

620C (J86925) AND 625C (J86926) POWER PLANTS

DESCRIPTION

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OPERATING PROCEDURES	9	1.01 This section describes the 620C (J86925) and 625C (J86926) power plants. Included in this section are the following:	
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NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

- Description of operating requirements
- Description of maintenance requirements.

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

1.03 **Abbreviations and Acronyms:** Refer to Table A for a list of abbreviations and acronyms used in this section.

TABLE A

ABBREVIATIONS AND ACRONYMS

ABBREVIATION	TERM
ALM	Alarm
ALM CO	Alarm Cutoff
ALM UPGR	Alarm Upgrade
CB	Circuit Breaker
CONV TEST	Converter Test
CP	Circuit Pack
FREQ	Frequency
FUSE ALM	Fuse Alarm
GUARD REG ALM	Guard Regulator Alarm
INTLK	Interlock
HI/LO VOLT ALM	High/Low Voltage Alarm
HVSD	High/Voltage Shutdown
LC ALM	Low Current Alarm
LED	Light-Emitting Diode
MJ	Major
MN	Minor
MON	Monitor
PLANT VOLT	Plant Voltage
OP	Operate
STBY	Standby
TEST ADJ	Test Adjust
TEMP ALM	Temperature Alarm
TP	Test Point

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

- SD-82553-01, DC-to-DC Converter +140V Input 24V or 48V, 50-Ampere Output, J87456A and J87457A
- SD-82561-01, DC-to-DC Converter Frame +140V Input $\pm 24V$ or $\pm 48V$, 0 to 300-Ampere Output, J86922A and J86923A

- SD-82518-02, DC Power Distributing Frame, J86334C
- SD-82565-01, Discharge Circuit $\pm 24V$ or $-48V$, 1200-Ampere Converter Plant, 620C or 625C.

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 SDs and circuit descriptions (CDs) to determine the extent of the changes and the manner in which the section may be affected.

Danger: Hazardous voltages and current potentials may be encountered in the 620C and 625C power plants. 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 and destructive short circuits may occur.

PURPOSE OF THE 620C AND 625C POWER PLANTS

1.05 The 620C and 625C power plants are direct replacements for the 620A, 625B, and 625F power plants, respectively. The plants are general purpose power plants that can be used in any system where the capacity and voltage ranges are suitable. The initial application is to provide regulated 24V (620C) or 48V (625C) to the Toll and Network/Processor areas of the No. 4 ESS office.

EQUIPMENT CHARACTERISTICS

1.06 A fully equipped 620C or 625C plant is comprised of two output buses each rated at 600 amperes. Two J86922A (24V) or J86923A (48V) power converter frames, each equipped with seven J87456A (24V) or J87457A (48V), 50-ampere dc-to-dc converters, are required to supply 24 or 48 volts dc for each 600-ampere bus. The plants may be equipped to supply from 50 to 600 amperes in 50-ampere increments. The number of converters required in a given plant is determined by office load requirements plus one additional operating converter in each converter frame. The additional converter ensures the ability of a fully equipped converter frame to deliver 300 amperes in the event of a converter malfunction.

1.07 The equipment is designed to operate in an ambient temperature range of 0° to 50° C.

1.08 Figure 1 shows a 625C power plant equipped to provide 100 amperes of output current on

each of two buses located in the central distribution frame. One converter in each frame is redundant. When equipped with the same number of converters and converter frames, the 620C and 625C power plants are physically identical except for some minor differences.

2. PHYSICAL DESCRIPTION

A. General

2.01 A fully equipped dual 600-ampere 620C or 625C power plant consists of five equipment frames approximately 7 feet high, 12 inches deep, and 2 feet 2 inches wide. A fully equipped 620C or 625C consists of the following:

- DC Power Distribution Frame—J86334C
- Initial Converter Frame—J86922A (24V) or J86923A (48V) (one per bus)
- Supplementary Converter Frame—J86922A (24V) or J86923A (48V) (one per bus)

B. DC Power Distribution Frame

2.02 The J86334C power distributing frame is used with both the 620C and 625C power plants. The maximum discharge capacity of the frame is 600 amperes on each of two independent buses on each side of the frame. The frame can be equipped with various fuse and circuit breaker distribution panels which cover a range of loads from 0.1 to 225 ampere ratings in accordance with job requirements. A fully equipped J86334C can include a combination of distribution panels without exceeding a maximum height of 54 inches. A bank of filter capacitors is always required on the distributing frame and is mounted at the bottom of the framework. Each A and B bus is mounted vertically on the distributing frame and extends the entire height of the framework.

