76854	Oak Mfg. Co. Crystal Lake, Illinois
77342	Potter & Brumfield Div. of Amer. Machine & Foundry Princeton, Indiana
77969	Rubbercraft Corp. of Calif. LTD. Torrance, California

78189	Shakeproof Div. of Illinois Tool Works Elgin, Illinois
78277	Sigma Instruments, Inc. South Braintree, Massachusetts
78488	Stackpole Carbon Co. St. Marys, Pennsylvania
78553	Tinnerman Products Cleveland, Ohio
79136	Waldes Kohinoor Inc. Long Island City, New York
79497	Western Rubber Company Goshen, Indiana
79963	Zierick Mfg. Corp. New Rochelle, New York
80031	Mepco Div. of Sessions Clock Co. Morristown, New Jersey
80145	API Instruments Co. Chesterland, Ohio
80183	Sprague Products North Adams, Massachusetts
80294	Bourns Inc. Riverside, California
80583	Hammarlund Co., Inc. Mars Hill, North Carolina
80640	Stevens, Arnold Inc. Boston, Massachusetts
81073	Grayhill Inc. La Grange, Illinois
81312	Winchester Electronics Div. of Litton Industries Oakville, Connecticut
81439	Therm-O-Disc Inc. Mansfield, Ohio
81483	International Rectifier Corp. El Segundo, California
81590	Korry Mfg. Co. Seattle, Washington
82376	Deleted
82389	Switchcraft Inc. Chicago, Illinois
82415	Price Electric Corp. Frederick, Maryland
82872	Roanwell Corp. New York, New York
82877	Rotron Mfg. Co., Inc. Woodstock, New York
82879	ITT Wire & Cable Div. Pawtucket, Rhode Island
83003	Varo Inc. Garland, Texas
83298	Bendix Corp. Electric Power Division Eatontown, New Jersey
83330	Smith, Herman H., Inc. Brooklyn, New York
83478	Rubbercraft Corp. of America New Haven, Connecticut
83594	Burroughs Corp. Electronic Components Div. Plainfield, New Jersey
83740	Union Carbide Corp. Consumer Products Div. New York, New York
84171	Arco Electronics, Inc. Great Neck, New York
84411	TRW Ogallala, Nebraska
86577	Precision Metal Products Stoneham, Massachusetts
86684	Radio Corp. of America Electronic Components & Devices Harrison, New Jersey
86689	Deleted
87034	Marco-Oak Inc. Anaheim, California
88419	Use 14655
88690	Replaced by 04217
89536	Fluke, John Mfg. Co., Inc. Seattle, Washington
89730	Replaced by 08806
90201	Mallory Capacitor Co. Indianapolis, Indiana
90215	Best Stamp & Mfg. Co. Kansas City, Missouri
90211	Square D Co. Chicago, Illinois
90303	Mallory Battery Co. Tarrytown, New York
91293	Johanson Mfg. Co. Boonton, New Jersey
91407	Replaced by 58474
91637	Dale Electronics Inc. Columbus, Nebraska
91662	Elco Corp. Willow Grove, Pennsylvania
91737	Gremar Mfg. Co., Inc. Wakefield, Massachusetts
91802	Industrial Devices, Inc. Edgewater, New Jersey
91836	King's Electronics Tuckahoe, New York
91929	Honeywell Inc. Micro Switch Div. Freeport, Illinois
91934	Miller Electric Co., Inc. Pawtucket, Rhode Island
93332	Sylvania Electric Products Semiconductor Products Div. Woburn, Massachusetts
94145	Replaced by 49956
94154	Tung-Sol Div. of Wagner Electric Corp. Newark, New Jersey
95146	Alco Electronics Products Inc. Lawrence, Massachusetts
95263	Leecraft Mfg. Co. Long Island City, New York
95264	Replaced by 98278
95275	Vitramon Inc. Bridgeport, Connecticut
95303	Radio Corp. of America Solid State & Receiving Tube Div. Cincinnati, Ohio
95354	Methode Mfg. Corp. Rolling Meadows, Illinois
95712	Dage Electric Co., Inc. Franklin, Indiana
95987	Weckesser Co., Inc. Chicago, Illinois
96733	San Fernando Electric Mfg. Co. San Fernando, California
96853	Rustrak Instrument Co. Manchester, New Hampshire
96881	Thomson Industries, Inc. Manhasset, New York
97540	Master Mobile Mounts Div. of Whitehall Electronics Corp. Los Angeles, California
97913	Industrial Electronic Hdware Corp. New York, New York
97945	White, S. S. Co. Plastics Div. New York, New York
97966	Replaced by 11358
98094	Replaced by 49956
98278	Microdot Inc. Pasadena, California
98291	Sealectro Corp. Conhex Div Mamaroneck, New York
98388	Accurate Rubber & Plastics Culver City, California
98743	Replaced by 12749
98925	Deleted
99120	Plastic Capacitors, Inc. Chicago, Illinois
99217	Southern Electronics Corp. Burbank, California
99515	Marshall Industries Capacitor Div. Monrovia, California

Revised August 1, 1968
Using H4-1 and H4-2
Dated June , 1968

APPENDIX B

SWITCH CROSS REFERENCE CHART

B-1. DECK TO FUNCTION

B-2. The following chart is provided as an aid to the technician. This chart can be used to determine upon which deck a particular switch function is located. The switch decks are numbered alphabetically from the front panel.

DECK	FRONT & REAR	SWITCHES										
		A2S1	A2S2	A2S3	A2S4	A2S5	A2S6	A2S7	A2S8	A2S9	A2S10	A1S1
A	F	a	a	a	a	a	a	a	a	a	a, b	a
	R	b	b	b	b			b			c	
B	F					b	b		b	b		b
	R								c		d	
C	F	c	c	c	c	c	c	c	d	c		b
	R			d	d	d	d	d		d		c
D	F	d	d	e	e	e	e	e	f	e		c
	R			f	f	f	f	f	g	f		
E	F	e	e	g	g	g	g	g	h	g		
	R						h	h		h		
F	F	f	f	h		h	i	i	i	i		
	R								j	j		
G	F	g	g	i					k	k		
	R									l		
H	F	h	h						l	m		
	R								m	n		
I	F	i	i						n	o		
	R									p		
J	F	j	j						o	q, r		
	R									s		
K	F	k							p	t		
	R											
L	F								q	u		
	R								r			
M	F								s	v		
	R											

WARRANTY

The JOHN FLUKE MFG. CO., INC. warrants each instrument manufactured by them to be free from defects in material and workmanship. Their obligation under this Warranty is limited to servicing or adjusting an instrument returned to the factory for that purpose, and to making good at the factory any part or parts thereof; except tubes, fuses, choppers and batteries, which shall, within one year after making delivery to the original purchaser, be returned by the original purchaser with transportation charges prepaid, and which upon their examination shall disclose to their satisfaction to have been thus defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started, if requested.

