N3 CARRIER TELEPHONE SYSTEM
CARRIER FREQUENCY SUPPLY
SWITCHING AND ALARM
MAINTENANCE

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1. GENERAL

1.01 This section describes the maintenance of the switching and alarm circuits which are located in the switching and alarm panel and in the relay transfer panel of the carrier frequency supply bay (see Fig. 1). These circuits work in conjunction with the sensing circuits located on each of the plug-in amplifiers, 4-kHz generators, and power supply units.

1.02 This section is reissued to include procedures for switching and alarm panels modified or manufactured to inhibit parallel bus operation of the −21 volt power supply units. Modified panels are designated by List WA following the appropriate list number. Arrows are used to indicate changes and additions to this section. This reissue does not affect the Equipment Test List.

1.03 The automatic switching feature, which substitutes an alternate unit for a working unit which goes out of limits, is operational only when an alternate plug-in unit is provided.

1.04 Major and minor office alarm lamps and associated reset keys are located on the switching and alarm panel. Alarm functions are provided for each plug-in unit. An out-of-limit unit is indicated by the lighted lamp located on the switching and alarm panel in close proximity to the defective unit.

1.05 The major and minor alarms indicate out-of-limit conditions as follows.

(a) A minor alarm is indicated if any plug-in unit equipped with an alternate unit (except the power supply) goes out of limits. The alarm circuit must be reset manually by pressing a reset button on the front panel next to the minor alarm lamp.

(b) A major alarm is indicated when a power supply, a regular plug-in unit not equipped with an alternate unit, or both regular and alternate plug-in units are out of limits. The major alarm is reset in the same manner as the minor alarm.

(c) Arrangements are provided for transfer of alarms to remote offices.

1.06 Resetting either the major or minor alarm does not extinguish any of the plug-in unit indicator lamps. The trouble must be eliminated by replacing the faulty unit.

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1.07 ***Apparatus:***

1—W1BC Test Cord

2—W2FP Test Cords

1—600-ohm 145A Resistor with KS-19531, List 2 Pin Plugs

1.08 Testing of the alarm and switching functions will depend upon whether or not the carrier supply is in service. Certain tests will interrupt the carriers momentarily which, in most cases, will be undesirable. The testing is described for:

(a) Initial installation (or out-of-service carrier supply) in Part 2

(b) Individual plug-in unit alarm circuit tests in Part 3

(c) In-service testing in Part 4.

1.09 The following procedures should be followed in removing plug-in units when regular and alternate units are available.

(a) Never remove an in-service (regular) 4-kHz generator, dual amplifier, or doubler amplifier. Be sure that an alternate amplifier or 4-kHz generator is in place, the indicating lamp associated with the alternate amplifier or 4-kHz generator is not lighted, and the key switch is directed toward the alternate amplifer or 4-kHz generator. This ensures that the alternate unit is placed in service; thus, the regular unit may be removed without causing hits.

(b) To remove a power supply unit, refer to the procedure outlined in Section 362-901-505.

1.10 When 48-volt power is first applied to a carrier supply, all indicating lamps on the switching and alarm panel associated with the 4-kHz generators, dual amplifiers, and doubler amplifiers will light. After approximately 10 seconds, half of the lamps will extinguish. This delay is due to the high Q of the 4-kHz generator crystal and its slow buildup of output voltage. The lamps associated with the dual or doubler amplifiers may be reset by momentarily operating the manual key switches which release the lock-up circuits. The 4-kHz generator lamps will not extinguish until the crystal ovens reach operating temperature, which will take approximately 20 to 30 minutes. The 4-kHz generator alarm circuit also has a lock-up feature which must be reset in the same manner as the plug-in amplifier alarm circuits, by operating the manual key switch. The major and minor alarms also will have to be manually reset.

2. INITIAL INSTALLATION TESTING OF ALARM AND SWITCHING FUNCTIONS

2.01 Carriers must be interrupted when testing the alarm and switching functions of the carrier frequency supply. ***The tests covered in 2.02 through 2.21 are to be made on an out-of-service basis.***

A. Fully Protected System

2.02 Initial conditions are as follows.

(a) Plug-in units are installed in each regular and alternate shelf position (see Fig. 1).

(b) All dual and doubler amplifier and 4-kHz generator key switches should be set to the REG position. ▶For modified panels, the PWR SUP key switch should be set so the white index line is in the vertical (NORM) position, even though the key is disabled. Panels of current manufacture are equipped with an apparatus blank in the switch position.◀

(c) All alarm indicating lamps should be extinguished. Major and minor lamps are reset by pressing their reset buttons. All other lamps can be reset by momentarily operating the associated manual key switch to alternate and then back to the regular position. The 4-kHz generator, when equipped with oven control, will require 20 to 30 minutes for the oven to reach operating temperature.