C. Initial Converter Frame

2.03 An initial or originating converter frame is located on each side of the distribution frame. The J86922A (24V) and the J86923A (48V) (Fig. 2) converter frames are physically identical except for some minor differences in electrical components and wiring. The top 13 inches of the converter frame contain the plant control printed wiring board, circuit

breakers, meters and bus bars. The remaining portion of the frame provides space for a minimum of two and a maximum of seven J87456A (24V) or J87457A (48V) converters. The controls and indicators mounted on the converter frame circuit pack are summarized in Table B. Each converter frame is completely wired and equipped with converter hangers to accept seven dc-to-dc converters. All of the converter frame controls (except the circuit breakers), jacks, and meters are located on a hinged panel door. All switches, alarm indicators, and adjustments for in-service testing are located on the edge of the ED-82932 plant control and alarm circuit pack. They are directly accessible from the front of the equipment. The ammeter, optional voltmeter, voltage/current test jacks, and plant circuit pack fuses are located on the hinged panel and are directly accessible from the front of the equipment.

2.04 DC-to-DC Converters: The J87456A (24V) and J87457A (48V) (Fig. 3) converters are physically identical. The converters are operated from a +140 volt source and, by circuit options, provides an 0- to 50-ampere isolated 24 or 48 volt output that may be connected as either polarity in the 620C or 625C converter frame, respectively. The converter is 9 inches high, 23.5 inches wide, 12 inches deep, and weighs approximately 65 pounds. Input power, control and alarm functions are provided through a single multipin connector. Output power is obtained from a 2-position terminal block. Therefore, the addition of 50 amperes capacity to the plant requires only the installation of one converter and one circuit breaker.

2.05 Converter Frame Panel: An ammeter, optional voltmeter, and voltage/current test jacks are located on the hinged panel door directly above the converters in the frame. Located behind the panel, but accessible from the front, is the converter frame control and alarm circuit pack (CP1) shown in Fig. 4. All switches, alarm indicators, and adjustments for in-service testing are located on the edge of the CP1 circuit pack. Some of the features provided on the CP1 circuit pack are listed in Table C.

D. Supplementary Converter Frame

2.06 The output capacity of the 620C and 625C power plants may be increased by adding additional converters as the office load grows. One supplementary converter frame may be added per bus when the bus load grows beyond 300 amperes. The

