KS-20493, L21 AND L22, RECTIFIERS
ITT-NORTH ELECTRIC COMPANY
48 VOLTS, 100 AMPERES
OPERATING METHODS

CONTENTS PAGE

1. GENERAL

1.01 The KS-20493, L21 and L22, rectifiers provide a nominal 48 volts dc at 100 amperes from a single-phase ac power source to charge and float a 23- or 24-cell battery at full load, or to charge a 25- or 27-cell battery at 80 percent of rated full load. This rectifier is primarily intended for use in the 110A, 111A, 151A, 303A, 301C, and 302A power plants. This rectifier is of the ferroresonant type. This type rectifier can provide a relatively constant dc output voltage, and may be used wherever the voltage, current capacities, and regulation characteristics meet the requirement with which they will be associated.

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes. This reissue does not affect the Equipment Test List.

(a) To add S option

(b) To add new procedures in charging output filter capacitors

(c) To add new changes of new design of rectifier

(d) To add new SD and CD for use with new design of rectifier

(e) To update the section in general.

1.03 The rectifier is arranged for single-phase, 60 ±3 Hz, input and is suitable for use with battery power plants where 3-phase service is not available. The rectifier is adaptable for the following variations:

KS-20493 RECTIFIER

LIST NO.	INPUT	OUTPUT
L21	208/240V	–48V
L22	480V	–48V

The rated current output is 0 to 100 amperes.

Note: From 48.00 Vdc to 57.20 Vdc, the rated output current is 100 amperes. Beyond 57.20

Vdc, up to 61.40 Vdc, the rated output current is 80 amperes.

1.04 The rectifier will operate with a permissible input voltage variation as follows:

NOMINAL	VARIATION
208V	186 to 221V
240V	216 to 253V
480V	430 to 506V

1.05 The rectifier is equipped with the following operating features:

(a) An ac input voltage monitor to shut down the rectifier when the ac input voltage drops below a predetermined value and automatically turns the rectifier on when the ac input voltage is restored to an acceptable level.

(b) An output voltage monitor to shut down and lock out the rectifier when the voltage exceeds a preset level. This level is set at 57.5 volts with an operating tolerance of ±0.2 volt.

(c) Automatic restart of the rectifier upon receiving a loop closure signal from the plant if the rectifier has been shut down and locked out by a temporary fault such as transient high voltage.

1.06 ▶This rectifier has two designs. See Table A and figure references for correct location of components.◀

1.07 This rectifier utilizes a triac and voltage and current regulator circuits to electronically control the output voltage. The output voltage is protected by the external charge fuse or charge circuit breaker (external to the rectifier) and by the current limit features ▶on R option rectifiers, or by internal circuit breaker (CB2) (internal to the rectifier) and by the current limit features on S option rectifiers.◀

Danger: Voltages inside the rectifier case are over 150 volts to ground. Do not allow a test pick to touch two metal parts at the same time as destructive and dangerous short circuits may occur. Disconnect the alternating current supply before working on the rectifier, except when necessary to make tests.

1.08 This rectifier is designed to mount on a 23-inch relay rack framework or in a cabinet with similar mounting arrangements and can be serviced and maintained from the front only. All electrical connections can be made with the front cover removed. The meter, controls, and fuses are mounted on a hinged panel for access, maintenance, or replacement.

1.09 ▶This issue of the section is based on drawings SD-82401-01, Issue 2B, and CD-82401-01, Issue 1, for KS-20493, L21, rectifier production models with

▶TABLE A◀

RECTIFIER	SERIAL NUMBER ON RECTIFIER	FIG. NUMBER REFERENCE	SD NUMBER CD NUMBER
KS-20493, L21	0-#1300	1 & 3	SD-82401-01 CD-82401-01
KS-20493, L21	#1300 and up	2 & 4	SD-82401-02 CD-82401-02
KS-20493, L22	0-#500	1 & 3	SD-82401-01 CD-82401-01
KS-20493, L22	#500 and up	2 & 4	SD-82401-02 CD-82401-02

