FLUKE®

# Instruction Manual

Model

# 750A

## Reference Voltage Divider

P/N 294082

SEPTEMBER 1968

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MODEL 750A REFERENCE VOLTAGE DIVIDER

# SECTION I

# INTRODUCTION AND SPECIFICATIONS

## 1-1. INTRODUCTION

1-2. The Fluke Model 750A is an extremely accurate and stable reference voltage divider having an input voltage range of 1100 to 1.1 volts dc and an output voltage range of 1100 to 0.1 volts dc. It is intended primarily for the purpose of making traceable measurements through use with a null detector and a standard cell. The combination of reference divider and null detector compares the output voltage of the divider to the standard cell voltage. Traceability is from the divider ratios to the standard cell in use, to the primary standard cell, to the inter-laboratory standard cell, and then to the National Bureau of Standards.

1-3. The primary application of the Model 750A is that of a stable accurate ratio reference for use in a dc calibration system including a voltage source, a standard cell and a null detector. Such a calibration system may be used as a reference for voltage stability measurements by utilizing the recorder output of the null detector as the common input of a recorder. In this application, the stability of the reference approaches that of the standard cell. The Model 750A may also be used as a volt box to extend the measurement range of laboratory potentiometers.

1-4. The use of switches for the selection of input and output voltage taps makes the Model 750A fast and convenient to use. Adjustment potentiometers in the divider string eliminate the need for correction curves. An overvoltage protection circuit is included to prevent operator error from causing damage to the instrument.

## 1-5. SPECIFICATIONS

INPUT VOLTAGES (Switched)
1.1, 5, 10, 50, 100, 500, 1000, 1100 volts dc.

OUTPUT VOLTAGES (Switched)
0.1, 0.5, 1, 1.1, 5, 10, 50, 100, 500, 1000, 1100 volts dc.

STANDARIZING OUTPUT
1.017000 to 1.019999 volts dc in 1 microvolt steps.

DIVISION RATIO ACCURACY AND STABILITY (Referended to Standard Cell Tap) ±(0.001% of output + 0.5 microvolt) for 1 year.

CALIBRATION
All taps 1.1 volt and above are adjustable to ±10 ppm.

CALIBRATION RESOLUTION
0.2 ppm.

DIVIDER CURRENT
1 milliampere nominal.

INPUT CURRENT ADJUST
Coarse and fine front-panel rheostats provide an input voltage adjustment span of 10 millivolt with better than 1 microvolt resolution.

OVERVOLTAGE PROTECTION
Up to 2,000 volts may be applied on any input range without damage.

OPERATING TEMPERATURE RANGE
15°C to 35°C.

TEMPERATURE COEFFICIENT OF OUTPUT
±1 ppm/°C over operating range.

INITIAL CALIBRATION TEMPERATURE
23(±1)°C.

STORAGE TEMPERATURE RANGE
-62°C to +70°C.

HUMIDITY
0 to 80%.

SHOCK
Meets 20g, 11 ms shock tests of MIL-E-4970A.

VIBRATION
Meets 10 Hz - 55 Hz tests of MIL-T-945A.

POWER
Two 6.75 volt mercury batteries power the over-voltage protection circuit. Recommended replacement interval is 1 year.

SIZE
3-1/2" high x 19" wide x 13" behind panel.

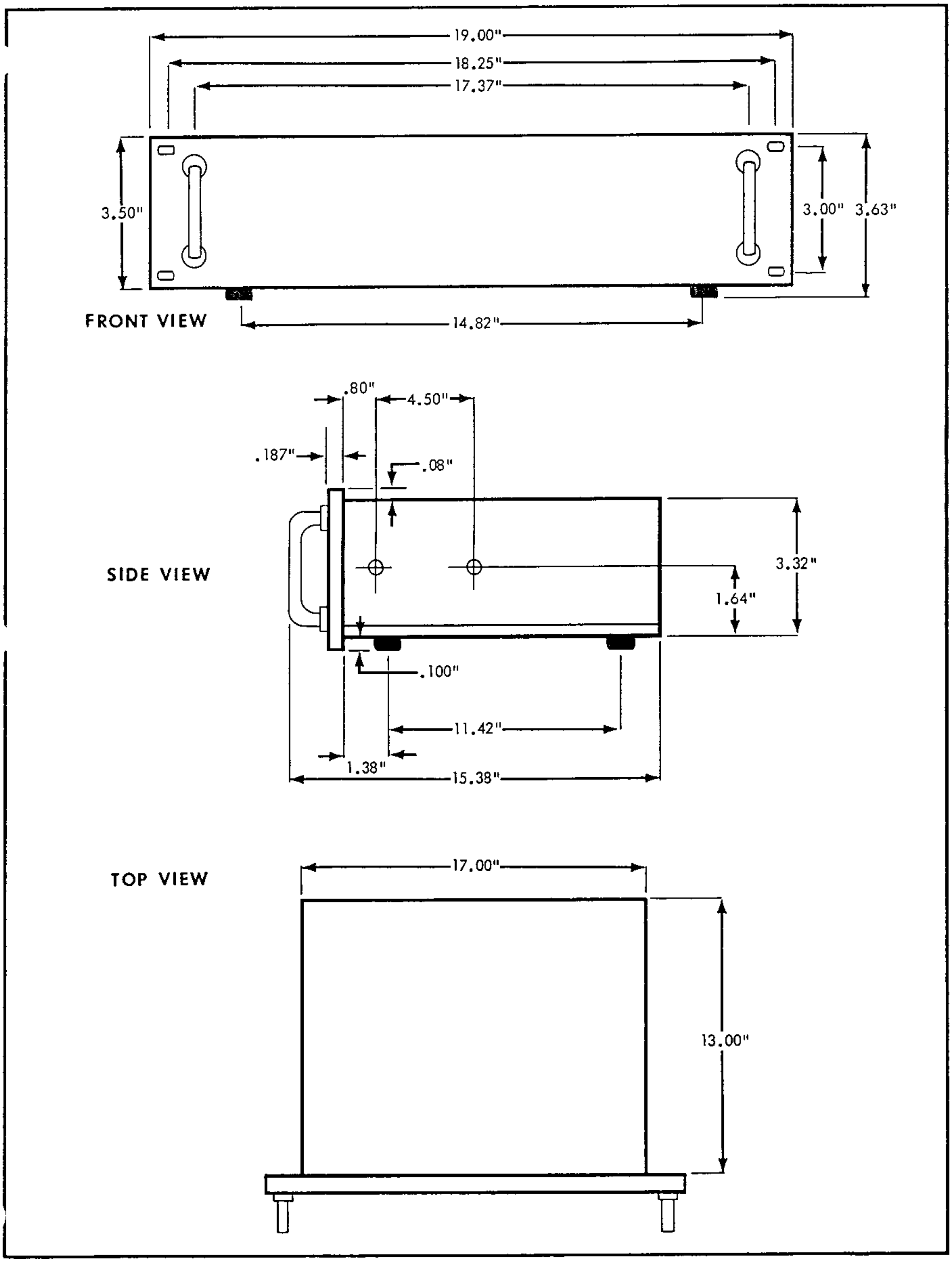
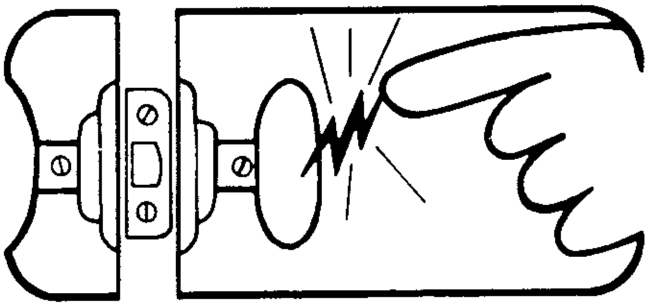



Figure 1-1. OUTLINE DRAWING

# static awareness

A Message From

**John Fluke Mfg. Co., Inc.**



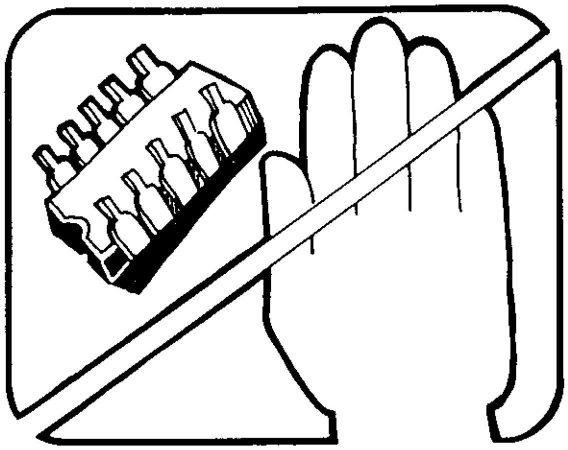
Some semiconductors and custom IC's can be damaged by electrostatic discharge during handling. This notice explains how you can minimize the chances of destroying such devices by:

1. Knowing that there is a problem.
2. Learning the guidelines for handling them.
3. Using the procedures, and packaging and bench techniques that are recommended.

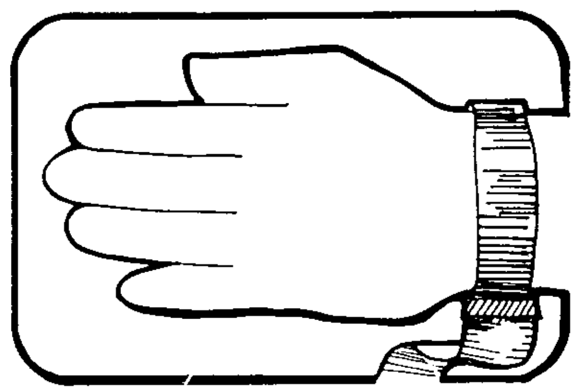
The Static Sensitive (S.S.) devices are identified in the Fluke technical manual parts list with the symbol

" ⊗ "

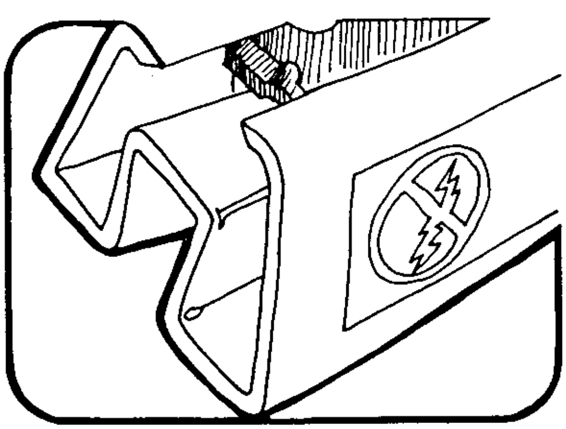
The following practices should be followed to minimize damage to S.S. devices.



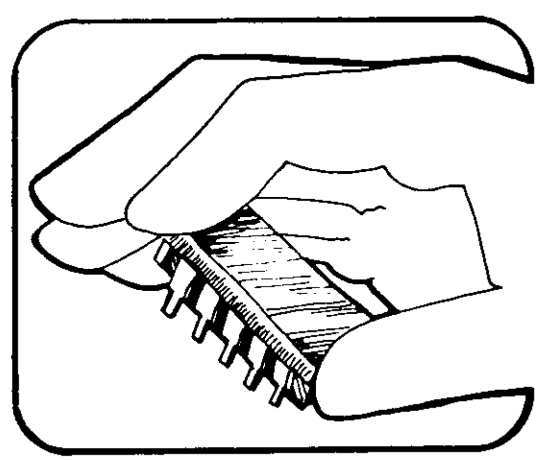
1. MINIMIZE HANDLING



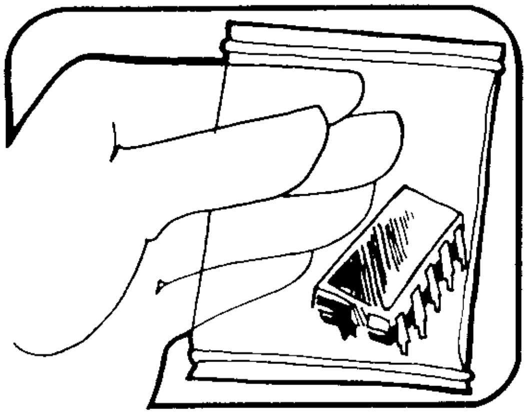
3. DISCHARGE PERSONAL STATIC BEFORE HANDLING DEVICES



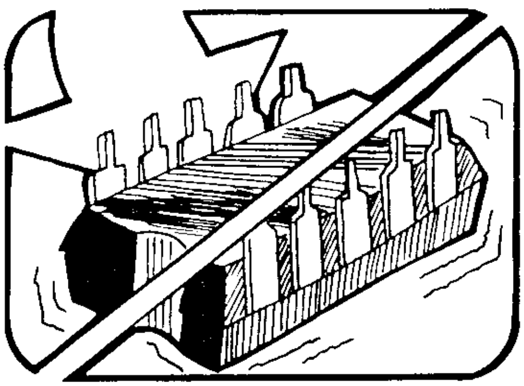
2. KEEP PARTS IN ORIGINAL CONTAINERS UNTIL READY FOR USE.



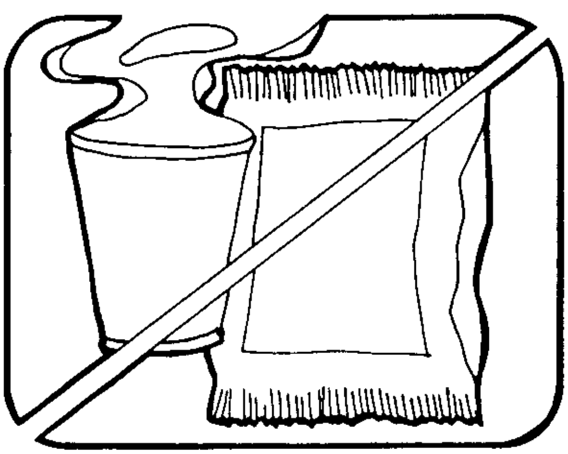
4. HANDLE S.S. DEVICES BY THE BODY



5. USE ANTI-STATIC CONTAINERS FOR HANDLING AND TRANSPORT



6. DO NOT SLIDE S.S. DEVICES OVER ANY SURFACE



7. AVOID PLASTIC, VINYL AND STYROFOAM® IN WORK AREA

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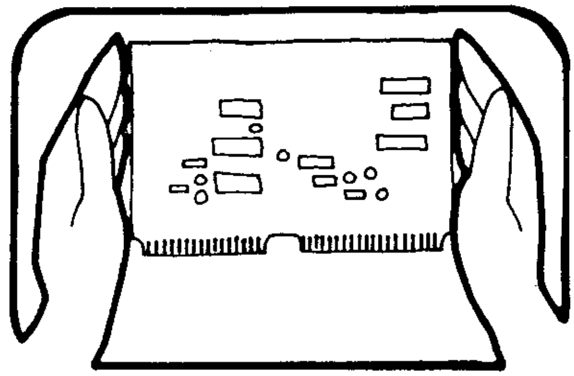
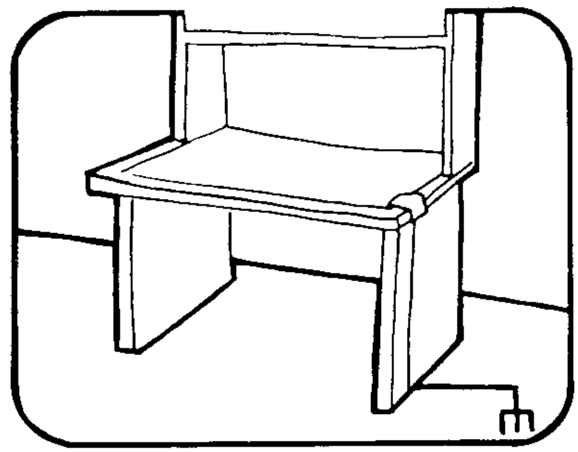
AND GENERAL DYNAMICS, POMONA DIV.



8. WHEN REMOVING PLUG-IN ASSEMBLIES, HANDLE ONLY BY NON-CONDUCTIVE EDGES AND NEVER TOUCH OPEN EDGE CONNECTOR EXCEPT AT STATIC-FREE WORK STATION. PLACING SHORTING STRIPS ON EDGE CONNECTOR USUALLY PROVIDES COMPLETE PROTECTION TO INSTALLED SS DEVICES.



9. HANDLE S.S. DEVICES ONLY AT A STATIC-FREE WORK STATION

10. ONLY ANTI-STATIC TYPE SOLDER-SUCKERS SHOULD BE USED.

11. ONLY GROUNDED TIP SOLDERING IRONS SHOULD BE USED.

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Anti-static bags, for storing S.S. devices or pcbs with these devices on them, can be ordered from the John Fluke Mfg. Co., Inc.. See section 5 in any Fluke technical manual for ordering instructions. Use the following part numbers when ordering these special bags.

| John Fluke Part No. | Description |
|---|---|
| 453522 | 6" X 8" Bag |
| 453530 | 8" X 12" Bag |
| 453548 | 16" X 24" Bag |
| 454025 | 12" X 15" Bag |
| Pink Poly Sheet | Wrist Strap |
| 30"x60"x60 Mil | P/N TL6-60 |
| P/N RC-AS-1200 | $7.00 |
| $20.00 | |

® Dow Chemical



J0089B-07U7810/SE EN Litho in U.S.A.

# SECTION II

# OPERATING INSTRUCTIONS

## 2-1. INTRODUCTION

2-2. This section contains the instructions for use and operation of the Fluke Model 750A. Instructions for use and operation in a dc calibration system and in a dc voltage stability test setup have been included because the primary purpose of the instrument is to provide a means of making voltage measurements of known absolute accuracy traceable to the National Bureau of Standards through a standard cell.

## 2-3. TEMPERATURE CONTROL

2-4. The Fluke Model 750A is factory calibrated at 73.4°F → 23±1°C, and has a temperature coefficient of ±1 ppm/°C. If the instrument is to be used in an environment significantly different from 23°C, it must be recalibrated at the operating temperature or the appropriate derating must be applied to the accuracy of measurement.

## 2-5. FUNCTIONS OF CONTROLS AND TERMINALS

2-6. The name and function of the controls, terminals, and indicators of the Model 750A 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.

## 2-7. USE IN A DC CALIBRATION SYSTEM

2-8. The Model 750A, a dc voltage source, a null detector, and a standard cell comprise a dc calibration system with accuracy of 10 to 30 ppm, depending on the accuracy of the auxilliary equipment used. A list of recommended equipment is given in Figure 2-2.

## 2-9. OPERATION OF THE DC CALIBRATION SYSTEM

2-10. A dc calibration system based on the Model 750A Reference Divider is shown in Figure 2-3. Connect the equipment as follows:

a. Set INPUT VOLTAGE switch to RESET.

b. Connect the power supply to the INPUT VOLTAGE terminals.

Note!

If a power supply with a grounded output is used, the instrument being calibrated must be ungrounded to avoid ground loop problems.