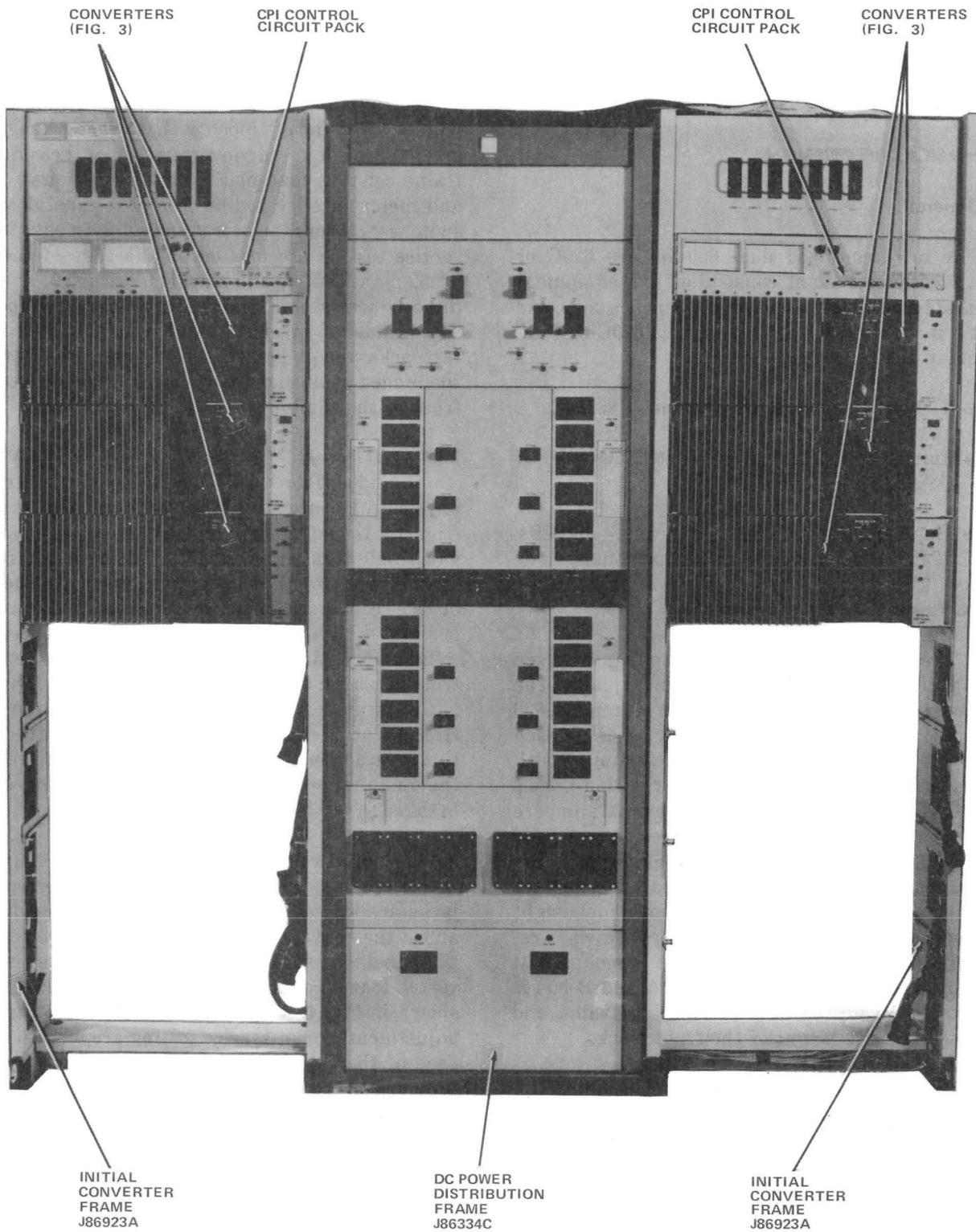


Fig. 1—625C (J86926) Power Plant

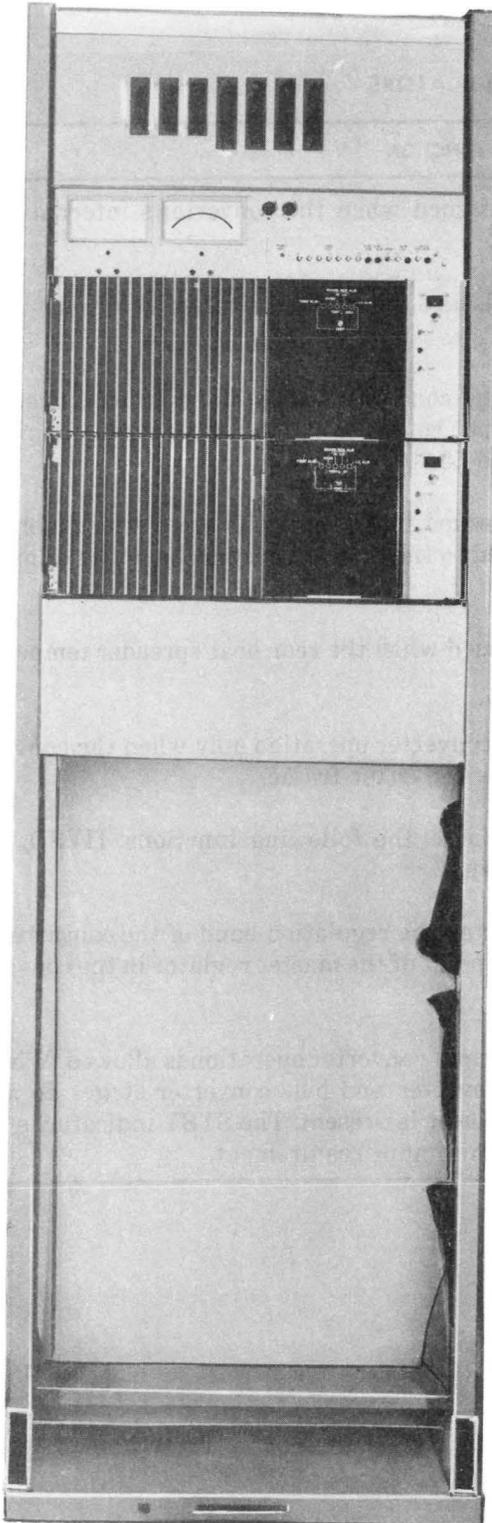


Fig. 2—J86922A/J86923A Converter Frame Equipped
With Two J87456A/J87457A Converters