Fig. 1—KS-20493 Rectifier—Front Cover In Place

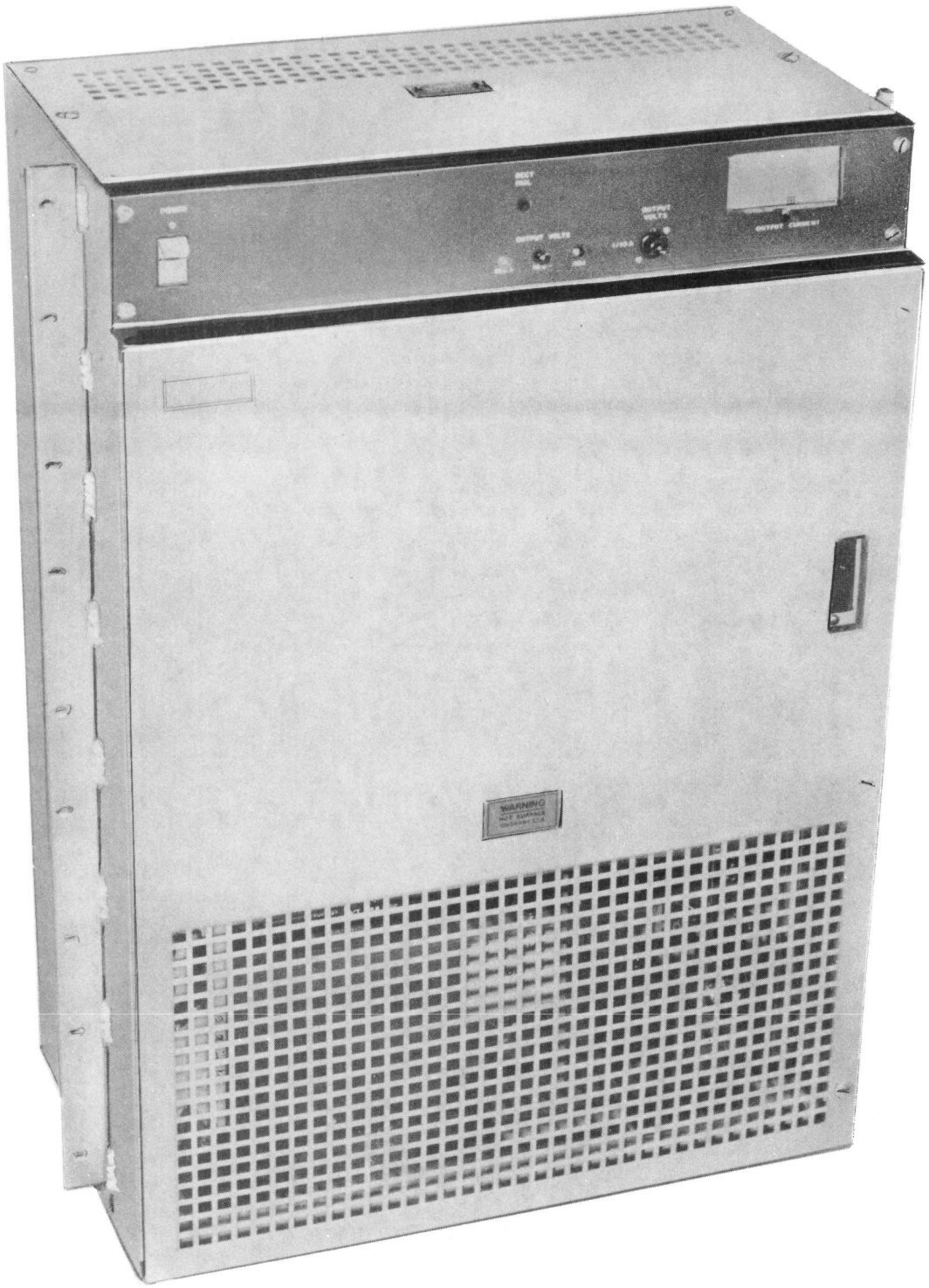

Fig. 2—KS-20493 Rectifier—Front Cover In Place

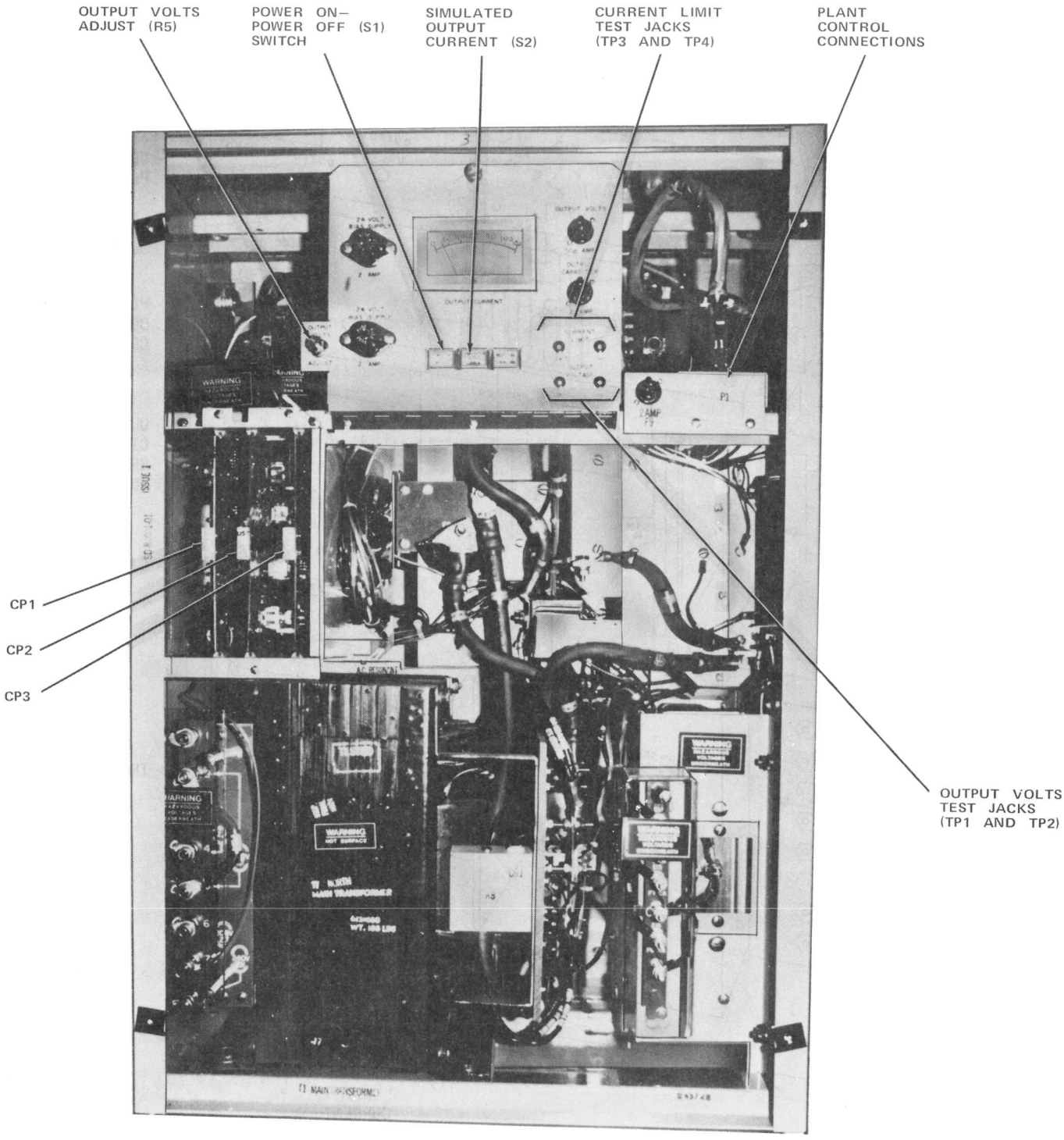

Fig. 3—KS-20493 Rectifier—Front Cover Removed

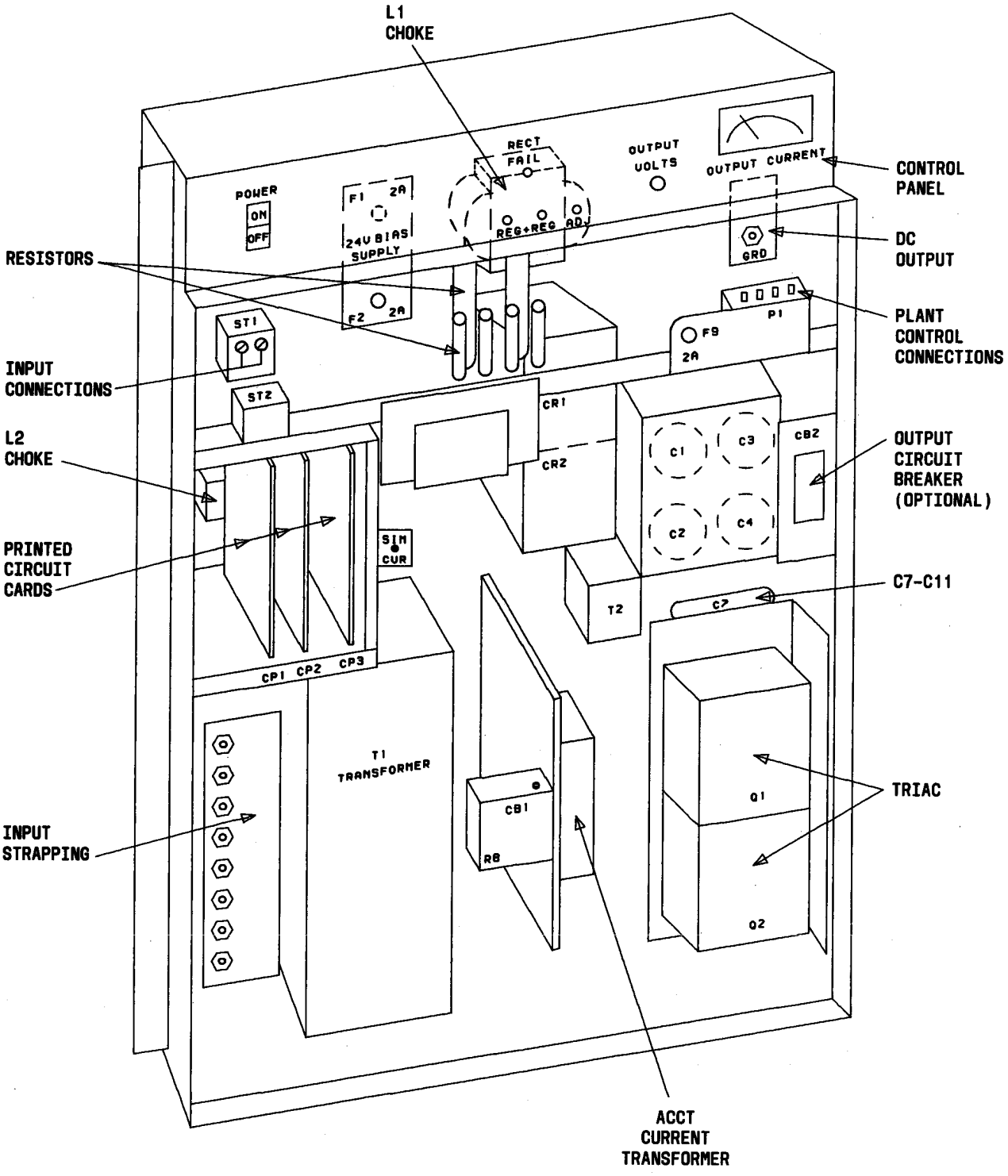

Fig. 4—KS-20493 Rectifier—Front Cover Removed

serial numbers before 1300 and KS-20493, L22, rectifier production models with serial numbers before 500. This issue is also based on drawings SD-82401-02, Issue 1, and CD-82401-02, Issue 1, for KS-20493, L21, rectifier production models with serial numbers after 1300 and KS-20493, L22, rectifier production models with serial numbers after 500.◀

1.10 For a detailed description of the operation, see the corresponding circuit description. If this section is to be used with equipment that is associated with an earlier or 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.

2. APPARATUS

2.01 ***List of Tools and Test Apparatus:*** The following tools and test apparatus are used in this section.

TOOLS	DESCRIPTION
—	3-Inch C Screwdriver
R-1005	Jewelers Screwdriver
TEST APPARATUS	
KS-20538	Volt-Ohm-Milliammeter (or equivalent)
KS-8039	DC Volt-Milliammeter (or equivalent)
ITE-4175	Output Capacitor Charging Tool

3. OPERATION