If any fault develops, the following steps should be taken.

1. Notify the John Fluke Mfg. Co., Inc., giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate of the charges will be made before the work begins, provided the instrument is not covered by the Warranty.

SHIPPING

All shipments of John Fluke Mfg. Co., Inc. instruments should be made via Railway Express prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be thoroughly inspected immediately upon receipt. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to John Fluke Mfg. Co., Inc. Upon receipt of this report you will be advised of the disposition of the equipment for repair or replacement. Include the model number, type number, and serial number when referring to this instrument for any reason.

The John Fluke Mfg. Co., Inc. will be happy to answer all application questions which will enhance your use of this instrument. Please address your requests to:

JOHN FLUKE MFG. CO., INC., P. O. BOX 7428, SEATTLE 33, WASHINGTON

Sales and Service Representatives

ALABAMA

HUNTSVILLE
BCS Associates, Inc.
2317 Bob Wallace Ave. S.W.
Tel. (205) 534-1648

ALASKA

SEATTLE
Instrument Specialists, Inc.
5950 Sixth Ave. South
Suite 106
Seattle, Washington
Tel. (206) 767-4260

ARIZONA

PHOENIX
Barnhill Associates
4900 E. Indian School Road
Tel. (602) 959-2115

CALIFORNIA

LOS ANGELES
Instrument Specialists, Inc.
2870 Los Feliz Place
Tel. (213) 665-5181

SAN FRANCISCO
Instrument Specialists, Inc.
2359 De La Cruz
Santa Clara, California
Tel. (408) 244-1505

COLORADO

DENVER
Barnhill Associates
1170 S. Sheridan Blvd.
Tel (303) 934-5505

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HARTFORD
Instrument Representatives, Inc.
P.O. Box 165
Glastonbury, Connecticut
Tel. (203) 633-0777

FLORIDA

ORLANDO
BCS Associates, Inc.
940 N. Fern Creek Ave.
Tel. (305) 425-2764

HAWAII

HONOLULU
Industrial Electronics, Inc.
646 Queen Street
Tel. (808) 506-095

ILLINOIS

CHICAGO
Cozzens & Cudahy, Inc.
9501 W. Devon Ave.
Rosemont, Illinois
Tel. (312) 825-1144

INDIANA

INDIANAPOLIS
Cozzens & Cudahy, Inc.
44 Kirk Drive
Tel. (317) 244-2456

LOUISIANA

NEW ORLEANS
BCS Associates, Inc.
P.O. Box 7371
Metairie, Louisiana
Tel. (504) 888-2266

MARYLAND

BALTIMORE
Electronic Marketing Assoc.
11501 Huff Court
Kensington, Maryland
Tel. (301) 744-7700

MASSACHUSETTS

BOSTON
Instrument Representatives, Inc.
1046 Massachusetts Avenue
Arlington, Massachusetts
Tel. (617) 646-1034

MICHIGAN

DETROIT
Technitron, Inc.
13657 Grand River Ave.
Tel. (313) 838-7324

MINNESOTA

MINNEAPOLIS
Cozzens & Cudahy, Inc.
7710 Computer Ave.
Tel. (612) 920-1022

MISSOURI

ST. LOUIS
Cozzens & Cudahy, Inc.
10534 Natural Bridge Road
Edmundson, Missouri
Tel. (314) 423-1234

NEW JERSEY

NEWARK
SBM Associates, Inc.
1519 Stuyvesant Avenue
Union, New Jersey
Tel. (201) 687-8737

NEW MEXICO

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827 Pennsylvania Ave.
Tel. (505) 265-7766

NEW YORK

NEW YORK
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28 Hobby Street
Pleasantville, New York
Tel. (914) 769-1811

LONG ISLAND
SBM Associates, Inc.
528 Old Country Road
Plainview, Long Island
Tel. (516) 433-1421

ROCHESTER
SBM Associates, Inc.
800 Linden Avenue
Tel. (716) 381-8330

SYRACUSE
SBM Associates, Inc.
138 Pickard Bldg.
5858 E. Molloy Road
Tel. (315) 454-9377

NORTH CAROLINA

GREENSBORO
BCS Associates, Inc.
1039 E. Wendover Avenue
Tel. (919) 273-1918

OHIO

CLEVELAND
Technitron, Inc.
23203 Lorain Road
North Olmsted, Ohio
Tel. (216) 734-0960

DAYTON
Technitron, Inc.
1250 W. Dorothy Lane
Tel. (513) 298-9964

OREGON

PORTLAND
Instrument Specialists, Inc.
5950 Sixth Ave. South
Suite 106
Seattle, Washington
Tel. (206) 767-4260

PENNSYLVANIA

PHILADELPHIA
Acromatix Associates, Inc.
3118 Germantown Pike
Fairview Village, Pennsylvania
Tel. (215) 279-0377

PITTSBURGH
Technitron, Inc.
114 Spring Grove Road
Tel. (412) 371-1231

TEXAS

DALLAS
Barnhill Associates
507B Bishop Street
Richardson, Texas
Tel. (214) AD 1-2573

HOUSTON
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Suite 203
3810 Westheimer
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5950 Sixth Ave. South
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WASHINGTON, D.C.

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North Burnaby 2, B.C.
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ONTARIO

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Allan Crawford Associates, Ltd.
376 Churchill Avenue — Suite 106
Tel. (613) 725-1288

TORONTO
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65 Martin Ross Avenue
Downsview, Ontario
Tel. (416) 636-4910

QUEBEC

MONTREAL
Allan Crawford Associates, Ltd.
6999 Cote de Neiges Road
Tel. (514) 739-6776

International Representatives

AUSTRALIA

Elmesco Instruments
41 Carter Road
Brookvale, N.S.W., Australia

AUSTRIA

Omni Ray AG
Techn. Beratung
Mollardgasse 54
Vienna VI, Austria

BELGIUM

C. N. Rood S/A
30 Rue Leon Frederic
Brussels 4, Belgium

DENMARK

Tage Olsen A/S
Ronnegade 1-0
Copenhagen, Denmark

FINLAND

Oy Findip AB Ltd.
Mannerheimintie 29C
Helsinki 25, Finland

FRANCE

S. E. R. I. E. L., s. a.
48 Avenue Victor Hugo
Clamart (Seine) France

HONG KONG and MACAO

Intronics Ltd.
4 Hankow Road, Suite 4A
Kowloon, Hong Kong

ISRAEL

R. D. T. Electronics
Engineering Ltd.
P.O. Box 21082
13 Dov-Hos Street
Tel-Aviv, Israel

ITALY

Elettronucleonica s. p. a.
7 Pizza DeAngli
20146 Milano, Italy

JAPAN

Toyo Trading Co., Ltd.
Central P.O. Box 999
Tokyo, Japan

Toyo Trading Co., Ltd.
4-37, Minamihonmachi
Higashika, Osaka, Japan

KOREA

M. - C International
Room 516, Bando Building
Seoul, Korea

THE NETHERLANDS

C. N. Rood N. V.
Post Office Box 4542
Rijswijk (Z. H.) The Netherlands

Fluke Nederland N. V.
Post Office Box 5053
Tilburg, The Netherlands

NEW ZEALAND

Sample Electronics (N. Z.) Ltd.
8 Matipo Street
Onehunga
Auckland, New Zealand

NORWAY

Morgenstierne & Co. A/S
Wesselsgt. 6
Oslo, Norway

OKINAWA

RYUKYU ISLANDS

Baxter Trading Co.
P.O. Box 26
Koza, Okinawa
Ryukyu Islands

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T. J. Wolff
2246 Pasong Tamo
Makati, Rizal
Manila, Philippines

