

## P1 CARRIER TELEPHONE SYSTEM

### ADJUSTMENTS AND MAINTENANCE

#### REPEATERS

#### GENERAL INFORMATION AND TEST EQUIPMENT

##### 1.00 INTRODUCTION

1.01 The adjustments and maintenance tests on repeaters have been divided into the following sections.

- 363-102-100 GENERAL INFORMATION AND TEST EQUIPMENT
- 363-102-501 PREPARATION FOR REPEATER AND TEST SET
- 363-102-502 ADJUSTMENTS AND TESTS, HIGH GROUP
- 363-102-503 ADJUSTMENTS AND TESTS, LOW GROUP
- 363-102-504 PREPARATION FOR CONNECTING TO LINE
- 363-102-505 ABBREVIATED ADJUSTMENT PROCEDURE
- 363-102-506 HOW TO LOCATE TROUBLE

1.02 These sections cover adjustment and test procedures for repeaters of the P1 carrier telephone system using J98707F, List 1 carrier test set. Installation and connections at in-service locations should be made as outlined in the section entitled P1 Carrier Telephone System, Installation and Connections, Remote Terminal and Repeater.

##### 2.00 GENERAL

2.01 The adjustment procedure consists of a series of tests which must be made on the repeater equipment before connecting it to the carrier line. For line-up and maintenance of the over-all system (after terminals and repeaters have been connected to the carrier line), see Section 363-103-100.

2.02 These tests and adjustments may be performed with the repeaters mounted either at their in-service locations or at a central location where arrangements have been made for supplying power for the operation of the equipment. This arrangement can also be used for locating network boards in trouble in repeaters that have been removed from service.

2.03 The adjusting procedure assumes that the high group frequencies (60 to 96 kc) are being transmitted from the central office. If the low group frequencies are transmitted from the central office (reverse direction), the procedure is similar; when different binding posts or values are used, they are indicated by REV.

**2.04** Listed below are the adjustments and tests to be performed and a brief explanation of each.

**Tests and Adjustments**

**A. High Group Gain (72 kc):** This test checks the circuit connections, continuity, and the gain of the high group portion of the repeater.

**B. Total Power Regulator—High Group (72 kc):** This adjustment sets the regulator output, checks the regulator for proper regulating range, and provides test values for system line-up.

**C. Pilot Regulator—High Group (73.5 or 76.5 kc):** This adjustment sets the pilot regulator output, checks the pilot regulator for proper regulating range, and provides test values for system line-up.

**D. Pilot Oscillator—High Group (73.5 or 76.5 kc):** This adjustment sets the pilot oscillator for proper output power.

**E. Low Group Gain (36 kc):** This test checks the circuit connections, continuity, and the gain of the low group portion of the repeater.

**F. Total Power Regulator—Low Group (36 kc):** This adjustment sets the regulator output, checks the regulator for proper regulating range, and provides test values for system line-up.

**G. Pilot Regulator—Low Group (31.5 or 34.5 kc):** This adjustment sets the pilot regulator output, checks the pilot regulator for proper regulating range, and provides test values for system line-up.

**H. Pilot Oscillator—Low Group (31.5 or 34.5 kc):** This adjustment sets the pilot oscillator for proper output power.

**2.05** The adjustments and tests that apply to the repeaters are as follows:

Group	Tests and Adjustments
High	A, B, C, and D
Low	E, F, G, and H

**2.06** Two methods for testing and adjusting repeaters are presented: first, a detailed step-by-step method; second, an abbreviated adjustment procedure using Charts I and II in Section 363-102-505. Do not use the charts until familiar with the tests and the use of the test set covered in the detailed procedure.

**2.07** When adjusting a repeater, make the appropriate tests and adjustments in the order in which they are listed.

**2.08** Disconnect the repeaters from the line when making the tests and adjustments, except when power over the cable is used. For a repeater furnished power over the cable, the line toward the source of power (generally the line toward the central office) cannot be removed from the repeater without removing the power. Therefore, only the line not connected to the power (generally the line toward the remote terminals) can be removed from the repeater.



