

**TONE POWER PLANT  
807G (J87814)  
OPERATING METHODS**

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. LIST OF TOOLS AND TEST APPARATUS . . . . .	2
3. OPERATION . . . . .	2
Automatic Operation of Plant . . . . .	2
Tone Generators and 1-VA Amplifiers . . . . .	2
Manual Operation of Plant . . . . .	2
4. ROUTINE CHECKS . . . . .	3
5. TROUBLES . . . . .	4
Trouble Chart . . . . .	5

**1. GENERAL**

**1.01** The 807G (J87814) power plant provides busy-tone interruptions for line-busy and paths-busy as required by offices arranged for step-by-step common control with controlled outpulsing.

**1.02** This section does affect the Equipment Test List.

**1.03** The busy tone is a combination of two frequencies (480 and 620 Hz) which are generated by transistor oscillators, mixed together, and amplified by power transistor amplifiers. Interrupter follow relays provide the BT2 60 IPM for line-busy and the BT2 120 IPM for paths-busy.

**1.04** The power plant operates from a -48 volt source (-44 to -52 Vdc central office battery).

**1.05** For reserve tone power, the plant includes duplicate tone generators and low-voltage monitors.

**1.06** Each amplifier output is monitored with separate low-voltage monitors. The automatic transfer circuit transfers the load to the reserve amplifier in case of failure of either the regular oscillator or of the regular amplifier. A minor alarm is provided in case of failure of units in either the regular or reserve generators. A major alarm is provided if elements in both generators should fail or if a fuse should fail.

*Caution: This power plant includes automatically controlled equipment. Care must be exercised to prevent automatic transfer to those parts of the plant on which maintenance work is to be done. Before starting work, prevent automatic transfer of equipment by removing fuses, blocking relays, etc, as necessary. When maintenance work has been completed, make sure the circuit has been restored to normal.*

**1.07** Instructions are based on the following drawings. For detailed description of the operation of individual circuits, refer to the corresponding circuit description.

- |             |  |
|-------------|--|
| SD-31521-01 | Step-by-Step Systems—No. 1 or 350A Miscellaneous Tone and Tone Alarm Circuits. |
| SD-32045-01 | Step-by-Step Systems—No. 1 or 350A Connector Shelf Circuits.                   |
| SD-32351-01 | Step-by-Step Systems—Originating Register Out Pulsing Controller.              |
| SD-81885-01 | Circuit Pack Schematic.  |

SD-82005-01 Power Systems—Signaling Circuit—Precise Busy Tone Supply for Step-by-Step Offices—807G Tone Power Plant.

1.08 The abbreviations cw and ccw refer to clockwise and counterclockwise, respectively.

2. LIST OF TOOLS AND TEST APPARATUS

**Caution:** *The Hewlett-Packard model 3400A true rms voltmeter is ac powered and is grounded. If this meter is to be used, use a Hubbell isolation plug to prevent damage to components of the tone power plant.*

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
411B	Test Pick
423B	Tool
731A	Tool
W1AF	Cord (8-1/2 feet long equipped with one 360A tool at each end)
KS-6278	Connecting Clip 3-Inch C Screwdriver
<b>TEST APPARATUS</b>	
KS-14510	Volt-Ohm-Milliammeter
—	True RMS Voltmeter, Hewlett-Packard Model 3400A
	or
—	True RMS Voltmeter, Greibach Model 500
158A	Circuit Pack Adapter (Board Extender)
169A	Circuit Pack Adapter (Board Extender)
716C	Receiver

3. OPERATION

**Automatic Operation of Plant**

3.01 Under normal operating conditions (with the GT relay in the control), the transfer and

alarm circuit is shunted down from operating. If any of the outputs of the regular side of the plant (regular generator) fail for any reason, the shunt will be removed, allowing the GT relay to operate and transfer the load to the reserve generator. The GT lamp lights and a minor alarm sounds. After operating, the GT relay remains locked operated. Once the trouble has been cleared, the plant can be restored to normal by depressing the GEN RST switch. This shunts down the GT relay and transfers the load back to the regular generator. The GT lamp extinguishes and the minor alarm silences. If some element in the reserve side of the plant fails without an earlier failure in the regular side of the plant, a trouble indicating lamp lights and a minor alarm sounds. When the trouble is cleared, the trouble indicating lamp extinguishes and the minor alarm silences. If some element in the reserve side of the plant fails after an earlier failure in the regular side of the plant, a trouble indicating lamp lights and a major alarm sounds. When the trouble is cleared, the trouble indicating lamp extinguishes and the major alarm silences.