(d) The −21 volt power supplies should be adjusted to their prescribed limits (Section 362-901-505).

(e) Check the individual dual amplifiers, doubler amplifiers, and 4-kHz generators as described in Part 3.

2.03 The alarm and switching circuits associated with any regular dual amplifier unit or regular doubler amplifier unit are tested by

connecting a short jumper between TST A or TST B jack and GRD jack on the plug-in units. This will simulate an amplifier defect which will cause the associated amplifier indicating lamp and the minor alarm to light and the transfer relay to switch to the alternate unit.

2.04 When the short is removed, the associated amplifier indicating lamp will not extinguish, the minor alarm will remain on until reset, and the transfer relay will remain in the alternate position. When the manual key switch is operated to the ALT position, the indicating lamp will extinguish. When the manual key switch is operated back to the REG position, the transfer relay will release.

2.05 With the manual key switch in the REG position and a short connected to an alternate unit as in 2.03, the associated indicating lamp and the minor alarm lamp will light, but the transfer relay will remain in its regular position.

2.06 Removing the short will extinguish the indicating lamp, and the minor alarm lamp will again have to be reset manually.

2.07 In order to determine if the major alarm is operating properly, both the regular and alternate amplifiers will have to be disabled. By placing a short from TST A jack to GRD jack on the regular unit and momentarily shorting TST A jack to GRD jack on the alternate unit, the major alarm will operate. This alarm will remain on until both shorts are removed and the major alarm reset button is pressed.

2.08 The 4-kHz generator unit alarm and switching circuit is tested by connecting a 600-ohm resistor from ALM IN A jack to GRD jack on the unit in the regular position. This will cause the 4-kHz generator REG indicating lamp to light and the K1 transfer relay to switch to the alternate unit. The minor alarm lamp will light and remain lighted until the resistor is removed and the minor alarm reset button is depressed. When the resistor is removed, the indicating lamp will remain lighted and the transfer relay will remain in the alternate position. Momentarily operate the 4-kHz generator key switch to the ALT position and then back to the REG position. The K1 transfer relay will switch to the regular position and the REG indicating lamp will extinguish.

2.09 With the manual key switch in the REG position, the test in 2.08 is performed on a 4-kHz generator unit in the alternate position. The minor alarm will function in the same manner, but the relay will not transfer. Removing the 600-ohm resistor will extinguish the ALT indicating lamp.

2.10 The power supply unit alarm circuit is tested by removing the PROTECTION fuse from the regular power supply unit. This will cause the regular power supply indicating lamp and the major alarm lamp to light. All transfer relays on the relay transfer panel will switch to the alternate units. Partially remove the regular power supply unit. The regular power supply indicating lamp will extinguish. Depress the major alarm reset button to extinguish the major alarm indicating lamp.

2.11 ◗Install the regular power supply PROTECTION fuse and insert the power supply unit into the carrier supply shelf. All transfer relays except K1 (4-kHz generator transfer relay) will switch to the regular position. Momentarily operate the 4-kHz generator key switch to the ALT position and then back to the REG position. The K1 relay will switch to the regular position and the 4-kHz generator REG indicating lamp will extinguish.

2.12 Set all manual key switches to the ALT position and remove the PROTECTION fuse located on the face of the alternate power supply unit. The major alarm, minor alarm, and alternate power supply indicating lamps will light. All transfer relays will revert to the regular position. Partially remove the alternate power supply unit. The ALT power supply indicating lamp will extinguish. Depress the major and minor alarm reset buttons to extinguish the alarm indicating lamps.

2.13 Install the power supply PROTECTION fuse and place the power supply unit in the carrier supply shelf. All transfer relays except K1 (4-kHz generator transfer relay) will switch to the alternate position. Momentarily operate the 4-kHz generator key switch to the REG position and then back to the ALT position. The K1 transfer relay will switch to the alternate position and the 4-kHz generator ALT indicating lamp will extinguish. Restore all key switches to the REG position.◖

B. Carrier Supply Without Alternate Units

2.14 When an alternate unit is not supplied, the single unit should always be located in the regular position. In this case, the operation of the transfer relay associated with the position is inhibited.

2.15 Initial conditions are the same as in 2.02 except an alternate plug-in unit is not supplied. The testing of individual units is covered in Part 3.

2.16 The dual and doubler amplifier alarm circuits can be tested by connecting a short jumper between TST A or TST B jack and GRD jack located on the dual and doubler amplifier units. This will disable the unit which will cause the associated REG indicating lamp, the minor alarm lamp, and the major alarm lamp to light.

2.17 When the short is removed, both the major and minor alarms and the REG indicating lamps remain lighted. The major and minor alarms can be extinguished by operating their reset buttons. The individual indicating lamp is turned off by momentarily operating the associated manual key switch.