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P.O. Box 1257
Johannesburg, So. Africa

A. C. Gowlett (Pty.) Ltd.
P.O. Box 3641
Cape Town, So. Africa

A. C. Gowlett (Pty.) Ltd.
P.O. Box 2143
Durban, Natal, So. Africa

SOUTH VIETNAM

R. B. Landis & Co., Inc.
216 Hien-Vuong
P.O. Box H-3
Saigon, Vietnam

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Calle General Sanjurjo, 18
Madrid, Spain

SWEDEN

Robert E. O. Olsson
Box 165
Tradgardsgatan 7
Motala, Sweden

SWITZERLAND

Omni Ray AG
Dufourstrasse 56
8008 Zurich, Switzerland

TAIWAN

Heighten Scientific Co., Ltd.
P.O. 1408
Taipei, Taiwan

THAILAND

G. Simon Radio Ltd.
30 Patpong Avenue
Suriwong
Bangkok, Thailand

THE UNITED KINGDOM

Fluke International Corp.
P.O. Box 102
Watford-Herts, England

WEST GERMANY

Rohde & Schwarz Vertriebs - Gmbh
5000 Koeln
Hohe Strasse 160-168
West Germany

Rohde & Schwarz Handels - Gmbh
1000 Berlin 10
Ernst - Reuter - Platz 10
West Germany

Rohde & Schwarz Vertriebs - Gmbh
2000 Hamburg 50
Grosse Bergstrasse 213-217
West Germany

Rohde & Schwarz Vertriebs - Gmbh
7500 Karlsruhe
Kriegsstrasse 39
West Germany

Rohde & Schwarz Vertriebs - Gmbh
8000 Muenchen
Dachauer Strasse 109
West Germany

In Europe contact FLUKE NEDERLAND, N. V., Post Office Box 5053, Tilburg, The Netherlands

FLUKE

NOTES:

- SOURCE COMMON
- MEASUREMENT COMMON
- CHASSIS GROUND
- INTERNAL ADJUSTMENT
- BUSS WIRE SHORTING STRIP, REMOVED DURING CALIBRATION AS NEEDED.

A2S1 THRU A2S7 - FIRST THRU SEVENTH READOUT SWITCHES (NUMBERED LEFT TO RIGHT).

A2S8 - "FUNCTION" SWITCH (V=VOLTS, A=AMPS, & Ω=OHMS)

A2S9 - "FREQUENCY" SWITCH

A2S10 - "METER SENS" SWITCH

NON-DESIGNATED CONTACTS OF A2S8 AND A2S9 ARE "STD BY" (STAND BY) POSITIONS.

NUMBERS LISTED NEAR SWITCH CONTACTS INDICATE AT WHICH SWITCH POSITIONS CONTACT IS MADE.

- LOCATED ON A2S3 REAR
- LOCATED ON A2S9 REAR
- LOCATED ON A2S10

CW ROTATING CONTROL CLOCKWISE MOVES WIPER TOWARDS CW

P/O PART OF

PCB PRINTED CIRCUIT BOARD

- LOCATED ON A2S4 REAR
- LOCATED ON A2S5 REAR
- LOCATED ON A2S6 REAR

* F1 & F2 ARE 2 AMP SB FOR 115V OPERATION AND 1 AMP FOR 230V OPERATION.

" " INDICATES FRONT PANEL NOMENCLATURE

(1) FOR S/N 001 THRU 307 ~ AC39, .0033 pf ADDED

(2) FOR S/N 400 AND ON ~ ADDED CR1, R10, R11 AND R31 TO CALIBRATION PCB ASSY A2A3. R32 WAS 1K, R33 WAS 1K.
* CR1 ~ R10 ARE FACTORY MATCHED.

