

**KS-20490 RECTIFIERS**  
**48 VOLTS, 400 AMPERES**  
**TROUBLE-LOCATING**

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**1. GENERAL**

**1.01** The KS-20490 rectifiers provide an isolated, filtered and regulated dc voltage for automatically floating and charging battery plants. The rectifiers are initially intended for use in the 300-type power plants but may be used whenever their characteristics and design apply. See Fig. 1 and 2.

**1.02** Whenever this section is reissued, the reason for reissue will be listed in this paragraph. This section does not affect the Equipment Test List.

**Warning:** *The voltages in this unit exceed 150 volts to ground. Avoid all contact with terminals. Do not allow a test pick to touch two metal parts at the same time or destructive and dangerous short circuits may occur. Disconnect ac supply before working on rectifier except when necessary to make tests.*

**1.03** This section is based on drawing SD-81996-01, Issue 4B. If this section is to be used with equipment or apparatus that is associated with a later issue of the drawing, reference should be made to the SD and CD to determine the extent of the changes and the manner in which the section may be affected.

**1.04** For a more detailed description of the operation of the KS-20490 rectifiers, refer to Section 169-742-301. Procedures for maintaining the output switch of the KS-20490 rectifier are covered in 169-742-701.

**2. LIST OF TEST APPARATUS**

CODE OR SPEC NO.	DESCRIPTION
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**TEST APPARATUS**

KS-14510	Volt-Ohm-Milliammeter (VOM)
—	John Fluke 8100A digital multimeter (or equivalent)
—	Oscilloscope, Tektronix 545B (or equivalent)
—	100-ohm resistor

**3. OPERATION**

**3.01** Normal operation of the KS-20490 rectifiers shall be in accordance with Section 169-742-301. In the event of a trouble condition, the rectifier shall be removed from service and after the trouble condition is eliminated shall be returned to service in accordance with Section 169-742-301.

