680A CONVERTER POWER PLANT
(J86891A), (J86891B)
30 TO 1150 VOLT, 910 MILLIAMPERE DC OUTPUT
DESCRIPTION

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1. GENERAL

A. Introduction

1.01 This section describes the 680A converter power plant. Included in this section are the following:

- General description and purpose of the 680A power plant
- Physical description of the 680A power plant
- Functional description of the 680A power plant
- Operational description of the 680A power plant
- Description of maintenance requirement.

1.02 Whenever this section is reissued, the reasons will be given in this paragraph. This issue does not affect the Equipment Test List.

1.03 This issue of the section is based on the following schematic drawings (SDs):

SD-82017-01, Issue 6D: Power Supply Circuit Positive and Negative Outputs, 0 to 1150 Volts, 910 Milliamperes DC, -24 Volts Input, Regular Converter 680A Power Plant, J86891A

SD-82018-01, Issue 4D: Power Supply Circuit Positive or Negative Output 0 to 1150 Volts, 910 Milliamperes DC, -24 Volts DC Input, Spare Converter, 680A Power Plant J86891B

SD-82074-01, Issue 2B: DC Distributing Circuit for 680A Power Plants

If this section is to be used with equipment or apparatus reflecting an earlier or later issue of the SD(s), reference should be made to the SD(s) and circuit description CD(s) to determine the extent of the changes and the manner in which the section may be affected.

Danger 1: Hazardous voltages may be encountered in the 680A power plant. Avoid all contact with terminals to prevent injuries from occurring. Do not allow a test pick to touch two metal parts at the same time as dangerous or destructive short circuits may occur.

Danger 2: Hazardous voltages are used in this system. Observe caution when performing any maintenance on the regular or SPARE line feed CONVERTERS or associated equipment. Each regular CONVERTER is equipped with a PERSONNEL SAFETY (S17) switch to allow maintenance to be safety performed on that regular CONVERTER and the associated coaxial cable. When a regular CONVERTER is in service and supplying power to the L5/L5E line, the PERSONNEL SAFETY (S17) switch should be in the NORMAL position. If a regular CONVERTER or the associated coaxial cable is out of service and personnel are performing tests or repairs, the PERSONNEL SAFETY (S17) switch should be in the SHUTDOWN position and the MEN WORKING ON CABLE lamp should be lighted. If tests or repairs are to be performed on a double-ended power feed system, the PERSONNEL SAFETY (S17) switch on the series-connected regular CONVERTERS at both ends of the power feed system should be in the SHUTDOWN position and the MEN WORKING ON CABLE lamps should be lighted. Before operating the PERSONNEL SAFETY (S17) switch on the series-connected regular CONVERTER at one end of the power feed system to the NORMAL position, establish telephone communications with the opposite terminal and verify

that the opposite terminal is ready to receive power.

Caution 1: Before starting any regular CONVERTER, verify that the correct regular CONVERTER will be turned up and that the correct cable is connected to the regular CONVERTER being turned up.

Caution 2: If the high voltage CONVERTER PATCH door is opened on an operating regular CONVERTER or SPARE CONVERTER, the CONVERTER will shut down. If the CONVERTER PATCH door is opened on any associated CONVERTER under patched conditions (SPARE CONVERTER patched to L5/L5E line and regular CONVERTER patched to test load), the CONVERTER with the opened door, the SPARE CONVERTER, and the patched regular CONVERTER will shut down. SPARE IN SERVICE lamps on the SPARE CONVERTER and on the associated regular CONVERTERS light when the SPARE CONVERTER is patched to a L5/L5E line (SPARE CONVERTER turned on) and the associated regular CONVERTER is patched to the test load.

B. Purpose of 680A Converter Power Plant

1.04 The 680A power plant consists of two major units.

- The regular CONVERTER (J86891A)
- The SPARE CONVERTER (J86891B)

1.05 The purpose of the regular CONVERTER (J86891A) (see Fig. 1) is to furnish dc power for the line repeaters in the L5/L5E coaxial carrier system.

1.06 The purpose of the SPARE CONVERTER (J86891B) (see Fig. 2) is as follows:

(1) Furnish power to the line repeaters in any L5/L5E coaxial cable whose regular CONVERTER is out of service

(2) Provide a test load for any regular CONVERTER in its patch system

(3) Provide a test facility for plug-in CONVERTER subunits.

C. Single-Ended Power Feed

1.07 If the length of the coaxial line is no greater than 37.5 miles, the line is powered by a single-ended power feed arrangement (see Fig. 3). A single-ended power feed is powered at one end of the cable by one regular CONVERTER supplying NEGATIVE voltage to one tube and POSITIVE voltage to the other tube. The opposite end will be nonpowered and will have a solid dc ground provided by the power separation filters (PSF).

D. Double-Ended Power Feed

1.08 If the length of the coaxial line is in the range of 37.5 to 75 miles, the line is powered by a double-ended power feed arrangement (see Fig. 4). A double-ended power feed is powered by two regular CONVERTER bays. One regular CONVERTER bay is used at both ends of the coaxial cable pair. The POSITIVE CONVERTER at one end together with the NEGATIVE CONVERTER at the opposite end will power one of the coaxial tubes. The remaining NEGATIVE and POSITIVE CONVERTER will supply power to the other cable (tube).

E. Equipment Characteristics

1.09 The 680A power plant, when turned up into its coaxial line, is fully automatic. The power plant will automatically shut down due to abnormal voltage and current conditions. Because many shutdown conditions are transitory in nature, that is short-lived faults, each CONVERTER in the 680A power plant has an automatic restart circuit that will, if activated, automatically attempt one restart of the CONVERTER. The 680A is designed to be monitored by a remote restart alarm control center. The remote control center has the capability to restart a CONVERTER after an automatic shutdown. The remote start capability is enabled by pressing the REM CONT/RESTART switch after a manual CONVERTER turn up.