3.01 The rectifier is completely automatic in the regulation of float voltage and should require no day-to-day routine adjustments. Normally it remains energized and connected. In addition to manual turnoff, it may be stopped and started by signals from the plant, and will shut down automatically upon occurrence of certain conditions.

3.02 If the load exceeds the safe capacity of the rectifier, the regulating circuit switches to constant current regulation. As the load diminishes, the rectifier brings the voltage to float value and returns to voltage regulation. The voltage at which the rectifier will regulate is determined by the setting of the OUTPUT VOLTS ADJUST (R5) rheostat.

3.03 If it is desirable to CHARGE the battery, the OUTPUT VOLTS ADJUST (R5) rheostat must be rotated cw to shift the operating point of the rectifier from 2.17 volts per cell to 2.20 volts per cell. The office load will then be subjected to the CHARGE voltage.

3.04 The rectifier will provide an OVERCHARGE voltage up to 2.30 volts per cell for 23- or 24-cell batteries at rated full load or will provide up to 2.20 volts per cell for 25- or 27-cell batteries at 80 percent of rated full load. If it is necessary to OVERCHARGE the battery, the OUTPUT VOLTS ADJUST (R5) rheostat must be rotated cw to shift the operating point of the rectifier from 2.17 volts per cell to the required OVERCHARGE voltage (up to 2.30 volts per cell). The office load will then be subjected to the OVERCHARGE voltage.