**3.02** Electrolytic capacitors should be maintained in accordance with Section 032-110-701.

**3.03** Circuit packs and semiconductor devices should be maintained in accordance with Section 032-173-301.

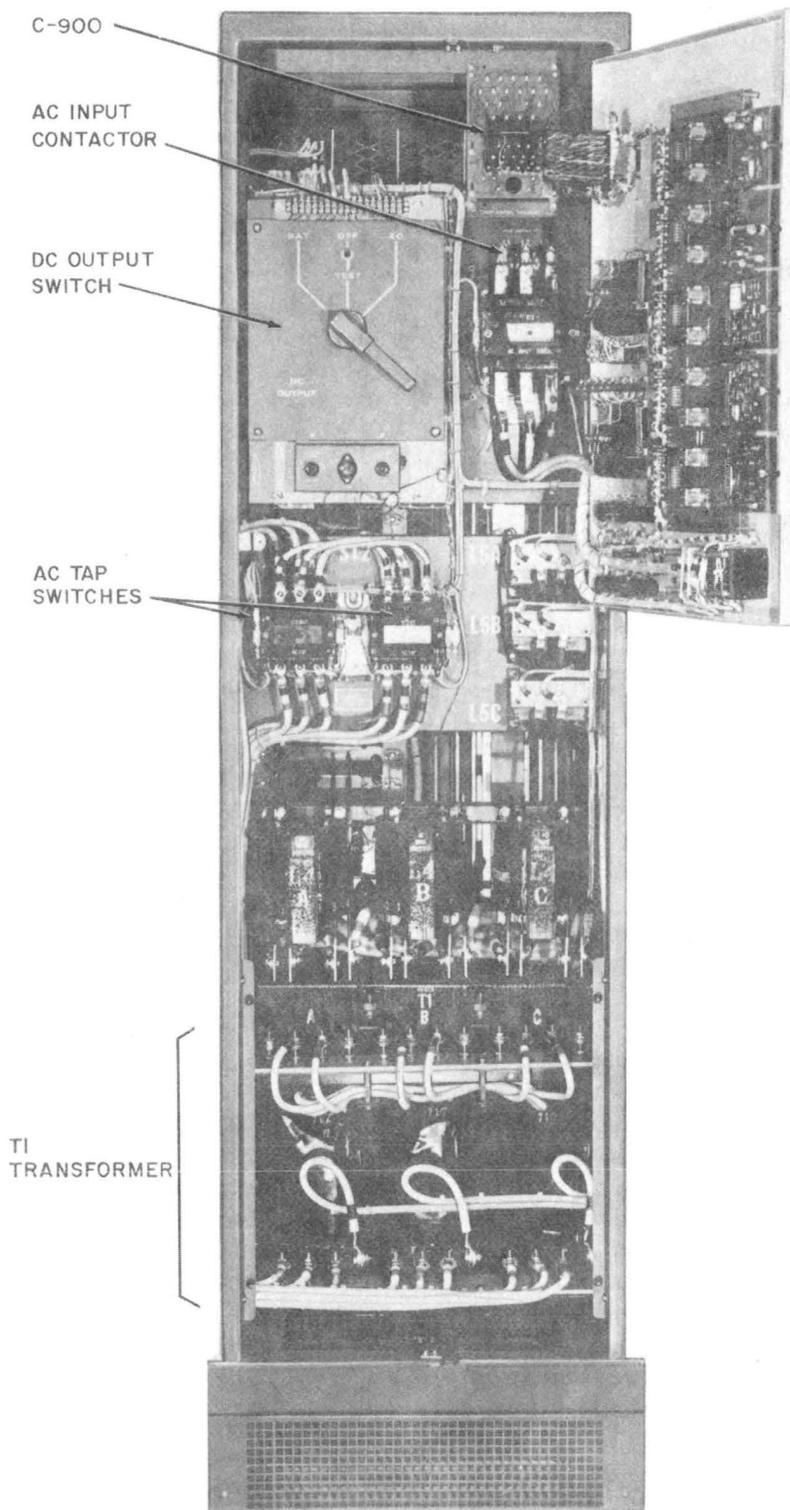


Fig. 1—KS-20490 Rectifier—Front View With Control Panel Open

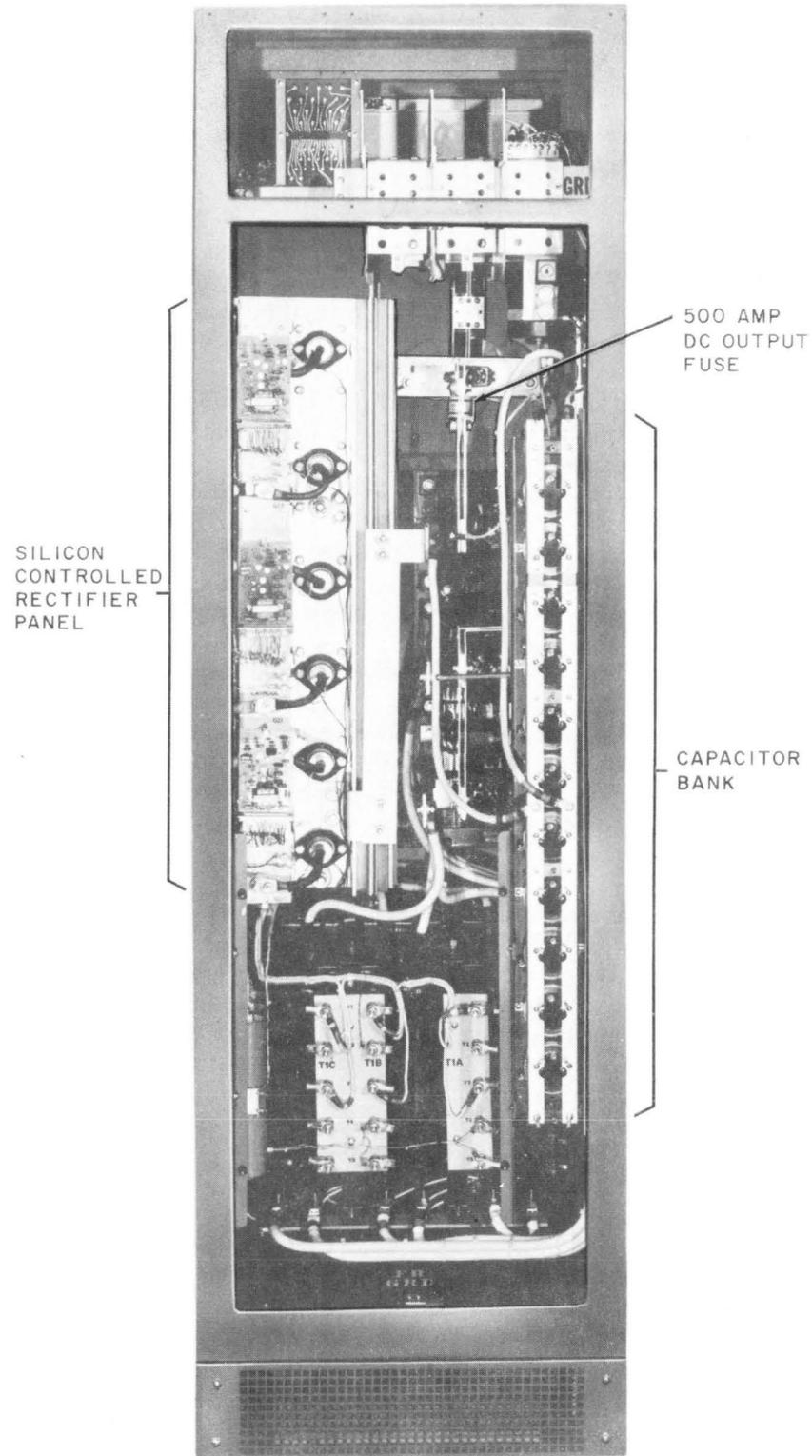


Fig. 2—KS-20490 Rectifier—Rear View With Doors Removed

#### 4. TROUBLE-LOCATING PROCEDURES

##### GENERAL

4.01 Failure of the KS-20490 rectifiers will usually be displayed in one of three ways:

- (a) Meter indications
- (b) Lamp indications
- (c) Plant signals

The trouble flowchart in Fig. 3 is designed to analyze troubles in rectifiers from the standpoint of these three indications. For example, if a rectifier is shut down and locked out due to a trouble, the first indication is that the OUTPUT CURRENT meter indicates zero amperes. The next noticeable indication would be the lamps on the control panel. See Fig. 4. From this point, the section of the chart which applies to a particular trouble should be consulted.

4.02 When the rectifier fails, try to locate the trouble before subjecting the rectifier to restart attempts. Repeated attempts to restart the rectifier before correcting the trouble condition may damage other rectifier components.

4.03 As a general trouble-locating procedure; check for faulty connections and broken, burned, or shorted wires. Inspect the harness wiring and leads from all components for possible breaks and shorts. Check that no adjacent terminals or lugs touch together. Check that all solder and pressure points make good electrical contact using a volt-ohmmeter. Inspect for evidence of poor connection at switch and bus joints. The main load carrying bolts should be tightened (including squeeze connecting lugs) within six weeks after installation cutover and once each year after that.

4.04 When trouble is traced to a circuit pack, replace it with the proper new or repaired circuit pack. **Do not attempt** to repair defective circuit packs unless personnel are equipped and trained to repair circuit packs. Return defective circuit packs to the authorized repair facility in accordance with local instructions.

4.05 The following precautions should be observed prior to and during the interval of detecting and clearing troubles in the rectifier.

(a) Do not apply ac power to the rectifier except when checking voltages, currents, or waveforms. To completely isolate the rectifier from the ac line, the AC switch at the bus plug-in unit or power service must be operated to OFF.

(b) Plus side of battery is grounded when using an oscilloscope or any other test equipment powered from the ac line which has one probe connected to the chassis. That probe must always be connected to ground potential when locating troubles in the rectifier.

(c) Under no circumstances should fuses of higher ratings than those specified be used.

(d) Use caution when working with wrenches, screwdrivers, and test leads to prevent shorting the dc circuit. Always disconnect the rectifier from battery and ac service before performing repairs.

4.06 Waveforms encountered in trouble-locating procedures are not contained in this section but can be found on the appropriate sheets of SD-81996-01, Issue 4B. When taking measurements with an oscilloscope, reference should be made to these waveforms as a guideline in locating specific troubles in the rectifier.

##### TROUBLE CHARTS AND TESTS

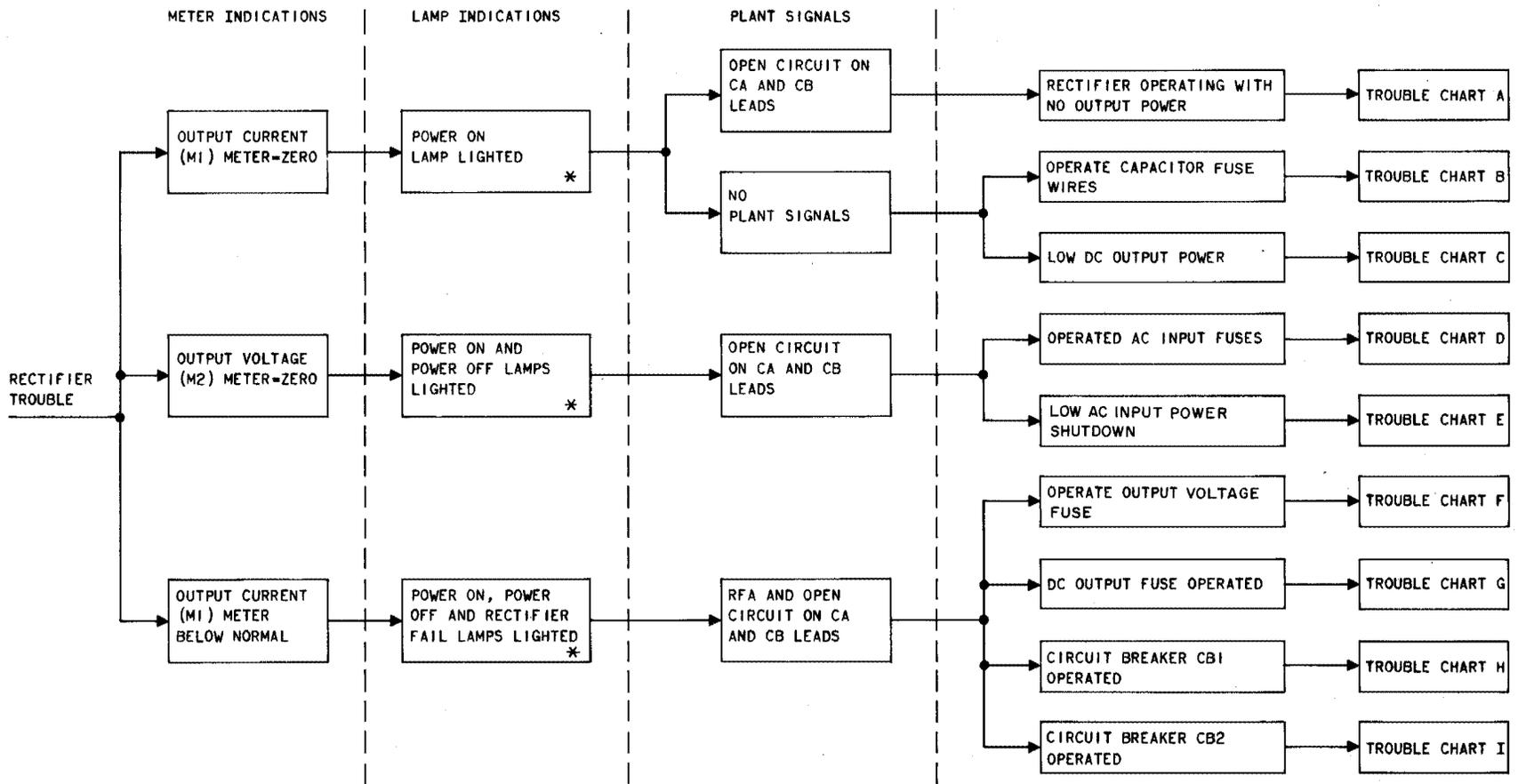
4.07 The trouble-locating procedures given in Trouble Charts A through I are to be used in conjunction with Test Charts 1 through 8. Whenever a test procedure requires testing a circuit pack, and components or test points are not accessible, circuit pack board extenders should be used.