**Tone Generators and 1-VA Amplifiers**

3.02 The output signals of the tone amplifiers are checked with low-voltage monitors. When the regular tone generator is operating properly, the relays in the low-voltage monitors are operated. If any of the relays should release, ground is provided on the GA leads to light lamps and indicate the source of trouble.

**Manual Operation of Plant**

3.03 Manual transfer of the load from the regular side of the plant to the reserve side of the plant is done by pushing the GEN TRFR key to the LOCK position. The GEN TRFR switch locks operated under control of the GEN RST switch. The lamp in the GEN TRFR switch lights and the GT relay operates in the same manner as with an automatic transfer. The GT relay prevents the operation of a minor alarm during manual transfer. To restore the plant to normal operation, push the GEN TRFR key to the UNLOCK position and depress the GEN RST switch. The GEN TRFR lamp extinguishes.

#### 4. ROUTINE CHECKS AND ADJUSTMENTS

**4.01** The tone monitors and the amplifiers are the only parts of the plant with adjustments. These units are factory adjusted and should rarely require adjustment when in service. On most of the circuit packs, the adjustments are internal—therefore, it is necessary to make use of the circuit pack *board extenders—158A* for “MON” and *169A* for “AMP.” The *723B* or the *731A tool* is required for the removal of the circuit packages.

**Caution:** *Before removing or inserting circuit packs, transfer the load to the reserve unit. Then remove the – 48 volt battery from the plant involved by removing the fuse associated with each circuit pack. Restore the – 48 volt battery by replacing the fuse.*

**4.02 Adjustment of Tone Low-Voltage Monitors—CP A751:** The tone low-voltage monitors are adjusted as follows. Information enclosed in parenthesis is to be used when adjusting the tone low-voltage monitor in the reserve unit.

- (1) Remove the F3 (F11) and F1 (F9) fuses to remove battery from the tone monitors and the oscillators.
- (2) By using a board extender, make the LVBT-1 (LVBT-2) circuit pack, CP A751, accessible for adjusting.
- (3) Rotate the LV ADJ potentiometer on the CP A751 fully ccw.
- (4) Remove the 480-1 (480-2) OSC, CP A749.
- (5) Replace the F3 (F11) and F1 (F9) fuses to restore battery to the tone monitors and oscillators. The LV lamp associated with each LV monitor should light.
- (6) Very slowly rotate the LV ADJ potentiometer on CP A751 cw until the LV lamp is extinguished.

- (7) Very slowly rotate the LV ADJ potentiometer on CP A751 ccw until the LV lamp just lights.

- (8) Remove the F3 (F11) and F1 (F9) fuses to remove battery from the tone monitors and the oscillators.

- (9) Insert the oscillator circuit pack removed in (4).

- (10) Replace the F3 (F11) and F1 (F9) fuses to restore battery to the tone monitors and the oscillators. The LV lamp should extinguish.

#### **4.03 1-VA Amplifier Adjustments—CP 264A:**

The 1-VA amplifiers are adjusted as follows. Information enclosed in parenthesis is to be used when adjusting the 1-VA amplifiers on the reserve unit.

- (1) Remove the F2 (F10) and F1 (F9) fuses to remove battery from the amplifiers and the oscillators.

- (2) Remove the F4 (F12) fuse feeding the T1 (T2) transformer.

- (3) Remove the 480-1 (480-2) OSC, CP A749 circuit pack.

- (4) Connect the true rms voltmeter to terminals 5 and 6 of the T1 (T2) transformer.

- (5) Replace the F2 (F10) and F1 (F9) fuses to restore battery to the amplifiers and the oscillators.

- (6) Adjust the ADJ 2 potentiometer on the BT1-1 (BT1-2) amplifier for an indication of 0.47 volt rms on the voltmeter.

- (7) Remove the F2 (F10) and F1 (F9) fuses to remove battery from the amplifiers and the oscillators.

- (8) Remove the 620-1 (620-2) OSC, CP A750 circuit pack.