Note: The rectifier will provide a maximum of 2.30 volts per cell only when the ac input voltage is equal to or greater than the value shown as follows:

RECTIFIER CONNECTED FOR	AC INPUT VOLTAGE
208V	200V (L21)
240V	230V (L21)
480V	460V (L22)

3.05 The rectifier can be tested without disturbing the office load by removing the external charge and charge alarm fuses (or operating the external charge circuit breaker to OFF) and disconnecting the plant control cable. It can then be operated in the FLOAT, CHARGE and OVERCHARGE conditions from no load to full load by adding an external resistance load across the BAT and GRD output terminals.

3.06 A circuit is provided to simulate an adjustable load up to 125 percent of the output current rating of the rectifier. The simulated output current circuit is enabled only when the SIMULATED OUTPUT CURRENT pushbutton is maintained depressed.

3.07 ***Preparing to Start:*** When putting the rectifier in service, check that:

(1) The POWER ON-POWER OFF (S1) switch is in the OFF position.

Requirement: The POWER OFF lamp is lighted if equipped or the RECT FAIL LED is lighted (on later production models).

(2) The plant control cable is connected to the rectifier.

(3) The ac service fuses are installed.

3.08 ***Charge Output Filter Capacitors:*** For rectifiers equipped with external charge and charge alarm fuses:

(1) At the dc distribution bay, locate the correct output charge fuse holder for the rectifier being tested.