1.10 The 680A power plant was designed for humidity conditions normally encountered

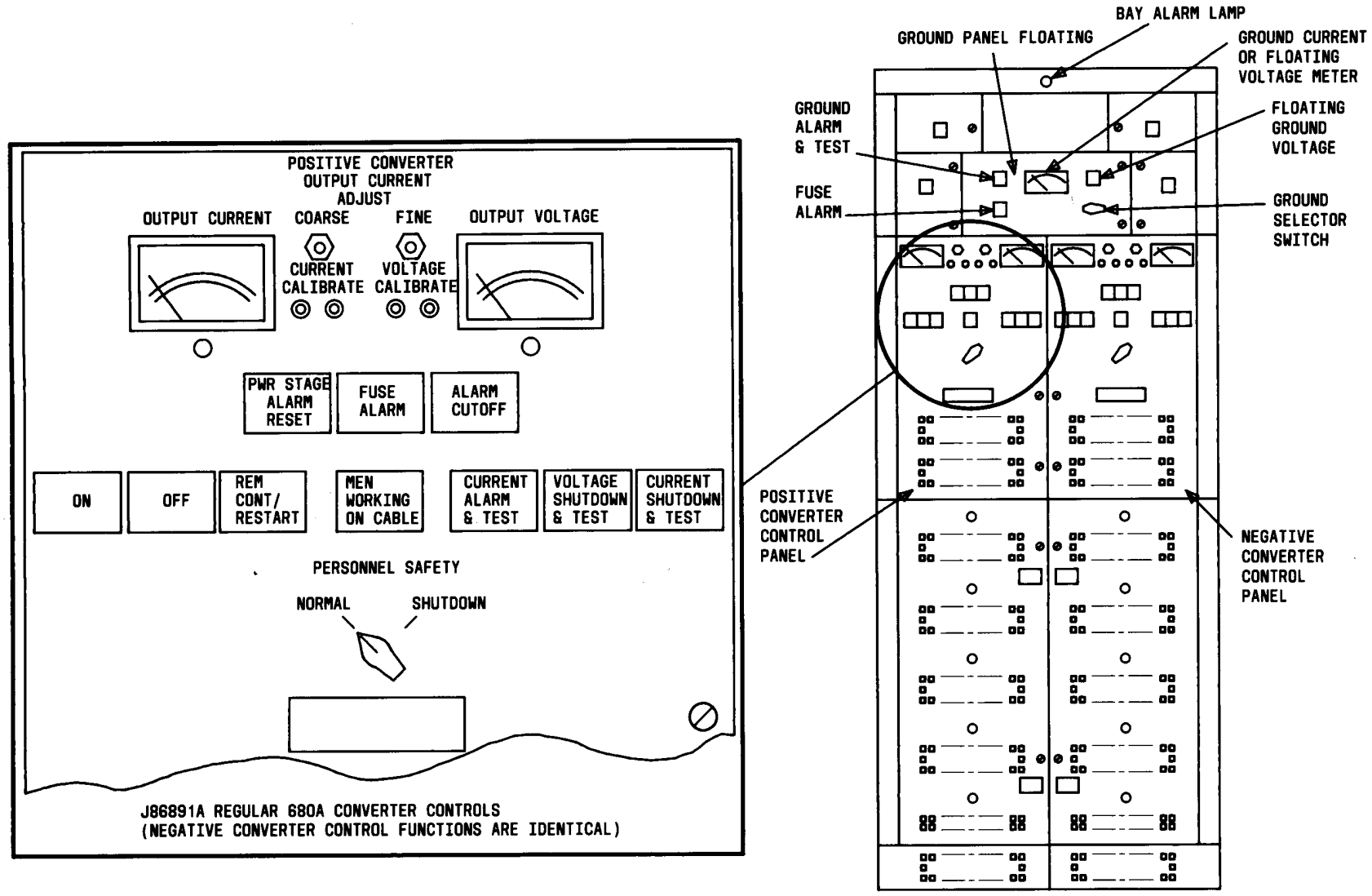

Fig. 1—Regular Converter (J86891A)