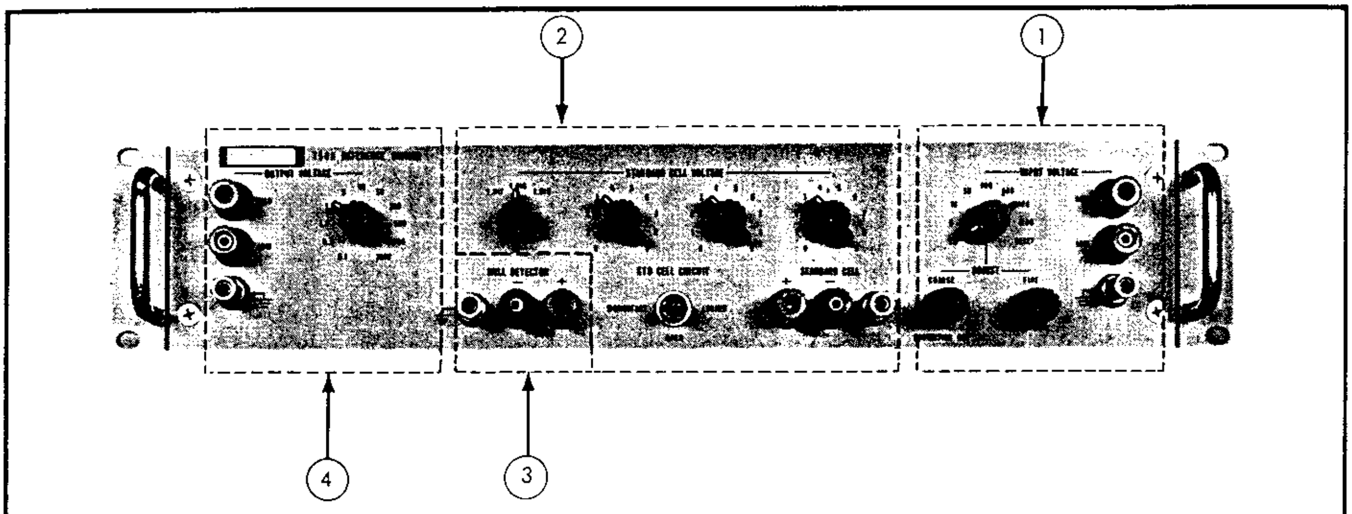
c. Set the polarity switch of the power supply and set the output voltage to the desired output.

d. Set the STANDARD CELL switch to OPEN and set the STANDARD CELL VOLTAGE dials to the correct standard cell voltage.

**CAUTION!**

The standard cell polarity and the power supply polarity must agree to avoid damaging the standard cell by drawing excessive current from it.

e. Connect the null detector to the NULL DETECTOR binding posts and connect a standard cell to the STANDARD CELL binding posts. This places the null detector and the standard cell in series.



| | CONTROL OR TERMINAL | FUNCTION |
|---|---|---|
| 1 | INPUT VOLTAGE | |
| | rotary switch | Used to select the desired input voltage from 1.1 to 1100 volts. In RESET position, disconnects divider string from input terminals and resets overvoltage trip. |
| | red terminal | High input terminal for connection of input voltage. |
| | black terminal | Low input terminal for connection of input voltage. |
| | metallic terminal | Chassis ground terminal for convenience. |
| | COARSE ADJUST | Coarse trimmer for input voltage adjustment. |
| | FINE ADJUST | Fine trimmer for input voltage adjustment. |
| 2 | STANDARD CELL VOLTAGE | |
| | four rotary switches | Used to set standardizing output of Model 750A to the voltage of the standard cell in use. Any voltage from 1.017000 to 1.019999 may be selected. |
| | STANDARD CELL | |
| | red terminal | Used to connect positive terminal of standard cell to reference divider. |
| | black terminal | Used to connect negative terminal of standard cell to reference divider. |
| | metallic terminal | Chassis ground terminal for convenience. |
| | STD CELL CIRCUIT | Toggle switch closes the standard cell circuit to standardize the divider input. Closure may be MOMENTARY or LOCKED. |
| 3 | NULL DETECTOR | |
| | red terminal | Used to connect input terminal of null detector to reference divider. |
| | black terminal | Used to connect common terminal of null detector to reference divider. |
| | metallic terminal | Chassis ground terminal for convenience. |
| 4 | OUTPUT VOLTAGE | |
| | rotary switch | Used to select the desired output voltage from 0.1 to 1100 volts. The selected output voltage must be no higher than the input voltage. |
| | red terminal | High output terminal. |
| | black terminal | Low output terminal. |
| | metallic terminal | Chassis ground terminal for convenience. |

Figure 2-1. LOCATION AND FUNCTION OF CONTROLS AND TERMINALS

| RECOMMENDED EQUIPMENT | SPECIFICATIONS |
|---|---|
| DC Voltage Source, Fluke Model 332B | Output voltage to 1100 volts. Minimum noise and ripple, and maximum short-term stability. |
| Null Detector, Fluke Model 845AB | Full scale sensitivity of 10 uv or better. High input resistance and battery operation are preferred. |
| Standard cells and enclosure, Guildline Instruments, Model 9152/P4 | Saturated cells are recommended. However unsaturated cells may be used with reduced accuracy. Leakage resistance must be at least $10^{11}$ ohms. |

Figure 2-2. RECOMMENDED COMPONENTS OF A DC CALIBRATION SYSTEM

f. Set the INPUT VOLTAGE switch to the desired input voltage.

g. Set the OUTPUT VOLTAGE switch to the desired output.

h. Turn on all equipment including the power supply output and allow it to warm up until it reaches temperature equilibrium.

i. Set the null detector to reduced sensitivity (1 volt, for example).

j. Throw the STANDARD CELL switch to MOMENTARY and note deflection of the null detector. Adjust the COARSE and FINE INPUT VOLTAGE controls and, if necessary, the power supply output voltage to obtain a zero indication on the null detector. Increase sensitivity of the null detector as null is approached. Final null should be on the 10 microvolt range.

k. The selected output voltage is now available at the OUTPUT VOLTAGE terminals and it may be used as a calibration source.

## 2-11. APPLICATIONS

### 2-12. CALIBRATING VOLTAGE STANDARDS

2-13. Voltage standards or calibrated power supplies can be calibrated with only the Model 750A, a standard cell, and a null detector. Proceed as follows:

a. Set the STANDARD CELL VOLTAGE dials to the correct standard cell voltage.

b. Set the STANDARD CELL switch to OPEN, and set the null detector for reduced sensitivity.

c. Connect the null detector to the NULL detector binding posts and connect a standard cell to the standard cell binding post.

d. Set the INPUT VOLTAGE switch to RESET.

*Note!*

Setting the INPUT VOLTAGE switch to RESET disconnects the input terminals and the overvoltage circuit. Failure to set the switch to reset may, at certain output settings, permit sufficient current flow in the overvoltage circuit to seriously impair the accuracy of the calibration being performed.

e. Connect the instrument to be calibrated to the OUTPUT VOLTAGE binding posts and set the OUTPUT VOLTAGE switch to 1100.

**CAUTION!**

The overvoltage protective circuit is inoperative when voltage is applied to the output binding posts. Care must be taken to prevent decreasing the setting of the OUTPUT VOLTAGE switch without first decreasing the applied voltage. Failure to observe this precaution may damage the equipment.

f. Turn on the equipment and allow it to warmup.

g. Set the output of the instrument being tested to the calibration voltage and set the OUTPUT VOLTAGE switch of the Model 750A to the same voltage.

h. Throw the standard cell switch to MOMENTARY and note deflection of the null detector.

i. Adjust the calibration control of the instrument being calibrated increasing null sensitivity until a null is obtained.

j. Repeat steps g through i for each calibration point.

### 2-14. DC VOLTAGE STABILITY MEASUREMENTS

2-15. Voltage stability measurements can be referenced to a standard cell by using the test setup shown in Figure 2-4. To make stability measurements, connect the equipment and proceed as follows:

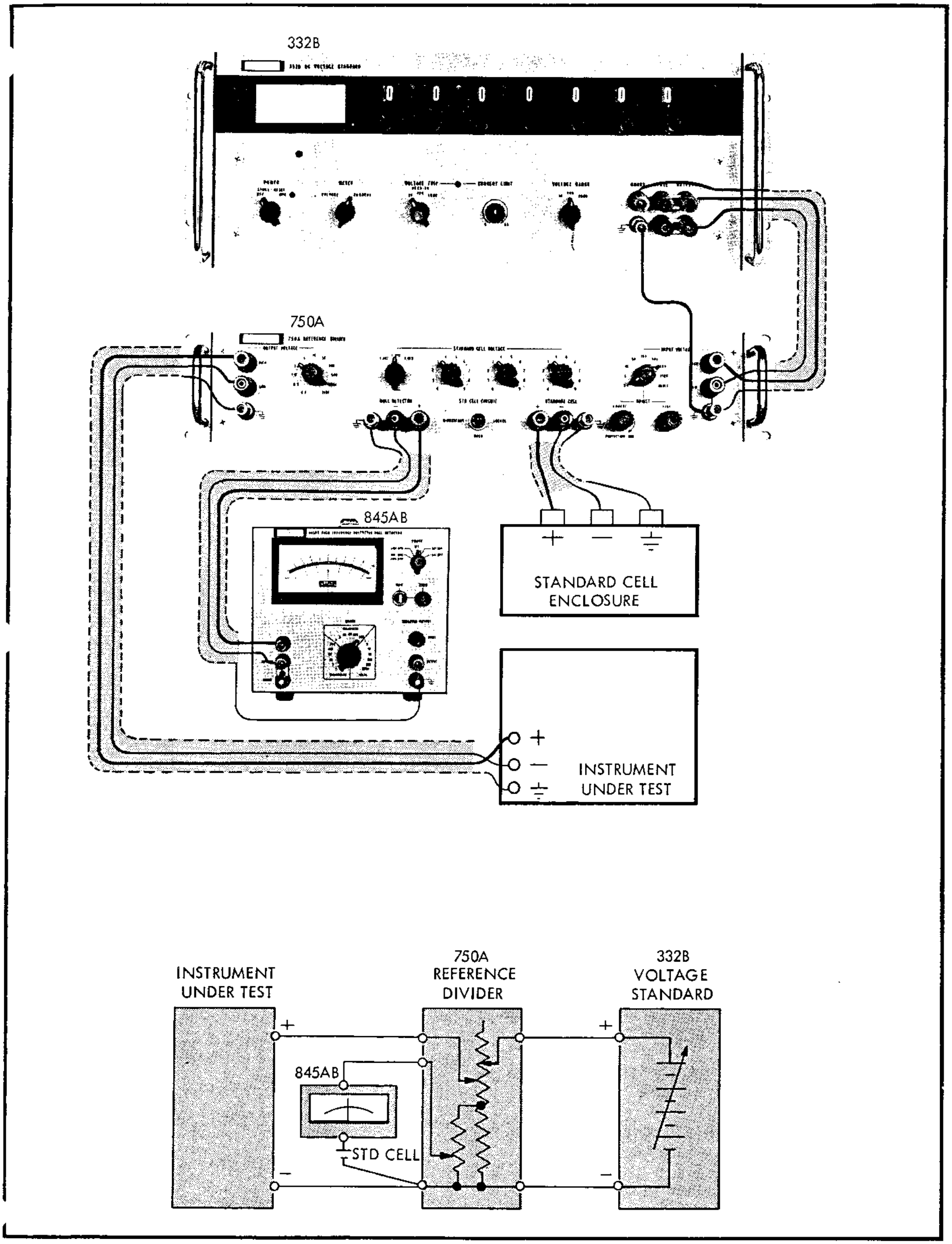



Figure 2-3. EQUIPMENT CONNECTIONS FOR A DC CALIBRATION SYSTEM

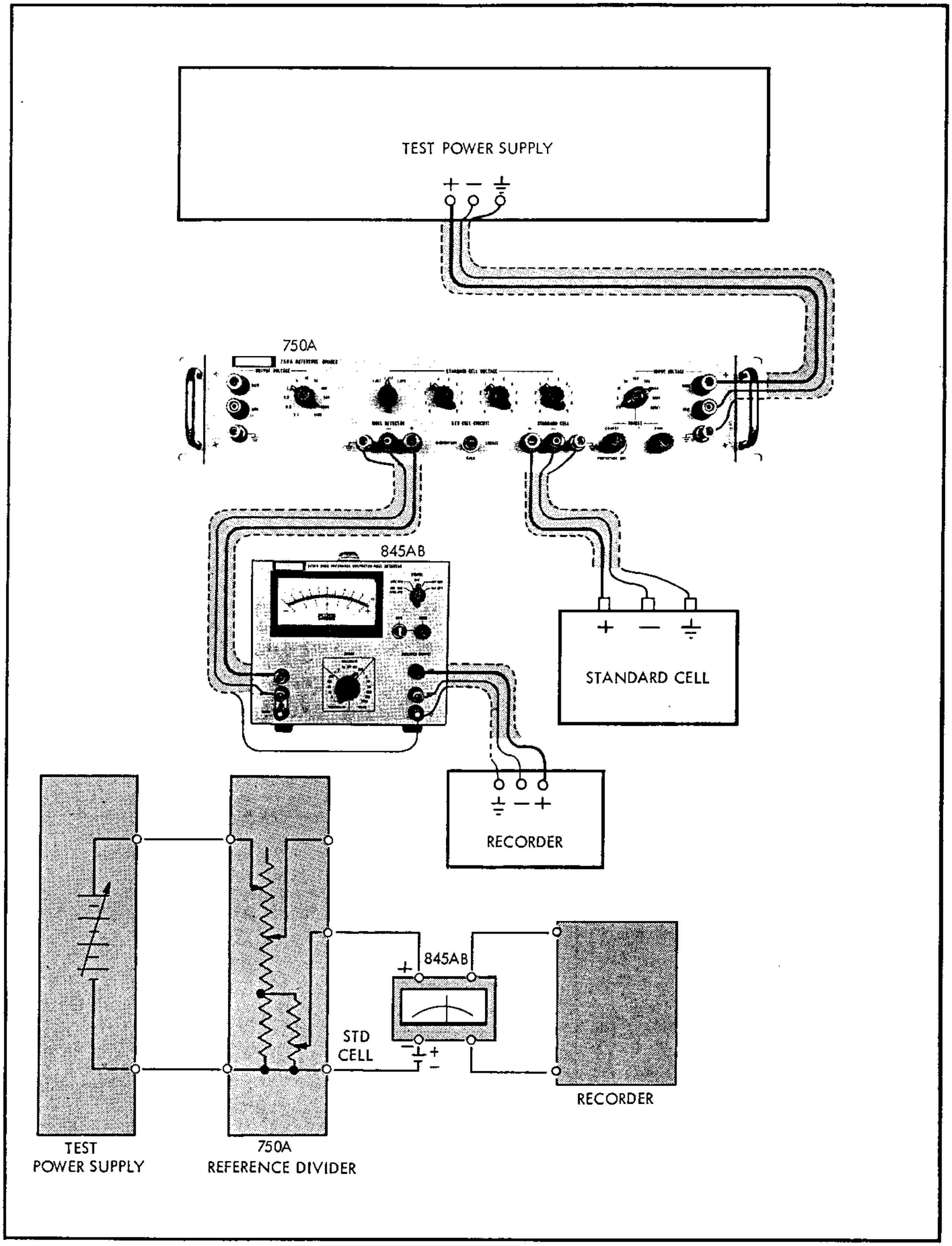



Figure 2-4. EQUIPMENT CONNECTIONS FOR STABILITY MEASUREMENTS

a. Set the power supply output and the INPUT VOLTAGE switch to the same value.

b. Turn on the equipment and allow it to warm up until it reaches temperature equilibrium.

c. Set the STANDARD CELL VOLTAGE dials to the correct standard cell voltage.

d. Throw the STANDARD CELL switch to MOMENTARY and adjust the COARSE and FINE INPUT VOLTAGE controls to obtain a zero indication on the null detector at the desired sensitivity.

e. Throw the STANDARD CELL switch to LOCKED position and adjust the recorder output controls of the null detector and the recorder controls to obtain the desired sensitivity on the recording.

*Note!*

For best results over long intervals it is essential that ambient temperature be maintained at a constant level because of its effect on all parts of the system. If the test is conducted in an environment with a cyclic temperature variation of a few degrees, the stability recording will be found to track the temperature cycles.

## 2-16. NOTES ON OPERATION

2-17. STANDARD CELLS

2-18. The standard cells provide traceability of the measurement to the National Bureau of Standards. Consequently they should be cared for and used properly. The cells should be compared weekly to saturated cells having traceability to the National Bureau of Standards.

2-19. The function of a standard cell is to provide a fixed standard emf at very low current. Current drain from a standard cell causes a slow, permanent change in cell voltage. If the STANDARD CELL switch is set to LOCKED and the overvoltage trip removes input voltage from the reference divider, the standard cell will discharge through the null detector resistance. Consequently, the STANDARD CELL switch should never be left in the LOCKED position when a null detector having low input resistance (for example, a galvanometer) is used.

2-20. OVERVOLTAGE TRIP

2-21. The overvoltage trip circuit prevents damage to the divider string resistors caused by reducing the setting of the INPUT VOLTAGE switch without reducing the input voltage. This circuit opens the input when the input voltage exceeds approximately 140% of the INPUT VOLTAGE switch setting. The overvoltage trip circuit is powered by two batteries which should be replaced once a year. See Section IV for battery replacement instructions.

2-22. OUTPUT CURRENT

2-23. Occasionally it may be necessary to provide a small output current at a given output voltage. When this need arises, the input voltage usually should be set to the same level as the output voltage to prevent current flow from the divider string. However, if the power supply being used has poor stability at low voltage, it may be desirable to set the input higher than the output voltage to reduce variation in the output.

*Note!*

Output current will be limited to approximately 0.4 milliampere by the overvoltage trip circuit.

To draw output current from the divider string, apply the load and increase the input voltage to obtain zero indication on the null detector.

## 2-24. SERVICING INFORMATION

2-25. The John Fluke Manufacturing Co., Inc. warrants each instrument manufactured by them for the period of one year upon making delivery of the instrument to you, the original purchaser. Complete warranty information is contained in the Warranty page located at the rear of this manual.

2-26. If you should encounter any problem in the operation of your instrument, please feel free to contact your nearest John Fluke Sales Representative or write directly to the John Fluke Manufacturing Co., Inc. with a statement of your problem.

# SECTION III

# THEORY OF OPERATION

## 3-1. PURPOSE OF THE MODEL 750A

3-2. The Model 750A provides a means of accurately comparing specific voltages from 0.1 volt to 1100 volts to the known potential of a standard cell. It may be used as a standardizing link in a dc calibration system or it may be used for direct comparison of power supply output and standard cell voltage.

## 3-3. THE MAIN DIVIDER STRING

3-4. The total effective resistance of the main divider string is 1.1 megohms. The input resistance is 1000 ohms per volt of rated input up to 1100 volts resulting in a nominal current of one milliampere. The input voltage may be adjusted by COARSE and FINE rheostats located on the front panel. The span of adjustment of 10 millivolts and resolution of better than one microvolt permit the operator to achieve an exact null. An adjustment in each step of the main divider string is used to compensate for drift during calibration.

## 3-5. STANDARD CELL VOLTAGE CONTROLS

3-6. The STANDARD CELL VOLTAGE controls shunt the lower end of the main divider string from common to the 1.1 volt tap. These controls form a modified Kelvin-Varley circuit spanning the range from 1.017000 volts to 1.019999 volts. They are used by the operator to obtain from the divider a voltage which will exactly equal the standard cell voltage when the input is at nominal value. This voltage is compared to the output of the standard cell by a null detector and the input to the divider is adjusted to obtain a null.