4.08 The following warnings and cautions should be observed while operating or performing maintenance on the rectifier.

**Warning:** *Voltages inside the rectifier are over 150 volts to ground. Avoid all contact with terminals.*

**Caution 1:** *Do not remove any plug-in circuit pack while the rectifier is in operation.*

**Caution 2:** *The POWER ON/OFF (S1) switch must be operated (depressed and*



\* EC LAMP IS LIGHTED WHENEVER THE DC OUTPUT (S1) SWITCH IS IN THE EC POSITION

Fig. 3—Trouble Flow Chart

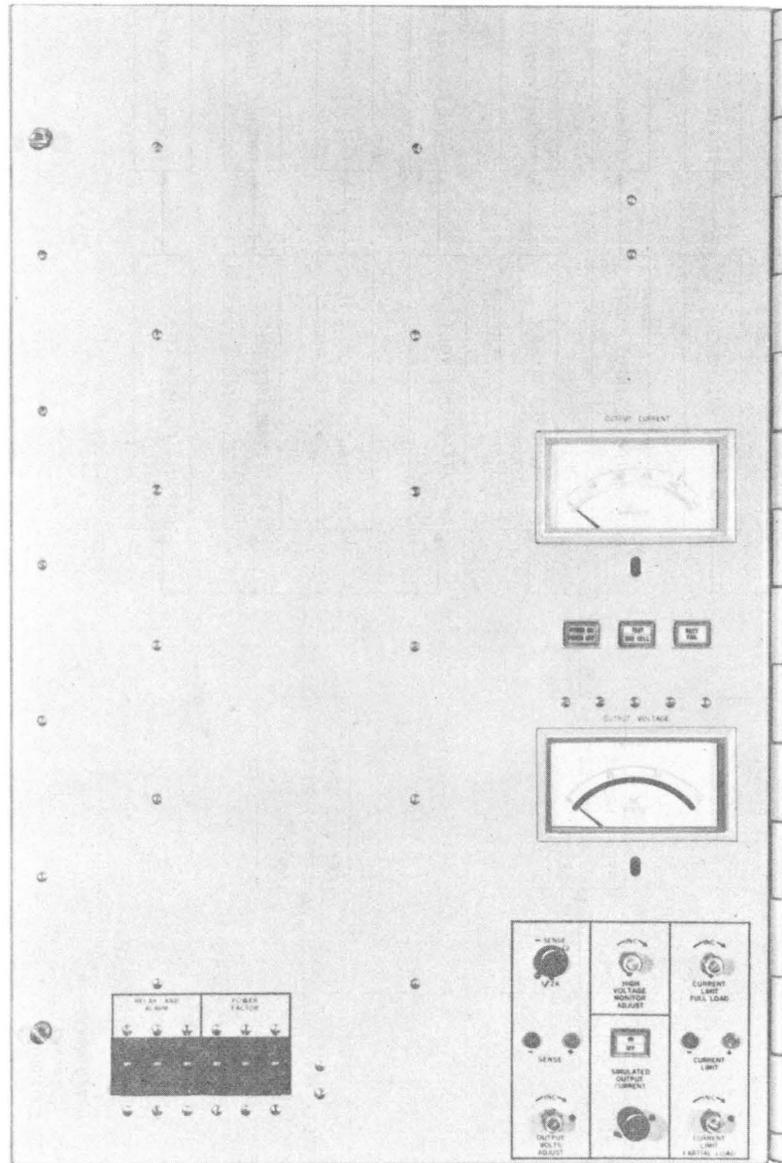


Fig. 4—KS-20490 Rectifier Control Panel Front View

*released) to shut down the rectifier before the DC OUTPUT (S3) switch or the AC TAP (S2) switch is operated from one position to another.*

*Caution 3: With the rectifier shut down and disconnected from the battery [DC OUTPUT (S3) switch in the off position], the filter capacitors in the rectifier will discharge in approximately one minute. The output capacitors should be charged in accordance with 169-742-301 prior to operation of the DC OUTPUT (S3) switch to the BAT or EC position.*

*Caution 4: Operation of the rectifier while a trouble exists may cause additional failures of some components. It is essential, while testing, to be alert to the need of quickly*

*shutting down the rectifier until the trouble is localized and corrected. Remove power from the circuit before removing and replacing circuit packs.*

*Caution 5: When using KS-14510 (VOM) set on resistance scale, the leads should be reversed in order that the polarity of the meter will agree with the polarity of the test points listed in this section.*

*Caution 6: When using an oscilloscope, reference should be made to the circuit notes in SD-81996-01 regarding each measurement. Some measurements are taken above ground and grounding the oscilloscope could result in damage to the test equipment and/or the rectifier.*

**TROUBLE CHART A**  
**NO DC OUTPUT POWER – RECTIFIER OPERATING**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) OUTPUT VOLTS ADJUST (R7) rheostat improperly adjusted.	<p>(1) Operate the POWER ON/OFF (S2) switch to the POWER OFF position. The POWER OFF lamp lights and the POWER ON lamp is extinguished.</p> <p>(2) Operate the DC OUTPUT (S1) switch to OFF position. See 4.08, Caution 3.</p> <p>(3) Operate OFF TEST (S4) switch to TEST position.</p> <p>(4) Operate the POWER ON/OFF (S2) switch to the POWER ON position.</p> <p><i>Requirement:</i> The OUTPUT VOLTAGE (M2) meter should indicate 49.91 volts for the L11 and L12 rectifiers or 52.08 volts for the L21 and L22 rectifiers.</p> <p>(5) If the requirement is met, proceed to (16). If the requirement is not met, continue with (6).</p> <p>(6) Rotate the SIMULATED OUTPUT CURRENT (R10) rheostat fully ccw.</p> <p>(7) Using the KS-14510 (VOM) set to the 60 VOLT DC scale, connect the negative lead to the -SENSE (J2) pin jack of the rectifier and the positive lead to the +SENSE (J1) pin jack.</p> <p>(8) Loosen the locking device on the OUTPUT VOLTS ADJUST (R7) rheostat and rotate slowly cw until OUTPUT VOLTAGE (M2) meter and the KS-14510 voltmeter meet the requirement in (4).</p> <p>(9) Operate the SIMULATED OUTPUT CURRENT (S3) switch to the ON position. The SIMULATED CURRENT ON lamp lights and the SIMULATED CURRENT OFF lamp is extinguished.</p> <p>(10) Slowly rotate the SIMULATED OUTPUT CURRENT (R10) rheostat cw until the OUTPUT CURRENT (M1) ammeter indicates 400 amperes. The OUTPUT VOLTAGE (M2) meter and the KS-14510 (VOM) should still indicate 49.91 volts or 52.08 volts. (A minor readjustment of the OUTPUT VOLTS ADJUST (R7) rheostat is permissible to retain the 49.91 volts or 52.08 volts indication.)</p> <p>(11) Tighten the locking device on the OUTPUT VOLTS ADJUST (R7) rheostat.</p>

## TROUBLE CHART A (Cont)

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
	(12) Rotate the SIMULATED OUTPUT CURRENT (R10) rheostat fully ccw.
	(13) Operate SIMULATED OUTPUT CURRENT (S3) switch to OFF position.
	(14) Operate the POWER ON/OFF (S2) switch to the POWER OFF position. The POWER OFF lamp lights and the POWER ON lamp extinguishes.
	(15) Disconnect the KS-14510 (VOM).
	(16) Operate OFF TEST (S4) switch to OFF position.
	(17) Charge output filter capacitors in accordance with Section 169-742-301, then operate DC OUTPUT (S1) switch to BAT or EC position.
	(18) Operate POWER ON/OFF (S2) switch to POWER ON position.
<i>Note:</i> Possible causes B, C, and D will cause the TEST lamp to light. If the TEST lamp is not lit, proceed to E. If the trouble is not found after all other tests are completed, then perform B, C, and D under the assumption that the TEST lamp is defective.	
(b) Fuse in plant RB lead operated.	Check fuse in RB lead of plant control circuit; replace if operated.
(c) Loose Connection at CP-P900.	Locate CP-P900 in upper right corner of rectifier, behind front control panel. Check to see that it is firmly seated in its connector.
(d) Defective SNS relay on CP-600.	<p>(1) Operate POWER ON/OFF (S2) switch to OFF.</p> <p>(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.</p> <p>(3) Remove OUTPUT VOLTAGE (F3) fuse.</p> <p>(4) Remove CP-100.</p> <p>(5) Remove CP-200.</p> <p>(6) Connect a jumper from (+ TEST) GRD bus bar to terminal 4 (J200) on CP-600.</p>

## TROUBLE CHART A (Cont)

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(e) Defective gradual output (walk-in) portion of CP-200.	<p>(7) Connect a jumper from (-TEST) BAT bus bar to terminal 9 (J100) on CP-600.</p> <p><i>Requirement:</i> The SNS relay should operate. The TEST lamp should extinguish.</p> <p>(8) If requirement is met, proceed to (10). If requirement is not met, continue with (9).</p> <p>(9) Replace SNS coil.</p> <p>(10) Disconnect jumpers.</p> <p>(11) Reinsert CP-200.</p> <p>(12) Reinsert CP-100.</p> <p>(13) Reinsert OUTPUT VOLTAGE (F3) fuse.</p> <p>(14) Charge filter capacitors in accordance with Section 169-742-301.</p> <p>(15) Operate DC OUTPUT (S1) switch to BAT or EC position.</p> <p>(16) Operate POWER ON/OFF (S2) switch to ON.</p> <p>Test CP-200 in accordance with Test Chart 2.</p>