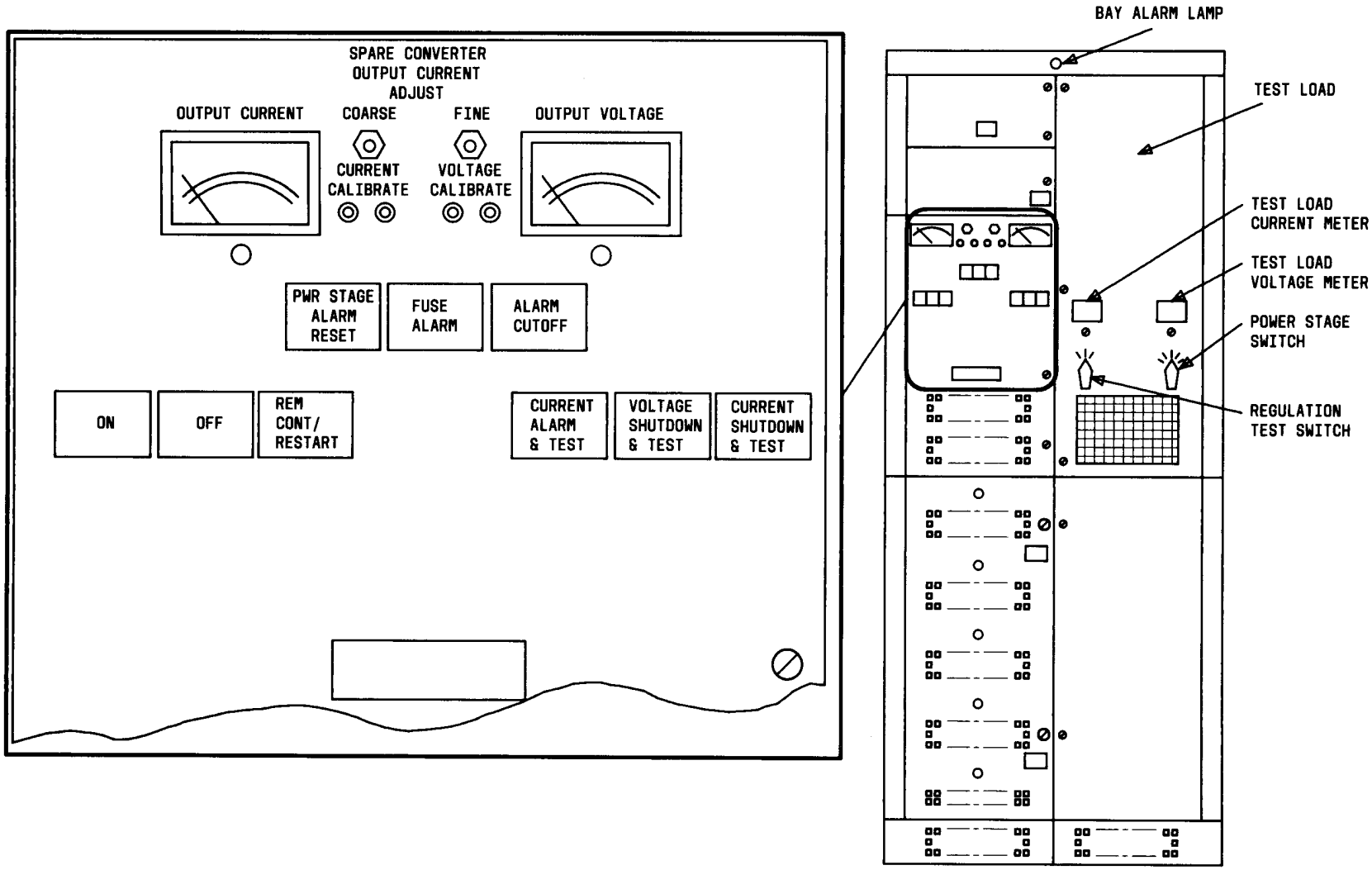

Fig. 2—Spare Converter (J86891B)