## 3-7. OVERVOLTAGE CIRCUIT

3-8. The overvoltage circuit (overvoltage trip) removes the input voltage from the divider when it exceeds approximately 1.4 times the setting of the INPUT VOLTAGE switch. The input voltage is applied to base of Q2 through a tapped resistive string which conducts approximately 0.07 milliampere at rated input voltage. Transistor Q2 is biased off when normal operating voltage is applied to the resistive string. Transistor Q1 is held cut off by Q2. When the input voltage to the divider reaches approximately 1.4 times the setting of the INPUT VOLTAGE switch, the current through the resistive string increases to 0.1 milliampere turning on Q2. Transistor Q2 turns on Q1 allowing capacitor C1 to discharge through the coil of relay K1 opening the input to the divider. Relay K1 is magnetically biased to remain in either the open or closed state until current flow through the coil is reversed. The operator may close the input to the divider by turning the INPUT VOLTAGE switch to RESET. This allows C202 to discharge in the opposite direction through the coil of K1 and also rapidly recharges C201 through R209. Operating power for the overvoltage circuit is furnished by two 6.75 volt mercury batteries.

# SECTION IV

# MAINTENANCE

## 4-1. INTRODUCTION

4-2. This section contains the instruction and information required for maintenance and calibration of the Model 750A Reference Divider. Because of the relative simplicity of the instrument and the critical nature of resistance matching and assembly processes, maintenance is limited in scope. When the instrument requires maintenance beyond that for which instructions are given in this manual, it should be returned to the factory for repair and recalibration.

## 4-3. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

4-4. The test equipment required for maintenance is listed in Figure 4-1. Equivalent or similar units may be substituted for those listed providing they have the required specifications given in the figure.

## 4-5. PREVENTIVE MAINTENANCE

4-6. Preventive maintenance of the Model 750A consists of battery replacement, leakage testing, and cleaning. Batteries should be replaced annually. The frequency with which leakage testing and cleaning should be performed depends upon the environment of the instrument. In an air conditioned standards laboratory, there will be little contamination of surfaces within the instrument and therefore leakage testing and cleaning will seldom be required. In a contaminated atmosphere leakage testing and cleaning will be required frequently to maintain the accuracy of the instrument.

## 4-7. BATTERY REPLACEMENT

4-8. The overvoltage trip circuit is powered by two 6.75 volt mercury cells which should be replaced annually. They are located inside a cover on the rear panel of the instrument as shown in Figure 4-2. To replace the cells proceed as follows:

a. Using a screwdriver turn the two battery cover fasteners one-quarter turn counterclockwise.

b. Lift the cover off.

c. Pull the two cells from their clips.

| RECOMMENDED EQUIPMENT | SPECIFICATIONS REQUIRED |
|---|---|
| Voltage source; Fluke Model 332B or Fluke Model 412B | Voltage source of 0 to 1100 vdc.<br>Accuracy of 0.25%.<br>Stability of 0.005% per hour. |
| DC Differential Voltmeter; Fluke Model 895A | 1 microvolt resolution.<br>100 megohms input resistance. |
| Standard Divider; Fluke Model 720A | Ratio accuracy of at least 1 ppm.<br>Ratio capability to 1.1. |
| Lead Compensator; Fluke Model 721A | Any commercial lead compensator is adequate. |
| DC Power Supply; Fluke Model 412B | Maximum output voltage of at least 1700 vdc. |
| Null Detector; Fluke Model 845AB | Sensitivity of at least 10 microvolts fullscale.<br>Battery operation. |

Figure 4-1. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

d. Place new cells in the clips.

e. Replace the battery cover and secure it by turning the fasteners one-quarter turn clockwise.

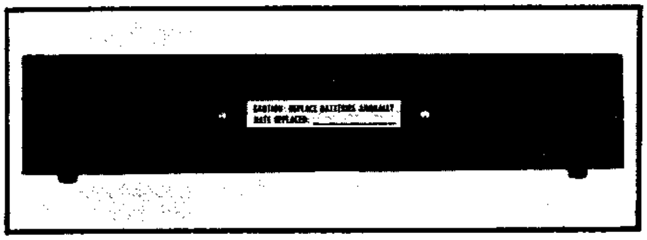


Figure 4-2. BATTERY LOCATION

4-9. LEAKAGE RESISTANCE TEST

4-10. The need for cleaning can be determined without removing the cover from the Model 750A by performing the simple test described in this paragraph. This test should be performed after cleaning to assure that all contamination has been removed. To measure leakage resistance, proceed as follows:

a. Place the Model 750A on a sheet of dielectric.

b. Use teflon insulated wire to connect the Model 750A, a 1000-volt source (Model 332B), and a null detector (Model 845AB) as shown in Figure 4-3.

c. Connect a shunt resistor across the input of the null detector to bring its input resistance to 1 megohm on the 100 millivolt range. The value required for the Model 845AB is 1.1 megohms.

d. Set the INPUT VOLTAGE switch to RESET.

e. Turn on the 1000 volt supply and read the null detector. An indication of 10 millivolts corresponds to $10^{11}$ ohms. If the voltage indication is above 10 millivolts, the leakage resistance is too low and corrective measures must be taken. If repeated cleaning fails to correct the problem, troubleshooting must be undertaken.

4-11. CLEANING

4-12. When the Model 750A is properly cared for and kept in a controlled atmosphere, cleaning will seldom be required. However, any contamination, particularly oil, in the instrument can contribute to reduced leakage resistance which will impair accuracy. Cleanliness of the switches is critical because low leakage resistance between switch contacts shunts a part of the string. Dust may be removed with dry, oil free air at a pressure of 15 pounds per square inch or less. To remove oil, place the instrument on its side, place paper towels under it, and spray with freon TF degreasing agent.

## 4-13. CALIBRATION

4-14. GENERAL DISCUSSION

4-15. Calibration of the Model 750A is performed from the low end of the divider to the high end. Calibration adjustments are provided for the outputs 1.1 volt and above. If the 1.0 volt or a lower output is out of tolerance, the instrument must be used with a correction graph or it must be returned to the factory for replacement of the defective resistor. All calibration adjustments are located under the calibration access cover on the top of the instrument. To remove the cover, use a screwdriver to turn the two fasteners counterclockwise. All calibration adjustments are identified underneath the cover. The check procedures must be performed in order for accurate calibration of the instrument.

4-16. OVERVOLTAGE TRIP CHECK

a. Set the INPUT VOLTAGE switch to RESET.

b. Connect a dc voltmeter to the OUTPUT VOLTAGE binding posts and connect the calibrated power supply (Model 332B) to the INPUT VOLTAGE binding posts. Any Fluke dc voltmeter will serve for this check; it should be placed in TVM mode.

c. Set both the INPUT VOLTAGE switch and the OUTPUT VOLTAGE switch to 1.1.

d. Set the power supply to +17 volts and turn it on. The voltmeter should indicate +17 volts.

*Note!*

If the voltmeter indicates zero, set the INPUT VOLTAGE switch to RESET and then, back to 1.1. If the voltmeter still indicates zero, the overvoltage circuit has failed to close relay K1.

e. Slowly increase the output voltage of the power supply until the overvoltage protection circuit trips. When the circuit trips, the voltmeter indication will drop to zero. The input voltage at this point should be between +18 and +22 volts.

f. Repeat steps a through e for the remaining input voltage taps of the Model 750A. The switch positions and trip points are tabulated below.

| INPUT VOLTAGE SETTING | OUTPUT VOLTAGE SETTING | INPUT VOLTAGE AT TRIP (Approximate) |
|---|---|---|
| 5 volts | 1.1 volts | 18 to 22 volts |
| 10 volts | 1.1 volts | 18 to 22 volts |
| 50 volts | 1.1 volts | 69 to 83 volts |
| 100 volts | 1.1 volts | 136 to 167 volts |
| 500 volts | 1.1 volts | 640 to 780 volts |
| 1000 volts | 1.1 volts | 1250 to 1530 volts |
| 1100 volts | 1.1 volts | 1250 to 1530 volts |

### 4-17. CALIBRATION CHECK OF 0.1, 0.5, AND 1 VOLT TAPS

a. Connect the test equipment as shown in Figure 4-4. Use the 1.1 binding post on the standard divider (Model 720A).

b. HIGH LEAD BALANCE. Balance lead and contact resistance on the high side of the dividers as follows:

(1) Set the standard divider to 1.099999X.

(2) Set the Model 750A INPUT VOLTAGE switch and the OUTPUT VOLTAGE switch to 1.1.

(3) Set the voltage source to 10.99999X volts.

(4) Set the lead compensator (Model 721A) to R STD > R TEST.

**Note!**

The null detector should be operated on battery power for all calibration checks and adjustment procedures.

(5) Adjust the lead compensator high balance to obtain a null indication on the 10 microvolt range of the null detector (Model 845AB) microvolt range.

(6) Set the low balance of the lead compensator to the same setting as the high balance and recheck the null.

(7) Turn the VOLTAGE switch of the lead compensator to off.

c. LOW LEAD BALANCE. Balance the lead and contact resistance on the low side of the divider as follows:

*ON THE 750A*

(1) Move the lead from the red OUTPUT VOLTAGE binding post to the black OUTPUT VOLTAGE binding post.

(2) Set the standard divider to 0000000.

(3) Adjust the lead compensator low balance to obtain a null indication on the 10 microvolt range of the null detector.

d. CALIBRATION CHECK OF 0.1 VOLT TAP.

(1) Move the lead from the black OUTPUT VOLTAGE binding post to the red OUTPUT VOLTAGE binding post.

(2) Set the OUTPUT VOLTAGE switch to 0.1.

(3) Set the standard divider to .1000000.

*ALLOW TIME TO SETTLE*

(4) Observe the null detector; it should indicate null ±10 microvolts. If the indication is beyond this tolerance, the instrument should be returned to the factory for repair or a correction graph should be constructed.

**Note!**

One microvolt is equal to 1 ppm.

e. CALIBRATION CHECK OF 0.5 VOLT TAP.

(1) Set the standard divider to .5000000.

(2) Set the OUTPUT VOLTAGE switch to 0.5.

(3) Observe the null detector; it should indicate null ±50 microvolts. If the indication is beyond this tolerance, the instrument should be returned to the factory for repair or a correction graph should be constructed.

**Note!**

Five microvolts equal 1 ppm.

f. CALIBRATION CHECK OF 1 VOLT TAP.

(1) Set the standard divider to 1.0000000.

(2) Set the OUTPUT VOLTAGE switch to 1.0.

(3) Observe the null detector; it should indicate null ±100 microvolts. If the indication is beyond this tolerance, the instrument should be returned to the factory for repair or a correction graph should be prepared.

**Note!**

10 microvolts equal 1 ppm.

### 4-18. CALIBRATION OF THE STANDARD CELL OUTPUT AND 1.1 VOLT TAPS.

a. Move the lead from the red OUTPUT VOLTAGE binding post to the red NULL DETECTOR binding post.

b. Set the STANDARD CELL VOLTAGE dials to 1.018000.

c. Set the standard divider to 1.0180000.

d. Adjust R87 to obtain a null indication.

### 4-19. CALIBRATION OF THE 5, 10, 50, 100, 500, 1000, AND 1100 VOLT TAPS.

a. Move the lead from the red NULL DETECTOR binding post to the red OUTPUT VOLTAGE binding post.

b. HIGH LEAD BALANCE. Balance lead resistance on the high side of the dividers, before calibrating each tap, as follows:

(1) Set the Model 750A INPUT VOLTAGE and OUTPUT VOLTAGE switches to the tap being calibrated.

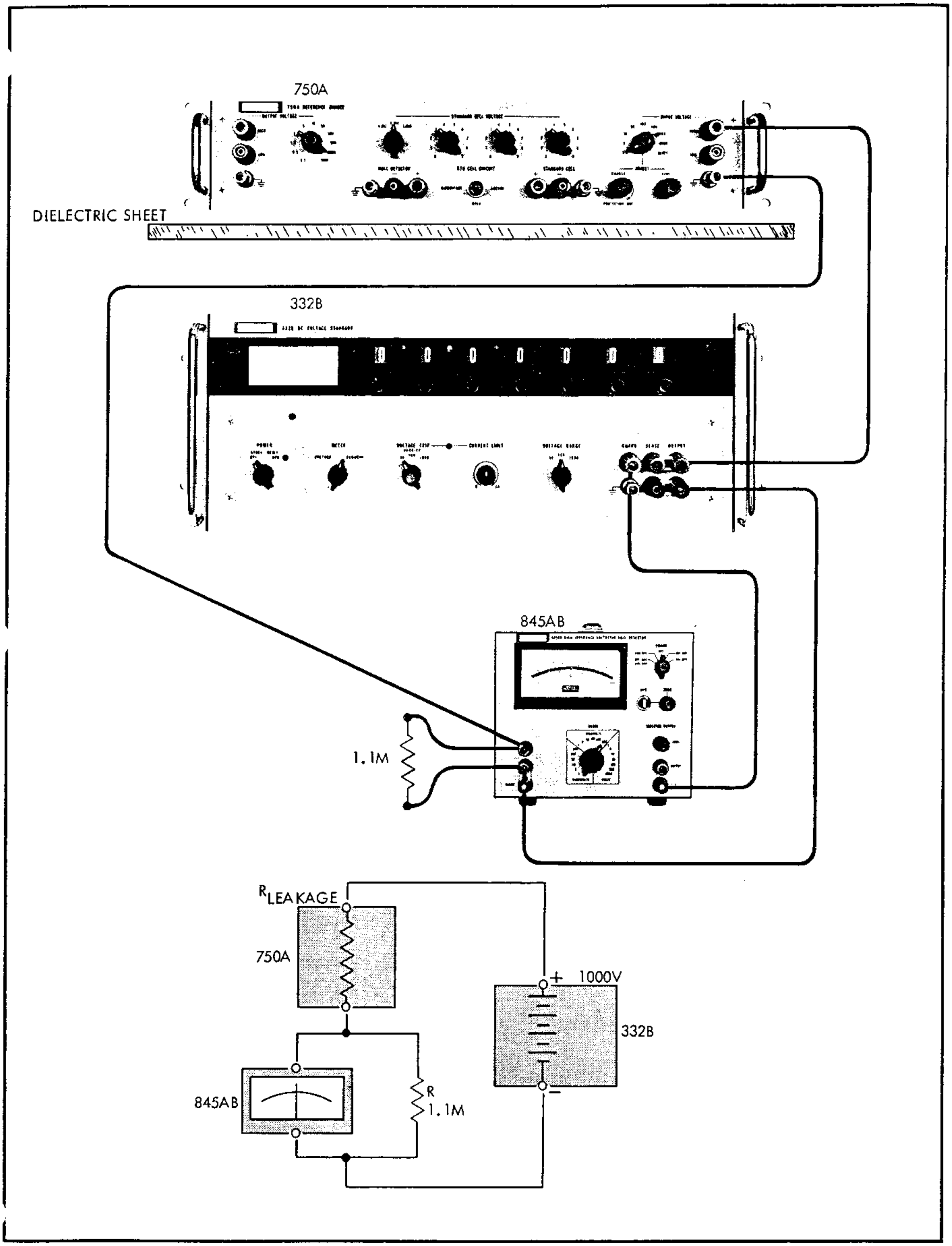



Figure 4-3. EQUIPMENT CONNECTIONS FOR LEAKAGE RESISTANCE TEST

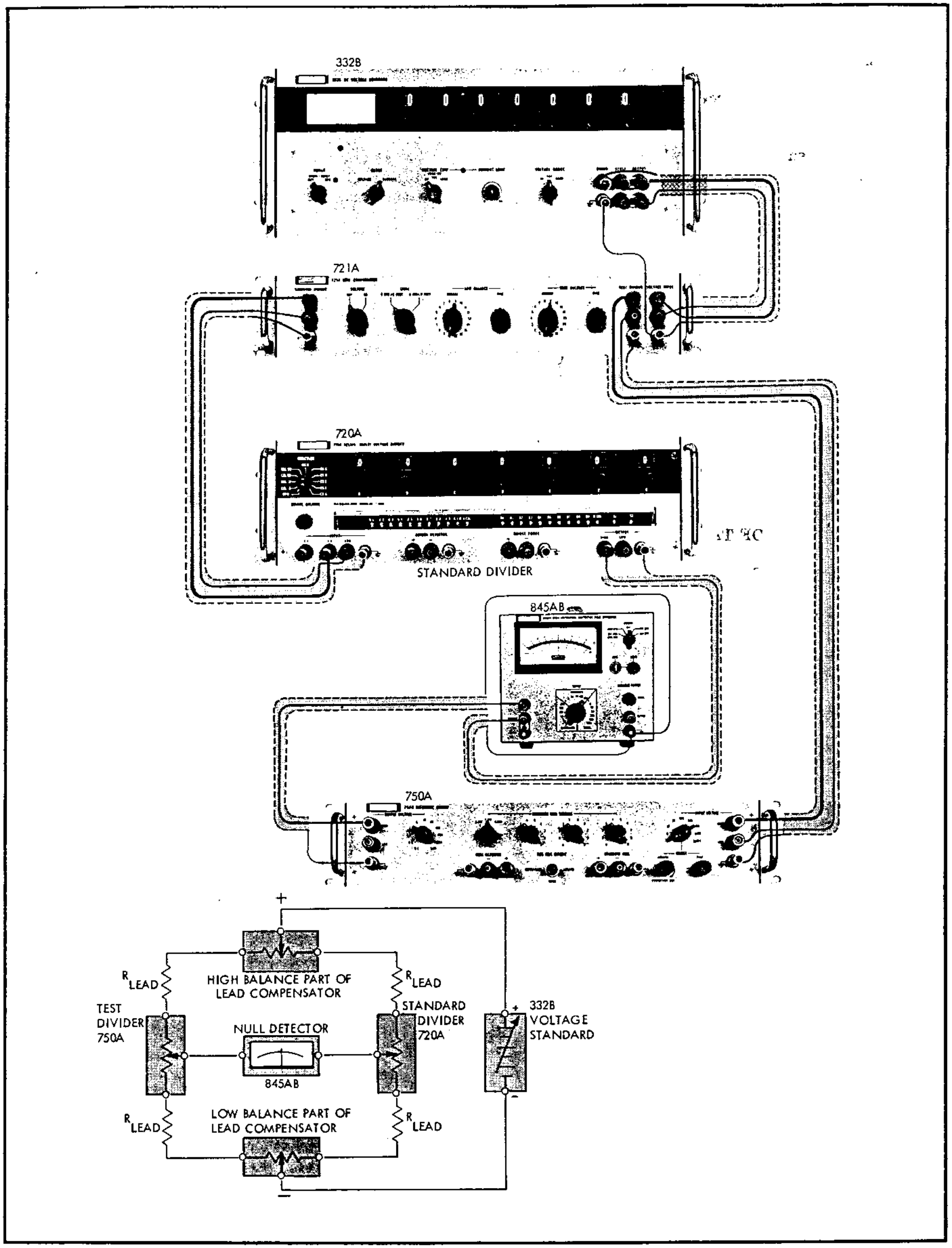



Figure 4-4. EQUIPMENT CONNECTIONS FOR CALIBRATION

(2) Use the 1.0 input binding post on the standard divider except when calibrating the 1100 volt tap.

(3) Set the standard divider to .999999X.

(4) Set the voltage source to the output voltage given in Figure 4-5.

(5) On the lead compensator, set the mode switch to the position listed in Figure 4-5 and turn the voltage switch on.

(6) Adjust the high balance controls to obtain a null indication on the null detector.

c. LOW LEAD BALANCE. Balance lead resistance on the low side of the dividers before calibrating each tap, as follows:

(1) Move the lead from the red OUTPUT VOLTAGE binding post to the black OUTPUT VOLTAGE binding post.

(2) Set the standard divider output to .0000000.

(3) Adjust the low balance controls to obtain a null indication on the null detector.

d. CALIBRATION OF TAPS.