2.18 The 4-kHz generator unit alarm function can be checked by connecting a 600-ohm resistor from ALM IN A jack to GRD jack on the 4-kHz generator unit. This will cause the REG indicating lamp, the major alarm lamp, and the minor alarm lamp to light.

2.19 Upon removing the 600-ohm resistor, all lamps will remain on until reset manually with the manual key switch and reset buttons.

2.20 The power supply unit alarm can be checked by removing the PROTECTION fuse located on the front of the power supply. This will light the REG indicator lamp and operate the major alarm.

2.21 Replacing the fuse will place the carrier supply back in operation; the major alarm lamp will remain on until reset.

3. INDIVIDUAL PLUG-IN UNIT ALARM CIRCUIT TESTS

3.01 The alarm circuit on each dual amplifier, doubler amplifier, and power supply plug-in unit should be checked to determine that it is within its nominal operating limits. These tests are covered in the following sections:

SECTION	TITLE
362-901-502	4-kHz Generator
362-901-503	Dual and Doubler Amplifiers
362-901-505	N3 Power Supply

4. IN-SERVICE TESTING

A. Fully Protected System

4.01 When a carrier supply is fully protected by the provision of alternate units in all positions, the following tests may be performed without causing interruptions to service.

B. Dual or Doubler Amplifier

4.02 With the manual key switch turned to the REG position, momentarily connect a shorting cord between TST A or TST B jack and GRD jack on the unit in the alternate position. This will cause the ALT indicator lamp and the minor alarm lamp to light. When the short is removed, the indicator lamp will extinguish, but the minor alarm lamp will remain on until reset manually.

Caution: If the short is left on for 10 to 15 seconds, a power distribution fuse in the primary frequency supply will open.

4.03 With the manual key switch in the ALT position, the procedures in 4.02 are repeated for the regular position and the same functions should occur.

C. 4-kHz Generator

4.04 With the manual key switch turned to the REG position, a 600-ohm resistor should be connected from ALM A jack to GRD jack on the unit in the alternate position. This will cause the ALT indicating lamp to light and the minor alarm to operate. Upon removal of the 600-ohm resistor, the indicating lamp will extinguish, but the minor alarm will remain on until its reset button is operated.

4.05 With the manual key switch in the ALT position, the tests in 4.04 are repeated for the regular position. This will cause the REG indicating lamp to light and the minor alarm to operate. Disconnect the 600-ohm resistor and observe the indicating lamp. The lamp will remain lighted. Momentarily operate the 4-kHz generator key switch to the ALT position and then back to the REG position. The indicating lamp will extinguish. Depress and release the minor alarm reset pushbutton to extinguish the alarm lamp.

D. Power Supply

4.06 ▶Set all key switches except power supply (see Note) to the REG position. Remove the PROTECTION fuse on the alternate power supply unit. This will cause the ALT indicating lamp to light and the major alarm lamp to operate. Partially remove the alternate power supply unit from the mounting shelf. The ALT indicating lamp will extinguish. Depress and release the major alarm reset pushbutton to extinguish the alarm indicating lamp. Replace the PROTECTION fuse and reinsert the power supply unit in the mounting shelf. Due to circuit transients, the minor alarm indicating lamp may light. If this occurs, depress and release the minor alarm reset pushbutton to extinguish the alarm indicating lamp. The 4-kHz generator ALT lamp may light when a 4-kHz generator unit with internal crystal oven is used. The lamp will extinguish when the oven temperature stabilizes.

> ***Note:*** Current manufacture of the switching and alarm panel is not equipped with a power supply switching key. Panels of earlier manufacture are modified (List WA) to eliminate use of the switching key. For these panels, the white index line of the key should be set to the vertical (NORM) position.◀

4.07 The regular unit is checked in the same manner as the alternate unit by first turning all key switches except power supply to the ALT position, and then removing the regular power supply unit fuse.

E. Partially Protected System

4.08 A carrier supply equipped with a partial complement of alternate units is tested in the same manner as the fully equipped carrier supply, but only in the positions where both the alternate and regular 4-kHz generators and dual or doubler amplifiers are supplied. No testing shall be done on the power supplies in a partially protected system. The alarm and switching circuits associated with partially equipped positions can be tested by borrowing an alternate unit from another fully equipped position.

> ***Caution: Care must be exercised to ensure that, before a 4-kHz generator or dual or doubler amplifier is tested or removed, the white index line of the manual key switch is pointing to the unit not to be tested or removed.***

F. Carrier Supply Without Alternate Units

4.09 No testing should be done on alarm circuitry.

5. MAINTENANCE

5.01 The following items should be checked if the alarm and switching functions described in Parts 2 and 4 are not met.

(a) If transfers occur properly but indicating lamps do not light, replace the lamp and repeat the tests.