**TROUBLE CHART B**  
**OPERATED CAPACITOR FUSE WIRES**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Defective filter capacitors C2 through C12.	<p>(1) Operate POWER ON/OFF (S2) switch to OFF.</p> <p>(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.</p> <p>(3) With the KS-14510 (VOM) set on the 60-volt dc scale, measure the voltage across (+TEST) GRD bus bar and (−TEST) BAT bus bar.</p> <p><i>Requirement:</i> The KS-14510 meter should indicate zero volts.</p> <p>(4) If requirement is not met, shunt C2 through C12 with a 100-ohm resistor momentarily to discharge capacitors. Then continue with (5).</p> <p>(5) If requirement is met, set KS-14510 meter to R × 1 scale and measure across each capacitor.</p> <p><i>Requirement:</i> The resistance should be low initially and then increase as the capacitor charges. If zero ohms is measured, the capacitor is shorted and should be replaced.</p> <p>(6) After all capacitors (C2 through C12) are checked, disconnect KS-14510 voltmeter.</p> <p>(7) Replace capacitor fuse wires.</p> <p>(8) Charge filter capacitors in accordance with Section 169-742-301.</p> <p>(9) Operate DC OUTPUT (S1) switch to BAT or EC position.</p> <p>(10) Operate POWER ON/OFF (S2) switch to ON position.</p>

TROUBLE CHART C  
LOW DC OUTPUT

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Low ac input.	(1) Set KS-14510 (VOM) on the 300-volt AC scale.  (2) Measure the ac input voltage at T1 transformer using the test connections and voltage tolerances outlined in SD-81996-01-D4, Note 322.
(b) Defective CP-100.	Test CP-100 in accordance with Test Chart 1.

**TROUBLE CHART D**  
**OPERATED AC INPUT FUSE**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Shorted or defective T1 transformer.	<p>(1) Operate POWER ON/OFF (S2) switch to OFF position.</p> <p>(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.</p> <p>(3) Remove fuses in power service cabinet.</p> <p>(4) Use the KS-14510 (VOM) set on the R <math>\times</math> 1 scale to measure the resistance of T1 primary and to check for shorts between T1 primary and ground.</p> <p><i>Requirement:</i> If T1 primary is shorted (resistance = zero), replace T1 transformer. Remove any shorts between T1 primary and ground.</p>
(b) Wiring between power service cabinet and T1 transformer shorted to ground.	<p>(5) If requirement is met, proceed to (8). If requirement is not met, continue with B (6).</p> <p>(6) Check wiring between power service cabinet and T1 transformer for shorts to ground.</p> <p><i>Requirement:</i> Remove any shorts to ground.</p> <p>(7) Reinsert fuses in power service cabinet.</p> <p>(8) Charge output filter capacitors in accordance with Section 169-742-301.</p> <p>(9) Operate DC OUTPUT (S1) switch to BAT or EC position.</p> <p>(10) Operate POWER ON/OFF (S2) switch to ON.</p>
(c) Defective ac input voltage monitor transformer CP-700.	Test CP-700 in accordance with Test Chart 6.

**TROUBLE CHART E**  
**LOW AC INPUT POWER SHUTDOWN**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Low ac input service voltage.	<p>(1) Set the KS-14510 (VOM) to the 300-volt ac scale for L11 and L21 rectifiers or to the 600-volt ac scale for the L12 and L22 rectifiers.</p> <p>(2) Remove protective cover from L1, L2, and L3 input terminals.</p> <p><i>Warning: Voltages behind this cover are over 200 volts to ground. Extreme care should be exercised when taking the following measurements.</i></p> <p>(3) Connect the KS-14510 voltmeter across the following points:</p> <p style="text-align: center;">L1 and L2 L2 and L3 L1 and L3</p> <p><i>Requirement:</i> The voltage should be a nominal 208- or 240-volts ac for L11 and L22 rectifiers and a nominal 480-volts ac for L12 and L22 rectifiers across each primary winding.</p> <p>(4) If the requirement is met, proceed to (6). If requirement is not met, continue with (5).</p> <p>(5) If the ac input voltage is low, the AC Input Voltage Monitor Circuit (CP-700) is functioning properly. The cause of this problem is either a defect in the ac distribution circuit or commercial power.</p> <p>(6) Disconnect the KS-14510 (VOM).</p> <p>(7) Return the protective cover to its original position.</p>
(b) Defective AC Input Voltage Monitor Circuit (CP-700).	Test the AC Input Voltage Monitor Circuit (CP-700) in accordance with Test Chart 6.

**TROUBLE CHART F**  
**OPERATED OUTPUT VOLTAGE (F3) FUSE**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Shorted voltmeter lead.	<p>(1) Operate POWER ON/OFF (S2) switch to OFF.</p> <p>(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.</p> <p>(3) Remove OUTPUT VOLTAGE (F3) fuse.</p> <p>(4) Set the KS-14510 (VOM) on the R × 1 scale.</p> <p>(5) Connect red lead of the KS-14510 (VOM) to GRD bus bar.</p> <p>(6) Place the black lead on the (−) terminal of OUTPUT VOLTAGE (M2) meter. See Fig. 5.</p> <p><i>Requirement:</i> If meter indicates zero ohms, check for shorted connection. If no shorts are found, replace M2 meter.</p> <p>(7) Disconnect KS-14510 (VOM).</p> <p>(8) Insert OUTPUT VOLTAGE (F3) fuse.</p> <p>(9) Operate RELAY AND ALARM circuit breaker (CB2) to ON position.</p> <p>(10) Charge output filter capacitors in accordance with Section 169-742-301.</p> <p>(11) Operate DC OUTPUT (S1) switch to BAT or EC position.</p> <p>(12) Operate POWER ON/OFF (S2) switch to ON.</p>
(b) Defective Voltage Regulator and Simulated Output Current (CP-100).	Test CP-100 in accordance with Test Chart 1.

**TROUBLE CHART G**  
**OPERATED 500 AMP DC OUTPUT (F1) FUSE**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Shorted SCR(s) Q1A, Q1B or Q1C or Q2A, Q2B or Q2C.	<p>(1) Operate POWER ON/OFF (S2) switch to ON.</p> <p>(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.</p> <p>(3) Disconnect the cathode lead (red) and gate lead (white) of each SCR.</p> <p>(4) Use KS-14510 (VOM) set on R × 1 scale to check anode (heat sink) to cathode resistance.</p> <p><i>Requirement:</i> The meter should indicate a resistance greater than 1000 ohms.</p> <p>(5) Reverse the meter leads.</p> <p><i>Requirement:</i> The meter should indicate a resistance greater than 1000 ohms.</p> <p>(6) An SCR with an anode to cathode resistance less than 1000 ohms in either direction should be replaced.</p> <p>(7) If the requirements in (4) and (5) are met, proceed to troubleshoot in accordance with (8). If the requirements are not met and defective SCRs are replaced, proceed to (22).</p>
(b) Shorted wiring between SCRs and ground.	<p>(8) Check wiring between SCR cathode (red lead) and the main transformer T1 for shorts to ground.</p> <p><i>Requirement:</i> Remove any shorts in wiring or replace T1 if windings are shorted to ground.</p> <p>(9) If shorts are removed from circuit, proceed to (22). If no short circuits are found, continue troubleshooting in accordance with (10).</p>
(c) Defective circuit packs CP-800, CP-100, or CP-200.	<p>(10) Operate OFF/TEST (S4) switch to TEST.</p> <p>(11) Verify that RELAY AND ALARM circuit breaker (CB2) is in ON position.</p> <p>(12) Replace DC OUTPUT (F1) fuse.</p> <p>(13) Replace DC OUTPUT ALARM (F2) fuse.</p> <p>(14) Operate POWER ON/OFF (S2) switch to ON.</p> <p><i>Requirement:</i> Output voltage should be normal.</p>

## TROUBLE CHART G (Cont)

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(d) Defective DC output (S1) switch.	(15) Operate SIMULATED OUTPUT CURRENT (S3) switch to ON position.
	(16) Turn the SIMULATED OUTPUT CURRENT (R10) rheostat slowly cw until OUTPUT CURRENT (M1) meter indicates 400 amperes.
	<i>Requirement:</i> Voltage should decrease slightly and current should remain at 400 amperes.
	(17) If the requirement is not met, test circuit packs 800, 200, and 100 in accordance with TEST CHARTS 7, 2, and 1 respectively. If the requirement is met, continue with (18) and then proceed with possible cause D.
	(18) Turn SIMULATED OUTPUT CURRENT (R10) rheostat fully cw.
	(19) Operate SIMULATED OUTPUT CURRENT (S3) switch to OFF.
	(20) Operate OFF/TEST (S4) switch to OFF.
	(21) Inspect, clean, or adjust DC output (S1) switch in accordance with Section 169-742-701.
	(22) When all troubles are cleared, verify the following:
	(a) DC OUTPUT (F1) fuse has been replaced with a good fuse.
	(b) DC OUTPUT ALARM (F2) fuse has been replaced with a good fuse.
	(c) OFF/TEST (S4) switch is in OFF position.
	(d) RELAY AND ALARM circuit breaker (CB2) is in ON position.
	(e) SIMULATED OUTPUT CURRENT (S3) switch is in OFF position.
	(23) Charge output filter capacitors in accordance with Section 169-742-301.
	(24) Operate DC OUTPUT (S1) switch to BAT or EC position.
	(25) Operate POWER ON/OFF (S2) switch to ON.