(1) Set the INPUT VOLTAGE switch to 5.

(2) Set the OUTPUT VOLTAGE switch to 1.1.

(3) Set the mode switch of the lead compensator to $R_{STD} > R_{TEST}$.

(4) Set the voltage source to 5 volts.

(5) Adjust high lead balance and low lead balance using the procedures given in paragraphs b and c.

(6) Adjust R34 to obtain an indication of null ±1.1 microvolts.

*Note!*

To calibrate the remaining taps, refer to the information given in Figure 4-5 for steps d through j and use the procedure given in (1) through (6) of d above.

## 4-20. TROUBLESHOOTING

4-21. The following paragraphs describe the procedures to be followed if troubles develop in the Model 750A Reference Divider. Sufficient information is given to determine the nature of the trouble and whether the repair should be performed in the field or the instrument should be returned to the manufacturer for repair. Electrical components in the standard cell voltage circuit may be replaced in the field using parts ordered from the manufacturer. The variable trimmer resistors in the main divider string may be replaced in the field. Fixed resistors housed in the oil-filled can and factory selected fixed resistors should be replaced only by the manufacturer.

4-22. CHECKING THE MAIN DIVIDER STRING

4-23. Trouble in the main divider string may be localized to a particular step by utilizing the calibration procedure to check linearity. When the trouble has been localized, repair efforts should be confined to checking and replacing the variable trimmer resistor. If another resistor in the string is faulty, the instrument should be returned to the factory for repair and recalibration. To troubleshoot the main divider string proceed as follows:

a. Perform the calibration checks described in paragraph 4-17. Inability to obtain a reading within the stated tolerance for any of these checks indicates the need for factory maintenance.

b. Perform the tap calibration procedure described in paragraph 4-24. Each tap should be within 1 ppm of the correct value. If any tap is beyond this limit, a resistor in the step is defective. The variable trimmer resistor should be checked and replaced if defective. If a fixed resistor is defective the instrument should be returned to the factory for repair.

4-25. CHECKING THE STANDARD CELL VOLTAGE CIRCUIT

4-26. The source of trouble in the standard cell voltage circuit (a modified Kelvin-Varley divider) may be located easily by a simple linearity check. This check will locate the trouble to a particular defective resistor or switch contact. If used analytically, it will reveal whether the trouble in a faulty resistor is value change, open circuit, or short circuit. Referring to the schematic diagram will aid in understanding the procedure and analyzing the results. To check the standard cell voltage circuit, proceed as follows:

a. Turn the INPUT VOLTAGE switch to RESET.

b. Set the voltage source (Model 332B) to 11.00000 volts.

c. Connect the voltage source to the OUTPUT VOLTAGE terminals, turn the OUTPUT VOLTAGE switch to 1.1, and turn the voltage source on.

d. Connect the differential voltmeter (Model 895A) between the positive (red) NULL DETECTOR terminal and the negative (black) STANDARD CELL terminals.

e. Turn the STANDARD CELL VOLTAGE controls to 1.017000. The differential voltmeter should read 10.17000 volts.

f. Observe the differential voltmeter and advance the right hand control switch one position at a time. The measured voltage should increase 10 microvolts for each step.

*Note!*

If all steps are equal but low (under 10 uv), the shunt R1124 is under value or shorted.

In this case, the voltage measured in step e will be a few microvolts high. If all steps are equal but high (over 10 uv), the shunt R1124 is over value or open. In this case, the voltage measured in step e will be a few microvolts low. If all steps are 10 microvolts low. If all steps are 10 microvolts and equal but one is missing, the switch contact is open. An over value resistor will produce a high step (over 10 uv) and slightly reduce all other steps. An under value resistor will produce a low step (under 10 uv) and slightly increase all other steps. A shorted resistor will cause two successive steps to produce the same output and will increase all other steps by approximately one microvolt. An open resistor will cause an abrupt discontinuity with the voltage remaining constant up to the open resistor. As the open resistor is passed, the voltage will increase and remain constant but high for the remaining steps.

g. Return the right hand dial to zero and advance the next control switch to the left, one position at a time. The measured voltage should increase 100 microvolts for each step.

*Note!*

If all steps are equal but low (under 100 uv), the shunt R1112 is under value or shorted. In this case, the voltage measured in step e will be a few microvolts high. If all steps are equal but high (over 100 uv), the shunt R1112 is over value or open. In this case, the voltage measured in step e will be a few microvolts low. If all steps are 100 microvolts and equal but one is missing the switch contact is open. An over value resistor will produce two adjacent high steps and slightly reduce all other steps. An under value resistor will produce two adjacent low steps and slightly increase all other steps. A shorted resistor will produce two successive low steps of approximately 50 microvolts and increase all other steps by about six microvolts. An open resistor will produce a constant but high voltage up to the open resistor. When the open resistor is shunted by the switch, the output voltage will drop to near normal (about 2 or 3 uv low). As the open resistor is passed, the voltage will rise to a slightly higher value than before and remain constant for the remaining steps.

h. Return the dial to zero and advance the next control switch to the left, one position at a time. The measured voltage should increase one millivolt for each step.

*Note!*

The analysis noted step f applies to the results obtained in step g because the switch configurations are the same. The shunt is R1005. The voltage errors noted in step f will be 10 times as great for step g.

i. Return the dial to zero and advance the left hand control switch to 1.018 and then to 1.019. The measured voltage should increase to 1.018000 volts and then to 1.019000 volts.

*Note!*

As the switch is advanced so the contacts span an open or over value resistor the measured voltage will be high. An open resistor in the string above the contacts will cause a reading of zero. An open resistor in the string below the contacts will cause a reading of 1.1 volts. An over value resistor above the contacts will cause a low reading. An over value resistor in the string below the contacts will cause a high reading. As the switch is advanced to span a shorted resistor the measured voltage will remain unchanged. As the switch is advanced to span an under value resistor the measured voltage will be low. An under value resistor in the string above the contacts will cause a high reading. An under value resistor in the string below the contacts will cause a low reading.

## 4-27. TROUBLES IN THE OVERVOLTAGE CIRCUIT

4-28. If trouble in the overvoltage circuit is suspected, the overvoltage trip check given in paragraph 4-16 should be performed. If operation is not satisfactory, check the batteries (BT1 and BT2) and relay K1. If the voltage of either battery is below 6.0 volts, both batteries should be replaced. To check the relay remove the batteries and furnish 5.5 volts to the coil first in one direction and then the other. The relay contacts should open when the voltage is applied on one direction and close when it is applied in the other. The contacts should remain in position (either open or closed) when the voltage is removed. Contact resistance should not exceed 130 milliohms. If the trouble is not caused by the batteries or relay K1, refer to the schematic diagram and theory of operation to troubleshoot the circuit.

## 4-29. REPAIR

4-30. In the event that a nonlinearity beyond the range of calibration adjustment is discovered in the main divider string, the following effort should be made to correct the fault. First, return the equipment to the condition in which the nonlinearity was discovered and recheck the measurement. Second, exercise the variable trimmer resistor which is the adjustment for that step by slowly sweeping it from one end of travel to the other. It should provide an adjustment range of approximately 20 microvolts at the 1.1 output tap. This procedure may clean the contacts of the trimmer resistor and correct the fault. If the adjustment range is insufficient or if meter deflection is erratic as the trimmer resistor is swept through its travel, it should be replaced. If the fault is found to be in one of the fixed resistors of the string, the instrument should be returned to the factory for repair and recalibration.

4-31. If a defective resistor is found in the standard cell circuit it may be replaced with a repair part ordered from the factory.

| STEP | 750A INPUT SWITCH SETTING | ** 750A OUTPUT SWITCH SETTING | APPLIED VOLTAGE | LEAD COMPENSATOR MODE SWITCH POSITION | NULL ADJUSTMENT | NULL SENSITIVITY | STANDARD DIVIDER SETTING |
|---|---|---|---|---|---|---|---|
| d. | 5 | 1.1 | 5v | $R_{STD} > R_{TEST}$ | R34 | 1.1 uv = 1 ppm | .2200000 |
| e. | 10 | 5 | 10v | $R_{STD} > R_{TEST}$ | R29 | 5 uv = 1 ppm | .5000000 |
| f. | 50 | 10 | 50v | $R_{STD} > R_{TEST}$ | R26 | 10 uv = 1 ppm | .2000000 |
| g. | 100 | 50 | 100v | $R_{STD} > R_{TEST}$ | R21 | 50 uv = 1 ppm | .5000000 |
| h. | 500 | 100 | 100v | $R_{STD} < R_{TEST}$ | R14 | 20 uv = 1 ppm | .2000000 |
| i. | 1000 | 500 | 100v | $R_{STD} < R_{TEST}$ | R11 | 50 uv = 1 ppm | .5000000 |
| * j. | 1100 | 1000 | 110v | $R_{STD} < R_{TEST}$ | R2 | 100 uv = 1 ppm | 1.0000000 |

Figure 4-5. TAP CALIBRATION STEPS

720A 1.099999X

** NOTE: 750A OUTPUT SWITCH SETTING AND INPUT SWITCH SETTING MUST BE THE SAME FOR HIGH LEAD BALANCE ADJUSTMENT.

# 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 name in the parts list and by a ten digit stock number in the illustrations. 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.

## 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 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 abreviations and symbols used, see the following page.

c. 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.

d. 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.

e. 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.

f. 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.

g. 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.

h. 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. To insure prompt and efficient handling of your order to the John Fluke Mfg. Co., Inc. please list the following information:

a. Quantity.

b. FLUKE Stock Number.

c. Description.

d. Reference Designation.

e. Instrument model and serial number.

For example; 1 each, 4707-171678, Resistor, 100 ohms, ±0.01%, 1/2W, R1002 for 750A, s/n 123.

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 ABBREVIATIONS

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

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | FINAL ASSEMBLY-Figure 5-1 | 750A | | | | | |
| | Front Panel Assembly (See Figure 5-2) | | | | | | |
| | Chassis Assembly (See Figure 5-4) | | | | | | |

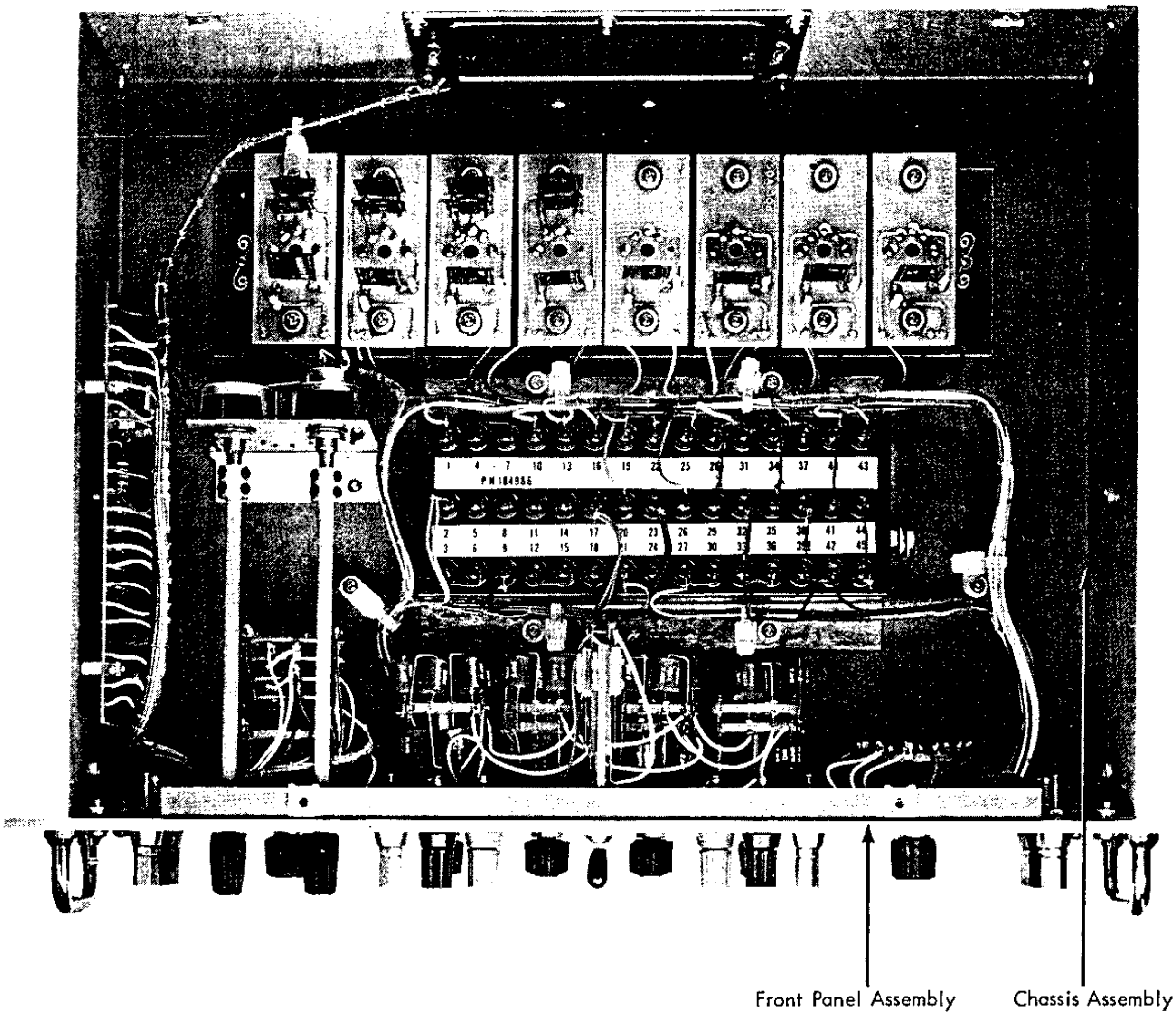



Figure 5-1. FINAL ASSEMBLY

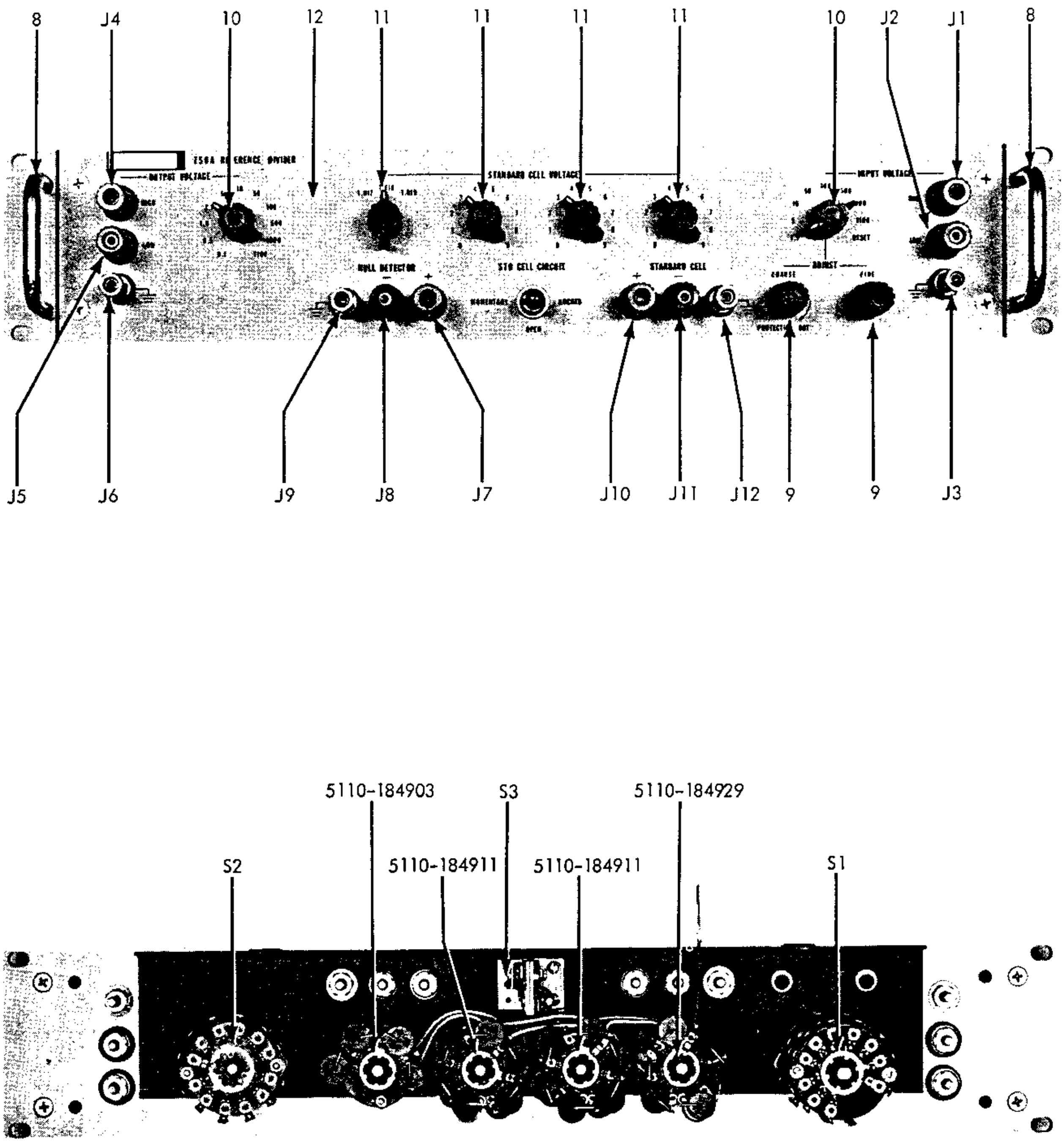



Figure 5-2. FRONT PANEL ASSEMBLY

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | **FRONT PANEL ASSEMBLY - Figure 5-2** | | | | | | |
| | Kelvin-Varley "A" Switch Assembly (See Figure 5-3) | 5110-184903 (750A-410) | 89536 | 5110-184903 | 1 | | |
| | Kelvin-Varley "B" Switch Assembly (See Figure 5-3) | 5110-184911 (750A-411) | 89536 | 5110-184911 | 2 | | |
| | Kelvin-Varley "C" Switch Assembly (See Figure 5-3) | 5110-184911 (750A-411) | 89536 | 5110-184911 | REF | | |
| | Kelvin-Varley "D" Switch Assembly (See Figure 5-3) | 5110-184929 (750A-412) | 89536 | 5110-184929 | 1 | | |
| J1 | Binding post, red, Input | 2811-149856 | 58474 | BHB-10208-G22 | 4 | | |
| J2 | Binding post, black, Input | 2811-149864 | 58474 | BHB-10208-G21 | 4 | | |
| J3 | Binding post, ground | 2811-155911 | 58474 | GP30NC | 4 | | |
| J4 | Binding post, red, Output | 2811-149856 | 58474 | BHB-10208-G22 | REF | | |
| J5 | Binding post, black, Output | 2811-149864 | 58474 | BHB-10208-G21 | REF | | |
| J6 | Binding post, ground | 2811-155911 | 58474 | GP30NC | REF | | |
| J7 | Binding post, red, Standard Cell | 2811-149856 | 58474 | BHB-10208-G22 | REF | | |
| J8 | Binding post, black, Standard Cell | 2811-149864 | 58474 | BHB-10208-G21 | REF | | |
| J9 | Binding post, ground | 2811-155911 | 58474 | GP30NC | REF | | |
| J10 | Binding post, red, Null Detector | 2811-149856 | 58474 | BHB-10208-G22 | REF | | |
| J11 | Binding post, black, Null Detector | 2811-149864 | 58474 | BHB-10208-G21 | REF | | |
| J12 | Binding post, ground | 2811-155911 | 58474 | GP30NC | REF | | |
| S1 | Switch, INPUT, rotary, 5p, 9 pos, 5 sect | 5105-184531 | 89536 | 5105-184531 | 1 | | |
| S2 | Switch, OUTPUT, rotary, 1p, 11 pos, 1 sect | 5105-184499 | 89536 | 5105-184499 | 1 | | |
| S3 | Switch, STANDARD CELL, toggle, dpdt | 5106-176594 | 82389 | 6S-2457 | 1 | | |
| 8 | Handle, chrome-plated brass | 2404-100412 | 05704 | 825 | 2 | | |
| 9 | Knob, COARSE ADJUST, FINE ADJUST | 2405-158949 | 89536 | 2405-158949 | 2 | | |
| 10 | Knob, INPUT VOLTAGE, OUTPUT VOLTAGE | 2405-170050 | 89536 | 2405-170050 | 2 | | A |
| | KNOB, INPUT VOLTAGE, OUTPUT VOLTAGE | 2405- 158956 | 89536 | 2405- 158956 | 6 | | B |
| 11 | Knob, STANDARD CELL VOLTAGE | 2405-158956 | 89536 | 2405-158956 | REF | | |
| 12 | Panel, front | 1406-184556 | 89536 | 1406-184556 | 1 | | |