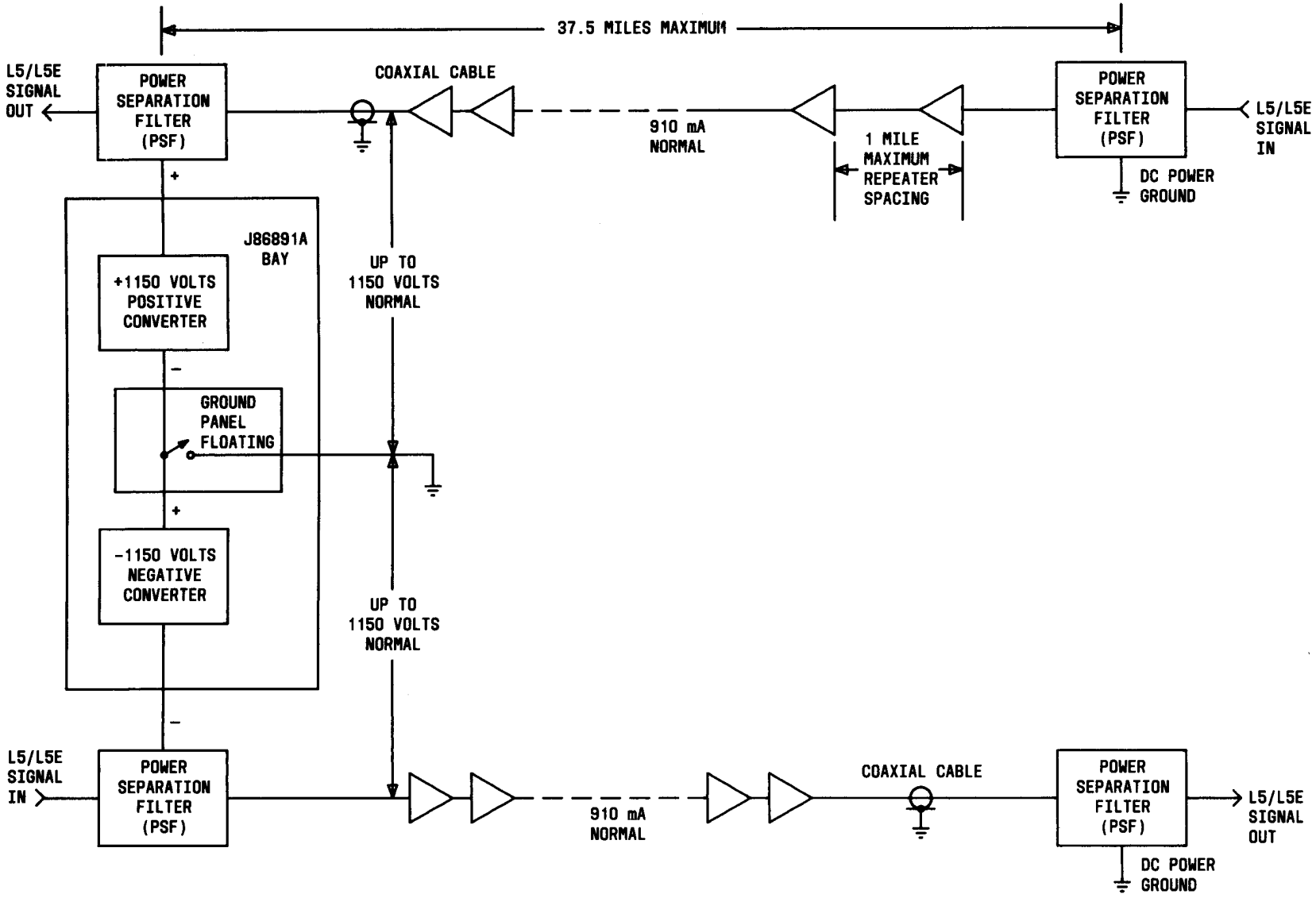

Fig. 3—L5/L5E Single—Ended Power Feed Using 680A Power Plant

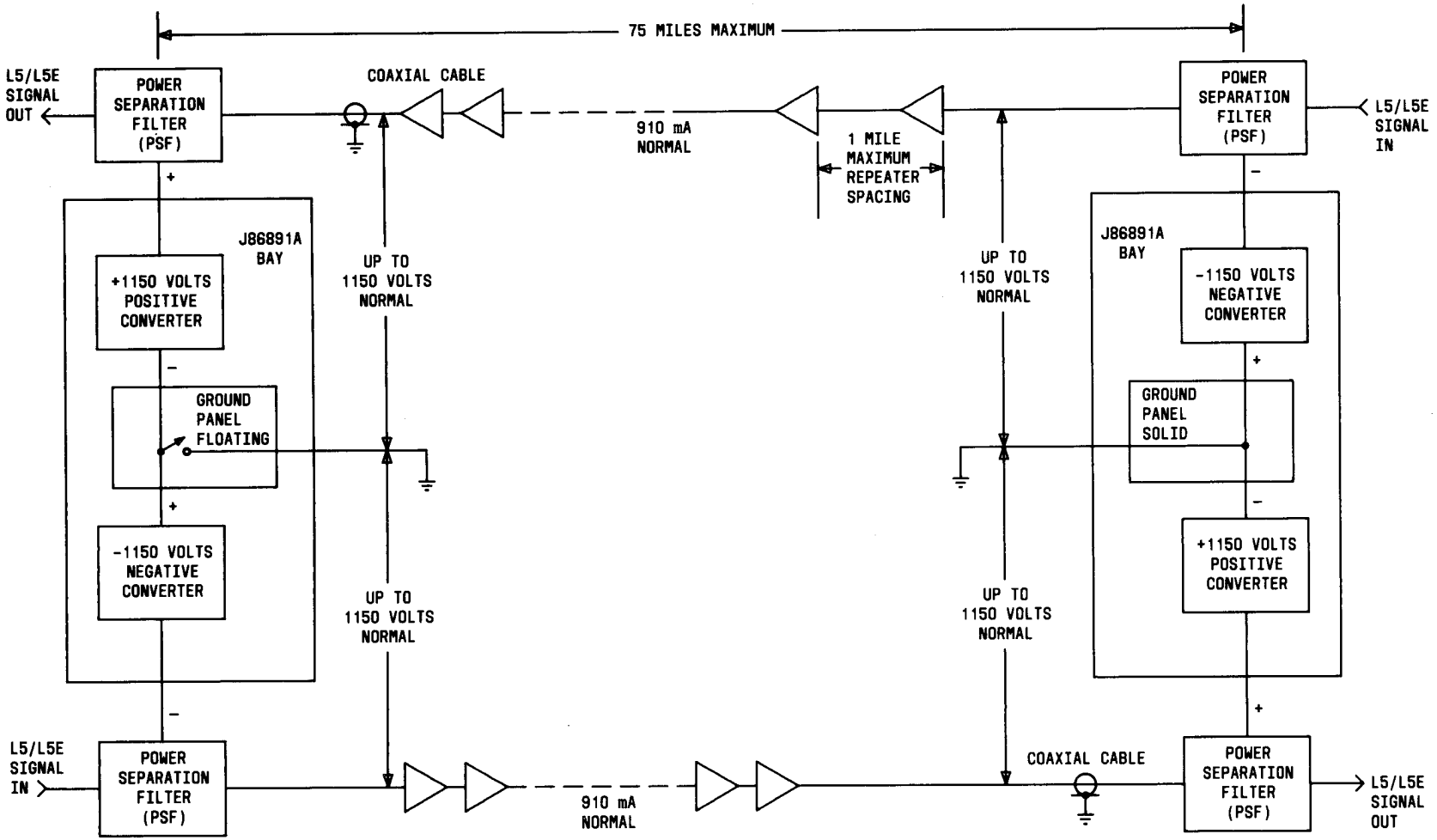

Fig. 4—L5/L5E Double—Ended Power Feed Using 680A Power Plant

when installed indoors in the continental United States.

1.11 The normal operating temperature range for the 680A power plant is from 40°F to 100°F. The short-term operating temperature range is from 35° to 140°F.

Note: Short term is a time duration of less than 3 days and for a total occurrence of 15 days in 1 year.

1.12 Each 680A power plant installation consists of at least two regular CONVERTERS (J86891A) and one SPARE CONVERTER (J86891B). One regular CONVERTER powers the in-service line, and the other regular CONVERTER powers the protection line. In a L5/L5E system, one protection line will provide service protection for up to ten regular in-service lines. The SPARE CONVERTER (J86891B) can replace any regular POSITIVE or NEGATIVE CONVERTER in its PATCH system. Whenever the SPARE CONVERTER is patched to a coaxial line, the regular CONVERTER is patched into the test load side of the SPARE CONVERTER (J86891B) bay. (See Fig. 5.)

F. 680A Power Limits (Per Converter)

1.13 ***DC Input Voltage:*** The 680A operates at a nominal input voltage of -24 volts dc. The normal operational input voltage range is -20 to -26 volts. Transitory voltage of up to -29 volts are acceptable.