**TROUBLE CHART H**  
**POWER FACTOR CIRCUIT BREAKER (CB1) OPERATED**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) Main Transformer (T1) shorted.	(1) Operate POWER ON/OFF (S2) switch to OFF. (2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3. (3) Remove fuses from power service cabinet. (4) Use KS-14510 (VOM) on R × 1 scale, to check T1A, T1B, and T1C for shorts to ground. Clear shorts or replace T1 if windings are defective. (5) If no shorts are found, continue with (6).
(b) POWER FACTOR INDUCTOR (L5) shorted.	(6) Use KS-14510 (VOM) on R × 1 scale to check POWER FACTOR INDUCTORS L5A, L5B, and L5C for shorts to ground. (7) Clear shorts or replace L5 if defective. (8) If no shorts are found, continue with (9).
(c) POWER FACTOR CAPACITORS C1A, C1B, and C1C shorted.	(9) Use KS-14510 (VOM) on R × 1 scale to check POWER FACTOR CAPACITORS C1A, C1B, and C1C for shorts.  <i>Requirement:</i> If KS-14510 (VOM) indicates zero ohms, the capacitor is shorted and should be replaced.  (10) Charge output filter capacitors in accordance with Section 169-742-301. (11) Operate DC OUTPUT (S1) switch to BAT or EC position. (12) Operate POWER ON/OFF (S2) switch to ON.

**TROUBLE CHART I**  
**RELAY AND ALARM CIRCUIT BREAKER (CB2) OPERATED**

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
(a) DC OUTPUT (F2) fuse operated.	Test in accordance with TROUBLE CHART G.
(b) OUTPUT VOLTAGE (F3) fuse operated.	Test in accordance with TROUBLE CHART F.
(c) $\pm 125V$ fuse operated.	<p>(1) Operate POWER ON/OFF (S2) switch to OFF.</p> <p>(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.</p> <p>(3) Remove <math>\pm 125V</math> (F4) fuse and check it with KS-14510 VOM set on R <math>\times</math> 1 scale.</p> <p><i>Requirement:</i> Zero ohms indicates the fuse is good.</p> <p>(4) If the requirement is met, reinsert <math>\pm 125V</math> (F4) fuse and proceed to (7). If the requirement is not met, insert new fuse and continue with (5).</p> <p>(5) Test DCCT circuit CP-250 in accordance with TEST CHART 8.</p> <p><i>Note:</i> If trouble is corrected, return to TROUBLE CHART I (25). If trouble is not corrected, continue with (6).</p> <p>(6) Test Stabilizer Circuit CP-400 in accordance with TEST CHART 4.</p> <p><i>Note:</i> If trouble is corrected, return to TROUBLE CHART I (25). If trouble is not corrected, continue troubleshooting in accordance with (7).</p>
(d) Plant grounded HV lead.	<p>(7) Operate OFF/TEST (S4) switch to TEST.</p> <p>(8) Operate POWER ON/OFF (S2) switch to ON.</p> <p>(9) Observe OUTPUT VOLTAGE (M2) meter.</p> <p><i>Requirement:</i> The OUTPUT VOLTAGE (M2) meter should indicate 49.91 volts dc for L11 and L12 rectifiers or 52.08 volts dc for L21 and L22 rectifiers.</p> <p>(10) If the requirement is met, proceed to (22). If the requirement is not met, continue with (11).</p> <p>(11) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat fully ccw.</p>

## TROUBLE CHART I (Cont)

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
	(12) Set KS-14510 (VOM) to 60-volt dc scale. Connect negative lead to -SENSE (J2) pin jack on rectifier and positive lead to +SENSE (J1) pin jack.
	(13) Loosen locking device on OUTPUT VOLTS ADJUST (R7) rheostat.
	(14) Rotate OUTPUT VOLTS ADJUST (R7) rheostat 1/2 turn ccw.  <i>Requirement:</i> The OUTPUT VOLTAGE (M2) meter should indicate a decrease in voltage.
	(15) If the requirement is not met, rotate OUTPUT VOLTS ADJUST (R7) rheostat 1/2 turn cw, tighten locking device and proceed to (22). If requirement is met, continue with (16).
	(16) Operate SIMULATED OUTPUT CURRENT (S3) switch to ON.
	(17) Rotate OUTPUT VOLTS ADJUST (R7) rheostat ccw until requirement in (9) is met.
	(18) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat cw until OUTPUT CURRENT (M1) meter indicates 400 amperes.
	(19) Readjust OUTPUT VOLTS ADJUST (R7) rheostat to maintain the 49.91 volts for L11 and L12 or 52.08 for L21 and L22.
	(20) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat fully ccw.
	(21) Disconnect KS-14510 (VOM) and proceed to (25).
(e) Defective or Maladjusted High Voltage Monitor CP-300.	(22) Check high voltage monitor adjustment in accordance with Section 169-742-301. Adjust if necessary.
	(23) If high voltage monitor circuit still malfunctions after adjustment, perform tests in TEST CHART 3. Repair or replace CP-300 and continue with (25).
(f) Defective 120-Hz Monitor CP-500.	(24) Test CP-500 in accordance with TEST CHART 5. Repair or replace CP-500 and continue with (25).
	(25) Verify that: <ul style="list-style-type: none"> <li data-bbox="639 1703 1430 1759">(a) SIMULATED OUTPUT CURRENT (R10) rheostat is fully ccw.</li> <li data-bbox="639 1797 1419 1854">(b) SIMULATED OUTPUT CURRENT (S3) switch is in OFF position.</li> </ul>

## TROUBLE CHART I (Cont)

POSSIBLE CAUSE	CORRECTIVE PROCEDURE
	(c) OFF/TEST (S4) switch is OFF.
	(d) The locking device on OUTPUT VOLTS ADJUST (R7) rheostat is secured.
	(e) POWER ON/OFF switch is OFF.
	(26) Charge output filter capacitors in accordance with Section 169-742-301.
	(27) Operate DC OUTPUT (S1) switch to BAT or EC position.
	(28) Operate POWER ON/OFF (S2) switch to ON.

## TEST CHART 1

## CP-100 – VOLTAGE REGULATOR AND SIMULATED OUTPUT CURRENT CIRCUIT

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove CP-100.		
(4) With KS-14510 (VOM) check the following points.		
(a) Meter on R × 1 scale; Pin 9 (+); Pin 11 (−).	5 ohms	∞ ohms indicates open CR114.
(b) Meter on R × 1 scale; Pin 9 (−); Pin 11 (+).	∞ ohms	Zero ohms indicates shorted CR114.
(c) Meter on R × 1 scale; Pin 7 (−); Pin 8 (+).	7K ohms	Zero ohms indicates shorted Q104.
(d) Meter on R × 1 scale; Pin 6 (+); Pin 8 (−).	∞ ohms	A low resistance indicates defective CR104.
(e) Meter on R × 1 scale; Pin 15 (−); Anode of CR105 (+).	5 ohms	Zero ohms indicates shorted CR105. ∞ ohms indicates opened CR105.
(f) Meter on R × 1 scale; Pin 15 (−); Anode of CR106 (+).	5 ohms	Zero ohms indicates shorted CR105. ∞ ohms indicates opened CR106.
(g) Meter on R × 1 scale; Pin 15 (−); Anode of CR107 (+).	5 ohms	Zero ohms indicates shorted CR105. ∞ ohms indicates opened CR106.
(h) Meter on R × 1K scale; Pin 15 (−); Cathode of CR100 (+).	10 Megohms	Zero ohms indicates shorted CR100.
(i) Meter on R × 1K scale; Pin 15 (−); Cathode of CR101 (+).	∞ ohms	Zero ohms indicates shorted CR101.
(j) Meter on R × 1 scale; Pin 4 (+); Cathode of CR109 (−).	5 ohms	Zero ohms indicates shorted CR109. ∞ ohms indicates CR109 opened.