FUNCTIONAL BLOCK DIAGRAM

MODEL 760A

METER CALIBRATOR

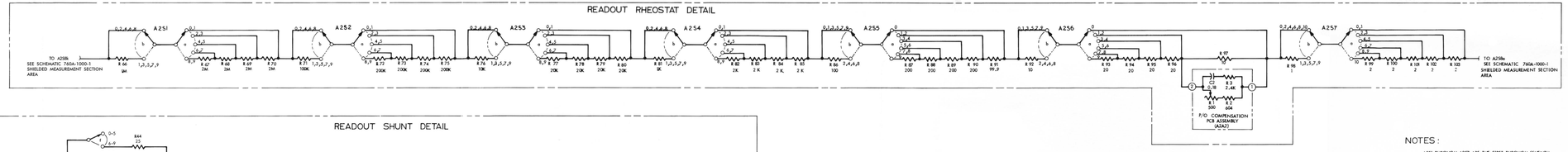
760A-1000-1

MODEL 760A METER CALIBRATOR b

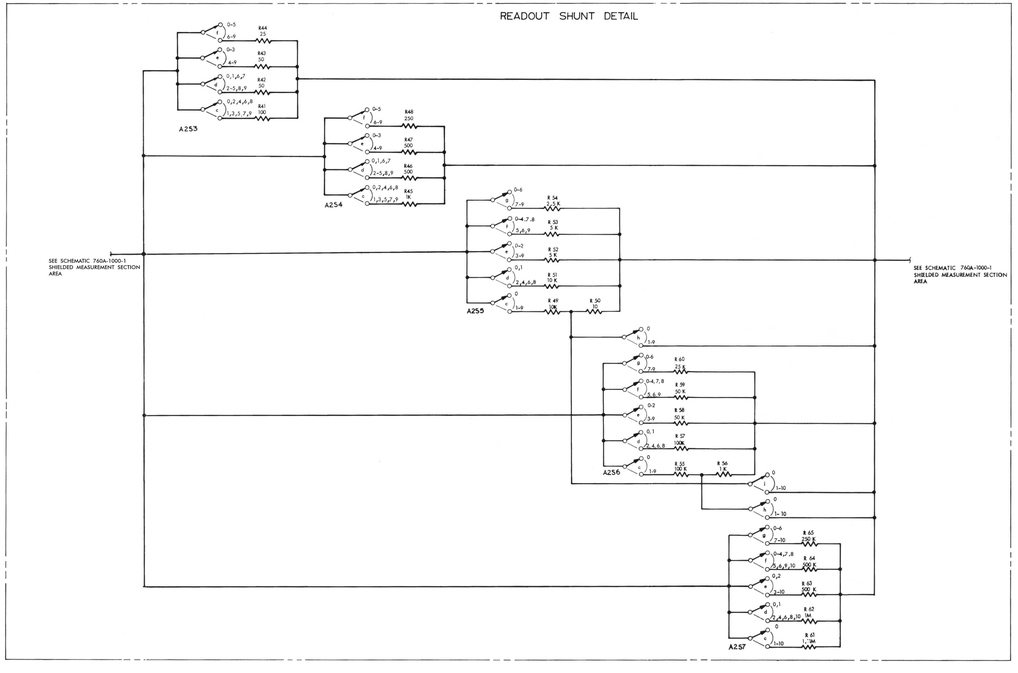
SER. NO. 123 & ON

FLUKE JOHN FLUKE MFG. CO., INC.
P.O. Box 7428 Seattle, Washington 98133

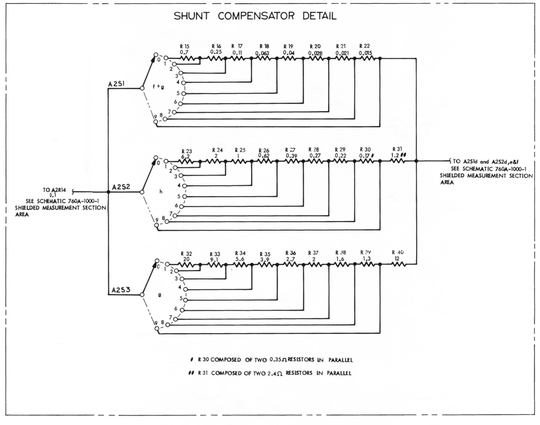
READOUT RHEOSTAT DETAIL



READOUT SHUNT DETAIL



SHUNT COMPENSATOR DETAIL



NOTES:

A251 THROUGH A257 ARE THE FIRST THROUGH SEVENTH FRONT PANEL READOUT SWITCHES (SWITCHES ARE NUMBERED LEFT TO RIGHT)

NUMBERS LISTED NEAR SWITCH CONTACTS INDICATE AT WHICH SWITCH POSITIONS CONTACT IS MADE

ALL RESISTOR VALUES ARE IN OHMS

F/O PART OF

FUNCTIONAL SCHEMATIC DIAGRAM
READOUT RHEOSTAT, SHUNT, AND SHUNT COMPENSATOR
760A-1000-2
MODEL 760A METER CALIBRATOR

SER. NO. 123 & ON

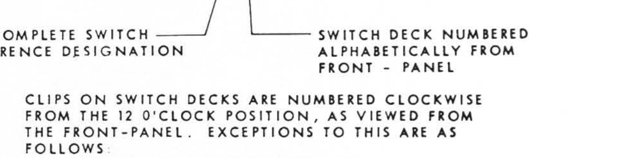
FLUKE JOHN FLUKE MFG. CO., INC.
P.O. Box 7428 Seattle, Washington 98133

NOTES:

ALL SOLID LINES SHOWN REPRESENT EXTERNAL WIRING BETWEEN PRINTED CIRCUIT BOARDS, COMPONENTS, AND SWITCHES.

DASHED LINES BETWEEN SWITCH DECK CLIPS REPRESENT BUSS WIRE CONNECTIONS.

ALL DOTTED LINES BETWEEN DESIGNATED AND NON-DESIGNATED SWITCH CLIPS INDICATE THAT THESE CLIPS ARE ONE AND THE SAME.



CLIPS ON SWITCH DECKS ARE NUMBERED CLOCKWISE FROM THE 12 O'CLOCK POSITION, AS VIEWED FROM THE FRONT-PANEL. EXCEPTIONS TO THIS ARE AS FOLLOWS:

(1) THE CLIPS OF THE REAR DECKS OF A2S1 THRU A2S7, EXTENDING BEYOND THE SHIELDED MEASUREMENT SECTION, ARE NUMBERED CLOCKWISE FROM THE 3 O'CLOCK POSITION.

(2) THE CLIPS OF THE REAR DECKS OF A2S8 AND A2S9, BEHIND THE SEPARATING BULKHEAD WITHIN THE MEASUREMENT SECTION, ARE ALSO NUMBERED CLOCKWISE FROM THE 3 O'CLOCK POSITION.

WIRING DIAGRAM

MAIN CHASSIS

760A-1000-3

MODEL 760A METER CALIBRATOR

a

SER NO 123 & ON

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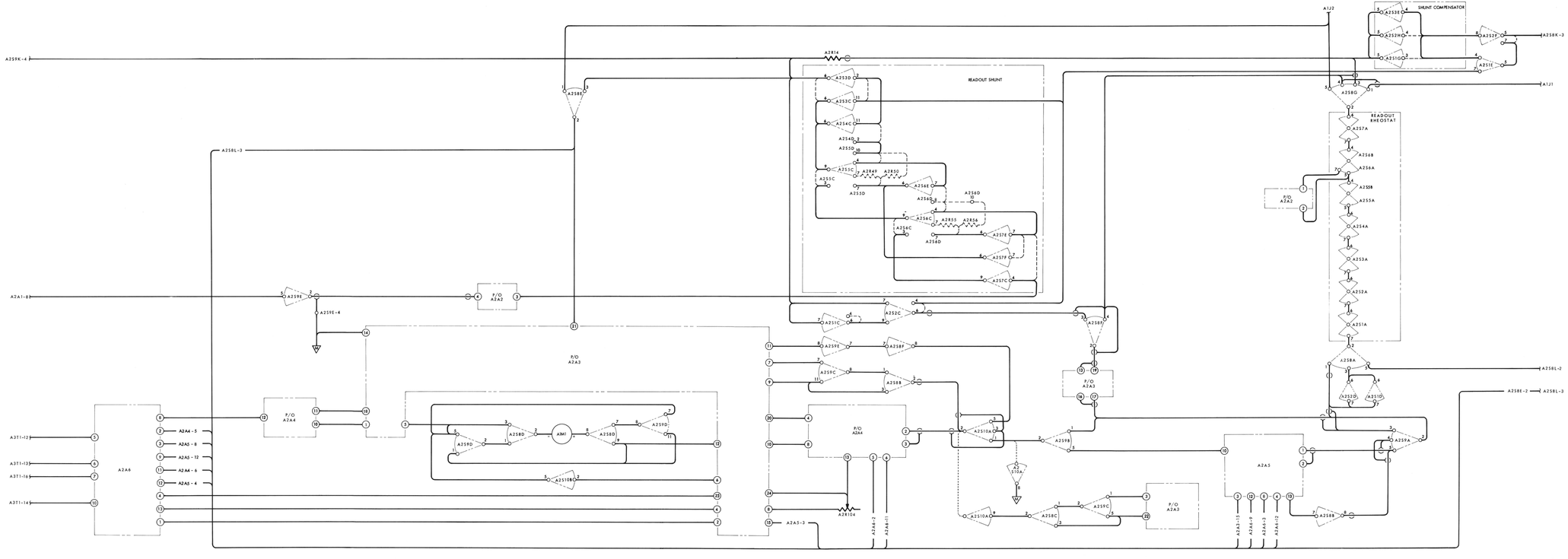

NOTES:

ALL SOLID LINES SHOWN REPRESENT EXTERNAL WIRING BETWEEN PRINTED CIRCUIT BOARDS, COMPONENTS, AND SWITCHES.