Warning: If the tool lamp fails to light or does not dim out in approximately 30 seconds, remove the tool promptly. DO NOT INSTALL THE DC OUTPUT FUSE until the trouble has been located and cleared.

(2) Insert the ITE-4175 tool or equivalent (Fig. 5) between the output charge fuse holder terminals.

Requirement: The lamp in the ITE-4175 tool glows brightly initially and then dims out in approximately 30 seconds. When the tool lamp extinguishes, the output filter capacitors should be charged.

Warning: The rectifier output filter capacitors start to discharge as soon as the ITE-4175 tool is removed from the fuse holder terminals. Install the dc output fuse quickly to avoid the loss of charge voltage.

(3) Remove the ITE-4175 tool from the fuse holder terminals and promptly install the external charge and charge alarm fuses of the proper size and type in place.

3.09 ***Charge Output Filter Capacitors:*** For rectifiers not equipped with external charge and charge alarm fuses:

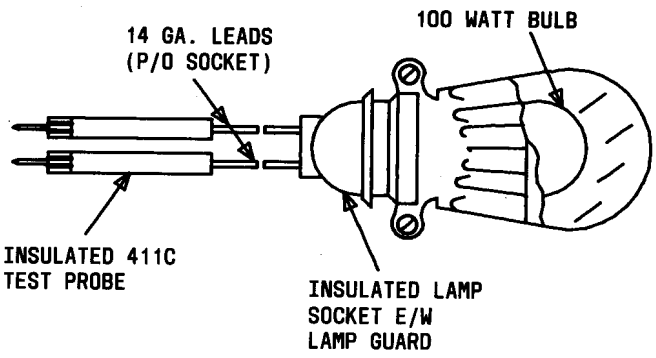

Fig. 5—Locally Constructed Equivalent of ITE-4175 Tool

(1) Set the external charge circuit breaker to the ON position.

(2) If the rectifier is equipped with S option, set the output circuit breaker (CB2) to the ON position (internal to the rectifier). See Fig 4.

3.10 ***Starting:*** To start the rectifier, proceed as follows:

(1) Verify that the procedures of paragraph 3.07 have been completed.

(2) Depress the POWER ON-POWER OFF (S1) switch.

Requirement: The POWER ON lamp is lighted, if equipped, or the RECT FAIL LED is extinguished (on later production models).

(3) After waiting approximately 15 seconds to allow for completion of walk-in before making adjustments, loosen the locking device and rotate the OUTPUT VOLTS ADJUST (R5) rheostat cw to increase or ccw to decrease the output voltage of the rectifier until the voltage at the battery (as indicated on the plant voltmeter) is the required value. Tighten the locking device for the OUTPUT VOLTS ADJUST (R5) rheostat being careful not to disturb the setting.

Note: Later production model rectifiers are not equipped with the locking device on the OUTPUT VOLTS ADJ (R5) rheostat.

Requirement: The voltage at the battery should meet the voltage values specified in the appropriate plant Bell System Practice.

(4) Observe the OUTPUT CURRENT (M1) ammeter to make sure the rectifier accepts its portion of the load (see the appropriate plant Bell System Practice for voltage and current adjustment of the rectifier).

3.11 ***Stopping:*** To stop the rectifier, proceed as follows:

(1) Depress the POWER ON-POWER OFF (S1) switch.

Requirement: The POWER OFF lamp is lighted, if equipped, or the RECT FAIL LED is lighted (on later production models).

(2) If the rectifier is to be left out of service for an extended period of time, remove the ac service fuses, external charge and charge alarm fuses, and disconnect the plant control cable. Set the output circuit breaker (CB2) to OFF on S option rectifiers (internal to the rectifier).

Danger: All power should be disconnected before attempting maintenance in the power sections of the rectifier. The battery should be disconnected when the rectifier is shut down for extended periods or for maintenance. Be careful not to short circuit the battery or sensing terminals.

4. ROUTINE CHECKS AND ADJUSTMENTS

4.01 Routine checks are intended to detect defects particularly in infrequently operating parts of the equipment and, insofar as possible, to guard against circuit failures which interfere with service. Checks and adjustments other than those required by trouble conditions, should be performed during a period when there will be a minimum interference to service.

4.02 Periodically check the output float voltage on the associated power plant voltmeter when the unit is operating on voltage control. If the voltage is not correct, readjust the rectifier float voltage as outlined in paragraph 4.06.

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

4.04 If the relays are mounted on circuit boards, they can be checked by use of the extender circuit board furnished with the rectifier, and must be replaced in case of malfunction. If possible, periodically check all other relays for condition of contacts, making sure that they are in accordance with the circuit requirements table and Bell System Practices which apply.

Warning: When using a portable instrument, the leads should be carefully examined to make sure the insulation is undamaged. The leads should be properly connected to the instrument before making any contact with the circuit to be tested. If connections are to be changed from one instrument range to another, the power should first be disconnected from equipment being tested or, if test picks are being used, they should be removed from the equipment under test.