1.14 ***DC Input Current:*** To calculate the input current of the regular CONVERTER (J86891A), refer to SD-82017-01. To calculate the input current of the SPARE CONVERTER (J86891B), refer to SD-82018-01.

1.15 ***DC Output Current:*** As used in the L5/L5E carrier system, the nominal output current is 910 milliamperes. The current limits are a minimum of zero milliamperes and a maximum of 1060 milliamperes. The current is smoothly adjustable through this range.

1.16 ***DC Output Voltage:*** When the 680A is in its current or impedance regulation mode (see paragraph 3.15), the dc output voltage is a function of the length of the coaxial cable or the connected load. When the CONVERTER is in the voltage regulation mode (see paragraph 3.15), the output voltage is limited to [n × (275 ±15)] volts, where "n" is the number of POWER STAGES in each CONVERTER. A CONVERTER equipped with five POWER STAGE(s) normally can supply 30 to 1150 volts at 910 milliamperes.

2. PHYSICAL DESCRIPTION

A. Regular Converter (J86891A)

2.01 Each regular CONVERTER (J86891A) bay consists of two CONVERTERS: one POSITIVE and one NEGATIVE. Each CONVERTER has five plug-in circuit packs, one OSCILLATOR module, and one to five POWER STAGE modules. To connect the output of the CONVERTER to either the L5/L5E line or the test load in the SPARE CONVERTER (J86891B) bay, each CONVERTER has a patch panel. If the CONVERTER is powering a single-ended power feeder, or is located at the floating end of a double-ended power feed, the CONVERTER will be equipped with GROUND PANEL FLOATING which includes a ground protection circuit.

2.02 The regular CONVERTER (J86891A) is contained in a cabinet 7 feet high, 2 feet 3 inches wide, and 14-1/2 inches deep. The J86891A weighs approximately 675 pounds when fully equipped.

B. Spare Converter (J86891B)

2.03 The SPARE CONVERTER (J86891B) bay consists of a reversible polarity CONVERTER and the test load. The CONVERTER has five plug-in circuit packs, one OSCILLATOR module, and five POWER STAGE modules. The test load side of the bay provides a load to check the operation of the CONVERTER or a subassembly.

2.04 The CONVERTER PATCH panel permits subsitution of the SPARE CONVERTER for a regular CONVERTER, and at the same time connects the regular CONVERTER to the test load.

2.05 The SPARE CONVERTER (J86891B) is contained in a cabinet 7 feet high, 2 feet 3 inches wide, and 14-1/2 inches deep. The J86891B bay weighs approximately 550 pounds when fully equipped.