DASHED LINES BETWEEN SWITCH DECK CLIPS REPRESENT BUSS WIRE CONNECTIONS.

ALL DOTTED LINES BETWEEN DESIGNATED AND NON-DESIGNATED SWITCH CLIPS INDICATE THAT THESE CLIPS ARE ONE AND THE SAME.

CLIPS ON SWITCH DECKS ARE NUMBERED CLOCKWISE FROM THE 12 O'CLOCK POSITION, AS VIEWED FROM THE FRONT-PANEL. EXCEPTIONS TO THIS ARE AS FOLLOWS:

(1) THE CLIPS OF THE REAR DECKS OF A251 THRU A257, EXTENDING BEYOND THE SHIELDED MEASUREMENT SECTION, ARE NUMBERED CLOCK-WISE FROM THE 3 O'CLOCK POSITION.

(2) THE CLIPS OF THE REAR DECKS OF A258 AND A259, BEHIND THE SEPARATING BULKHEAD WITHIN THE MEASUREMENT SECTION, ARE ALSO NUMBERED CLOCKWISE FROM THE 3 O'CLOCK POSITION.

WIRING DIAGRAM

MEASUREMENT SECTION

760A-1000-4

MODEL 760A METER CALIBRATOR

SER NO 123 & ON

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NOTES:

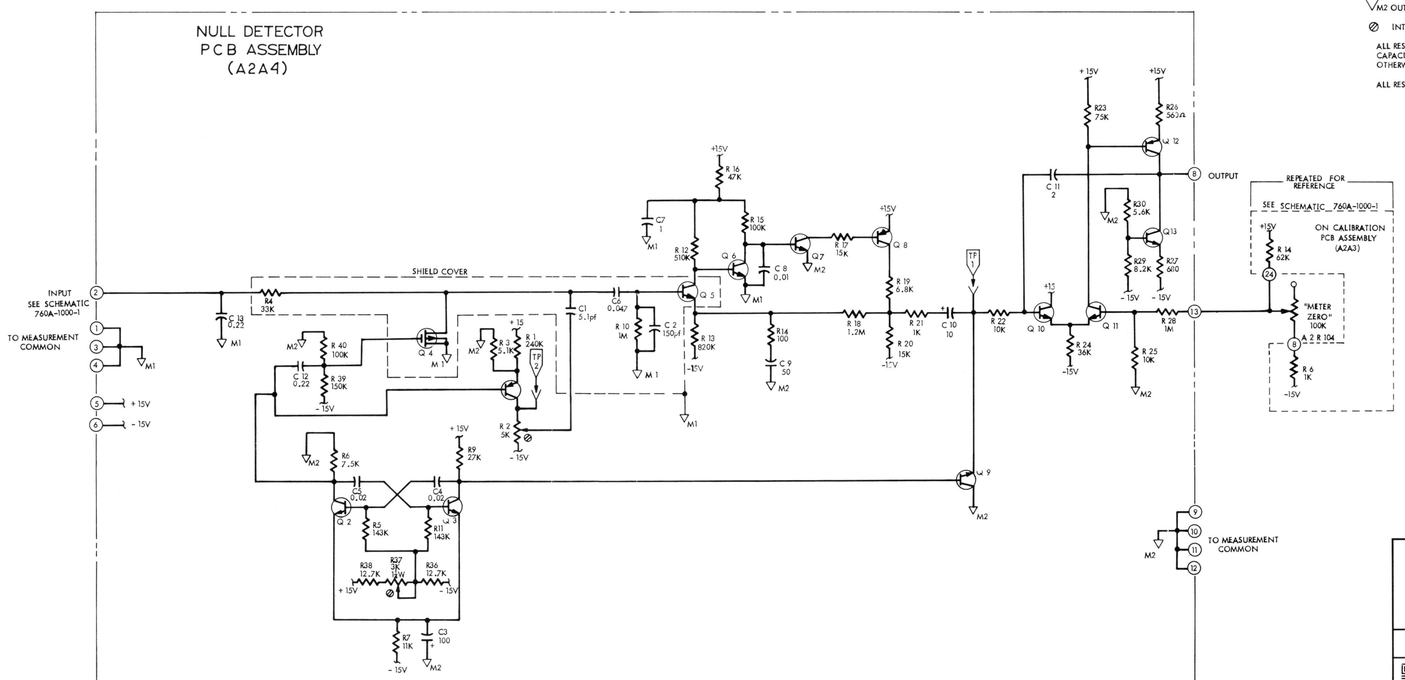
M1 INPUT COMMON

M2 OUTPUT COMMON

⊘ INTERNAL ADJUSTMENT

ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE SPECIFIED.



FUNCTIONAL SCHEMATIC DIAGRAM

NULL DETECTOR (A2 A4)