4.05 ***Placing the Rectifier in the Test Mode:*** The rectifier should be tested and adjusted in the TEST mode, disconnected from the office load. To place the rectifier in the TEST mode, use the following procedure:

(1) Turn the rectifier off by operating the POWER ON-POWER OFF (S1) switch to OFF.

(2) Remove the external charge and charge alarm fuses or operate the external charge circuit breaker to OFF. Set the output circuit breaker (CB2) to OFF on the S option rectifiers (internal to the rectifier).

(3) Disconnect the PLANT CONTROL DISCONNECT (J1) connector from the rectifier.

(4) Connect a jumper between the BAT output terminal and the CBS lead (terminal 15 of the PLANT CONTROL DISCONNECT, P1 connector). See Table B and Fig. 6 for the location and designation of each terminal of P1 connector.

TABLE B

P1 WIRING SIDE

TERMINAL	DESIGNTION	DESCRIPTION
1	RB	REG BATTERY
3	RG	REG GROUND
4	RS	REMOTE START
5	RSR	REMOTE START RETURN
6	HV	HIGH-VOLTAGE SHUTDOWN
7	TR	REMOTE SELECTIVE SHUTDOWN
8	RFA	RCTIFIER FAIL ALARM
9	CA	LOW CURRENT
10	CB	LOW CURRENT
12	RFA-RTN	RFA- (Rectifiers fail alarm) RETURN
14	CFA	CHARGE FUSE ALARM
15	CBS	CONTROL BATTERY SUPPLY

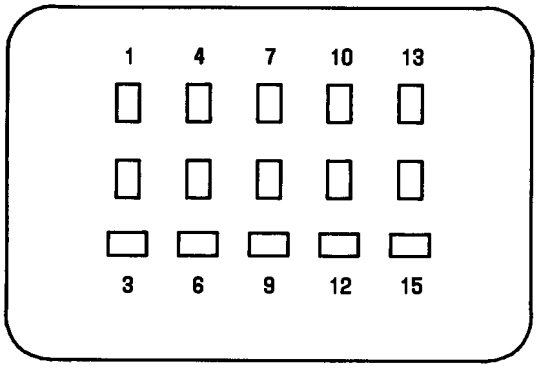

Fig. 6—P1 Connector Arrangement

(5) The rectifier is now in the TEST mode and may be turned on without disturbing the office load.

4.06 ***Output Voltage Adjustment:*** To adjust the output voltage, proceed as follows:

(1) Depress the POWER ON-POWER OFF (S1) switch.

Requirement: The POWER ON lamp is lighted, if equipped, or the RECT FAIL LED is extinguished (on later production models).

(2) Connect the KS-8039 volt-milliammeter, set to the 75 Vdc scale, to the OUTPUT VOLTS, TP1 (+) and TP2 (−) test jacks on early production models. On later production models, connect volt-milliammeter to the OUTPUT VOLTS, REG + and REG − test jacks. Observe proper polarity in making the connections.

(3) Loosen the locking device and slowly rotate the OUTPUT VOLTS ADJUST (R5) rheostat until the reading on the KS-8039 volt-milliammeter is equal to the battery float voltage requirements at the associated power plant or 2.17 volts per cell if no battery float requirement is given. Tighten the locking device for the OUTPUT VOLTS ADJUST (R5) rheostat being careful not to disturb the setting.

Note: Later production model rectifiers are not equipped with the locking device on the OUTPUT VOLTS ADJ (R5) rheostat.

4.07 ***Current Limiting Adjustment:*** To adjust the current limit, proceed as follows:

Note: The CURRENT LIMIT ADJUST (R222) rheostat is factory set for 100 amperes. If it is necessary to readjust the current limit point, proceed as follows:

(1) Turn off the rectifier by depressing the POWER ON-POWER OFF (S1) switch.

Requirement: The POWER OFF lamp lights momentarily and then extinguishes (on early production model rectifier) or the RECT FAIL LED is lighted (on later production models).

(2) Located on the CP2 circuit pack, rotate the CURRENT LIMIT ADJUST (R222) rheostat fully cw.

(3) Continue current limiting adjustment with paragraph 4.08 or 4.09.

4.08 ***Current Limiting Adjustment on Early Production Model Rectifiers:*** (See paragraph 1.06 to distinguish rectifiers and for correct figure references for components.)

(1) Observing proper polarity, connect the KS-20538 volt-ohm-milliammeter, set to the 60-volt dc scale, to the CURRENT LIMIT test jacks, TP3(+) and TP4(−), located on the control panel of the rectifier.

(2) Depress the POWER ON-POWER OFF (S1) switch to the ON position to start the rectifier.

Warning: Make sure the external charge and charge alarm fuses are removed or external charge circuit breaker is operated to OFF before operating the SIMULATED OUTPUT CURRENT feature.

(3) Depress and hold the SIMULATED OUTPUT CURRENT (S2) switch.

Requirement: The SIMULATED OUTPUT CURRENT lamp is lighted.