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | **KELVIN-VARLEY "A" SWITCH ASSEMBLY-Figure 5-3** | 5110-184903 (750A-410) | 89536 | 5110-184903 | REF | | |
| R1001 | Res, ww, 100Ω ±0.01%, 1/2w | 4707-171678 | 89536 | 4707-171678 | 36 | 1 | |
| R1002 | Res, ww, 100Ω ±0.01%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1003 | Res, ww, 100Ω ±0.01%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1004 | Res, ww, 100Ω ±0.01%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1005 | Res, ww, 250Ω ±0.01%, 1/2w | 4707-182220 | 89536 | 4707-182220 | 3 | 1 | |
| S1001 | Switch, rotary, 2p, 3 pos, 2 sect | 5105-184507 | 89536 | 5105-184507 | 1 | | |
| | **KELVIN-VARLEY "B" SWITCH ASSEMBLY-Figure 5-3** | 5110-184911 (750A-411) | 89536 | 5110-184911 | REF | | |
| R1101 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | 1 | |
| R1102 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1103 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1104 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1105 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1106 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1107 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1108 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1109 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1110 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1111 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1112 | Res, ww, 250Ω ±0.05%, 1/2w | 4707-182220 | 89536 | 4707-182220 | REF | 1 | |
| S1101 | Switch, rotary, 2p, 10 pos, 2 sect | 5105-184515 | 89536 | 5105-184515 | 2 | | |
| | **KELVIN-VARLEY "C" SWITCH ASSEMBLY-Figure 5-3** | 5110-184911 (750A-411) | 89536 | 5110-184911 | REF | | |
| R1113 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1114 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1115 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1116 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1117 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1118 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1119 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1120 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1121 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1122 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1123 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1124 | Res, ww, 250Ω ±0.05%, 1/2w | 4707-182220 | 89536 | 4707-182220 | REF | | |
| S1102 | Switch, rotary, 2p, 10 pos, 2 sect | 5105-184515 | 89536 | 5105-184515 | REF | | |

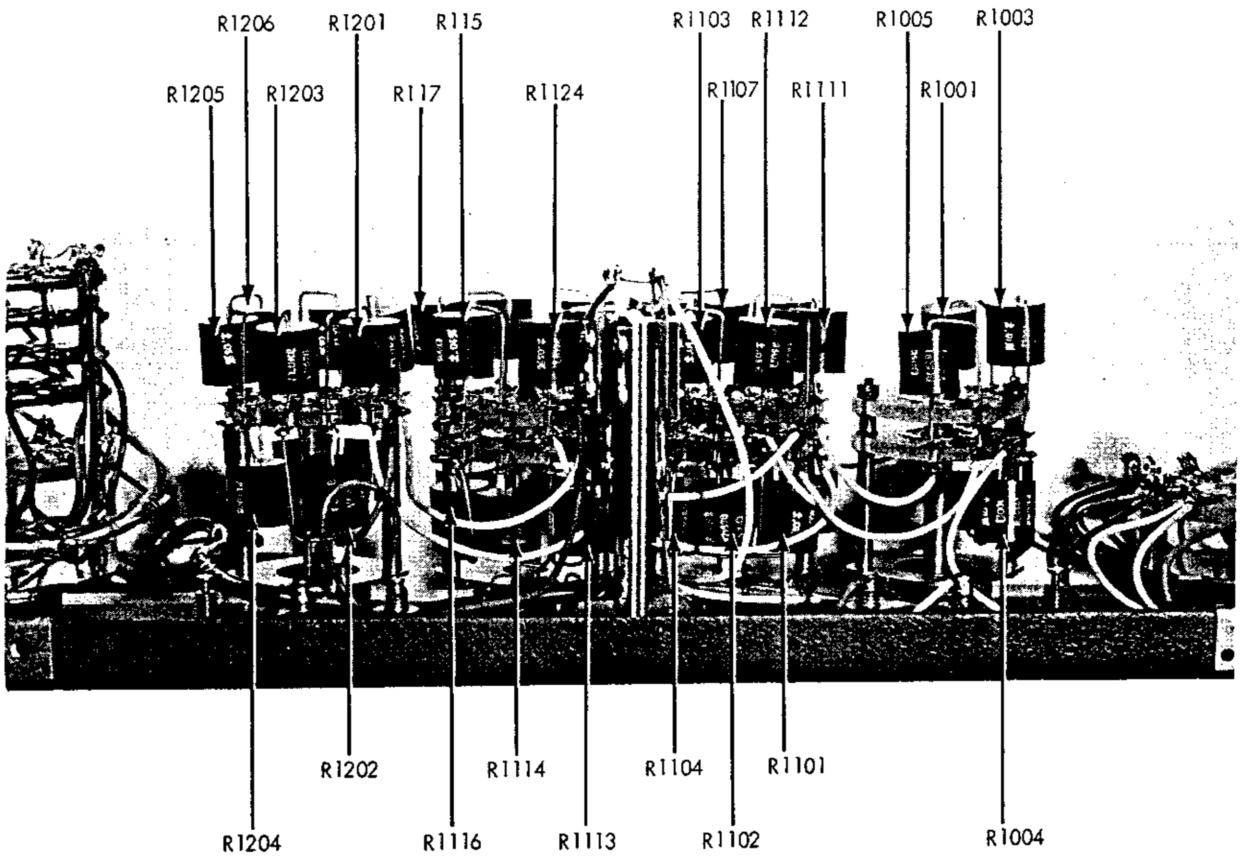



Figure 5-3. KELVIN-VARLEY SWITCH ASSEMBLIES (Sheet 1 of 2)

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | KELVIN-VARLEY "D" SWITCH ASSEMBLY-Figure 5-3 | 5110-184929 (750A-412) | 89536 | 5110-184929 | REF | | |
| R1201 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1202 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1203 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1204 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1205 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1206 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1207 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1208 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1209 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| R1210 | Res, ww, 100Ω ±0.05%, 1/2w | 4707-171678 | 89536 | 4707-171678 | REF | | |
| S1201 | Switch, rotary, 1p, 10 pos, 1 sect | 5105-184523 | 89536 | 5105-184523 | 1 | | |

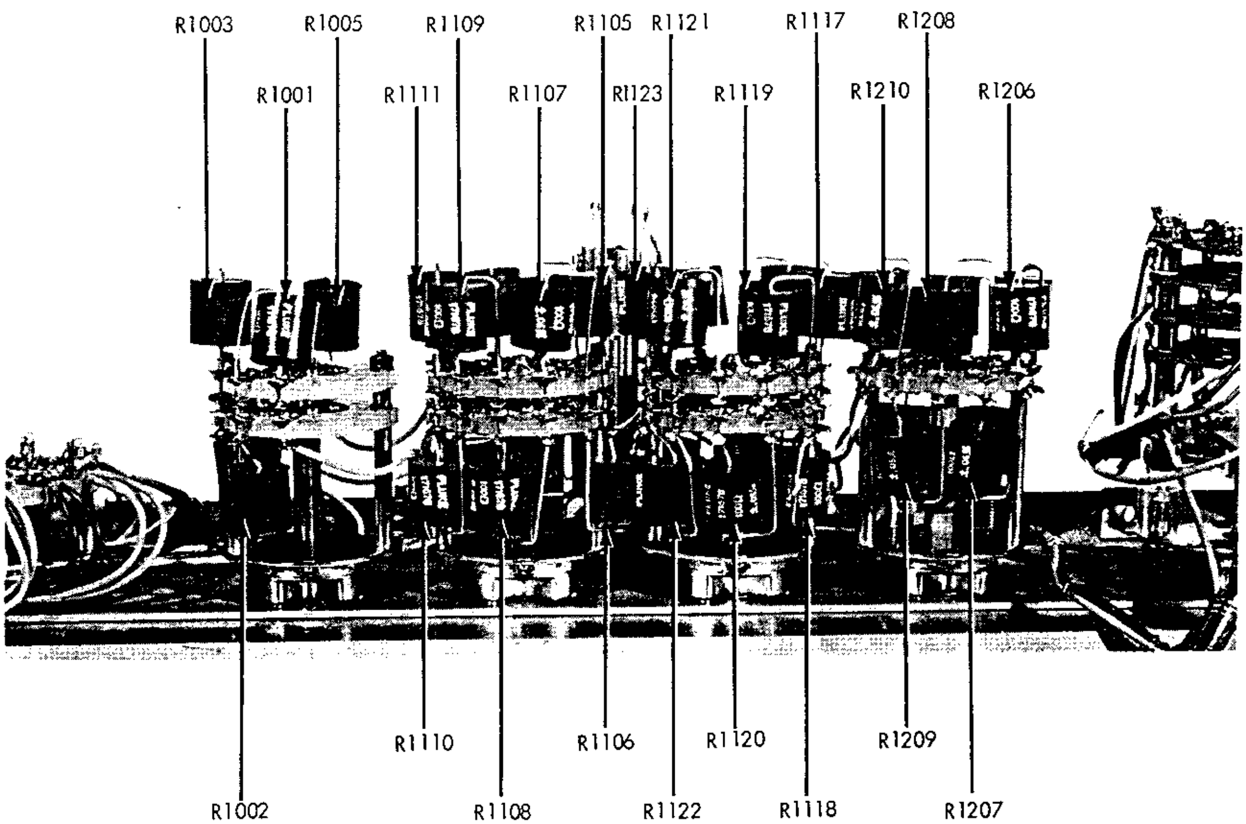



Figure 5-3. KELVIN-VARLEY SWITCH ASSEMBLIES (Sheet 2 of 2)

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | **CHASSIS ASSEMBLY-Figure 5-4** | | | | | | |
| | Adjustment No. 1 P/C Assembly (See Figure 5-5) | 1702-184812 (750A-401) | 89536 | 1702-184812 | 1 | | |
| | Adjustment No. 2 P/C Assembly (See Figure 5-5) | 1702-184820 (750A-402) | 89536 | 1702-184820 | 1 | | |
| | Adjustment No. 3 P/C Assembly (See Figure 5-5) | 1702-184838 (750A-403) | 89536 | 1702-184838 | 1 | | |
| | Adjustment No. 4 P/C Assembly (See Figure 5-5) | 1702-184846 (750A-404) | 89536 | 1702-184846 | 1 | | |
| | Adjustment No. 5 P/C Assembly (See Figure 5-5) | 1702-184853 (750A-405) | 89536 | 1702-184853 | 1 | | |
| | Adjustment No. 6 P/C Assembly (See Figure 5-5) | 1702-184861 (750A-406) | 89536 | 1702-184861 | 1 | | |
| | Adjustment No. 7 P/C Assembly (See Figure 5-5) | 1702-184879 (750A-407) | 89536 | 1702-184879 | 1 | | |
| | Adjustment No. 8 P/C Assembly (See Figure 5-5) | 1702-184887 (750A-408) | 89536 | 1702-184887 | 1 | | |
| | Protection P/C Assembly (See Figure 5-6) | 1702-179416 (750A-409) | 89536 | 1702-179416 | 1 | | |
| | Pot Mounting P/C Assembly (See Figure 5-7) | 1702-184937 (750A-413) | 89536 | 1702-184937 | 1 | | |
| | Resistor Can Assembly If a resistor in this assembly requires replacement, the entire instrument must be returned to the factory for repair and recalibration. | 4710-184986 (750A-418) | 89536 | 4710-184986 | 1 | | |
| BT1 | Battery, 6.75v, Mercury (not illustrated) | 4001-150409 | 37942 | TR-135R | 2 | | |
| BT2 | Battery, 6.75v, Mercury (not illustrated) | 4001-150409 | 37942 | TR-135R | REF | | |
| 1 | Case, battery | 3155-184630 | 89536 | 3155-184630 | 1 | | |
| 2 | Coupler | 2402-104505 | 89536 | 2402-104505 | 2 | | |
| 3 | Cover, battery | 3156-184648 | 89536 | 3156-184648 | 1 | | |
| 4 | Cover, bottom | 1403-184572 | 89536 | 1403-184572 | 1 | | |
| 5 | Cover, calibration adjustment (not illustrated) | 3156-184622 | 89536 | 3156-184622 | 1 | | |
| 6 | Foot, rubber | 2819-130138 | 89536 | 2819-130138 | 4 | | |
| 7 | Shaft, pot | 2402-184689 | 89536 | 2402-184689 | 2 | | |

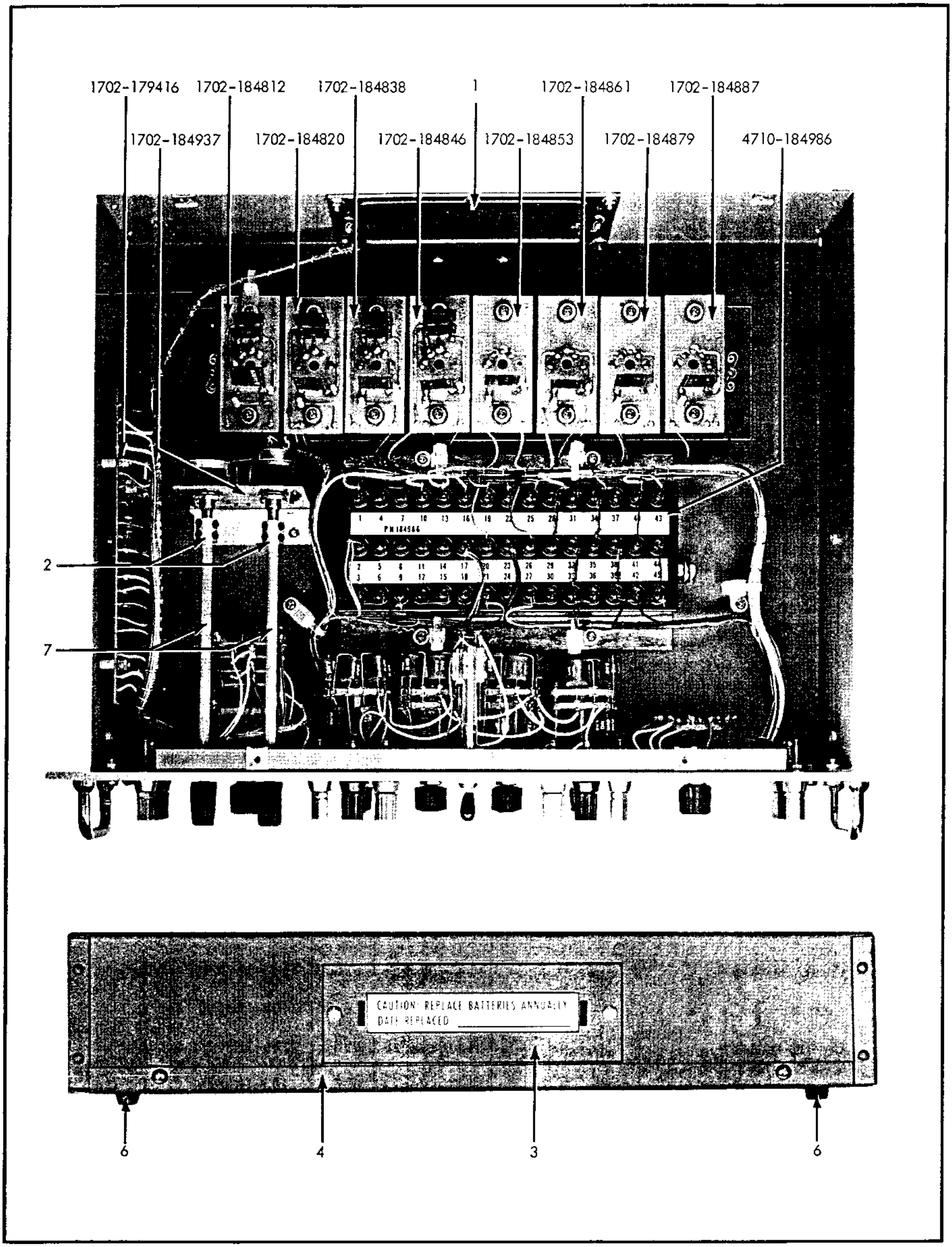



Figure 5-4. CHASSIS ASSEMBLY

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | ADJUSTMENT NO. 1 P/C ASSEMBLY Figure 5-5 | 1702-184812 (750A-401) | 89536 | 1702-184812 | REF | | |
| R47 | Res, ww, factory selected | ▷1 | | | | | |
| R86 | Res, ww, 10Ω ±0.09%, 1/2w | 4707-155879 | 89536 | 4707-155879 | 3 | 1 | |
| R87 | Res, var, ww, 20Ω ±10%, 2w | 4702-184457 | 71450 | Type 115 | 4 | | |
| R88 | Res, ww, 10Ω ±0.09%, 1/2w | 4707-155879 | 89536 | 4707-155879 | REF | | |
| | ADJUSTMENT NO. 2 P/C ASSEMBLY Figure 5-5 | 1702-184820 (750A-402) | 89536 | 1702-184820 | REF | | |
| R15 | Res, ww, factory selected | ▷1 | | | | | |
| R33 | Res, ww, 0.85Ω ±1%, 1/2w | 4707-182378 | 89536 | 4707-182378 | 2 | 1 | |
| R34 | Res, var, ww, 2Ω ±10%, 2w | 4702-153445 | 71450 | Type 115 | 3 | | |
| R35 | Res, ww, 2Ω ±0.1%, 1/2w | 4707-131789 | 89536 | 4707-131789 | 1 | 1 | |
| | ADJUSTMENT NO. 3 P/C ASSEMBLY Figure 5-5 | 1702-184838 (750A-403) | 89536 | 1702-184838 | REF | | |
| R12 | Res, ww, factory selected | ▷1 | | | | | |
| R28 | Res, ww, 0.85Ω ±1%, 1/2w | 4707-182378 | 89536 | 4707-182378 | REF | | |
| R29 | Res, var, ww, 2Ω ±10%, 2w | 4702-153445 | 71450 | Type 115 | REF | | |
| R30 | Res, ww, 1Ω ±1%, 1/2w | 4707-131771 | 89536 | 4707-131771 | 2 | 1 | |
| | ADJUSTMENT NO. 4 P/C ASSEMBLY Figure 5-5 | 1702-184846 (750A-404) | 89536 | 1702-184846 | REF | | |
| R3 | Res, ww, factory selected | ▷1 | | | | | |
| R25 | Res, ww, 10Ω ±0.09%, 1/2w | 4707-155879 | 89536 | 4707-155879 | REF | | |
| R26 | Res, var, ww, 20Ω ±10%, 2w | 4702-184457 | 71450 | Type 115 | REF | | |
| R27 | Res, ww, 20Ω ±0.03%, 1/2w | 4707-155887 | 89536 | 4707-155887 | 1 | 1 | |

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | ADJUSTMENT NO. 5 P/C ASSEMBLY Figure 5-5 | 1702-184853 (750A-405) | 89536 | 1702-184853 | REF | | |
| R20 | Res, ww, factory selected | ▷1 | | | | | |
| R21 | Res, var, ww, 2Ω ±10%, 2w | 4702-153445 | 71450 | Type 115 | REF | | |
| | ADJUSTMENT NO. 6 P/C ASSEMBLY Figure 5-5 | 1702-184861 (750A-406) | 89536 | 1702-184861 | REF | | |
| R13 | Res, ww, factory selected | ▷1 | | | | | |
| R14 | Res, var, ww, 10Ω ±10%, 2w | 4702-183921 | 71450 | Type 115 | 1 | | |
| | ADJUSTMENT NO. 7 P/C ASSEMBLY Figure 5-5 | 1702-184879 (750A-407) | 89536 | 1702-184879 | REF | | |
| R10 | Res, ww, factory selected | ▷1 | | | | | |
| R11 | Res, var, ww, 20Ω ±10%, 2w | 4702-184457 | 71450 | Type 115 | REF | | |
| | ADJUSTMENT NO. 8 P/C ASSEMBLY Figure 5-5 | 1702-184887 (750A-408) | 89536 | 1702-184887 | REF | | |
| R1 | Res, ww, factory selected | ▷1 | | | | | |
| R2 | Res, var, ww, 20Ω ±10%, 2w | 4702-184457 | 71450 | Type 115 | REF | | |

▷1 These resistors are factory selected. If replacement is required, give model, serial number, full reference designation, and all information stamped on the resistor.