760A-1001

MODEL 760A METER CALIBRATOR

SER. NO. 123 & ON

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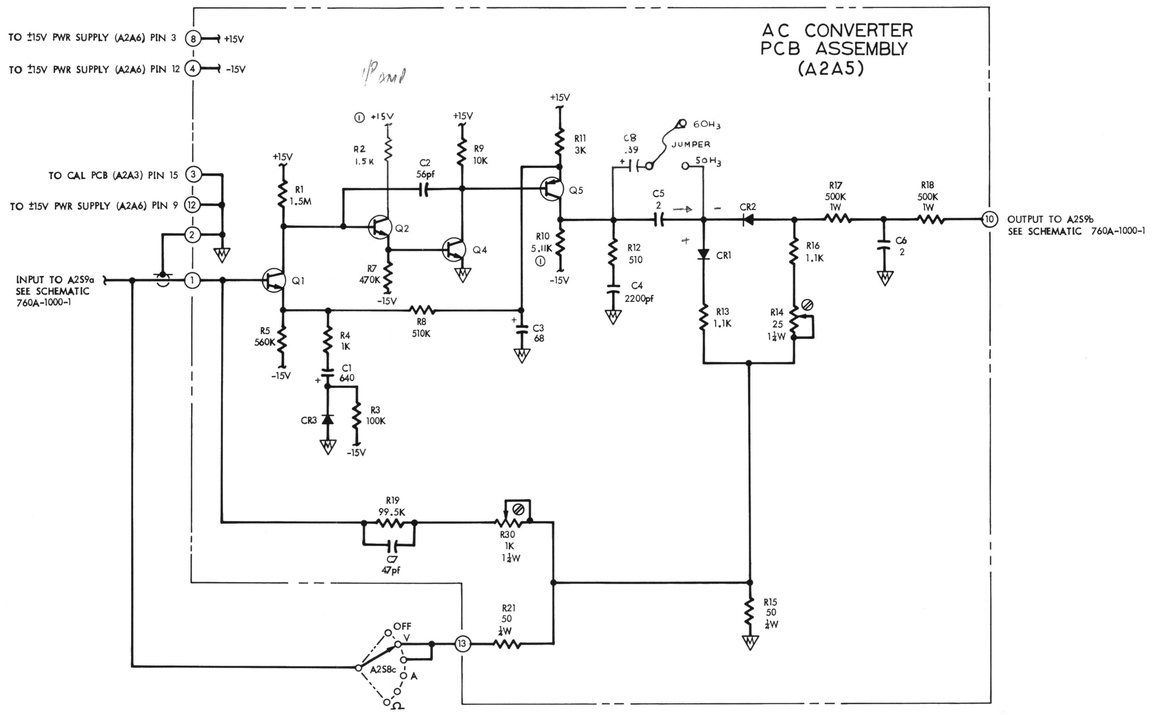

NOTES :

MEASUREMENT COMMON

INTERNAL ADJUSTMENT

ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE DESIGNATED

① ALL RESISTORS ARE ¼WATT UNLESS OTHERWISE DESIGNATED FOR S/N 400 & ON ADDED R2, C8, JUMPER & TERMINALS. R10 WAS 5.6K.

FUNCTIONAL SCHEMATIC DIAGRAM
AC CONVERTER (A2 A5)
760A-1002
MODEL 760A METER CALIBRATOR 6
SER. NO. 123 & ON
FLUKE JOHN FLUKE MFG. CO., INC.
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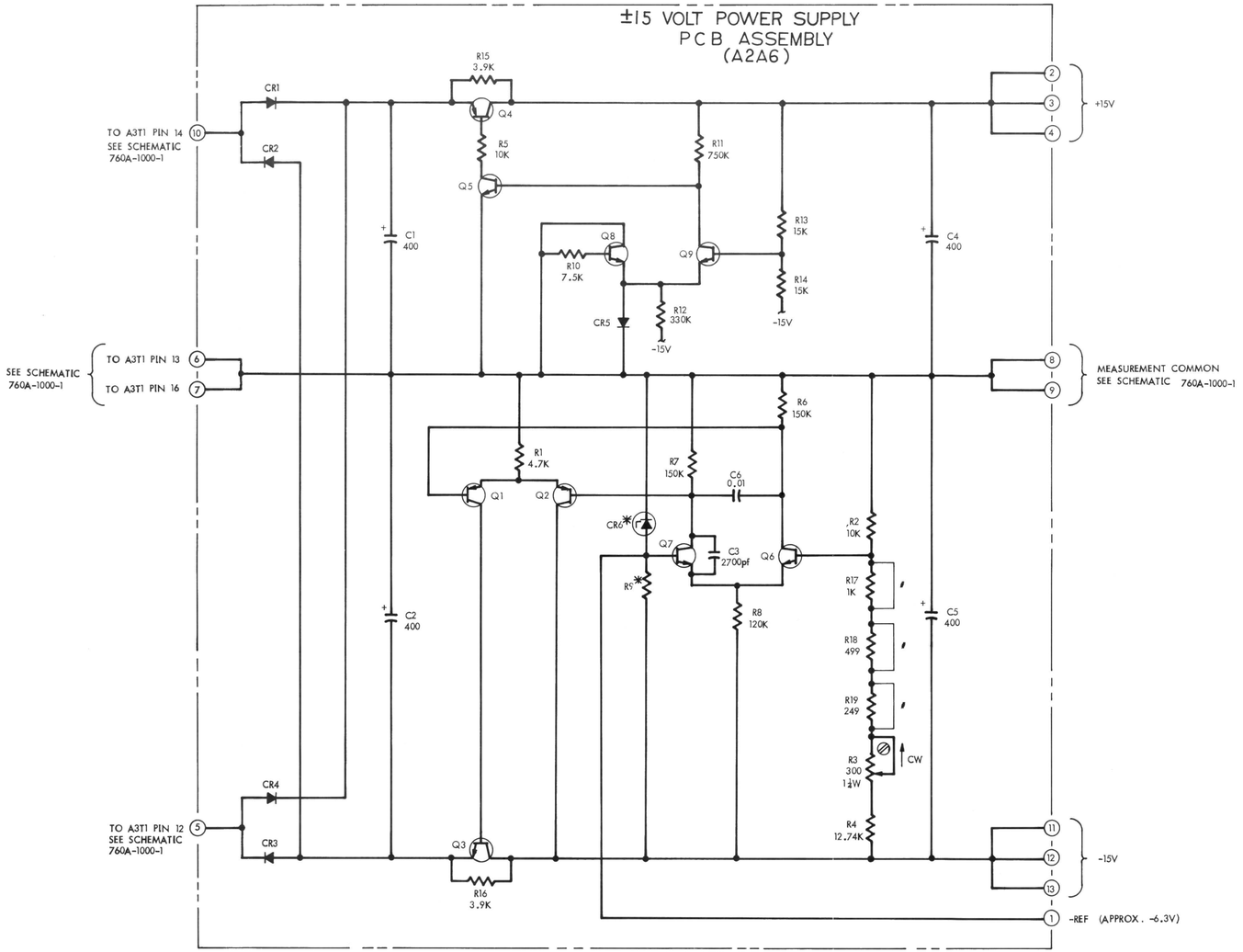
±15 VOLT POWER SUPPLY PCB ASSEMBLY (A2A6)



NOTES :

- ✳ INDICATES CR6 AND R9 ARE A MATCHED SET SELECTED AT THE FACTORY
- ⊘ INTERNAL ADJUSTMENT
- ′ BUSS WIRE SHORTING STRIPS ON R17, R18, AND R19 ARE CUT AS NEEDED DURING CALIBRATION
- ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE INDICATED
- ALL RESISTORS ARE ¼ WATT UNLESS OTHERWISE INDICATED
- ↑ CW ROTATING CONTROL CLOCKWISE MOVES WIPER IN DIRECTION INDICATED BY ARROW