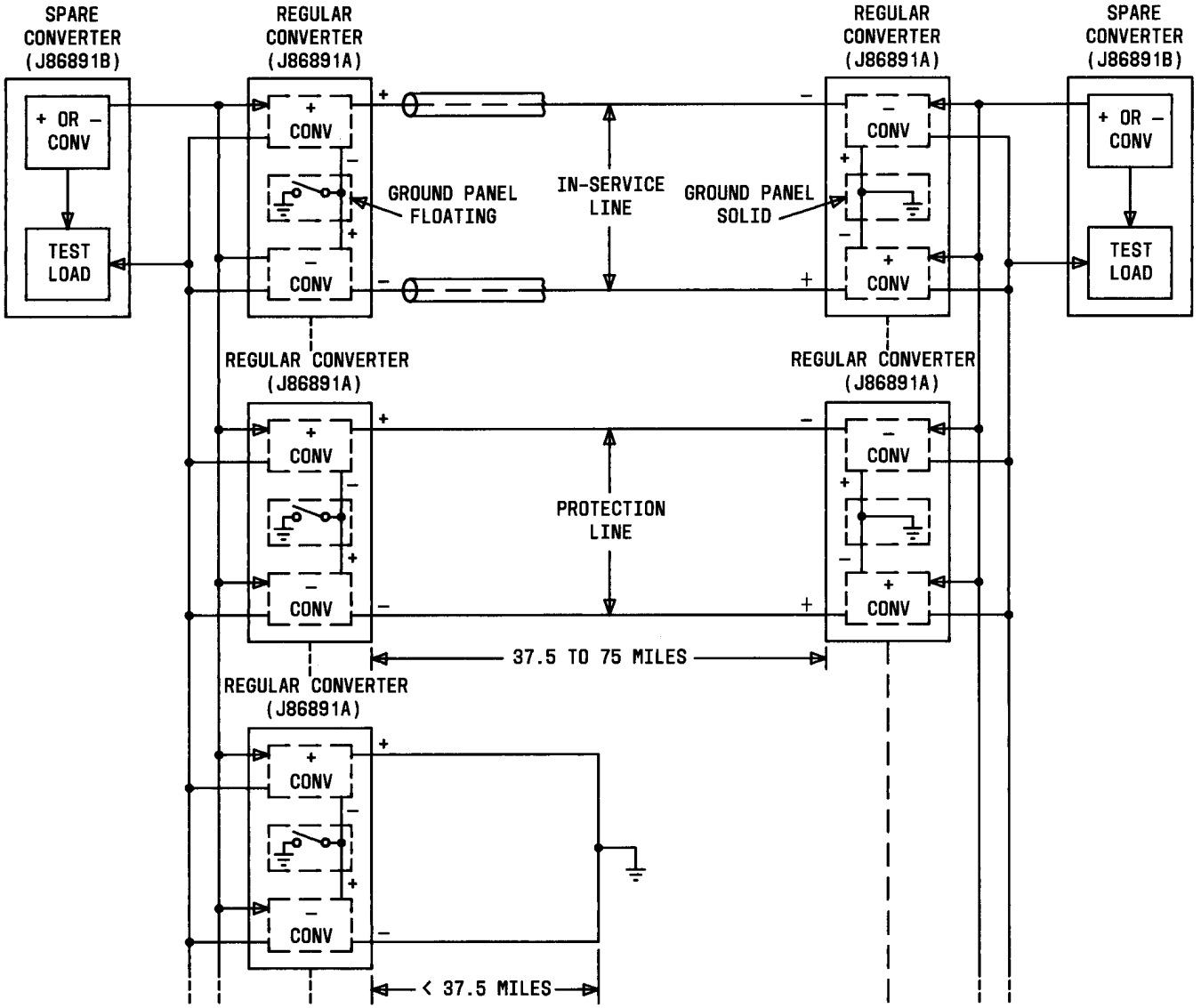

Fig. 5—L5/L5E Coaxial Cable System Power Feed Arrangement

3. FUNCTIONAL DESCRIPTION

A. General

3.01 The function of the 680A power plant is to supply up to 1150 volts of regulated 910 milliampere direct current. The 910 mA current powers the line repeaters in the L5/L5E coaxial carrier system. The power is applied to the center conductor of each coaxial cable through a power separation filter (PSF) at power feed stations. The functional units of the 680A power plant are as follows:

- Regular CONVERTER (J86891A)
- SPARE CONVERTER (J86891B)
- POWER STAGE (J86891AA)
- OSCILLATOR (J86891AB)
- CONTROL CIRCUIT (J86891AC)
- ALARM SENDING Circuit (J86891AD)
- CURRENT SHUTDOWN Circuit (J86891AE)
- VOLTAGE SHUTDOWN Circuit (J86891AF)
- FEEDBACK REGULATOR Circuit (J86891AG)
- GROUND PANEL FLOATING
- GROUND PANEL SOLID

B. Regular Converter (J86891A)

3.02 Each regular CONVERTER (J86891A) bay contains two complete power converters. One CONVERTER supplies a NEGATIVE voltage and the other supplies a POSITIVE voltage. The two CONVERTERS are connected in series to power one pair of tubes. One CONVERTER powers the transmit tube and the other CONVERTER powers the receive tube.

3.03 Each CONVERTER contains the circuitry necessary to automatically regulate the current, limit the voltage, detect abnormal current and voltage conditions, and automatically ground the floating ground point. Automatic restart and remote restart are also possible. Personnel hazards and equipment damage are minimized by protective circuits. Each CONVERTER has a CONVERTER PATCH panel which enables patching the regular CONVERTER to the test load. Whenever the regular CONVERTER is patched to the test load, the SPARE CONVERTER is patched to the line normally powered by the regular CONVERTER. Each regular CONVERTER has a PERSONNEL SAFETY switch which prevents accidental powering up of a CONVERTER, or the powering up of a patched through SPARE CONVERTER.

C. Spare Converter (J86891B)

3.04 The SPARE CONVERTER (J86891B) bay contains one reversible polarity CONVERTER, the test load, and a CONVERTER PATCH panel. The SPARE CONVERTER can furnish either a POSITIVE or a NEGATIVE voltage to power an L5/L5E coaxial line when the regular CONVERTER is out of service and patched to the test load. The polarity of the SPARE CONVERTER is automatically determined by the polarity of the patched regular CONVERTER which was replaced by the SPARE CONVERTER.

3.05 The SPARE CONVERTER (J86891B) contains the circuitry necessary to automatically regulate the current, limit the voltage, and detect abnormal current conditions. Automatic restart of the SPARE CONVERTER is possible. Personnel hazards and equipment damage are minimized by protective circuits. A CONVERTER PATCH panel enables patching the SPARE CONVERTER to a coaxial line to replace a regular CONVERTER. Whenever the SPARE CONVERTER is patched to a coaxial line, the regular CONVERTER is patched into the test load.

D. Power Stage (J86891AA)

3.06 Each POWER STAGE (J86891AA) converts a negative 24 volts dc input to a higher dc output voltage. Output voltages of up to 230 volts dc per POWER STAGE are possible. The output voltage of each POWER STAGE is dependent upon the length of the coaxial cable or the connected load. Therefore, the longer the cable, the greater the voltage required to power the line. The output current is regulated at a constant value for all cable routes regardless of cable length. For the L5/L5E system, the current is regulated at 910 milliampers. A pulse-width-modulation technique performs the power conversion function. Each POWER STAGE is individually protected by an

input fuse (F5). An alarm lamp is provided on each POWER STAGE. The alarm lamp indicates which POWER STAGE is in a trouble condition.

E. Oscillator (J86891AB)

3.07 The OSCILLATOR (J86891AB) generates the internal 20-kHz operating frequency of each CONVERTER. The 20-kHz signal is used to supply the base drive for the power transistors in each power stage (J86891AA). The OSCILLATOR also functions as the internal power supply for the CONVERTER.

F. Control Circuit (J86891AC)

3.08 The CONTROL CIRCUIT (J86891AC) circuit pack automatically restarts the CONVERTER after a shutdown, provided the restart capacity is engaged. A timer is provided to delay the restart attempt so that possible transient faults may clear. The control circuit also shuts down the CONVERTER if the input voltage drops below 18 volts dc.

G. Alarm Sending Circuit (J86891AD)

3.09 The ALARM SENDING (J86891AD) circuit controls the internal and external alarm indicators. For the external alarm system, two normally open contacts are provided for the major alarm (relay MJ) and two normally open contacts are provided for the minor alarm (relay MN). The external minor alarm can be inhibited by depressing and releasing the ALARM CUTOFF switch on the CONVERTER control panel. Because a major alarm is an indication of a serious trouble condition, the ALARM CUTOFF switch will not inhibit the major alarm.