number of converters and converter frames per output bus for a given office load on that bus is shown in Table D. A fully equipped plant consists of two initial and two supplementary converter frames. The supplementary frame is located beside the initial frame and has the same J code, J86922A (24V) or J86923A (48V), as the initial frame.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 The function of the 620C and 625C power plants is to supply up to 1200 amperes of regulated, 24- or 48-volt dc power, respectively. The functional units of the converter frames are as follows:

- DC-to-DC Converter, J87456A (24V) or J87457A (48V)
- Converter Frame Control and Alarm Circuit.

B. DC-to-DC Converter

3.02 The J87456A (24V) and J87457A (48V) converters provide an isolated dc output rated at 50 amperes. The functional units of the converters are as follows:

- Converter Power Circuit
- Converter Control and Alarm Circuit.

3.03 Converter Power Circuit: The J87456A converter has an output voltage and corresponding output power rating of 1.2 kW (24V, 50A). The output voltage and power rating of the J87457A converter is 2.4 kW (48V, 50A). The J87456A converter is powered by a single-ended transistor inverter and half-wave rectifier circuit. The same basic subcircuits are duplicated in the J87457A converter to form a push-pull transistor inverter and full-wave rectifier. Both converters have special subcircuits that improve conversion efficiency and overload performance.

3.04 Converter Control and Alarm Circuit: Both the J87456A (24V) and the J87457A (48V) converter use a common CP1 control circuit. Regulation of power-flow from the input source to the load is achieved by the controller modulating the ratio of the conduction time to the cutoff time of the inverter transistor. Table B lists some of the controls and in-

TABLE B

CONVERTER CONTROLS AND INDICATORS

CONTROL/INDICATOR	FUNCTION
GUARD REG ALM LO	Indicator is lit and an alarm is issued when the converter's internal low guard backup regulator is active.
GUARD REG ALM HI	Indicator is lit and an alarm is issued when the converter's internal high guard backup regulator is active.
HVSD	Indicator is lit, alarm is issued, and converter is shut down when converter delivers output during a high output voltage condition. Shut down occurs at $27.5 \pm 0.3V$ for 620C converter and $55 \pm 0.5V$ for 625C converter.
LC ALM	Indicator is lit and an alarm is issued if the converter provides an abnormally low output current compared to the command from the frame or master regulator.
TEMP ALM	Indicator is lit and an alarm is issued when the rear heat spreader temperature exceeds $95^{\circ}C$.
INTLK	Mechanical interlock that allows converter operation only when the converter is completely inserted into the converter frame.
TEST Switch	When depressed, automatically checks the following functions: HVSD, LC ALM, TEMP, and guard regulators.
TEST ADJ	Front panel adjustment for centering the regulation band of the converter's guard regulators on the operating point of the master regulator in the converter frame.
ON/STBY Switch	When switch is in ON position, normal converter operation is allowed. When switch is in STBY position, the inverter and bias converter stages do not switch but are energized if input power is present. The STBY indicator is lit if the input voltage is above the minimum requirement.