FUNCTIONAL SCHEMATIC DIAGRAM
±15 VOLT POWER SUPPLY
(A2 A6)
760A-1003
MODEL 760A METER CALIBRATOR a
SER. NO. 123 & ON

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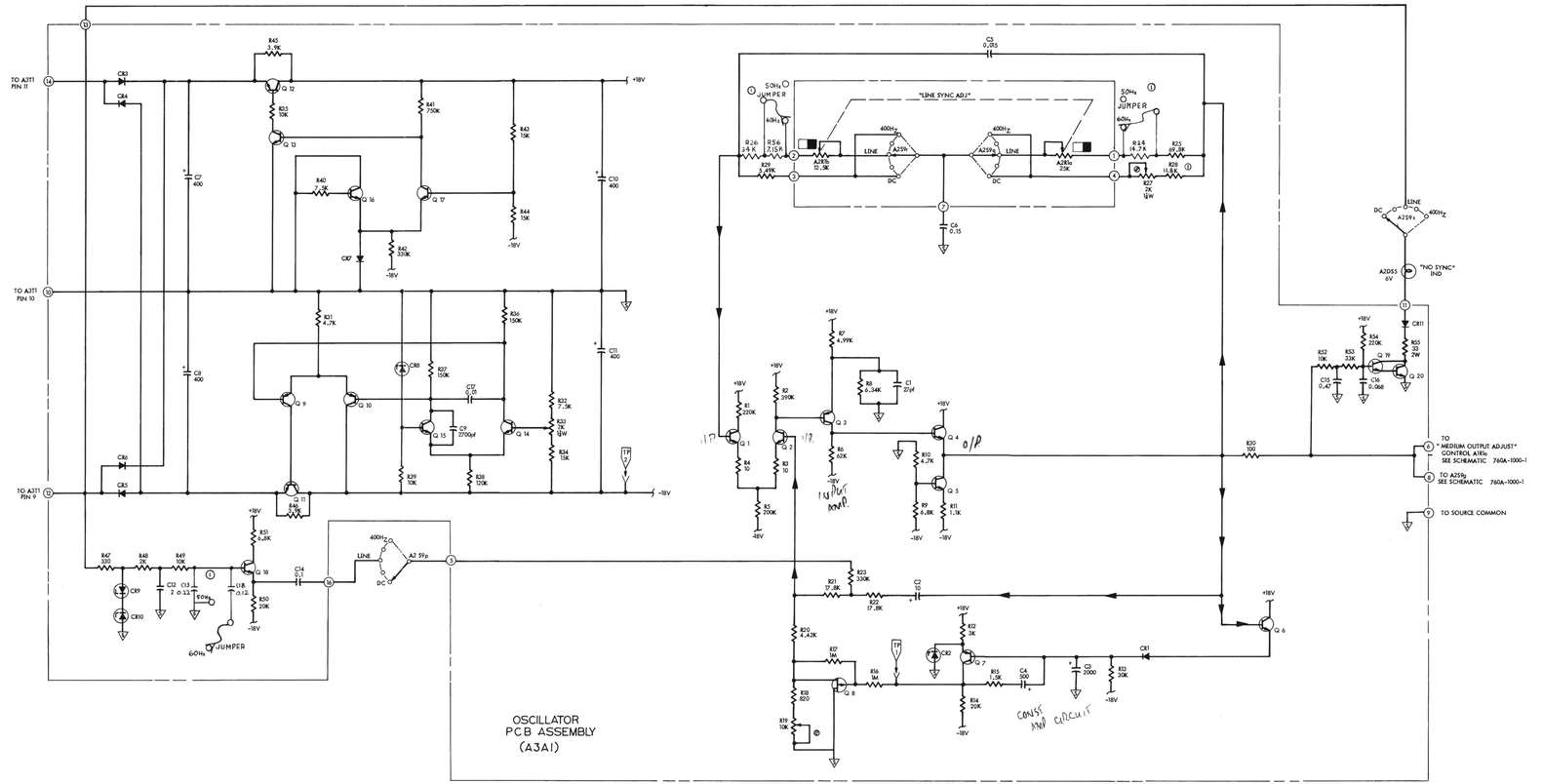

NOTES:

- SOURCE COMMON
- INTERNAL ADJUSTMENT
- LOCATED ON MEASUREMENT CHASSIS

NON-DESIGNATED POLES OF "FREQUENCY" SWITCH A2S9 ARE "STD-BY" (STAND-BY) POSITIONS

ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE ¼ WATT UNLESS OTHERWISE SPECIFIED.

① FOR S/N 198 THRU 207, 400 AND ON ADDED R26, R56, C18 & JUMPERS. R28 WAS 11K.

FUNCTIONAL SCHEMATIC DIAGRAM

OSCILLATOR (A2 A1)

760A-1005

MODEL 760A METER CALIBRATOR

SER. NO. 123 & ON

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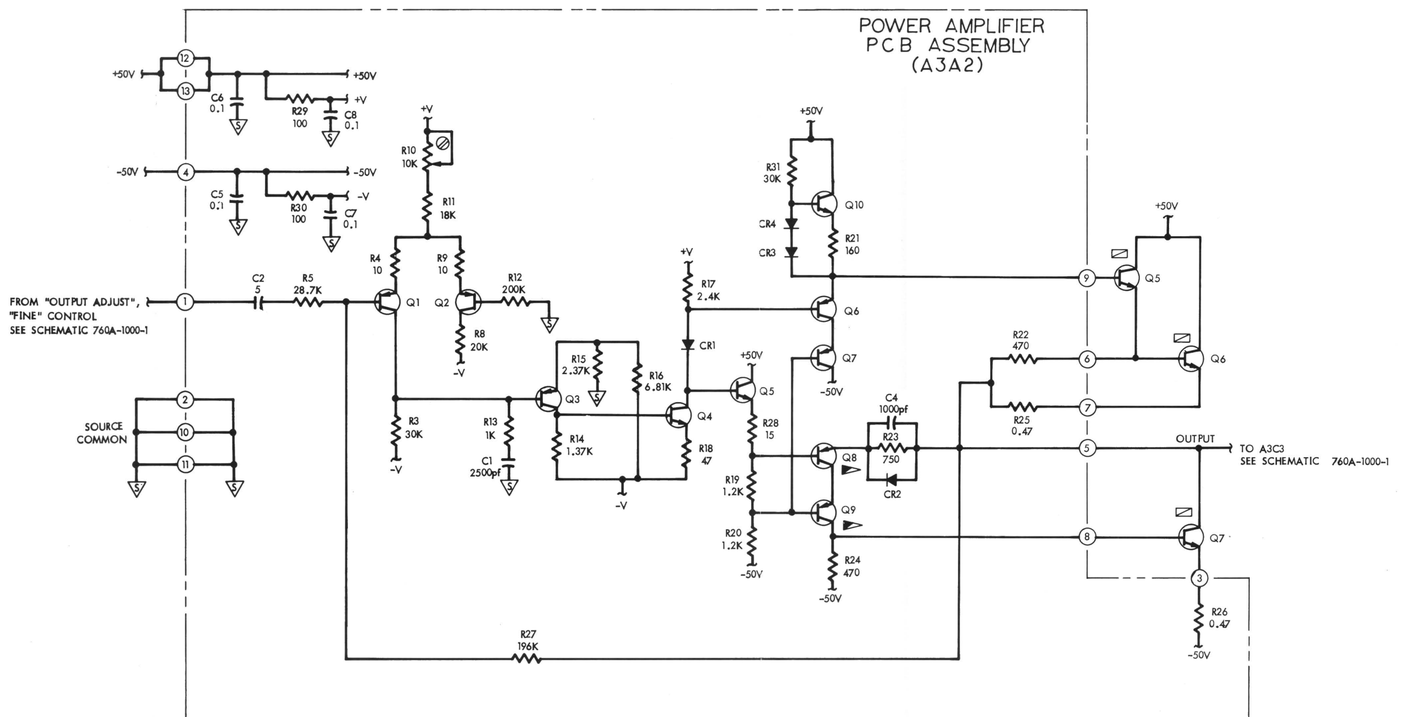