- (9) Insert the 480-1 (480-2) OSC, CP A749 circuit pack.

## SECTION 167-725-318

- (10) Replace the F2 (F10) and F1 (F9) fuses to restore battery to the amplifiers and the oscillators.
- (11) Adjust the ADJ 1 potentiometer on the BT1-1 (BT1-2) amplifier for an indication of 0.37 volt rms on the voltmeter.
- (12) Remove the F2 (F10) and F1 (F9) fuses to remove battery from the amplifiers and the oscillators.
- (13) Insert the 620-1 (620-2) OSC, CP A750 circuit pack.
- (14) Insert the F2 (F10) and F1 (F9) fuses to restore battery to the amplifiers and the oscillators. The voltmeter should indicate  $0.6 \pm 0.02$  volt rms.
- (15) Remove the F2 (F10) and F1 (F9) fuses to remove battery from the amplifiers and the oscillators.
- (16) Disconnect the true rms voltmeter connected in (4).
- (17) Insert the F4 (F12) fuse removed in (2).
- (18) Insert the F2 (F10) and F1 (F9) fuses to restore battery to the unit.

### Distribution Fuse Alarm Checks

**4.04 Fuse Alarms:** Periodically check the fuse alarm relays as follows. Use the W1AF

cord equipped with one 411B test pick and one KS-6278 connecting clip. Connect the KS-6278 connecting clip to the distribution fuse bus. Insert the 411B test pick through the aperture of each of the associated fuses, adjacent to the colored bead, to a point where contact is made with the alarm surface of the fuse cap. The FA relay operates to light the FA lamp and provide a major alarm.

**4.05** Using the test receiver (716C) with a 1K resistor in series with one lead, periodically check the interrupted outputs. An experienced attendant should listen to the interrupted tones to ascertain that the volume and frequency sound normal.

## 5. TROUBLES

**5.01** Trouble in the plant is usually detected by visual trouble indicator lamps in the control panel and by audible minor or major alarms. If any element in the regular generator fails, the office load will automatically transfer to the reserve side of the plant. A major alarm is provided if both the regular and reserve units should fail or if any fuse should fail.

**5.02 Alarm Lamps:** Table A shows the alarm lamps (or switch lamps) associated with the tone generators.

**TABLE A**  
**ALARM LAMPS**  
**TONE GENERATORS**

LAMP	INDICATION
GENERATOR TRANSFER	The GT relay is released. An automatic or manual transfer of the load from the regular unit to the reserve unit has occurred. A minor audible and visual alarm circuit is provided.
FUSE ALARM	(The GENERATOR RESTORE switch is depressed to restore the load to the regular unit and to extinguish the GENERATOR TRANSFER LAMP.) A fuse has failed. If the fuse failure occurred in the regular unit, the load is automatically transferred to the reserve unit. A major audible and visual alarm is provided for all operated fuses.
TONE FAIL	The TF relay has operated. The tone output of the reserve generator has failed, after a previous failure of the regular generator. A major audible and visual alarm is provided when both tone generators fail.
GEN 1	The tone output of the regular generator has failed. The load has transferred from the regular unit to the reserve unit. The A relay has operated to provide a minor alarm. The MON 1 relay provides a ground to light the GEN 1 lamp.
GEN 2	The tone output of the reserve generator has failed without an earlier failure of the regular generator. The A relay has operated to provide a minor alarm. The MON 2 relay provides a ground to light the GEN 2 lamp.

**Trouble Chart**

**5.03** The possible causes of trouble in a unit and the action to be taken are given in the

following trouble chart. In addition to the action specified, check for loose or open connections or short circuits due to foreign matter lying across associated wiring terminals.

TROUBLE	POSSIBLE CAUSE	ACTION
(a) No output voltage or low output voltage	No dc input to oscillators, amplifiers, or tone monitors.	Check for blown fuse A or fuse B in the -48 volt charge and discharge circuit. Check for blown dc input fuses associated with each unit.
(b) Low or high output voltage	Potentiometers on amplifiers out of adjustment. Loss of an oscillator.	Check and, if necessary, adjust the amplifiers in accordance with 4.03. If a requirement is not made or an adjustment cannot be made, replace the unit or component.
(c) Output erratic	Loose connections.	Check wiring terminals.