## TEST CHART 1 (Cont)

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(k) Meter on R $\times$ 1 scale; Pin 4 (+); Cathode of CR110 (-).	5 ohms	Zero ohms indicates shorted CR110. $\infty$ ohms indicates CR110 opened.
(l) Meter on R $\times$ 1 scale; Pin 4 (+); Cathode of CR111 (-).	5 ohms	Zero ohms indicates shorted CR111. $\infty$ ohms indicates opened CR111.
(m) Meter on R $\times$ 1 scale; Anode of CR112 (+); Cathode of CR112 (-).	5 ohms	Zero ohms indicates shorted CR112. $\infty$ ohms indicates opened CR112.
(n) Meter on R $\times$ 1 scale; Anode of CR113 (+); Cathode of CR113 (-).	5 ohms	Zero ohms indicates shorted CR113. $\infty$ ohms indicates opened CR113.
(o) Meter on R $\times$ 1 scale; Anode of CR103 (-); Cathode of CR103 (+).	$\infty$ ohms	Zero ohms indicates shorted CR103.
(p) Meter on R $\times$ 1 scale; Anode of CR115 (-); Cathode of CR115 (+).	$\infty$ ohms	Zero ohms indicates shorted CR103.
(q) Meter on R $\times$ 1 scale; Anode of CR101 (+); Cathode of CR101 (-).	5 ohms	Zero ohms indicates shorted CR101. $\infty$ ohms indicates opened CR101.

- (5) Place CP-100 in circuit board extender.
- (6) Operate OFF/TEST (S4) switch to TEST.
- (7) Connect an oscilloscope across (+) and (-) terminals of OUTPUT CURRENT M1 meter.
- (8) Operate POWER ON/OFF (S2) switch to ON and compare waveforms with SD-81966-01 sheet B8.
- (9) Replace CP-100 if necessary.
- (10) Operate POWER ON/OFF (S2) switch to OFF.
- (11) Operate OFF/TEST (S4) switch to OFF.
- (12) Charge output filter capacitors in accordance with Section 169-742-301.

TEST CHART 1 (Cont)

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(13) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(14) Operate POWER ON/OFF (S2) switch to ON.		

## TEST CHART 2

## CP-200 – CURRENT LIMIT, LO – CURRENT, GRADUAL OUTPUT CIRCUIT

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Operate OFF/TEST (S4) switch to TEST.		
(4) Operate SIMULATED OUTPUT CURRENT (S3) switch to ON position.		
(5) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat cw until OUTPUT CURRENT (M1) meter indicates 400 amperes.		
(6) Operate POWER ON/OFF (S2) switch to ON.		
(7) Take the following measurement on CP-200 with KS-14510 (VOM).		
(a) Meter on 12V DC VOLTS scale.	Between 5.49 and 5.71 volts dc.	If voltage is not within tolerance, refer to TEST CHART 8.
(8) <i>Do not disturb the meter connection.</i> Rotate the SIMULATED OUTPUT CURRENT (R10) rheostat ccw until OUTPUT CURRENT (M1) meter indicates 200 amperes.		
<i>Requirement:</i> The KS-14510 volt-ohmmeter indicates between 2.8 and 4.2 volts dc.		If voltage is not within tolerance, refer to TEST CHART 8.
(9) Connect the KS-14510 (VOM) to the following test point.		
(a) Meter on 12V DC VOLTS scale; Pin 1 (–); Junction of R219 and R221 (–).	Between 2.8 and 4.2 volts dc.	Defective Integrated circuit A200, A201, or A202.
(10) <i>Note:</i> The following measurements should be taken with a John Fluke 8100A digital multimeter (or equivalent).		
Rotate SIMULATED OUTPUT CURRENT (R10) rheostat fully ccw.		

## TEST CHART 2 (Cont)

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(11) Connect the John Fluke meter to the following points:		
Meter on 100-volt dc scale; Pin 1 (+); Pin 3 (—).	Between 44.65 and 49.35 volts dc.	Defective A200, Q200 or Q201.
(12) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat cw until OUTPUT CURRENT (M1) meter indicates 50 amperes.		
Meter on 1-volt dc scale; Pin 1 (+); Pin 3 (—).	Between .76 and .84 volts dc.	Defective A200, Q200 or Q201.
(13) Disconnect John Fluke meter.		
(14) If trouble is not located, proceed to TEST CHART 8. If trouble is located, correct it and continue with (15).		
(15) Operate POWER ON/OFF (S2) switch to OFF.		
(16) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat fully cw.		
(17) Operate SIMULATED OUTPUT CURRENT (S3) switch to OFF.		
(18) Operate OFF/TEST (S4) switch to OFF.		
(19) Charge output filter capacitors in accordance with Section 169-742-301.		
(20) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(21) Operate POWER ON/OFF (S2) switch to ON.		

**TEST CHART 3**  
**CP-300 – HIGH VOLTAGE MONITOR CIRCUIT**

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove CP-300 from connector.		
(4) With the KS-14510 (VOM) take the following resistance measurements.		
(a) Meter on R $\times$ 1 scale; Pin 7 (–); Anode of CR320 (+).	4 to 6 ohms	Zero ohms indicates shorted CR320.
(b) Meter on R $\times$ 1 scale; Pin 7 (–); Cathode of CR304 (+).	$\infty$ ohms	Zero ohms indicates shorted CR304.
(c) Meter on R $\times$ 1 scale; Pin 7 (–); Cathode of CR305 (+).	$\infty$ ohms	Zero ohms indicates shorted CR305 or shorted CR301.
(d) Meter on R $\times$ 1 scale; Pin 11 (–); Anode of CR306 (+).	4 to 6 ohms	Zero ohms indicates shorted CR306.
(e) Meter on R $\times$ 1 scale; Pin 15 (+); Cathode of CR307 (–).	4 to 6 ohms	Zero ohms indicates shorted CR307.
(f) Meter on R $\times$ 100 scale; Pin 5 (–); Anode of CR300 (+).	4 to 6 ohms	Zero ohms indicates shorted CR300.
(g) Meter on R $\times$ 1 scale; Pin 5 (–); Anode of CR301 (+).	4 to 6 ohms	Zero ohms indicates shorted CR301.
(h) Meter on R $\times$ 1 scale; Anode of CR303 (+); Cathode (–).	4 to 6 ohms	Zero ohms indicates shorted CR303.
(5) If above tests do not indicate trouble, suspect defective A300 or A301 and replace circuit pack.		
(6) Charge output filter capacitors in accordance with Section 169-742-301.		
(7) Verify that CP-300 is firmly seated in connector.		
(8) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(9) Operate POWER ON/OFF (S2) switch to ON.		

**TEST CHART 4**  
**CP-400 – STABILIZER CIRCUIT**

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove CP-400 from connector.		
(4) With KS-14510 (VOM) take the following resistance measurements.		
(a) Meter on R × 1 scale; Pin 4 (–); Anode of CR400 (+).	4 to 6 ohms	Zero ohms indicates shorted CR400.
(b) Meter on R × 1 scale; Pin 1 (–); Pin 8 (+).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C402.
(c) Meter on R × 1 scale; Junction between R401 and C401A (–); Pin 15 (+).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C401A or C401B.
(d) Meter on R × 1 scale; Junction between R404 and C404A (–); Pin 15 (+).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C404A or C404B.
(5) If trouble is found, replace CP-400. If trouble is not found, reinsert old CP-400 and continue with (6).		
(6) Charge output filter capacitors in accordance with Section 169-742-301.		
(7) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(8) Operate POWER ON/OFF (S2) switch to ON.		

**TEST CHART 5**  
**CP-500 – 120 H<sub>z</sub> MONITOR CIRCUIT**

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove CP-500 from connector.		
(4) With KS-14510 (VOM) take the following resistance measurements.		
(a) Meter on R × 1 scale; Pin 15 (+); Cathode of CR502 (-).	4 to 6 ohms	Zero ohms indicates shorted CR502.
(b) Meter on R × 1 scale; Pin 14 (-); Anode of CR503 (+).	4 to 6 ohms	Zero ohms indicates shorted CR503.
(c) Meter on R × 1 scale; Anode of CR504 (+); Cathode of CR504 (-).	4 to 6 ohms	Zero ohms indicates shorted CR504.
(d) Meter on R × 1 scale; Pin 15 (+); Anode of CR501 (-).	∞ ohms	Zero ohms indicates shorted CR501.
(e) Meter on R × 1 scale; Cathode CR500 (+); Anode CR500 (-).	∞ ohms	Zero ohms indicates shorted CR500.
(f) Meter on R × 1 scale; Junction between R500 and C501 (+); Junction between C501 and L500 (-).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C501 or C502.
(g) Meter on R × 1 scale; Terminal 1 of L500 (+); terminal 2 of L500 (-).	Low resistance.	Zero ohms indicates shorted L500, C503, C504.
(h) Meter on R × 1 scale; Pin 15 (+); Anode of CR504 (-).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C500.
(5) If all tests pass, suspect A500 and replace CP-500.		
(6) Charge output filter capacitors in accordance with Section 169-742-301.		
(7) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(8) Operate POWER ON/OFF (S2) switch to ON.		