NOTES :

SOURCE COMMON

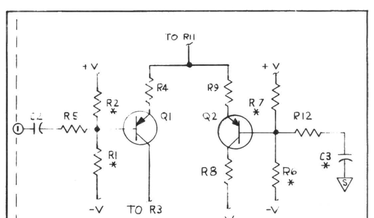
MOUNTED ON HEAT RADIATOR LOCATED AT REAR OF MAIN CHASSIS (A3)

INTERNAL ADJUSTMENT

CLIP-ON HEAT RADIATORS

ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS OTHERWISE DESIGNATED

CHANGES :



FUNCTIONAL SCHEMATIC DIAGRAM

POWER AMPLIFIER (A3 A2)

760A-1006

MODEL 760A METER CALIBRATOR b

SER. NO. 123 & ON

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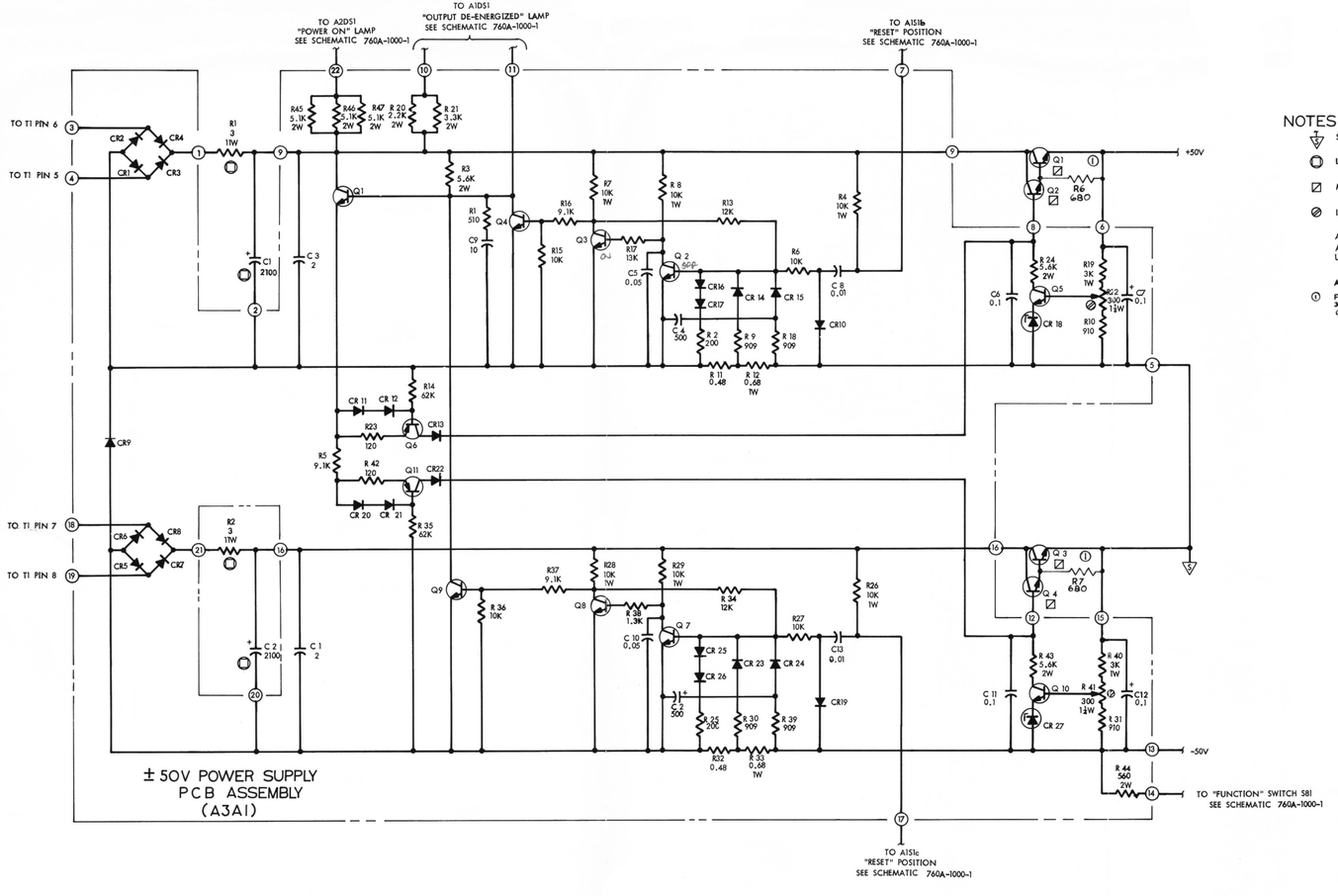

NOTES:

- SOURCE COMMON
- LOCATED ON MAIN CHASSIS (A3)
- MOUNTED ON HEAT RADIATOR LOCATED AT REAR OF MAIN CHASSIS (A3)
- INTERNAL ADJUSTMENT

ALL RESISTOR VALUES ARE IN OHMS AND
ALL CAPACITOR VALUES ARE IN MICROFARADS
UNLESS OTHERWISE NOTED

ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE DESIGNATED

① FOR S/N 260, 262, 264, 267, 271, 273 THRU 307, 400 AND ON. R6 & R7 ADDED TO MAIN CHASSIS ASSY.

FUNCTIONAL SCHEMATIC DIAGRAM
±50 VOLT POWER SUPPLY
(A3 A1)
760A-1007
MODEL 760A METER CALIBRATOR b
SER. NO. 123 & ON

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