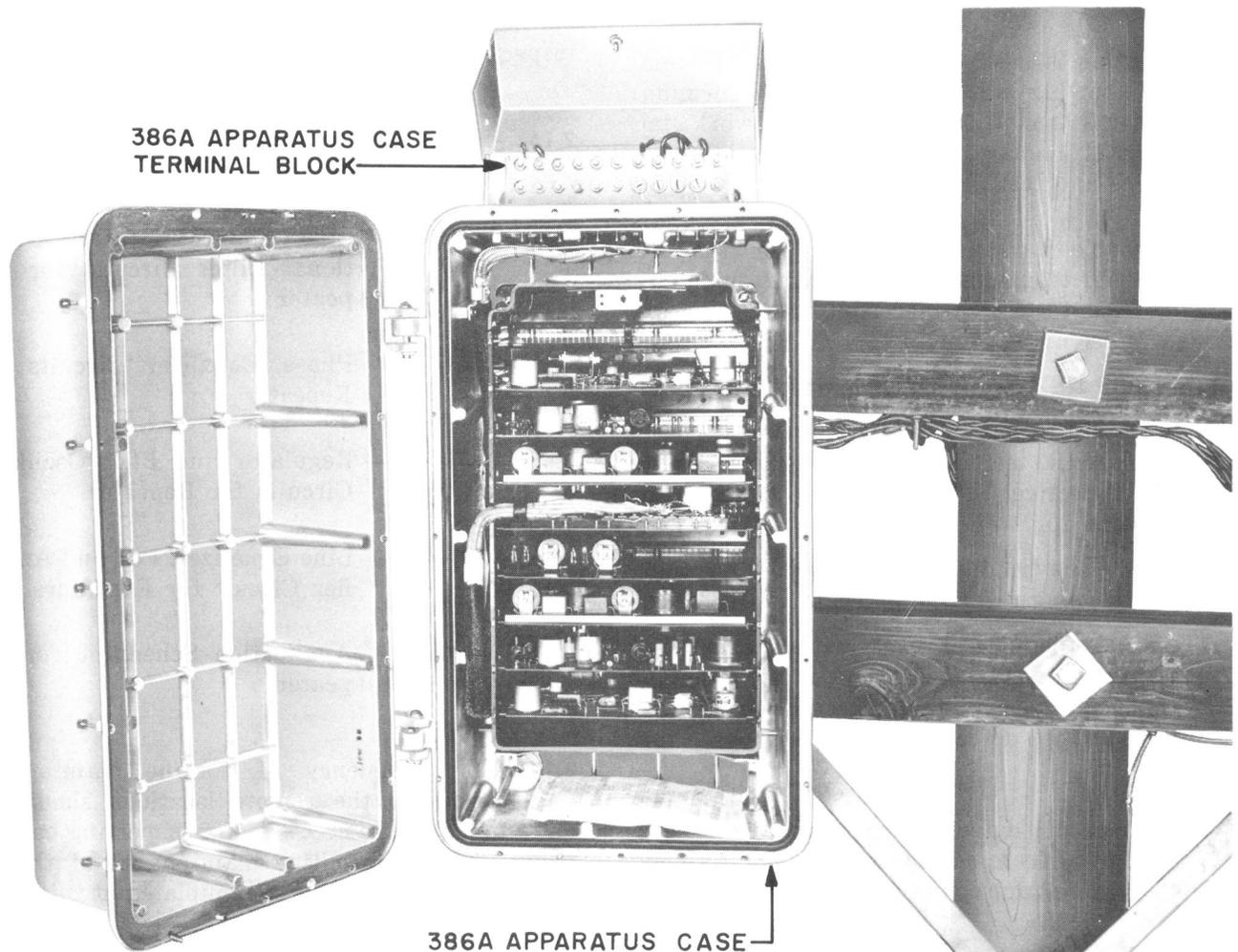
*Caution: Do not ground the 7F test set when testing or adjusting a repeater furnished power over the cable at an in-service location. A potential difference of +60 volts may exist between test set case and ground.*

**2.09** The 800AA network (line board) cannot be used for regulated repeaters or power over the cable. All 800AA networks should be modified as shown on SD-95236-01, Issue 5 or later; and the local cable connections changed as shown on SD-95240-01, Issue 4 or later. Then the binding post numbers shown apply to both the 800AA and the 800AU networks.

**2.10** The repeater is shown in Fig. 1. The letters stenciled along the side of the 803B con-

necter indicate the network board position in the connector. These letters are used when referring to the various network boards.

**Note:** For convenience in identifying network boards, each board is referred to by a letter (A through J) indicating its position in the 803-type connector. For example, the 800AA or AU network occupies position E in the 803B connector and will be referred to as board E.