(4) ⏵Located on CP1 circuit pack,⏴ rotate the SIMULATED OUTPUT CURRENT (R106) rheostat cw until the OUTPUT CURRENT (M1) ammeter indicates the desired maximum output current. In the absence of a plant requirement, adjust to 100 amperes.

(5) ⏵Located on CP2 circuit pack,⏴ rotate the CURRENT LIMIT ADJUST (R222) rheostat slowly ccw until the KS-20538 volt-ohm-milliammeter indicates increasing voltage.

Note: When the rectifier is not current limiting, the KS-20538 meter indicates 0 volt. This voltage will begin to increase when the desired current limit setting is reached.

(6) Release the SIMULATED OUTPUT CURRENT (S2) switch.

Requirement: The SIMULATED OUTPUT CURRENT lamp extinguishes.

(7) ⏵Located on CP1 circuit pack,⏴ rotate the SIMULATED OUTPUT CURRENT (R106) rheostat fully ccw.

(8) Remove the KS-20538 volt-ohm-milliammeter test leads from rectifier test jacks.

4.09 ⏵***Current Limiting Adjustment on Later Production Model Rectifiers:*** (See pargraph 1.06 to distinguish rectifiers and for correct figure references for components.)

(1) Observing proper polarity, connect the KS-20538 volt-ohm-milliammeter, set to the 60-volt dc scale, to the OUTPUT VOLTS REG+ and REG− test jacks, located on the control panel of the rectifier.

(2) Depress the POWER ON-POWER OFF (S1) switch to the ON position to start the rectifier.

Warning: Make sure that the external charge and charge alarm fuses are removed or external charge circuit breaker is operated to the OFF position (R option) or the internal circuit breaker CB2 is operated to the OFF position (S option) and the PLANT CONTROL DISCONNECT plug (P1) is disconnected before operating the SIMULATED OUTPUT CURRENT feature.

(3) Depress and hold SIMULATED OUTPUT CURRENT (S2) switch.

(4) Located on CP1 circuit pack, rotate the SIMULATED OUTPUT CURRENT (R106) rheostat cw until the OUTPUT CURRENT (M1) ammeter indicates the desired maximum output current. In the absence of a plant requirement, adjust to 100 amperes.

(5) Located on CP2 circuit pack, rotate the CURRENT LIMIT ADJUST (R222) rheostat slowly ccw until a 0.25 volt decrease is observed on the KS-20538 volt-ohm-milliammeter.

(6) Release the SIMULATED OUTPUT CURRENT (S2) switch.

(7) Located on CP1 circuit pack, rotate the SIMULATED OUTPUT CURRENT (R106) rheostat fully ccw.

(8) Remove the KS-20538 volt-ohm-milliammeter test leads from rectifier test jacks.⏴

4.10 ***Overvoltage Shutdown Adjustment:*** To adjust the overvoltage shutdown, proceed as follows:

Note: The OV ADJ (R315) potentiometer is factory set to shut down and lock out the rectifier if the output voltage exceeds 57.5 ±0.2 volts. If it is necessary to readjust the overvoltage shutdown setting, proceed as follows:

(1) Turn the rectifier off by depressing the POWER ON-POWER OFF (S1) switch.

(2) Remove CP3, insert extender board, and replace CP3 into extender board.

(3) Rotate the OV ADJ (R315) potentiometer fully cw.

(4) ⏵Connect the KS-8039 meter, set to the 75 Vdc scale, to the OUTPUT VOLTS TP1(+) and TP2(−) test jacks on early production models. On later production models, connect volt-milliammeter to the OUTPUT VOLTS, REG+ and REG− test jacks. Observe proper polarity in making the connections.⏴

(5) Turn the rectifier on by depressing the POWER ON-POWER OFF (S1) switch.

(6) Adjust the OUTPUT VOLTS ADJUST (R5) rheostat cw until the meter indicates 57.5 volts.

(7) Slowly rotate the OV ADJ (R315) potentiometer ccw until the rectifier shuts down.

(8) To restore the rectifier, rotate the OUTPUT VOLTS ADJUST (R5) rheostat fully ccw.

(9) Turn the rectifier on by depressing the POWER ON-POWER OFF (S1) switch to OFF and then to ON (POWER ON lamp lights).

(10) Adjust the output voltage to the desired level in accordance with paragraph 4.06.

4.11 ***Overvoltage Shutdown Setting (End Cell):*** To adjust the overvoltage shutdown setting (end cell), proceed as follows:

Caution: This 68-volt setting shall never be used when the rectifier is used to power any ESS plant such as the 151A power plant.

Note: If end-cell operation is required, it is necessary to reset the overvoltage shutdown feature for 68 volts operation. Proceed as follows:

(1) Turn the rectifier off by depressing the POWER ON-POWER OFF (S1) switch.

(2) Remove CP3 from its connector, insert extender board in its place, and plug CP3 into the extender board.

(3) Rotate OV ADJ (R315) potentiometer fully cw.