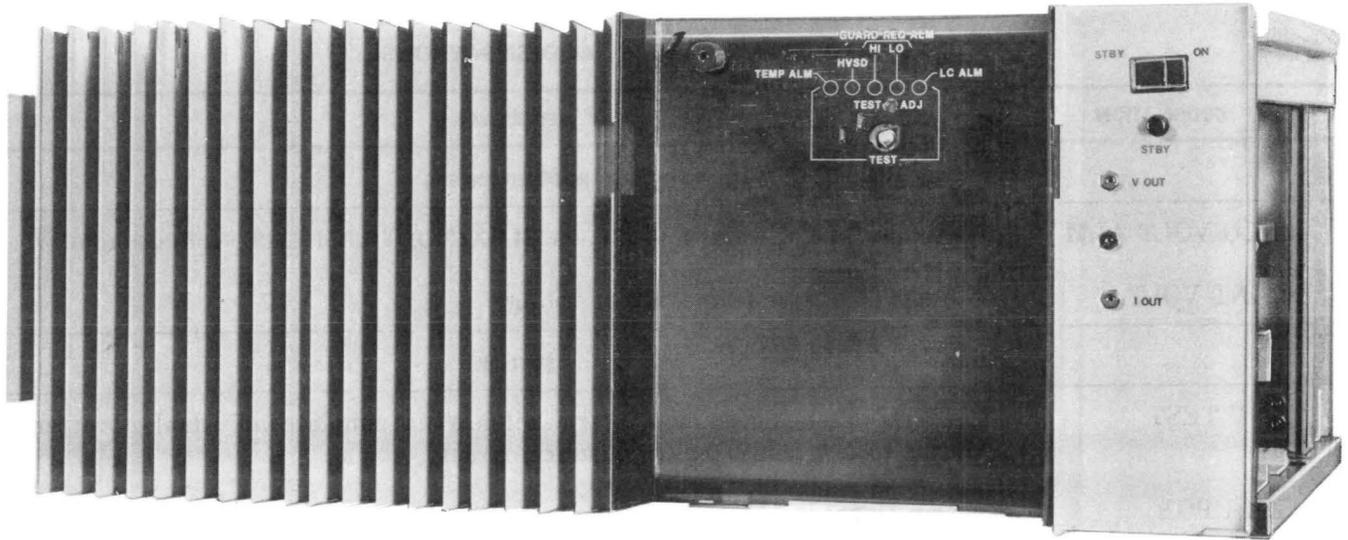


Fig. 3—J87456A (24V) or J87457A (48V) Converter

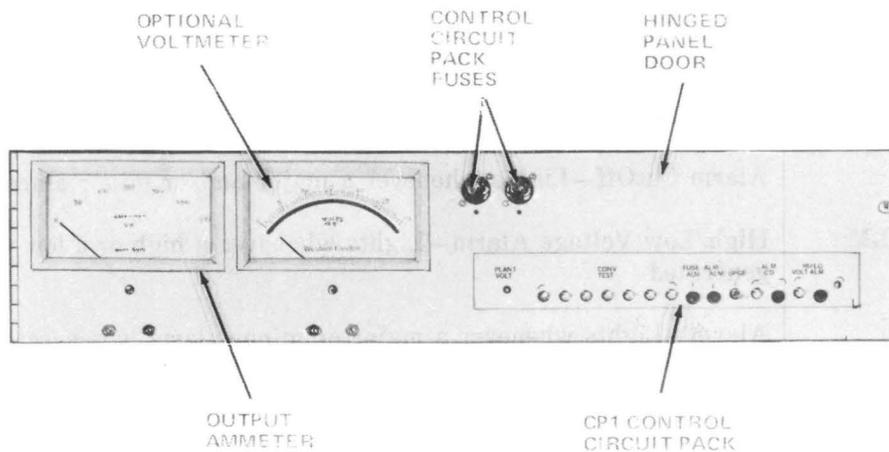


Fig. 4—CP1 Plant Control and Alarm Circuit Pack

dicators mounted on the control circuit pack, CP1. The major features provided with the CP1 control circuit are as follows:

- (a) **Clock and Logic Circuit:** Used to generate the alternate pulse-width control signals that drive the inverter transistors into and out of conduction.
- (b) **Inverter Transistor Current Control Circuit:** Used as a timing signal to determine when to stop transistor conduction.
- (c) **Master Regulation System:** Supplies identical error current signals to each converter in a frame to provide an automatic load current sharing function with $\pm 1\%$ voltage regulation over the load range.
- (d) **Guard Regulator:** Monitors the performance of the master regulator, and takes over control of the individual converters if the master regulator fails to hold the bus voltage within limits of ± 2 percent.