TEST CHART 6  
CP-700 – AC INPUT VOLTAGE MONITOR CIRCUIT

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove fuses from power service cabinet.		
(4) Remove protective covering from terminals of CP-700. See Figure 6.		
(5) With KS-14510 (VOM) take the following resistance measurements.		
(a) Meter on R × 1K scale; Terminal 6 (+) and lead 2 of winding A (–).	1200 ohms	Low resistance indicates shorted turn. High resistance indicates open turn.
(b) Meter on R × 1K scale; Terminal 7 (+) and lead 2 of winding B (–).	1200 ohms	Low resistance indicates shorted turn. High resistance indicates open turn.
(c) Meter on R × 1K scale; Terminal 8 (+) and lead 2 of winding C (–).	1200 ohms	Low resistance indicates shorted turn. High resistance indicates open turn.
(d) Meter on R × 1 scale; Pin 1 (+); Cathode CR703 (–).	4 to 6 ohms	Zero ohms indicates shorted CR703.
(e) Meter on R × 1 scale; Pin 5 (+); Pin 4 (–).	4 to 6 ohms	Zero ohms indicates shorted CR704.
(f) Meter on R × 1 scale; Anode CR705 (+); Cathode CR705 (–).	4 to 6 ohms	Zero ohms indicates shorted CR705.
(g) Meter on R × 1 scale; Anode CR706 (+); Cathode CR706 (–).	4 to 6 ohms	Zero ohms indicates shorted CR706.
(h) Meter on R × 1 scale; Anode CR707 (+); Cathode CR707 (–).	4 to 6 ohms	Zero ohms indicates shorted CR707.
(i) Meter on R × 1 scale; Anode CR700 (–); Cathode CR700 (+).	∞ ohms	Zero ohms indicates shorted CR700.
(j) Meter on R × 1 scale; Anode CR701 (–); Cathode CR700 (+).	∞ ohms	Zero ohms indicates shorted CR701.

## TEST CHART 6 (Cont)

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(k) Meter on R $\times$ 1 scale; Anode CR700 (-); Cathode CR705 (+).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C702
(l) Meter on R $\times$ 1 scale; Cathode CR705 (-); Cathode CR706 (+).	Initially low resistance steadily increasing.	Zero ohms indicates shorted C701.
(m) Meter on R $\times$ 1 scale; Cathode CR706 (-); Cathode CR707 (+).	Initially low resistance; steadily increasing.	Zero ohms indicates shorted C700.
(6) If all tests pass, assume defective A700 and replace CP-700.		
(7) Charge output filter capacitors in accordance with Section 169-742-301.		
(8) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(9) Reinsert fuses in power service cabinet.		
(10) Operate POWER ON/OFF (S2) switch to ON.		

**TEST CHART 7**  
**CP-800 – PULSE CIRCUIT**

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove CP-800 A, B, or C from connector.		
(4) With KS-14510 (VOM) take the following resistance measurements.		
(a) Meter on R × 1 scale; Pin 8 (–); Pin 7 (+).	4 to 6 ohms	Zero ohms indicates shorted CR802.
(b) Meter on R × 1 scale; Cathode of CR803 (–); Pin 7 (+).	4 to 6 ohms	Zero ohms indicates shorted CR803.
(c) Meter on R × 1 scale; Pin 7 (–); Anode of CR806 (+).	4 to 6 ohms	Zero ohms indicates shorted CR806.
(d) Meter on R × 1 scale; Pin 6 (+); Cathode of CR804 (–).	4 to 6 ohms	Zero ohms indicates shorted CR804.
(e) Meter on R × 1 scale; Pin 6 (–); Anode of CR807.	4 to 6 ohms	Zero ohms indicates shorted CR807.
(f) Meter on R × 1 scale; Pin 6 (+); Pin 8 (–).	4 to 6 ohms	Zero ohms indicates shorted CR805.
(g) Meter on R × 1 scale; Cathode of CR801 (–); Anode of CR801 (+).	4 to 6 ohms	Zero ohms indicates shorted CR801.
(h) Meter on R × 1 scale; Cathode of CR817 (–); Anode of CR817 (+).	4 to 6 ohms	Zero ohms indicates shorted CR817.
(i) Meter on R × 1 scale; Cathode of CR816 (–); Anode of CR816 (+).	4 to 6 ohms	Zero ohms indicates shorted CR816.
(j) Meter on R × 1 scale; Cathode of CR815 (–); Anode of CR815 (+).	4 to 6 ohms	Zero ohms indicates shorted CR815.
(k) Meter on R × 1 scale; Pin 6 of A800 (–); Pin 2 of A801 (+).	4 to 6 ohms	Zero ohms indicates shorted CR814.
(l) Meter on R × 1 scale; Pin 2 of A801 (–); Anode of CR800 (+).	4 to 6 ohms	Zero ohms indicates shorted CR800.
(m) Meter on R × 1 scale; Anode of CR808 (+); Cathode of CR808 (–).	4 to 6 ohms	Zero ohms indicates shorted CR808.

## TEST CHART 7 (Cont)

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(n) Meter on R $\times$ 1 scale; Cathode of CR809 (-); Anode of CR809 (+).	4 to 6 ohms	Zero ohms indicates shorted CR809.
(o) Meter on R $\times$ 1 scale; Cathode of CR819 (-); Anode of CR819 (+).	4 to 6 ohms	Zero ohms indicates shorted CR819.
(p) Meter on R $\times$ 1 scale; Anode of CR810 (+); Cathode of CR810 (-).	4 to 6 ohms	Zero ohms indicates shorted CR810.
(q) Meter on R + 1 scale; Anode of CR811 (+); Pin 5 (-).	4 to 6 ohms	Zero ohms indicates shorted CR811.
(r) Meter on R + 1 scale; Anode of CR818 (+); Cathode of CR818 (-).	4 to 6 ohms	Zero ohms indicates shorted CR818.
(s) Meter on R $\times$ 1 scale; Anode of CR813 (+); Pin 15 (-).	4 to 6 ohms	Zero ohms indicates shorted CR813.
(t) Meter on R $\times$ 1 scale; Anode of CR812 (+); Pin 1 (-).	4 to 6 ohms	Zero ohms indicates shorted CR812.
(5) Operate OFF/TEST (S4) switch to TEST.		
(6) Place CP-800 in circuit board extender, if necessary.		
(7) Operate POWER ON/OFF (S2) switch to ON and take the following measurement.		
(a) Meter on 12V DC VOLTS scale; Pin 5 (-); Cathode of CR814 (+).	5.4 volts dc	Above 5.4 volts indicates defective A800.
(8) With an oscilloscope measure the gate (+) to cathode (-) gating pulses and compare with SD-81996-01 sheet B2.		
(9) Operate POWER ON/OFF (S2) switch to OFF.		
(10) Replace CP-800 A, B, or C if necessary.		
(11) Operate OFF/TEST (S4) switch to OFF.		
(12) Charge output filter capacitors in accordance with Section 169-742-301.		
(13) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(14) Operate POWER ON/OFF (S2) switch to ON.		

**TEST CHART 8**  
**CP-250 – DCCT CIRCUIT**

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
(1) Operate POWER ON/OFF (S2) switch to OFF.		
(2) Operate DC OUTPUT (S1) switch to OFF. See 4.08, Caution 3.		
(3) Remove protective shield from CP-250. See figure 7.		
(4) With a KS-14510 (VOM) take the following measurements.		
(a) Meter on R × 1 scale; Pin 4 (+); Pin 6 (–).	4 to 6 ohms	Zero ohms indicates shorted CR252.
(b) Meter on R × 1 scale; Pin 6 (+); Pin 3 (–).	4 to 6 ohms	Zero ohms indicates shorted CR250.
(c) Meter on R × 1 scale; Pin 4 (+); Pin 5 (–).	4 to 6 ohms	Zero ohms indicates shorted CR253.
(d) Meter on R × 1 scale; Pin 5 (+); Pin 3 (–).	4 to 6 ohms	Zero ohms indicates shorted CR251.
(e) Meter on R × 1 scale; Pin 3 (+); Junction of C251 and R250.	Initially low resistance steadily increasing.	Zero ohms indicates shorted C251.
(f) Meter on R × 1 scale; Pin 3 (+); Junction of C250 and R250.	Initially low resistance steadily increasing.	Zero ohms indicates shorted C250.
(5) Operate OFF/TEST (S4) switch to TEST.		
(6) Adjust SIMULATED OUTPUT CURRENT (R10) rheostat fully cw.		
(7) Operate SIMULATED OUTPUT CURRENT (S3) switch to ON position.		
(8) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat ccw until OUTPUT CURRENT M1 meter indicates 200 amperes.		
(9) Connect oscilloscope between 2 and 8 on CP-250.		