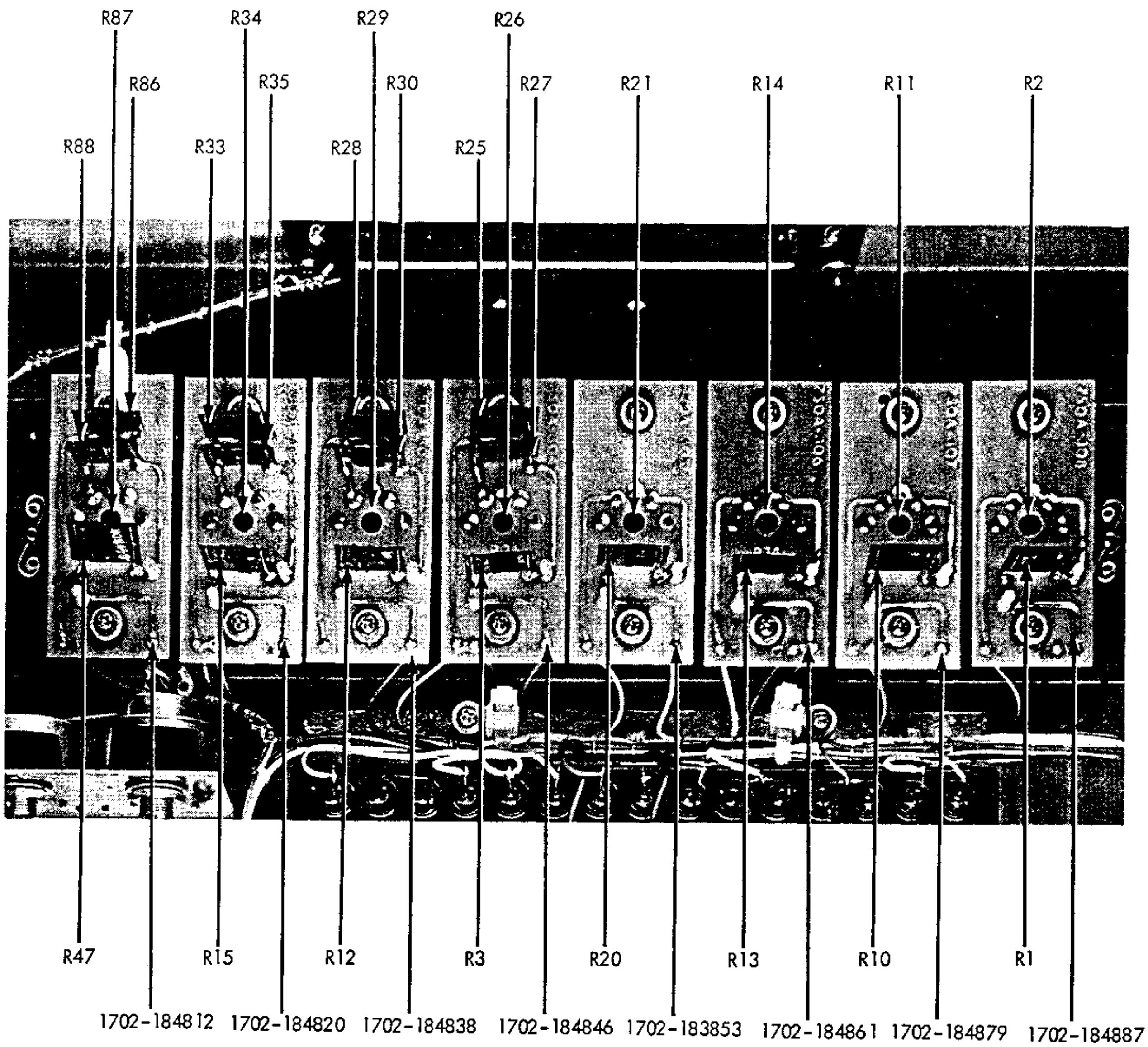



Figure 5-5. ADJUSTMENT P/C ASSEMBLIES NUMBER 1 THROUGH NUMBER 8

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | **PROTECTION P/C ASSEMBLY** Figure 5-6 | 1702-179416 (750A-409) | 89536 | 1702-179416 | REF | | |
| C201 | Cap, Ta, 100 uf ±10%, 10v | 1508-170456 | 05397 | K100C10K | 2 | | |
| C202 | Cap, Ta, 100 uf ±10%, 10v | 1508-170456 | 05397 | K100C10K | REF | | |
| C203 | Cap, plstc, 0.47 uf ±20%, 250v | 1507-184366 | 73445 | C280AE/P470K | 1 | | |
| CR1 | Diode, Type 1N4822 | 4802-112383 | 05277 | 1N4822 | 4 | 1 | |
| CR2 | Diode, Type 1N4822 | 4802-112383 | 05277 | 1N4822 | REF | | |
| CR3 | Diode, Type 1N4822 | 4802-112383 | 05277 | 1N4822 | REF | | |
| CR4 | Diode, Type 1N4822 | 4802-112383 | 05277 | 1N4822 | REF | | |
| K1 | Relay, 6v, SPST | 4501-185678 | 15636 | R1407-1 | 1 | 1 | |
| Q1 | Tstr, Motorola Type MPS3638 | 4805-169375 | 04713 | MPS3638 | 1 | 1 | |
| Q2 | Tstr, Type 2N3391 | 4805-168708 | 03508 | 2N3391 | 1 | 1 | |
| R201 | Res, comp, 6.8M ±5%, 1w | 4704-182311 | 01121 | GB6855 | 1 | | |
| R202 | Res, comp, 5.6M ±5%, 1w | 4704-182295 | 01121 | GB5655 | 1 | | |
| R203 | Res, comp, 750k ±5%, 1w | 4704-182329 | 01121 | GB7545 | 1 | | |
| R204 | Res, comp, 560k ±5%, 1w | 4704-182337 | 01121 | GB5645 | 1 | | |
| R205 | Res, comp, 120k ±5%, 1w | 4704-182303 | 01121 | GB1245 | 1 | | |
| R206 | Res, comp, 68k ±10%, 1w | 4704-109629 | 01121 | GB6835 | 1 | | |
| R207 | Res, comp, 560k ±10%, 1/2w | 4704-108795 | 01121 | EB5645 | 1 | | |
| R208 | Res, comp, 100k ±5%, 1/2w | 4704-168054 | 01121 | EB1045 | 1 | | |
| R209 | Res, comp, 1k ±5%, 1/2w | 4704-108597 | 01121 | EB1025 | 1 | | |

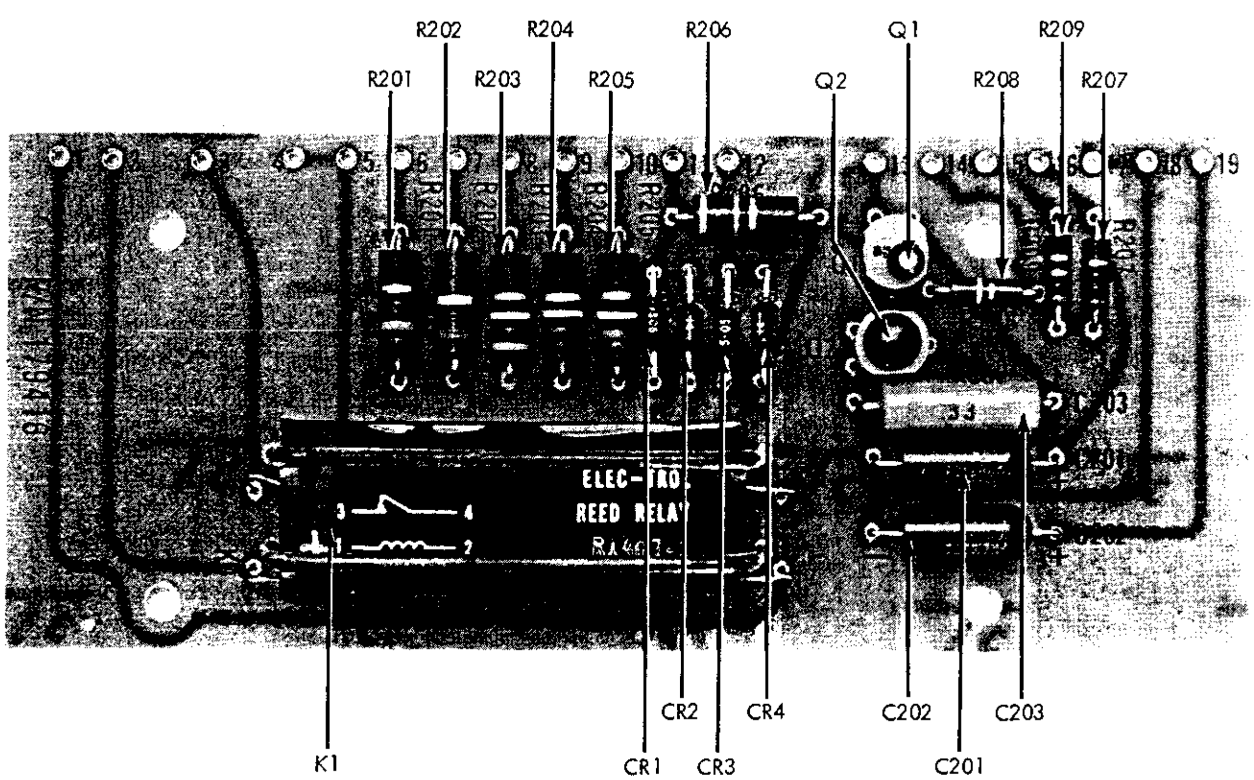



Figure 5-6. PROTECTION P/C ASSEMBLY

| REF DESIG | DESCRIPTION | STOCK NO | MFR | MFR PART NO | TOT QTY | REC QTY | USE CODE |
|---|---|---|---|---|---|---|---|
| | **POT MOUNTING P/C ASSEMBLY** Figure 5-7 | 1702-184937 (750A-413) | 89536 | 1702-184937 | REF | | |
| R101, S101 | Res, var, ww, 10Ω ±10%, 2w | 4702-185660 | 71450 | Type 252 | 1 | | |
| R102 | Res, ww, 1Ω ±1%, 1/2w | 4707-131771 | 89536 | 4707-131771 | REF | | |
| R103 | Res, var, ww, 1Ω ±10%, 2w | 4702-185652 | 71450 | Type 2W | 1 | | |
| R104 | Res, ww, 3Ω ±1%, 1/2w | 4707-182402 | 89536 | 4707-182402 | 1 | 1 | |

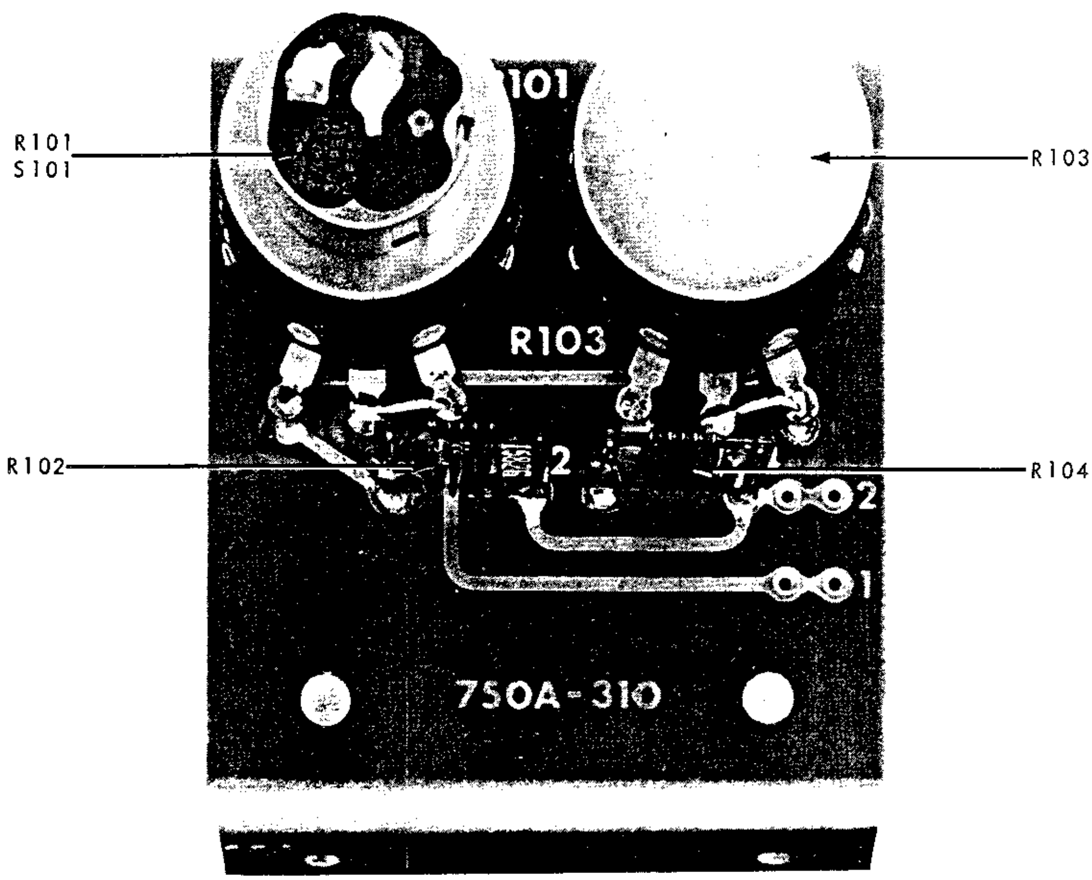



Figure 5-7. POT MOUNTING P/C ASSEMBLY

## 5-8. SERIAL NUMBER EFFECTIVITY

‾-9. A Use Code column is provided to identify cer-.in parts that have been added, deleted, or modified during production of the Model 750A. 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 123. New codes will be added as required by instrument changes.

| USE CODE | EFFECTIVITY |
|---|---|
| No Code | Model 750A serial number 123 and on. |
| A | Model 750A serial number 123 thru 217. |
| B | Model 750A serial number 218 and on. |

## Section 7

# General Information

7-1. This section of the manual contains generalized user information as well as supplemental information to the List of Replaceable parts contained in Section 5. The following information is presented in this section:

List of Abbreviations

Federal Supply Codes for Manufacturers

Fluke Technical Service Centers — U.S. and Canada

Sales and Service Locations — International

Sales Representatives — U.S. and Canada

## List of Abbreviations and Symbols

| | |
|---|---|
| A or amp | ampere |
| ac | alternating current |
| af | audio frequency |
| a/d | analog-to-digital |
| assy | assembly |
| AWG | american wire gauge |
| B | bel |
| bcd | binary coded decimal |
| °C | Celsius |
| cap | capacitor |
| ccw | counterclockwise |
| cer | ceramic |
| cermet | ceramic to metal(seal) |
| ckt | circuit |
| cm | centimeter |
| cmrr | common mode rejection ratio |
| comp | composition |
| cont | continue |
| crt | cathode-ray tube |
| cw | clockwise |
| d/a | digital-to-analog |
| dac | digital-to-analog converter |
| dB | decibel |
| dc | direct current |
| dmm | digital multimeter |
| dvm | digital voltmeter |
| elect | electrolytic |
| ext | external |
| F | farad |
| °F | Fahrenheit |
| FET | Field-effect transistor |
| ff | flip-flop |
| freq | frequency |
| FSN | federal stock number |
| g | gram |
| G | giga ($10^9$) |
| gd | guard |
| Ge | germanium |
| GHz | gigahertz |
| gmv | guaranteed minimum value |
| gnd | ground |
| H | henry |
| hd | heavy duty |
| hf | high frequency |
| Hz | hertz |
| IC | integrated circuit |
| if | intermediate frequency |
| in | inch(es) |
| intl | internal |
| I/O | input/output |
| k | kilo ($10^3$) |
| kHz | kilohertz |
| kΩ | kilohm(s) |
| kV | kilovolt(s) |
| lf | low frequency |
| LED | light-emitting diode |
| LSB | least significant bit |
| LSD | least significant digit |
| M | mega ($10^6$) |
| m | milli ($10^{-3}$) |
| mA | milliampere(s) |
| max | maximum |
| mf | metal film |
| MHz | megahertz |
| min | minimum |
| mm | millimeter |
| ms | millisecond |
| MSB | most significant bit |
| MSD | most significant digit |
| MTBF | mean time between failures |
| MTTR | mean time to repair |
| mV | millivolt(s) |
| mv | multivibrator |
| MΩ | megohm(s) |
| n | nano ($10^{-9}$) |
| na | not applicable |
| NC | normally closed |
| (–) or neg | negative |
| NO | normally open |
| ns | nanosecond |
| opnl ampl | operational amplifier |
| p | pico ($10^{-12}$) |
| para | paragraph |
| pcb | printed circuit board |
| pF | picofarad |
| pn | part number |
| (+) or pos | positive |
| pot | potentiometer |
| p-p | peak-to-peak |
| ppm | parts per million |
| PROM | programmable read-only memory |
| psi | pound-force per square inch |
| RAM | random-access memory |
| rf | radio frequency |
| rms | root mean square |
| ROM | read-only memory |
| s or sec | second (time) |
| scope | oscilloscope |
| SH | shield |
| Si | silicon |
| serno | serial number |
| sr | shift register |
| Ta | tantalum |
| tb | terminal board |
| tc | temperature coefficient or temperature compensating |
| tcxo | temperature compensated crystal oscillator |
| tp | test point |
| u or μ | micro ($10^{-6}$) |
| uhf | ultra high frequency |
| us or μs | microsecond(s) ($10^{-6}$) |
| uut | unit under test |
| V | volt |
| v | voltage |
| var | variable |
| vco | voltage controlled oscillator |
| vhf | very high frequency |
| vlf | very low frequency |
| W | watt(s) |
| ww | wire wound |
| xfmr | transformer |
| xstr | transistor |
| xtal | crystal |
| xtlo | crystal oscillator |
| Ω | ohm(s) |
| μ | micro ($10^{-6}$) |