TABLE C

CONVERTER FRAME FUNCTIONAL DESIGNATIONS

DESIGNATION	FUNCTION
POTENTIOMETERS	
HI/LO VOLT ALM	High/Low Voltage Alarm—Adjusts HI/LO VOLT ALM ($\pm 4\%$) voltage monitor
PLANT VOLT	Adjusts converter frame output voltage
SWITCHES	
CONV TEST	Converter Test—Seven momentary switches that simulate individual converter alarms to test converter frame alarm circuit
ALM UPGR	Alarm Upgrade—Upgrades a single minor alarm to a major alarm
ALM CO	Alarm CutOff—Cuts off major and/or minor audible alarms
HI/LO VOLT ALM	High/Low Voltage Alarm—Tests and calibrates HI/LO VOLT ALM voltage monitor
LED INDICATORS	
FUSE ALM	Fuse Alarm—Lights whenever a converter frame fuse operates
ALM CO	Alarm CutOff—Lights whenever a major and/or minor alarm is cut off
HI/LO VOLT ALM	High/Low Voltage Alarm—Lights whenever a high or a low voltage alarm is generated
ALM	Alarm—Lights whenever a major or minor alarm is generated

TABLE D
CURRENT RATING PER CONVERTER

MAXIMUM OUTPUT CURRENT (WITH 50A SPARE CAPACITY PER CONVERTER FRAME)	CONVERTERS	CONVERTER FRAMES
50 AMPS	2	1
100 AMPS	3	1
150 AMPS	4	1
200 AMPS	5	1
250 AMPS	6	1
300 AMPS	7	1
350 AMPS	9	2
400 AMPS	10	2
450 AMPS	11	2
500 AMPS	12	2
550 AMPS	13	2
600 AMPS	14	2

(e) **Output Current Limiting Circuit:** Provides predictable voltage and current characteristics during overload conditions.

(f) **Soft-Start Circuit:** Provides a gradual buildup of output current by slowly widening the pulse width signal.

C. CONVERTER FRAME CONTROL AND ALARM CIRCUIT

3.05 The alarm circuit on the CP1 control circuit pack monitors the alarms generated by each converter, the output voltage at the frame bus, and the fuses in the converter frame. A major alarm, audible and visual, is issued when:

- (a) Two or more converters issue alarms
- (b) Alarm upgrade (ALM UPGR) feature is used and one or more converters issue an alarm
- (c) Output bus voltage exceeds $\pm 4\%$ of nominal output voltage.

A minor alarm, audible and visual, is issued when:

- (a) One or more converters issue alarms
- (b) One or more fuses blow in the frame.

The alarm indicators, switches, and potentiometers provided on the converter frame control circuit pack

(CP1) and their functional designations are provided in Table C.

4. OPERATION

INTRODUCTION

4.01 The power plants are fully automatic in supplying the required voltage to the load and should not require day-to-day routine adjustments. Normally, the plants are energized and connected to office loads.

Danger: Hazardous voltages and current potentials may be encountered in the 620C and 625C power plants. 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 and destructive short circuits may occur.

OPERATING PROCEDURES

4.02 Detailed trouble and nontrouble tasks are contained in the associated TOP Section 167-689-104.

5. MAINTENANCE

INTRODUCTION

5.01 For proper automatic operation of the 620C and 625C power plants, scheduled maintenance must be performed on the plant control and alarm circuits. A properly maintained power plant provides the following:

- Identification of trouble conditions in converter or plant circuits
- Bus reliability should one power source fail by providing one power source more than required to serve the load
- Isolation of converter from plant for test or repair.

5.02 Craft personnel are notified of trouble conditions by major and minor office alarms (audible and visual).

MAINTENANCE TASKS

5.03 Detailed maintenance procedures for the 620C and 625C power plants are contained in TOP Section 167-689-104.

ACCESSIBILITY

5.04 The 620C and 625C plants are designed to be maintained entirely from the front except for the installation of additional converter output circuit breakers. Against-the-wall installation is not permitted since the air flow along the rear heat sink surface is needed for unit cooling in the converter frame. The control circuit pack mounts on the front panel of the converter frame. Functional in-service testing of both the converter and plant voltage monitor and alarm monitor is provided with several front panel pushbutton switches and potentiometers.

6. REFERENCE

6.01 The following listing provides further information concerning the 620C and 625C power plants:

SECTION	TITLE
201-224-101	J86334B and C, DC Power Distributing Frame—Operating Methods
167-689-104	620C and 625C Power Plants—TOP