**Fig. 1 — Repeater**

2.11 Before replacing a network board due to failure in meeting a requirement, check that the test set cord connections and switch settings are in accordance with instructions. After a network board has been replaced, the entire test procedure for that portion of the repeater (High Group or Low Group) should be repeated.



*Caution: Always remove the network board in position E before removing any of the other network boards. This is necessary to prevent surge voltages that could damage circuit components.*

2.12 Section 363-102-506 contains Charts I and II showing a logical order of performing tests to isolate trouble to a particular network and also Chart III showing repeater and test set connections and test limits.

2.13 Trouble locating procedure for the P1 carrier telephone system, when trouble has been isolated to the carrier equipment, may be divided into four basic steps:

1. Isolate the trouble to a particular terminal or repeater.
2. Replace the terminal or repeater and return the defective equipment to a convenient location for trouble analysis.
3. Isolate the trouble to an individual network board using the trouble locating procedure.
4. Adjust the circuit back within operating requirements. If adjustment is not possible, replace the individual network board and return the defective network board for repair.

2.14 When a defective repeater has been removed from service and taken to a convenient location for repairs, prepare the repeater

and perform the tests outlined in Section 363-102-506. The original line board (800AA or AU network) will not be removed from service along with the repeater. Therefore, a good spare will have to be inserted into the connector before proceeding with the tests at a convenient location.

2.15 Notice that throughout the adjustment and maintenance procedure, trouble conditions are cleared by replacement of network boards. Keep in mind that the troubles may be due to bent or broken grid wires or terminal connectors, defective pads, etc. In all cases, make a visual inspection of the equipment.

2.16 Following is a list of the applicable schematic drawings:

SD-95236-01 — Line Connecting and Directional Filter Circuits for Repeater

SD-95237-01 — Phase Equalizer Circuits for Repeater

SD-95238-01 — Regulator and Pilot Oscillator Circuits for Repeater

SD-95239-01 — Line Equalizer, Pad and Amplifier Circuit for Repeaters

SD-95240-01 — Application Schematic for Repeater

2.17 The frequency of routine maintenance visits to the remote locations should be determined by the necessity for inspecting battery power supplies. Routine maintenance of the P1 carrier repeaters is not contemplated at this time.

**3.00 APPARATUS**

**3.01** The following apparatus is required when testing or adjusting a repeater:

- 4 — Clips, Alligator, small (Mueller Electric Company, No. 30 or equivalent) to be soldered on resistor leads
- 1 — Cord, 1W13B (used for grounding test set)
- 1 — Network (Line Connector), 800AU
- 2 — Networks (Dummy Regulators), 800AF
- 2 — Pads, 8 db (29D)
- 2 — Pads, 24 db (29M), required for testing pilot regulators and when no 337 equalizer is specified
- 1 — Resistor, 145A, 135 ohm
- 1 — Resistor, 145A, 600 ohm

1 — Test Set, P1 Carrier, J98707F, L1, equipped with send and receive cords

1 — Volt-ohm Milliammeter, KS-14510, L1

**3.02** The necessary apparatus for testing the power supply is listed in the section covering J86463-type power plants.

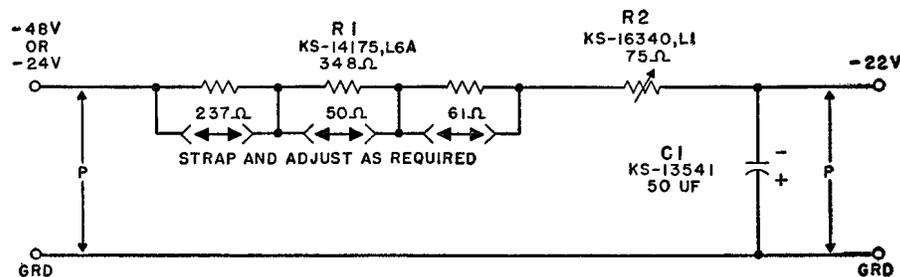
**3.03** To provide the proper operating voltages to the repeater when making the adjustments or tests at a bench location, use a spare J86463 power supply or connect the following apparatus to form the network shown in Fig. 2:

1 — Capacitor, KS-13541, 50 uf

1 — Resistor, KS-14175, L6A, 348 ohm

1 — Resistor, KS-16340, L1, 75 ohm, adjustable

**Note:** When a 24- or 48-volt central office battery is not available, use a 22.5-volt dry cell battery.



**Fig. 2 — 22.5-Volt Supply Circuit**