(b) If transfers do not occur when the manual key switch is operated (may be observed by watching operation of appropriate relay on the relay transfer panel for all units except power supply), check individual plug-in units in accordance with Part 3.

5.02 Other malfunctions which can occur may be caused by broken leads, open resistors, and relay windings.

6. REFERENCE LIST

6.01 Reference is made to the following:

SD-99735-01	Application Schematic
SD-99734-01	Doubler Amplifier Schematic
SD-99733-01	Dual Amplifier Schematic
SD-99732-01	Switching and Alarm Circuit
SD-99730-01	4-kHz Generator Circuit
SD-81638-01	Power Supply Circuit

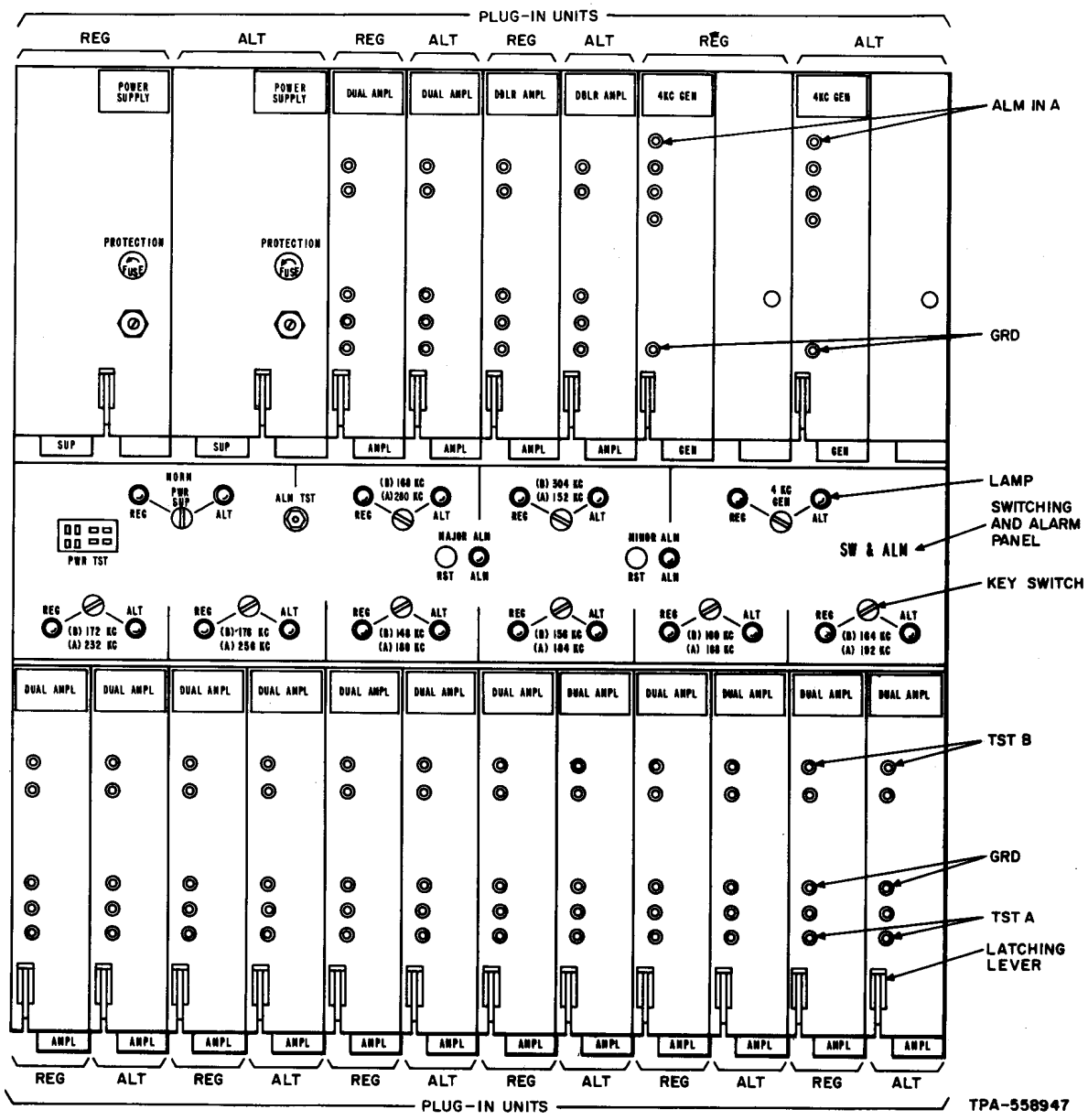

Fig. 1—N3 Carrier Frequency Supply—Switching and Alarm Panel and Location of Plug-in Units