H. Current Shutdown Circuit (J86891AE)

3.10 The CURRENT SHUTDOWN (J86891AE) circuit monitors the CONVERTER output current and will shut down the CONVERTER if a serious current trouble occurs. The circuit consists of three op-amps corresponding to the three following modes of operation.

(a) Current shutdown (CSD) occurs, after a time delay of 100 to 200 milliseconds, whenever the CONVERTER output current exceeds 1200 (±30 milliamperes) milliamperes.

(b) Fast shutdown (FSD) occurs in 120 to 180 milliseconds, whenever the CONVERTER output current exceeds 1600 (±40 milliampers) milliamperes.

(c) Rate shutdown (RSD) occurs whenever the CONVERTER output current fluctuates at an amplitude exceeding 200 milliampers peak-to-peak. Shutdown also occurs immediately if the current drops 500 milliamperes below the operating current.

3.11 An in-service testing of the CURRENT SHUTDOWN circuit may be performed by using the CURRENT SHUTDOWN and TEST switch on the CONVERTER control panel.

I. Voltage Shutdown and Current Alarm Circuit (J86891AF)

3.12 The VOLTAGE SHUTDOWN (J86891AF) circuit performs both the high output voltage and the abnormal output current monitoring activities. The circuit monitors the output voltage and shuts the CONVERTER down if the output voltage exceeds 1750 volts dc. This will prevent excessive and dangerous voltages from being applied to the line. This circuit will also shut the CONVERTER down if the CONVERTER load exceeds a series combination of 200 volts dc and 3500 ohms. Should the circuit detect a high impedance versus voltage ratio, it will shut the CONVERTER down at a relatively low value of output voltage. This should prevent the CONVERTER from being turned up into an open cable.

3.13 The current alarm part of this circuit monitors the output current of the CONVERTER. If the current shifts outside of the range of from 860 to 975 milliamperes, the current alarm circuit activates the CURRENT ALARM and TEST lamp and minor alarm, but does not shut down the CONVERTER.

3.14 An in-service test of the VOLTAGE SHUTDOWN circuit and CURRENT ALARM circuit is performed by pressing pushbutton on the CONVERTER control panel.

J. Feedback Regulator Circuit (J86891AG)

3.15 The FEEDBACK REGULATOR (J86891AG) circuit regulates both the output current and voltage of each CONVERTER. The regulation

is accomplished by the FEEDBACK REGULATOR controlling the POWER STAGE duty cycle. This is done by controlling the width of the base current pulse being applied to the POWER STAGE switching transistors. The FEEDBACK REGULATOR responds to OUTPUT CURRENT and VOLTAGE and operates in one of the three following modes:

(a) ***Voltage Mode:*** In the voltage mode, the FEEDBACK REGULATOR responds to and controls the OUTPUT VOLTAGE of the CONVERTER. This mode prevents excessive voltage on the line repeaters when the load impedance is higher than normal.

(b) ***Current Mode:*** In the current mode, the FEEDBACK REGULATOR responds to and controls the OUTPUT CURRENT of the CONVERTER. This mode limits the line current if a cable short circuits.

(c) ***Impedance Mode:*** In the impedance mode, the FEEDBACK REGULATOR responds to both OUTPUT VOLTAGE and OUTPUT CURRENT of the CONVERTER. This mode is the normal operating mode of the CONVERTER.

3.16 The FEEDBACK REGULATOR also controls the CONVERTER current during turnup. During CONVERTER turnup, a ramp circuit in the FEEDBACK REGULATOR causes the OUTPUT CURRENT to increase at a linear rate from zero to a value determined by the OUTPUT CURRENT ADJUST COARSE and FINE controls. The CONVERTER turnup process is started by pressing and releasing the ON switch or by remote control.

K. Ground Panel Floating

3.17 During normal operation of the 680A power plant, one end of the power feed is grounded and the other end will be floating. If the CONVERTER is at the powered end of a single-ended power feed or the floating end of a double-ended power feed, it will be equipped with a GROUND PANEL FLOATING. The GROUND PANEL FLOATING provides the means of either floating or grounding the common point of the POSITIVE and NEGATIVE CONVERTER. The opposite end will have a permanent ground provided by a permanent ground internal to the power separation filter (PSF) in a single-ended power feed system and a GROUND PANEL SOLID in a double-ended power feed system.

3.18 Grounding the power feed only at one end accomplishes the following:

(a) Avoids the possibility of corrosion damage to the cable sheaths due to continuous dc current via an earth path.

(b) Minimizes the susceptability of the metallic circuit to longitudinal voltage induced by lighting and power line faults.

3.19 GROUND PANEL FLOATING automatically grounds the floating end of the power feed to protect the repeaters from excessive voltage and to maintain operation of the power feed if trouble develops in a coaxial cable or CONVERTER.

L. Ground Panel Solid

3.20 GROUND PANEL SOLID is provided at the grounded end of a double-ended power feed. The panel contains two bus bars to provide a permanent ground at the common point of the POSITIVE and NEGATIVE CONVERTERS.

4. OPERATION

A. Introduction

4.01 The 680A power plant is automatic in supplying power to the L5/L5E line repeaters and should not require any day-to-day adjustments. Normally the regular CONVERTERS are turned up and powering the coaxial lines.

B. Operating Procedures

4.02 Table A provides a listing of controls and indicators and the reasons they are lighted. Detailed procedures for routine operation, acceptance, and trouble clearing tasks are contained in the associated TOP volume 167-693-102.

5. MAINTENANCE

A. Introduction

5.01 For proper automatic operation of the 680A power plant, schedule routine maintenance should be performed on the plant.