00213
Nytronics Comp. Group Inc.
Subsidiary of Nytronics Inc.
Formerly Sage Electronics
Rochester, New York

00327
Welwyn International, Inc.
Westlake, Ohio

00656
Aerovox Corp.
New Bedford, Massachusetts

00686
Film Capacitors, Inc.
Passaic, New Jersey

00779
AMP Inc.
Harrisberg, Pennsylvania

01121
Allen-Bradley Co.
Milwaukee, Wisconsin

01281
TRW Electronic Comp.
Semiconductor Operations
Lawndale, California

01295
Texas Instruments, Inc.
Semiconductor Group
Dallas, Texas

01537
Motorola Communications &
Electronics Inc.
Franklin Park, Illinois

01686
RCL Electronics Inc.
Manchester, New Hampshire

01730
Replaced by 73586

01884 - use 56289
Sprague Electric Co.
Dearborn Electronic Div.
Lockwood, Florida

02114
Ferroxcube Corp.
Saugerties, New York

02131
General Instrument Corp.
Harris ASW Div.
Westwood, Maine

02395
Rason Mfg. Co.
Brooklyn, New York

02533
Snelgrove, C.R. Co., Ltd.
Don Mills, Ontario, Canada
M3B 1M2

02606
Fenwal Labs
Div. of Travenal Labs.
Morton Grove, Illinois

02660
Bunker Ramo Corp., Conn Div.
Formerly Amphenol-Borg
Electric Corp.
Broadview, Illinois

02799
Areo Capacitors, Inc.
Chatsworth, California

03508
General Electric Co.
Semiconductor Products
Syracuse, New York

03614
Replaced by 71400

03651
Replaced by 44655

03797
Eldema Div.
Genisco Technology Corp.
Compton, California

03877
Transistron Electronic Corp.
Wakefield, Massachusetts

03888
KDI Pyrofilm Corp.
Whippany, New Jersey

03911
Clairex Electronics Div.
Clairex Corp.
Mt. Vernon, New York

03980
Muirhead Inc.
Mountainside, New Jersey

04009
Arrow Hart Inc.
Hartford, Connecticut

04062
Replaced by 72136

04202
Replaced by 81312

04217
Essex International Inc.
Wire & Cable Div.
Anaheim, California

04221
Aemco, Div. of
Midtex Inc.
Mankato, Minnesota

04222
AVX Ceramics Div.
AVX Corp.
Myrtle Beach, Florida

04423
Telonic Industries
Laguna Beach, California

04645
Replaced by 75376

04713
Motorola Inc. Semiconductor
Products
Phoenix, Arizona

04946
Standard Wire & Cable
Los Angeles, California

05082
Replaced by 94988

05236
Jonathan Mfg. Co.
Fullerton, California

05245
Components Corp. now
Corcom, Inc.
Chicago, Illinois

05277
Westinghouse Electric Corp.
Semiconductor Div.
Youngwood, Pennsylvania

05278
Replaced by 43543

05279
Southwest Machine &
Plastic Co.
Glendora, California

05397
Union Carbide Corp.
Materials Systems Div.
New York, New York

05571 - use 56289
Sprague Electric Co.
Pacific Div.
Los Angeles, California

05574
Viking Industries
Chatsworth, California

05704
Replaced by 16258

05820
Wakefield Engineering Inc.
Wakefield, Massachusetts

06001
General Electric Co.
Electronic Capacitor &
Battery Products Dept.
Columbia, South Carolina

06136
Replaced by 63743

06383
Panduit Corp.
Tinley Park, Illinois

06473
Bunker Ramo Corp.
Amphenol SAMS Div.
Chatsworth, California

06555
Beede Electrical Instrument Co.
Penacook, New Hampshire

06739
Electron Corp.
Littleton, Colorado

06743
Clevite Corp.
Cleveland, Ohio

06751
Components, Inc. Semcor Div.
Phoenix, Arizona

06860
Gould Automotive Div.
City of Industry, California

06961
Vernitron Corp., Piezo
Electric Div.
Formerly Clevite Corp., Piezo
Electric Div.
Bedford, Ohio

06980
Eimac Div.
Varian Associates
San Carlos, California

07047
Ross Milton, Co., The
South Hampton, Pennsylvania

07115
Replaced by 14674

07138
Westinghouse Electric Corp.,
Electronic Tube Division
Horsehead, New York

07233
TRW Electronic Components
Cinch Graphic
City of Industry, California

07256
Silicon Transistor Corp.
Div. of BBF Group Inc.
Chelmsford, MA

07261
Aumet Corp.
Culver City, California

07263
Fairchild Semiconductor
Div. of Fairchild Camera
& Instrument Corp.
Mountain View, California

07344
Bircher Co., Inc.
Rochester, New York

07597
Burndy Corp.
Tape/Cable Div.
Rochester, New York

07792
Lerma Engineering Corp.
Northampton, Massachusetts

07910
Teledyne Semiconductor
Formerly Continental Device
Hawthorne, California

07933 - use 49956
Raytheon Co.
Semiconductor Div. HQ
Mountain View, California

08225
Industro Transistor Corp.
Long Island City, New York

08261
Spectra Strip Corp.
Garden Grove, California

08530
Reliance Mica Corp.
Brooklyn, New York

08806
General Electric Co.
Miniature Lamp Products Dept.
Cleveland, Ohio

08863
Nylomatic Corp.
Norrisville, Pennsylvania

08988 - use 53085
Skottie Electronics Inc.
Archbald, Pennsylvania

09214
G.E. Co. Semi-Conductor
Products Dept.
Power Semi-Conductor
Products OPN Sec.
Auburn, New York

09353
C and K Components
Watertown, Massachusetts

09423
Scientific Components, Inc.
Santa Barbara, California

09922
Burndy Corp.
Norwalk, Connecticut

09969
Dale Electronics Inc.
Yankton, S. Dakota

10059
Barker Engineering Corp.
Formerly Amerace, Amerace
ESNA Corp.
Kenilworth, New Jersey

11236
CTS of Berne
Berne, Indiana

11237
CTS Keene Inc.
Paso Robles, California

11358
CBS Electronic Div.
Columbia Broadcasting System
Newburyport, MN

11403
Best Products Co.
Chicago, Illinois

11503
Keystone Columbia Inc.
Warren, Michigan

11532
Teledyne Relays
Hawthorne, California

## Federal Supply Codes for Manufacturers (Continued)

11711
General Instrument Corp
Rectifier Division
Hickville, New York

11726
Qualidyne Corp.
Santa Clara, California

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

12300
Potter-Brumfield Division
AMF Canada LTD.
Guelph, Onatrio, Canada

12323
Presin Co., Inc.
Shelton, Connecticut

12327
Freeway Corp. formerly
Freeway Washer & Stamping Co.
Cleveland, Ohio

12443
Budd Co. The, Polychem Products
Plastic Products Div.
Bridgeport, PA

12615
U.S. Terminals Inc.
Cincinnati, Ohio

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

12969
Unitrode Corp.
Watertown, Massachusetts

13103
Thermalloy Co., Inc.
Dallas, Texas

13327
Solitron Devices Inc.
Tappan, New York

13511
Amphenol Cadre Div.
Bunker-Ramo Corp.
Los Gatos, California

13606 - use 56289
Sprague Electric Co.
Transistor Div.
Concord, New Hampshire

13839
Replaced by 23732

14099
Semtech Corp.
Newbury Park, California

14140
Edison Electronic Div.
Mc Gray-Edison Co.
Manchester, New Hampshire

14193
Cal-R-Inc. formerly
California Resistor, Corp.
Santa Monica, California

14298
American Components, Inc.
an Insilco Co.
Conshohocken, Pennsylvania

14655
Cornell-Dublier Electronics
Division of Federal Pacific
Electric Co. Govt. Control Dept.
Newark, New Jersey

14752
Electro Cube Inc.
San Gabriel, California

14869
Replaced by 96853

14936
General Instrument Corp.
Semi Conductor Products Group
Hicksville, New York

15636
Elec-Trol Inc.
Saugus, California

15801
Fenwal Electronics Inc.
Div. of Kidde Walter and Co., Inc.
Framingham, Massachusetts

15818
Teledyne Semiconductors, formerly
Amelco Semiconductor
Mountain View, California

15849
Litton Systems Inc. Useco Div.
formerly Useco Inc.
Van Nuys, California

15898
International Business
Machines Corp.
Essex Junction, Vermont

15909
Replaced by 14140

16258
Space-Lok Inc.
Burbank, California

16299
Corning Glass
Electronic Components Div.
Raleigh, North Carolina

16332
Replaced by 28478

16473
Cambridge Scientific Ind.
Div. of Chemed Corporation
Cambridge, Maryland

16742
Paramount Plastics Fabricators, Inc.
Downey, California

16758
Delco Electronics
Div. of General Motors Corp.
Kokomo, Indiana

17001
Replaced by 71468

17069
Circuit Structures Lab.
Burbank, California

17338
High Pressure Eng. Co., Inc.
Oklahoma City, Oklahoma

17545
Atlantic Semiconductors, Inc.
Asbury Park, New Jersey

17856
Siliconix, Inc.
Santa Clara, California

17870
Replaced by 14140

18178
Vactec Inc.
Maryland Heights, Missouri

18324
Signetics Corp.
Sunnyvale, California

18612
Vishay Resistor Products Div.
Vishay Intertechnology Inc.
Malvern, Pennsylvania

18736
Voltronics Corp.
Hanover, New Jersey

18927
G T E Sylvania Inc.
Precision Material Group
Parts Division
Titusville, Pennsylvania

19451
Perine Machinery & Supply Co.
Seattle, Washington

19701
Electro-Midland Corp.
Mepco-Electra Inc.
Mineral Wells, Texas

20584
Enochs Mfg. Inc.
Indianapolis, Indiana

20891
Self-Organizing Systems, Inc.
Dallas, Texas

21604
Buckeye Stamping Co.
Columbus, Ohio

21845
Solitron Devices Inc.
Transistor Division
Riveria Beach, Florida

22767
ITT Semiconductors
Palo Alto, California

23050
Product Comp. Corp.
Mount Vernon, New York

23732
Tracor Inc.
Rockville, Maryland

23880
Stanford Applied Engrng.
Santa Clara, California

23936
Pamotor Div., Wm. J. Purdy Co.
Burlingame, California

24248
Replaced by 94222

24355
Analog Devices Inc.
Norwood, Massachusetts

24655
General Radio
Concord, Massachusetts

24759
Lenox-Fugle Electronics Inc.
South Plainfield, New Jersey

25088
Siemen Corp.
Isilen, New Jersey

25403
Amperex Electronic Corp.
Semiconductor &
Micro-Circuits Div.
Slatersville, Rhode Island

27014
National Semiconductor Corp.
Santa Clara, California

27264
Molex Products
Downers Grove, Illinois

28213
Minnesota Mining & Mfg. Co.
Consumer Products Div.
St. Paul, Minnesota

28425
Serv-/-Link formerly
Bohannan Industries
Fort Worth, Texas

28478
Deltrol Controls Div.
Deltrol Corporation
Milwaukee, Wisconsin

28480
Hewlett Packard Co. Corporate H.Q.
Palo Alto, California

28520
Heyman Mfg. Co.
Kenilworth, New Jersey

29083
Monsanto, Co., Inc.
Santa Clara, California

29604
Stackpole Components Co.
Raleigh, North Carolina

30148
A B Enterprise Inc.
Ahoskie, North Carolina

30323
Illinois Tool Works, Inc.
Chicago, Illinois

31091
Optimax Inc.
Colmar, Pennsylvania

32539
Mura Corp.
Great Neck, New York

32767
Griffith Plastic Corp.
Burlingame, California

32879
Advanced Mechanical Components
Northridge, California

32897
Erie Technological Products, Inc.
Frequency Control Div.
Carlisle, Pennsylvania

32997
Bourns Inc.
Trimpot Products Division
Riverside, California

33173
General Electric Co.
Products Dept.
Owensboro, Kentucky

34333
Silicon General
Westminister, California

34335
Advanced Micro Devices
Sunnyvale, California

34802
Electromotive Inc.
Kenilworth, New Jersey

37942
Mallory, P.R. & Co., Inc.
Indianapolis, Indiana

42498
National Radio
Melrose, Massachusetts

43543
Nytronics Inc.
Transformer Co. Div.
Geneva, New York

44655
Ohmite Mfg. Co.
Skokie, Illinois

49671
RCA Corp.
New York, New York

49956
Raytheon Company
Lexington, Massachusetts

50088
Mostek Corp.
Carrollton, Texas

50579
Litronix Inc.
Cupertino, California

51605
Scientific Components Inc.
Linden, New Jersey

53021
Sangamo Electric Co.
Springfield, Illinois

54294
Cutler-Hammer Inc. formerly
Shallcross, A Cutter-Hammer Co.
Selma, North Carolina

55026
Simpson Electric Co.
Div. of Am. Gage and Mach. Co.
Elgin, Illinois

56289
Sprague Electric Co.
North Adams, Massachusetts

58474
Superior Electric Co.
Bristol, Connecticut

60399
Torin Corp, formerly
Torrington Mfg. Co.
Torrington, Connecticut

63743
Ward Leonard Electric Co., Inc.
Mount Vernon, New York

64834
West Mfg. Co.
San Francisco, Californai

65092
Weston Instruments Inc.
Newark, New Jersey

66150
Winslow Tele-Tronics Inc.
Eaton Town, New Jersey

70485
Atlantic India Rubber Works
Chicago, Illinois

70563
Amperite Company
Union City, New Jersey

70903
Belden Corp.
Geneva, Illinois

71002
Birnbach Radio Co., Inc.
Freeport, LI New York

71400
Bussmann Mfg.
Div. of McGraw-Edison Co.
Saint Louis, Missouri

71450
CTS Corp.
Elkhart, Indiana

71468
ITT Cannon Electric Inc.
Santa Ana, California

71482
Clare, C.P. & Co.
Chicago, Illinois

71590
Centrelab Electronics
Div. of Globe Union Inc.
Milwaukee, Wisconsin

71707
Coto Coil Co., Inc.
Providence, Rhode Island

71744
Chicago Miniature Lamp Works
Chicago, Illinois

71785
TRW Electronics Components
Cinch Connector Operations Div.
Elk Grove Village, Chicago, Illinois

72005
Driver, Wilber B., Co.
Newark, New Jersey

72092
Replaced by 06980

72136
Electro Motive Mfg. Co.
Williamantic, Connecticut

72259
Nytronics Inc.
Pelham Manor, New Jersey

72619
Dialight Div.
Amperex Electronic Corp.
Brooklyn, New York

72653
G.C. Electronics
Div. of Hydrometals, Inc.
Brooklyn, New York

72665
Replaced by 90303

72794
Dzus Fastener Co., Inc.
West Islip, New York

72928
Gulton Ind. Inc.
Gudeman Div.
Chicago, Illinois

72982
Erie Tech. Products Inc.
Erie, Pennsylvania

73138
Beckman Instruments Inc.
Helipot Division
Fullerton, California

73293
Hughes Aircraft Co.
Electron Dynamics Div.
Torrence, California

73445
Amperex Electronic Corp.
Hicksville, LI, New York

73559
Carling Electric Inc.
West 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.
Components Corp
Brooklyn, New York

73949
Guardian Electric Mfg. Co.
Chicago, Illinois

74199
Quan Nichols Co.
Chicago, Illinois

74217
Radio Switch Corp.
Marlboro, New Jersey

74276
Signalite Div.
General Instrument Corp.
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
TRW Electronics Components
IRC Fixed Resistors
Philadelphia, Pennsylvania