(4) Remove CP2 from its connector and, using an insulated jumper wire, short resistor R249.

(5) Replace CP2 into its connector.

(6) Turn the rectifier on by depressing the POWER ON-POWER OFF (S1) switch.

(7) ▶Observing proper polarity, connect the KS-8039 meter, using 75 Vdc scale, to the OUTPUT VOLTS TP1(+) and TP2(−) test jacks on early production models. On later production models, connect volt-milliammeter to the OUTPUT VOLTS, REG+ and REG− test jacks.◀

(8) Adjust the OUTPUT VOLTS ADJUST (R5) rheostat until the VOM indicates 68 volts.

(9) Slowly rotate OV ADJ (R315) potentiometer ccw until the rectifier shuts down.

(10) To restore rectifier, rotate the OUTPUT VOLTS ADJUST (R5) rheostat fully ccw.

(11) Remove the extender board and replace CP3 in its connector.

(12) Remove the jumper wire from R249 and replace CP2 in its connector.

(13) Turn the rectifier on by depressing the POWER ON-POWER OFF (S1) switch, first to OFF and then to ON.

(14) Adjust the output voltage to the desired level in accordance with paragraph 4.06.

(15) After end-cell charging is completed, restore the overvoltage shutdown setting to 57.5 volts in accordance with paragraph 4.10.

4.12 ***Check TR Shutdown:*** To check the TR shutdown, proceed as follows:

(1) Using a suitable jumper, connect ground to terminal 7 of the P1 plug. ▶See Table B for location of pin.◀

Requirement: The rectifier shuts down.

(2) Remove the jumper.

Requirement: The rectifier restarts.

4.13 ***Check HV Shutdown:*** To check the HV shutdown, proceed as follows:

(1) Using a suitable jumper, connect ground to pin 6 of the P1 plug.▶See Table B for location of pin.

Warning: Make sure that the external charge and charge alarm fuses are removed or external charge circuit breaker is operated to the OFF position (R option) or the internal circuit breaker (CB2) is operated to the OFF position (S option) and the PLANT CONTROL DIS-

CONNECT plug P1 is disconnected before operating the SIMULATED OUTPUT CURRENT feature.

(2) Depress and hold the SIMULATED OUTPUT CURRENT (S2) switch.

(3) Rotate the SIMULATED OUTPUT CURRENT (R106) rheostat cw.

Requirement: The rectifier shuts down when the OUTPUT CURRENT (M1) ammeter indicates between 5 to 10 amperes.

(4) Release the SIMULATED OUTPUT CURRENT (S2) switch.

(5) Remove the jumper.

(6) Depress the POWER ON-POWER OFF (S1) switch twice to release the relays and restart the rectifier.

(7) Rotate the SIMULATED OUTPUT CURRENT (R106) rheostat fully ccw.

4.14 ***Automatic Restart Check:*** To check the automatic restart, proceed as follows:

(1) Turn the rectifier on by depressing the POWER ON-POWER OFF (S1) switch.

Warning: Make sure that the external charge and charge alarm fuses are removed or external charge circuit breaker is operated to the OFF position (R option) or the internal circuit breaker (CB2) is operated to the OFF position (S option) and the PLANT CONTROL DISCONNECT plug P1 is disconnected before operating the SIMULATED OUTPUT CURRENT feature.

(2) Depress and hold the SIMULATED OUTPUT CURRENT (S2) switch.

Requirement: The SIMULATED OUTPUT CURRENT lamp lights, if equipped.

(3) Rotate the SIMULATED OUTPUT CURRENT (R106) rheostat cw until the OUTPUT CURRENT (M1) ammeter indicates 10 amperes. Release the SIMULATED OUTPUT CURRENT (S2) switch.

(4) Using a suitable jumper, connect ground to pin 6 of the P1 plug. See Table B for location of pin.

(5) Depress the SIMULATED OUTPUT CURRENT (S2) switch. (Release when rectifier shuts down and locks out.)

Requirement: The rectifier shuts down and locks out.

(6) Using a suitable jumper, connect pins 4 and 5 of the P1 plug. See Table B for location of pins.

Requirement: The rectifier restarts after 2 seconds. When the SIMULATED OUTPUT CURRENT (S2) switch is depressed, the rectifier shuts down and locks out again.

(7) Temporarily remove the jumper from pin 4 of P1 plug and then replace.

Requirement: The rectifier restarts after 2 seconds, then shuts down and locks out when SIMULATED OUTPUT CURRENT (S2) is depressed.

(8) Remove the jumpers from pin 6 of P1 plug to ground and from pins 4 and 5 of P1 plug.

(9) Turn the rectifier off by depressing the POWER ON-POWER OFF (S1) switch.

(10) Return rectifier to service in accordance with paragraphs 3.07, 3.08, 3.09, and 3.10.

5. TROUBLES

5.01 Refer to Section 169-745-312 for trouble-locating information for the KS-20493 rectifier manufactured by ITT-North Electric Company.