5.02 Personnel are notified of trouble conditions by audible and visible major and minor alarms.

TABLE A	
680A OPERATION STATUS INDICATORS	
CONVERTER BAY AND PANEL LAMPS LIGHTED	**INDICATION**
CURRENT SHUTDOWN & TEST	**CONVERTER** has shut down due to: (a) Current shutdown (CSD) occurs, after a time delay of from 100 to 200 milliseconds, whenever the **CONVERTER** output current exceeds 1200 ±30 milliamperes (b) Fast shutdown (FSD) occurs in 120 to 180 milliseconds whenever the **CONVERTER** output current exceeds 1600 ±40 milliamperes (c) Rate shutdown (RSD) occurs whenever the **CONVERTER** output current fluctuates at an amplitude. exceeding 200 milliamperes peak-to-peak at frequencies up to 100 Hz. Shutdown also occurs immediately if the current drops 500 milliamperes below the operating current.
	Or the **CURRENT SHUTDOWN & TEST** pushbutton has been depressed to simulate a current shutdown condition
CURRENT ALARM & TEST	**CONVERTER** output current is not within 860 to 975 mA, or the **CURRENT ALARM & TEST** pushbutton has been depressed to simulate a current alarm condition
VOLTAGE SHUTDOWN & TEST	**CONVERTER** has shut down due to: (a) **CONVERTER** output voltage has exceeded 1750 ±50 volts, (b) **CONVERTER** load has exceeded a series combination of 200 volts and 3500 ohms,
	Or the **VOLTAGE SHUTDOWN & TEST** pushbutton has been depressed to simulate a voltage shutdown condition
FUSE ALARM (CONVERTER)	Fuse **F1**, **F2**, **F3**, or **F4** has blown
FUSE ALARM [On **GROUND PANEL FLOATING** of regular **CONVERTER (J86891A)**]	Fuse **F6** has blown because **SG1** or **SG2** protector has operated
GROUND ALARM & TEST [On **GROUND PANEL FLOATING** of regular **CONVERTER (J86891A)**]	The common point of the two line feed **CONVERTER**(s) at the floating end of the power feed section (normally ungrounded) is now grounded due to: (a) The dc ground voltage has exceeded 250 volts (b) The ground transient voltage has exceeded 800 volts (c) The sum of the **POSITIVE** and **NEGATIVE CONVERTER** output currents is less than 1550 mA (d) The difference between **CONVERTER** output currents is greater than 35 mA.
	Or the **GROUND ALARM & TEST** pushbutton has been depressed to simulate a ground alarm condition

TABLE A (Contd)	
680A OPERATION STATUS INDICATORS	
CONVERTER BAY AND PANEL LAMPS LIGHTED	**INDICATION**
REM CONT/RESTART	The **CONVERTER** cannot be started remotely from E2 control terminal
	The **CONVERTER** will not attempt an automatic restart after a shutdown has occurred. If an external major alarm is activated at the same time, the **CONVERTER** has shut down and an automatic restart has occurred.
POWER STAGE Alarm	**POWER STAGE** has been operating at less than 50 percent duty cycle or **POWER STAGE** fuse **F5** has blown
MEN WORKING ON CABLE	**PERSONNEL SAFETY** switch has been placed in **SHUTDOWN** position removing output of **CONVERTER** from line. **CONVERTER** cannot be turned up. If **SPARE CONVERTER** has been patched through **CONVERTER**, then **PERSONNEL SAFETY** switch will prevent **SPARE CONVERTER** from being turned up
ALARM CUTOFF	**ACO** relay is operated and external minor alarms are deactivated
Bay alarm (Red Lamp at Top of Bay)	Major or minor bay alarms are activated due to a **CONVERTER** trouble condition or one of the alarm test pushbuttons has been depressed
OFF	**CONVERTER** has automatically shut down due to a trouble condition, or **OFF** pushbutton has been depressed to turn **CONVERTER** down. [***DANGER: Even though CONVERTER OFF lamp is lighted, the power feed section may still be energized. To de-energize power feed section, turn down series-connected*** **CONVERTER**(s) ***and verify that all associated*** **OUTPUT CURRENT** ***ammeters and*** **OUTPUT VOLTAGE** ***voltmeters indicate zero.***]

B. Maintenance Tasks

5.03 Routine, acceptance, and trouble clearing tasks are contained in the associated TOP volume 167-693-102.

6. REFERENCES

6.01 The following list provides further information concerning the 680A Converter Power Plant:

NUMBER	TITLE
167-693-102	680A Power Plant—TOP
SD-82017-01	Power Supply Circuit Positive and Negative Outputs 0 to 1150 Volts, 910 Milliamperes DC -24 Volt Input Regular Converter for L5/L5E Coaxial System 680A Power Plant (J86891A)
SD-82018-01	Power Supply Circuit Positive or Negative Output 0 to 1150 Volts, 910 Milliamperes DC -24 Volt Input Spare Converter for L5/L5E Coaxial Systems 680A Power Plant (J86891B)
SD-82074-01	DC Distributing Circuit for 680A Power Plants
SD-51110-01	Common Systems L5/L5E Carrier or Digital Transmission Facilities T4M Digital Line Power Separation Filter Circuit
802-867-150	680A Power Plant 0 to 1150 Volt 910 Milliampere DC Output -24 Volt DC Input Equipment Design Requirements Power Systems
ED-82423-30	Power System Specification for Ground Protection Unit Printed Wiring Board for L5 Coaxial System
ED-82437-10	Power Systems Cabling Plan for 680A Power Plant Power Supply Bay (J86891) L5 Coaxial System
ED-82497-30	Power Systems Specification for Extender Board Unit for the J86891A and J86891B Power Supplies
ED-82508-10	Power Systems Spare Parts List for the J86891A and B Power Supplies 680A Power Plant