75376
Kurz-Kasch Inc.
Dayton, Ohio

75378
CTS Knights Inc.
Sandwich, Illinois

75382
Kulka Electric Corp.
Mount Vernon, New York

75915
Littlefuse Inc.
Des Plaines, Illinois

76854
Oak Industries Inc.
Switch Div.
Crystal Lake, Illinois

77342
AMF Inc.
Potter & Brumfield Div.
Princeton, Indiana

77638
General Instrument Corp.
Rectifier Division
Brooklyn, New York

77969
Rubbercraft Corp. of CA. LTD.
Torrance, California

78189
Shakeproof
Div. of Illinois Tool Works Inc.
Elgin, Illinois

78277
Sigma Instruments, Inc.
South Braintree, Massachusetts

78488
Stackpole Carbon Co.
Saint Marys, Pennsylvania

78553
Eaton Corp. Engineered
Fastener Div.
Tinnerman Plant
Cleveland, Ohio

79136
Waldes Kohinoor Inc.
Long Island City, New York

79497
Western Rubber Company
Goshen, Indiana

79963
Zierick Mfg. Corp.
Mt. Kisko, New York

80031
Electro-Midland Corp., Mepco Div.
A North American Phillips Co.
Morristown, New Jersey

80145
LFE Corp., Process Control Div.
formerly API Instrument Co.
Chesterland, Ohio

80183 - use 56289
Sprague Products
North Adams, Massachusetts

80294
Bourns Inc., Instrument Div.
Riverside, California

80583
Hammarlund Mfg. Co., Inc.
Red Bank, New Jersey

80640
Stevens, Arnold Inc.
South Boston, Massachusetts

81073
Grayhill, Inc.
La Grange, Illinois

81312
Winchester Electronics
Div. of Litton Industries Inc.
Oakville, Connecticut

81439
Therm-O-Disc Inc.
Mansfield, Ohio

81483
International Rectifier Corp.
Los Angeles, California

81590
Korry Mfg. Co.
Seattle, Washington

81741
Chicago Lock Co.
Chicago, Illinois

82305
Palmer Electronics Corp.
South Gate, California

82389
Switchcraft Inc.
Chicago, Illinois

82415
North American Phillips
Controls Corp.
Frederick, Maryland

82872
Roanwell Corp.
New York, New York

82877
Rotron Inc.
Woodstock, New York

82879
ITT Royal Electric Div.
Pawtucket, Rhode Island

83003
Varo Inc.
Garland, Texas

83058
Carr Co., The United Can Div.
of TRW
Cambridge, Massachusetts

83298
Bendix Corp.
Electric Power Division
Eatontown, New Jersey

83330
Smith, Herman H., Inc.
Brooklyn, New York

83478
Rubbercraft Corp. of America, Inc.
West Haven, Connecticut

83594
Burroughs Corp.
Electronic Components Div.
Plainfield, New Jersey

83740
Union Carbide Corp.
Battery Products Div.
formerly Consumer Products Div.
New York, New York

84171
Arco Electronics
Great Neck, New York

84411
TRW Electronic Components
TRW Capacitors
Ogallala, Nebraska

84613
Fuse Indicator Corp.
Rockville, Maryland

84682
Essex International Inc.
Industrial Wire Div.
Peabody, Massachusetts

86577
Precision Metal Products,
of Malden Inc.
Stoneham, Massachusetts

86684
Radio Corp. of America
Electronic Components Div.
Harrison, New Jersey

86928
Seastrom Mfg. Co., Inc.
Glendale, California

87034
Illuminated Products Inc.
Subsidiary of Oak Industries Inc.
Anahiem, California

88219
Gould Inc.
Industrial Div.
Trenton, New Jersey

88245
Litton Systems Inc.
Useco Div.
Van Nuys, California

88419
Cornell-Dubilier Electronic Div.
Federal Pacific Co.
Fuquay-Varian, North Carolina

88486
Plastic Wire & Cable
Jewitt City, Connecticut

88690
Replaced by 04217

89536
Fluke, John Mfg. Co., Inc.
Seattle, Washington

89730
G.E. Co., Newark Lamp Works
Newark, New Jersey

90201
Mallory Capacitor Co. Div of
P.R. Mallory Co., Inc.
Indianapolis, Indiana

90211 - use 56365
Square D Co.
Chicago, Illinois

90215
Best Stamp & Mfg. Co.
Kansas City, Missouri

90303
Mallory Battery Co.
Div. of Mallory Co., Inc.
Tarrytown, New York

91094
Essex International Inc.
Suglex/IWP Div.
Newmarket, New Hampshire

91293
Johanson Mfg. Co.
Boonton, New Jersey

91407
Replaced by 58474

91502
Associated Machine
Santa Clara, California

91506
Augat Inc.
Attleboro, Massachusetts

91637
Dale Electronics Inc.
Columbus, Nebraska

91662
Elco Corp.
Willow Grove, Pennsylvania

91737 - use 71468
Gremar Mfg. Co., Inc.
ITT Cannon/Gremar
Santa Ana, California

91802
Industrial Devices, Inc.
Edgewater, New Jersey

91833
Keystone Electronics Corp.
New York, New York

91836
King's Electronics Co., Inc.
Tuckahoe, New York

91929
Honeywell Inc.
Micro Switch Div.
Freeport, Illinois

91934
Miller Electric Co., Inc.
Div of Aunet
Woonsocket, Rhode Island

92194
Alpha Wire Corp.
Elizabeth, New Jersey

93332
Sylvania Electric Products
Semiconductor Products Div.
Woburn, Massachusetts

94145
Replaced by 49956

94154 - use 94988
Wagner Electric Corp.
Tung-Sol Div.
Newark, New Jersey

94222
Southco Inc. formerly
South Chester Corp.
Lester, Pennsylvania

95146
Alco Electronic Products Inc.
Lawrence, Massachusetts

95263
Leecraft Mfg. Co.
Long Island City, New York

95264
Replaced by 98278

95275
Vitramon Inc.
Bridgeport, Connecticut

95303
RCA Corp.
Receiving Tube Div.
Cincinnati, Ohio

95348
Gordo's Corp.
Bloomfield, New Jersey

95354
Methode Mfg. Corp.
Rolling Meadows, Illinois

95712
Bendix Corp.
Electrical Components Div.
Microwave Devices Plant
Franklin, Indiana

95987
Weckesser Co. Inc.
Chicago, Illinois

96733
San Fernando Electric Mfg. Co.
San Fernando, California

96853
Gulton Industries Inc.
Measurement and Controls Div.
formerly Rustrak Instruments Co.
Manchester, New Hampshire

96881
Thomson Industries, Inc.
Manhasset, New York

97540
Master Mobile Mounts
Div. of Whitehall Electronics Corp.
Ft. Meyers, Florida

97913
Industrial Electronic Hdware Corp.
New York, New York

97945
Penwalt Corp.
SS White Industrial Products Div.
Piscataway, New Jersey

97966
Replaced by 11358

98094
Replaced by 49956

98159
Rubber-Teck, Inc.
Gardena, California

98278
Malco A Microdot Co., Inc.
Connector & Cable Div.
Pasadena, California

98291
Sealectro Corp.
Mamaroneck, New York

98388
Royal Industries
Products Div.
San Diego, California

98743
Replaced by 12749

98925
Replaced by 14433

99120
Plastic Capacitors, Inc.
Chicago, Illinois

99217
Bell Industries Elect. Comp. Div.
formerly Southern Elect. Div.
Burbank, California

99392
STM
Oakland, California

99515
ITT Jennings Monrovia Plant
Div. of ITT Jennings formerly
Marshall Industries Capacitor Div.
Monrovia, California

99779 - use 29587
Bunker-Ramo Corp.
Barnes Div.
Landsdowne, Pennsylvania

99800
American Precision Industries Inc.
Delevan Division
East Aurora, New York

99942
Centrelab Semiconductor
Centrelab Electronics Div. of
Globe-Union Inc.
El Monte, California

Toyo Electronics
(R-Ohm Corp.)
Irvine, California

National Connector
Minneapolis, Minnesota

## Fluke Technical Service Centers — U.S. and Canada

**United States**

**CALIFORNIA**
**Burbank**
Fluke Technical Center
2020 N. Lincoln St.
Zip: 91504
Tel. (213) 849-4641

**Santa Clara**
Fluke Technical Center
2300 Walsh Avenue
Zip: 95050
Tel. (408) 985-1200

**COLORADO**
**Denver**
Fluke Technical Center
1980 S. Quebec St.
Unit 4
Zip: 80231
Tel. (303) 750-1228

**FLORIDA**
**Orlando**
Fluke Technical Center
940 N. Fern Creek Ave.
Zip: 32803
Tel. (305) 896-2296

**ILLINOIS**
**Rolling Meadows**
Fluke Technical Center
1400 Hicks Road
Zip: 60008
Tel. (312) 398-5800

**MARYLAND**
**Kensington**
Fluke Technical Center
11501 Huff Court
Zip: 20795
Tel. (301) 881-6155

**MASSACHUSETTS**
**Waltham**
Fluke Technical Center
244 Second Ave.
Zip: 02154
Tel. (617) 890-1604

**MINNESOTA**
**Minneapolis**
Fluke Technical Center
10800 Lyndale Ave. So.
Zip: 55420
Tel. (612) 884-4541

**NEW JERSEY**
**Clifton**
Fluke Technical Center
460 Colfax Ave.
Zip: 07013
Tel. (201) 778-1339

**NORTH CAROLINA**
**Greensboro**
Fluke Technical Center
1310 Beaman Place
Zip: 27408
Tel. (919) 273-1918

**TEXAS**
**Dallas**
Fluke Technical Center
14400 Midway Road
Zip: 75240
Tel. (214) 233-9945

**WASHINGTON**
**Mountlake Terrace**
John Fluke Mfg. Co., Inc.
21707 66th Ave. W. Suite 1
Zip: 98043
Tel. (206) 774-2206

**Canada**

**ALBERTA**
**Calgary**
Allan Crawford Assoc. Ltd.
Fluke Technical Center
14-2280 39th N.E.
Zip: T2E 6P7
Tel. (403) 276-9658

**ONTARIO**
**Mississauga**
Allan Crawford Assoc. Ltd.
Fluke Technical Center
6503 Northam Drive
Zip: L4V 1J5
Tel. (416) 678-1500

**QUEBEC**
**Longueuil**
Allan Crawford Assoc. Ltd.
Fluke Technical Center
1330 Marie Victorin Blvd. E.
Zip: J4G 1A2
Tel. (514) 670-1212

## Sales and Service Locations — International

**Supplied and supported by Fluke (Nederland) B.V., P.O. Box 5053, Zevenheuvelenweg 53, Tilburg, Netherlands.**

**EUROPE**

**AUSTRIA**
*Walter Rekirsch Elektronische
Gerate GmbH & Co. Vertrieb KG
Liechtensteinstrasse 97/6
A-1090 Vienna, Austria
Tel. (222) 347646-0

**BELGIUM**
*C. N. Rood S/A
37 Place de Jamblinne de Meux
B-1040 Brussels, Belgium
Tel. (02) 27352135

**CYPRUS**
Chris Radiovision Ltd.
P.O. Box 1989
Nicosia, Cyprus
Tel. 66121

**DENMARK**
*Tage Olsen A/S
Ballerup Byveg 222
DK-2750 Ballerup
Tel. (01) 2-65 81 11

**FINLAND**
*Oy Findip AB
Teollisuustie 7
02700 Kauniainen
Helsinki, Finland
Tel. (080) 502255

**FRANCE**
*M. B. Electronique S.A.
Rue Fourney
ZAC de BUC
B. P. No. 31
78530 BUC, France
Tel. (01) 9563130

**GERMAN FEDERAL REPUBLIC**
*Fluke (Deutschland) GmbH
4-Dusseldorf
Meineckestrasse 53
West Germany
Tel. 211-450831

*Fluke (Deutschland) GmbH
8000 Munich 80
Vertriesburo Bayern
Rosenheimer Strasse 139
West Germany
Tel. 089-404061

**GREECE**
*Hellenic Scientific
Representations Ltd.
11 Vrassida Street
Athens 612, Greece
Tel. (021) 7792320

**ITALY**
*Sistrel S.p.A.
Via Giuseppe Armellini No. 39
00143 Rome, Italy
Tel. (06) 5915551

*Sistrel S.p.A.
Via Timavo 66
20099 Sesto S. Giovanni (Milan)
Italy
Tel. (02) 2476693

**NETHERLANDS**
*C.N. Rood, B.V.
Cort van der Lindenstraat 11-13
Rijswijk ZH2280AA
Netherlands
Tel. (070) 996360

**NORWAY**
*Morgenstierne & Co. A/A
Konghellegate 3
P.O. Box 6688, Rodelokka
Oslo 5, Norway
Tel. (02) 356110

**PORTUGAL**
*Equipamentos
De Laboratorio Ltda.
P.O. Box 1100
Lisbon 1, Portugal
Tel. (019) 976551

**SPAIN**
*Hispano Electronica S.A.
Poligono Industrial Urtinsa
Apartado de Correos 48
Alcorcon (Madrid), Spain
Tel. 09-341-6194108

**SWEDEN**
*Teleinstrument AB
P.O. Box 490
S-162 Vallingby-4
Sweden
Tel. (08) 380370

**SWITZERLAND**
*Traco Electronic AG
Jenatschstrasse 1
8002 Zurich, Switzerland
Tel. (01) 2010711

**TURKEY**
*Erkman Electronik Aletler
Necatibey Cad 92/2
Karakoy/Istanbul
Turkey
Tel. 441546

**UNITED KINGDOM**
*Fluke International Corp.
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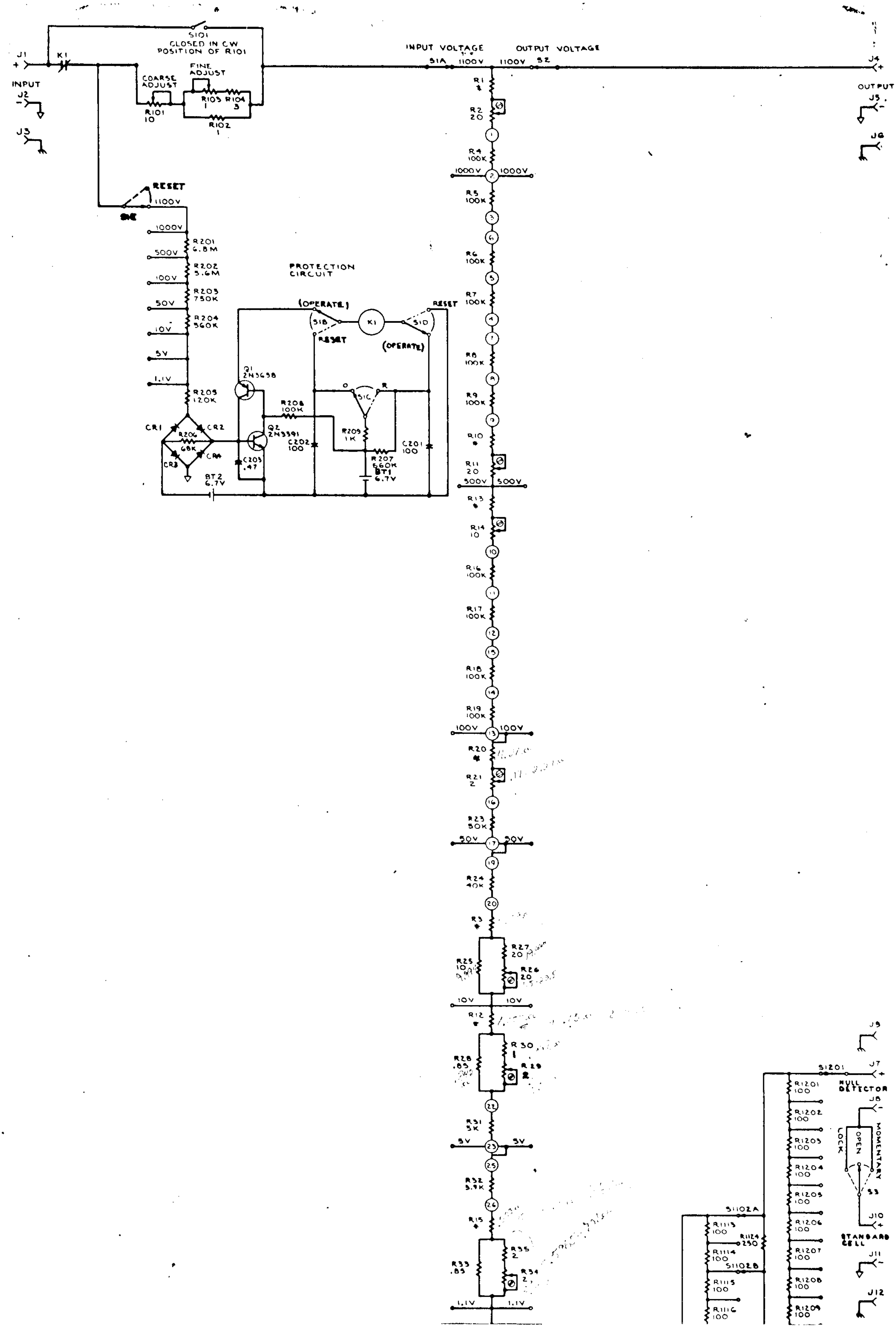
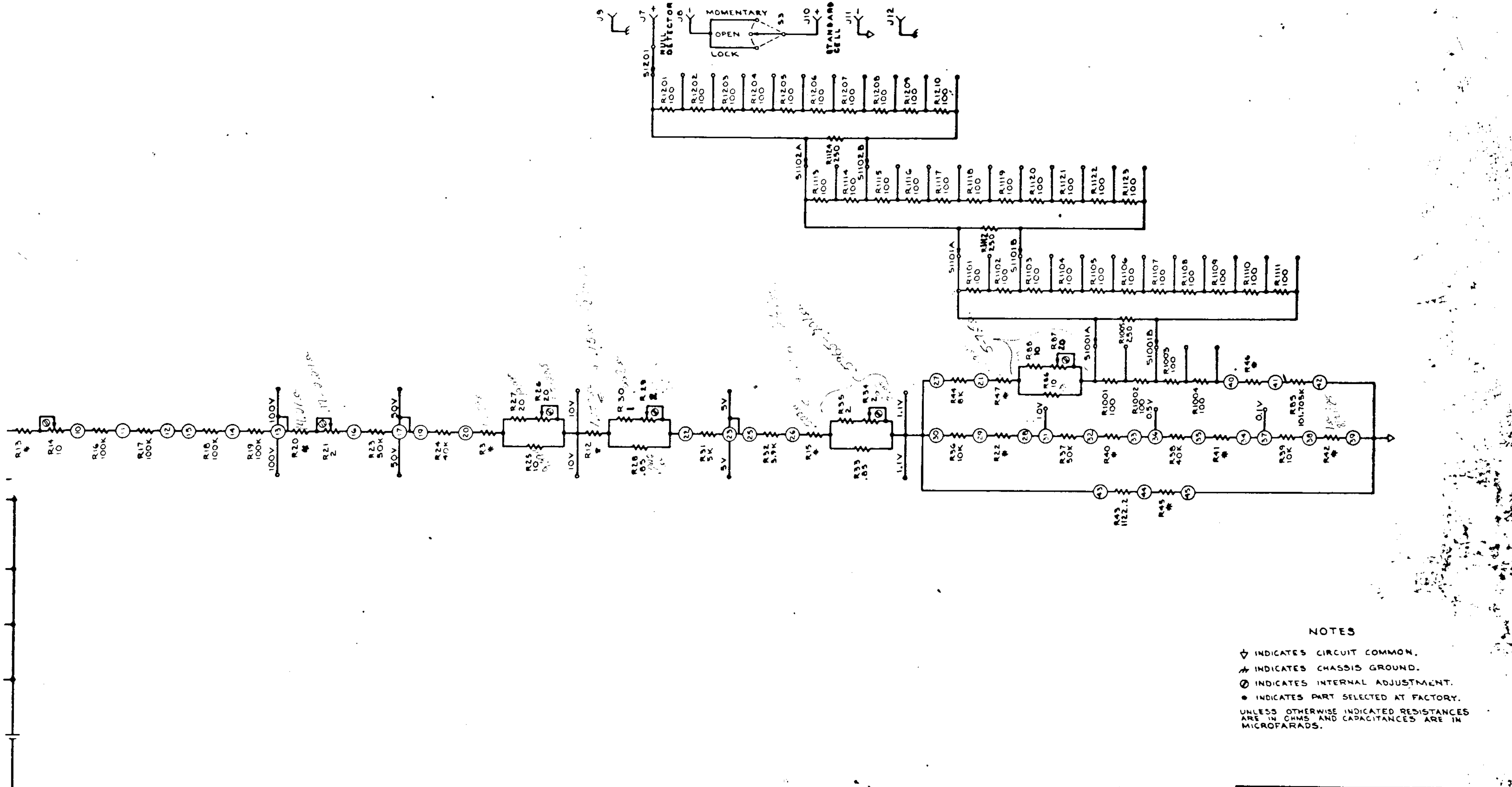


INPUT
J1
J2
J3
K1
S101
CLOSED IN C.W. POSITION OF R101
COARSE ADJUST
R101 10
FINE ADJUST
R103 1
R104 3
R102 1
INPUT VOLTAGE
S1A
1100V
OUTPUT VOLTAGE
S2
OUTPUT
J4
J5
J6
RESET
1100V
1000V
500V
100V
50V
10V
5V
1.1V
R201 6.8M
R202 5.6M
R203 750K
R204 560K
R205 120K
R206 68K
CR1
CR2
CR3
CR4
BT2 6.7V
PROTECTION CIRCUIT
(OPERATE)
S1B
K1
S1D
(OPERATE)
Q1 2N3638
Q2 2N3391
R208 100K
R209 1K
R207 560K
BT1 6.7V
C202 100
C201 100
C203 .47
S1C
R1
R2 20
R4 100K
R5 100K
R6 100K
R7 100K
R8 100K
R9 100K
R10
R11 20
R13
R14 10
R16 100K
R17 100K
R18 100K
R19 100K
R20
R21 2
R23 50K
R24 40K
R3
R27 20
R25 10
R26 20
R12
R30 1
R28 .85
R29 2
R31 5K
R32 3.9K
R15
R35 2
R33 .85
R34 2
J7
S1201
NULL DETECTOR
J8
LOCK
OPEN
MOMENTARY
S3
J9
J10
STANDARD CELL
J11
J12
R1201 100
R1202 100
R1203 100
R1204 100
R1205 100
R1206 100
R1207 100
R1208 100
R1209 100
S1102A
S1102B
R1113 100
R1124 250
R1114 100
R1115 100
R1116 100




## NOTES

- ▽ INDICATES CIRCUIT COMMON.
- ⏚ INDICATES CHASSIS GROUND.
- ⊘ INDICATES INTERNAL ADJUSTMENT.
- * INDICATES PART SELECTED AT FACTORY.

UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS AND CAPACITANCES ARE IN MICROFARADS.

FUNCTIONAL SCHEMATIC C

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**MODEL 750A**

MODEL 750A SER. NO. 123 & ON

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