*Caution: Observe circuit note 306 on SD-81996-01 sheet D4 or damage to oscilloscope may occur.*

## TEST CHART 8 (Cont)

TEST PROCEDURE	APPROXIMATE READING	POSSIBLE CAUSE OF INCORRECT INDICATION
Compare oscillogram on SD-81996-01 sheet B6 with oscilloscope indication.		
(10) Replace CP-250, if necessary.		
(11) Rotate SIMULATED OUTPUT CURRENT (R10) rheostat fully cw.		
(12) Operate SIMULATED OUTPUT CURRENT (S3) switch to OFF.		
(13) Operate OFF/TEST switch to OFF.		
(14) Charge output filter capacitors in accordance with Section 169-742-301.		
(15) Operate DC OUTPUT (S1) switch to BAT or EC position.		
(16) Reinstall protective cover over CP-250.		
(17) Operate POWER ON/OFF (S2) switch to ON.		

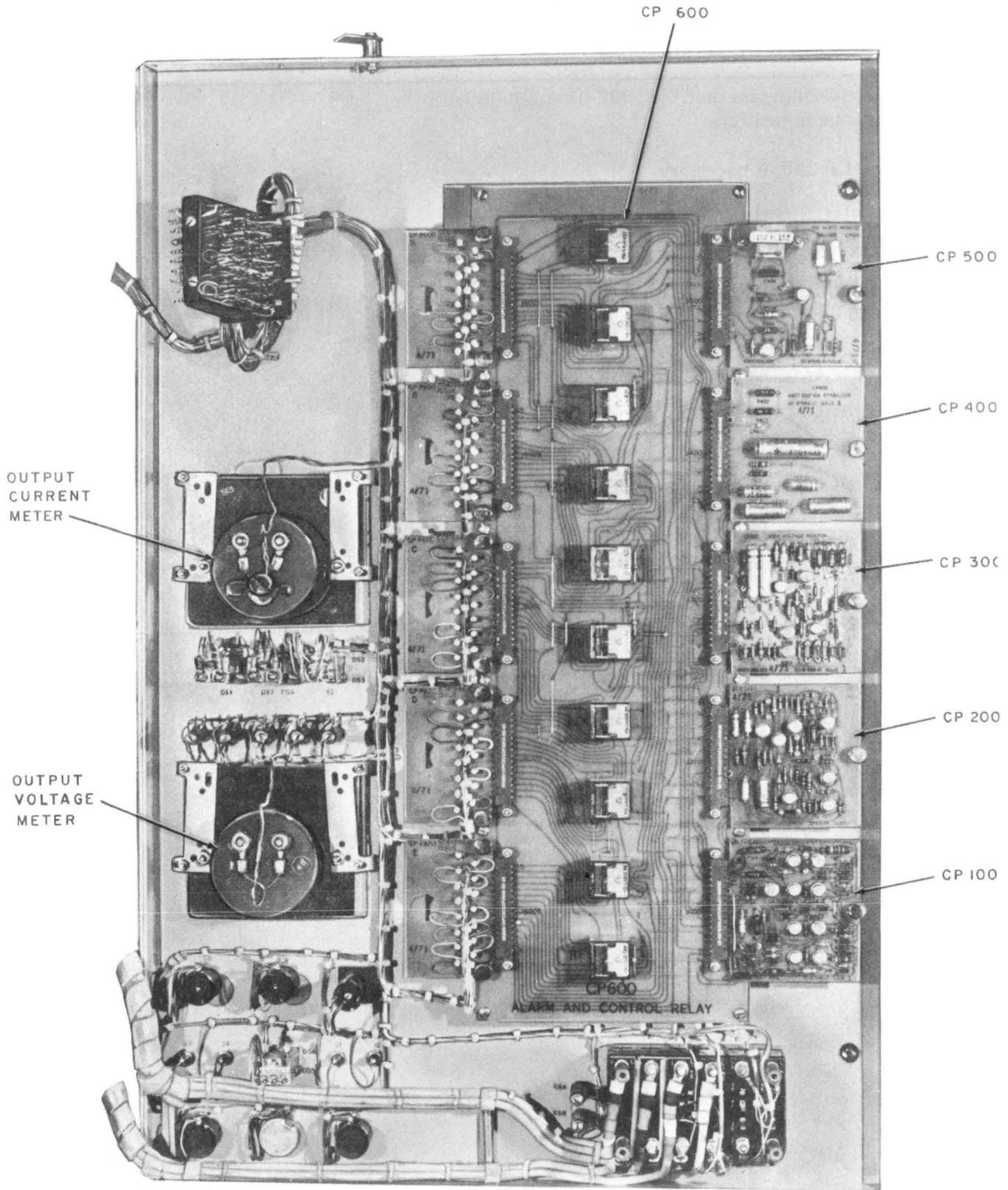


Fig. 5—KS-20490 Rectifier Control Panel Rear View

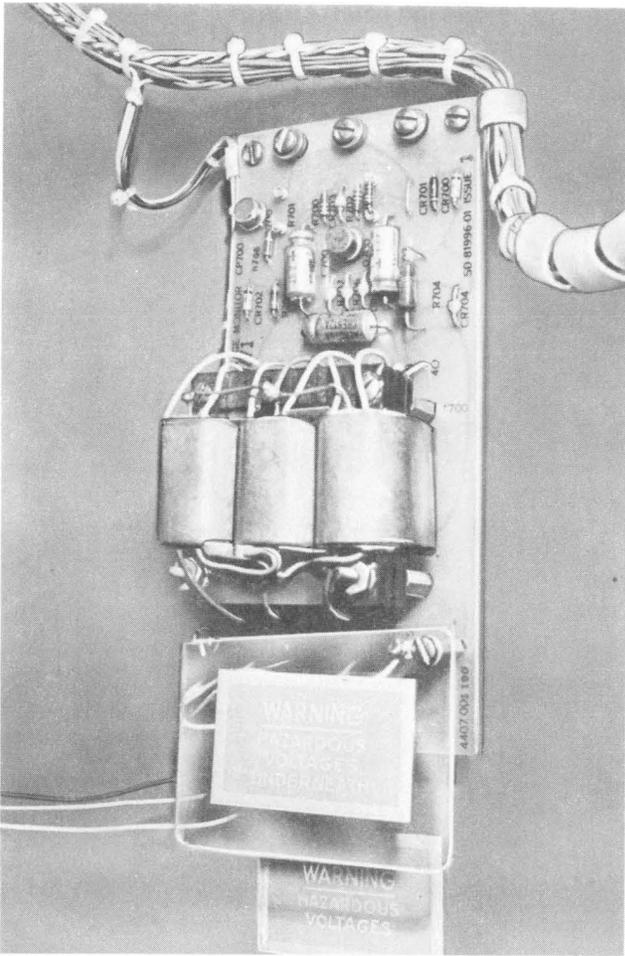


Fig. 6—Circuit Pack 700-AC INPUT VOLTAGE MONITOR

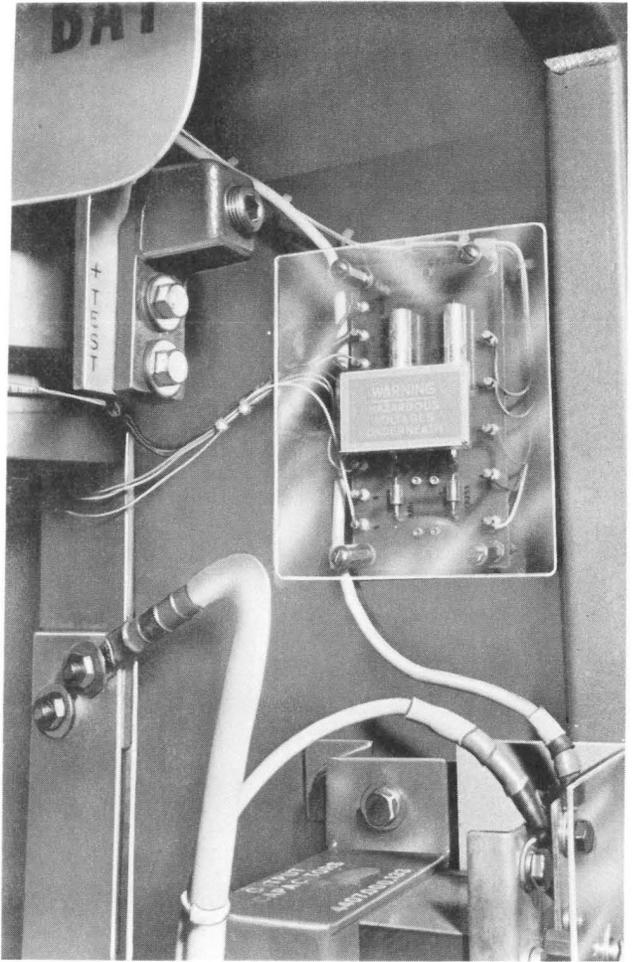


Fig. 7—Circuit Pack 250-DCCT Circuit