

**DIGITAL DATA SYSTEM**  
**DIGITAL 56-KB/S REPEATER**  
**MAINTENANCE**

**1. GENERAL**

- 1.01 This section describes the maintenance procedures to be followed when troubleshooting the central office (CO) 56-kb/s repeater.
- 1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.
- 1.03 Neither the CO nor outside plant (OP) repeater requires routine maintenance after installation tests and adjustments have been made.
- 1.04 Refer to Section 807-610-191 for the performance requirements that the CO 56-kb/s repeater must meet after installation and before acceptance by the telephone company (telco).
- 1.05 To help meet Digital Data System (DDS) service objectives, it is recommended that a number of each circuit pack (CP) codes be stocked as maintenance spares. The number of maintenance spares is determined by the number of active CPs of each code (see Table A).

- 1.06 Refer to Section 640-251-107 for maintenance spare recommendations for the OP installations.

**2. TROUBLESHOOTING FEATURES**

- 2.01 In the event of a trouble condition, the customer should notify his serving test center (STC).
- 2.02 A digital loopback of the repeater and a bypass of the repeater to allow dc access to the 4-wire loop are available as maintenance features.
- 2.03 Both the CO and OP repeaters have looping capability which allows the data from the office channel unit (OCU) to be looped at the output of the repeater under test to aid in fault sectionalization. The looping is done remotely from the STC or from the OCU location.
- 2.04 The tester transmits the channel loopback code which causes the OCU to reverse sealing current. This operates the reversal and looping relays at the repeater. The looping relay connects the repeater output which normally transmits toward the station through a pad to the repeater input normally receiving from the station. This causes data sent from the OCU to return to the OCU, checking the integrity of the repeater and connecting loop.
- 2.05 If this check is successful, the tester will transmit a period of "all 1s" data. Repeater logic detects this and, when the "all 1s" are removed, the looping relay is released. The reversal relay is still operated, however, and reverses the simplex current to the next repeater or the station, causing that unit to loop back. The procedure is continued until all repeater sections are checked.

**TABLE A**

**RECOMMENDED SPARE STOCKAGE**

MINIMUM SPARE LEVELS ARE RECOMMENDED TO BE:		WHEN ACTIVE CIRCUIT PACKS ARE:	
BETWEEN	AND	BETWEEN	AND
1	2	1	10
3	12	11	100
13	80	101	1000

**NOTICE**

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## SECTION 314-920-300

**2.06** Both repeater types also have a bypass feature which removes the repeater from the loop to allow dc testing of the pairs all the way from the OCU to the station. In the CO repeater or power unit (list 1 or 2 shelf), this is accomplished by manually operating the bypass button. In the list 2 shelf, an automatic bypass can be accomplished by removing the sealing current from the loop at the OCU. In either case, this illuminates the bypass lamp and connects the incoming pairs directly to the outgoing pairs with only small (approximately  $9\Omega$ ) lightning protection resistors left in the circuit. In the OP repeater, the bypass occurs when the simplex current is removed from the loops. In this case, the incoming pairs are connected to the outgoing pairs with a  $2.87\text{-k}\Omega$  resistor in each of the four legs left in the circuit. These arrangements are shown in Fig. 1.

**2.07** There are four jacks on the CO repeater which give direct access to the loops while breaking the connection to the repeater. There are also pin jacks which allow checking of the dc simplex loop current and dc power of the repeater itself.

**2.08** On the OP repeater, the loops terminate on a 31A connector block which allows access for maintenance or acceptance testing. When required, all connections to the repeater circuitry can be broken by removing the middle CP—LA5.

**2.09** Two green light-emitting diodes (LEDs) on the faceplate of LA1 are illuminated in the CO repeater when there are data 1s passing through the repeater. The bottom LED TRMT DA is for the direction toward the station or second repeater. The top LED RCV DA is for the direction toward the OCU or first repeater. The LEDs are not illuminated in the OP repeater in order to save power.

**2.10** The alarm relay operates when either or both of the  $-48\text{V}$  or  $+130\text{V}$  (or  $-130\text{V}$  if list 2 shelf) power indicating-type fuses blow, triggering the CO alarm circuits. A make-contact on the same relay activates the fuse alarm lamp (red filter) on the front of the repeater.

### 3. TROUBLESHOOTING PROCEDURES

**3.01** Figure 2 is a flowchart showing the suggested troubleshooting procedures for maintenance of the CO repeater. For maintenance and testing procedures of the OP repeater, see Section 640-251-107.

### 4. CP REMOVAL AND REPLACEMENT PROCEDURES

**4.01** All CPs (except CP 1) are installed on a plug-in basis and, in the event of a repeater failure, the defective CP can be replaced.

**4.02** Replacement of CP 1 (current regulators and alarm relay CP) will be accomplished by removal and replacement of the entire list 1 repeater shelf.

**4.03** CP 2 (current regulators, automatic bypass, and alarm relay used with list 2 repeater shelf) is replaceable on a plug-in basis. The removal and replacement of six mounting screws is also necessary.

**4.04** Removal and replacement procedures for the OP repeater CP are described in Section 640-251-107.

**4.05** If the LA1 CP (CO repeater) or the LA4 CP (OP repeater) is replaced, the loop loss compensation option screw switches on the replacement unit must be properly positioned. The option screw switches, located on LA1 and LA4, must be positioned in accordance with Table B.

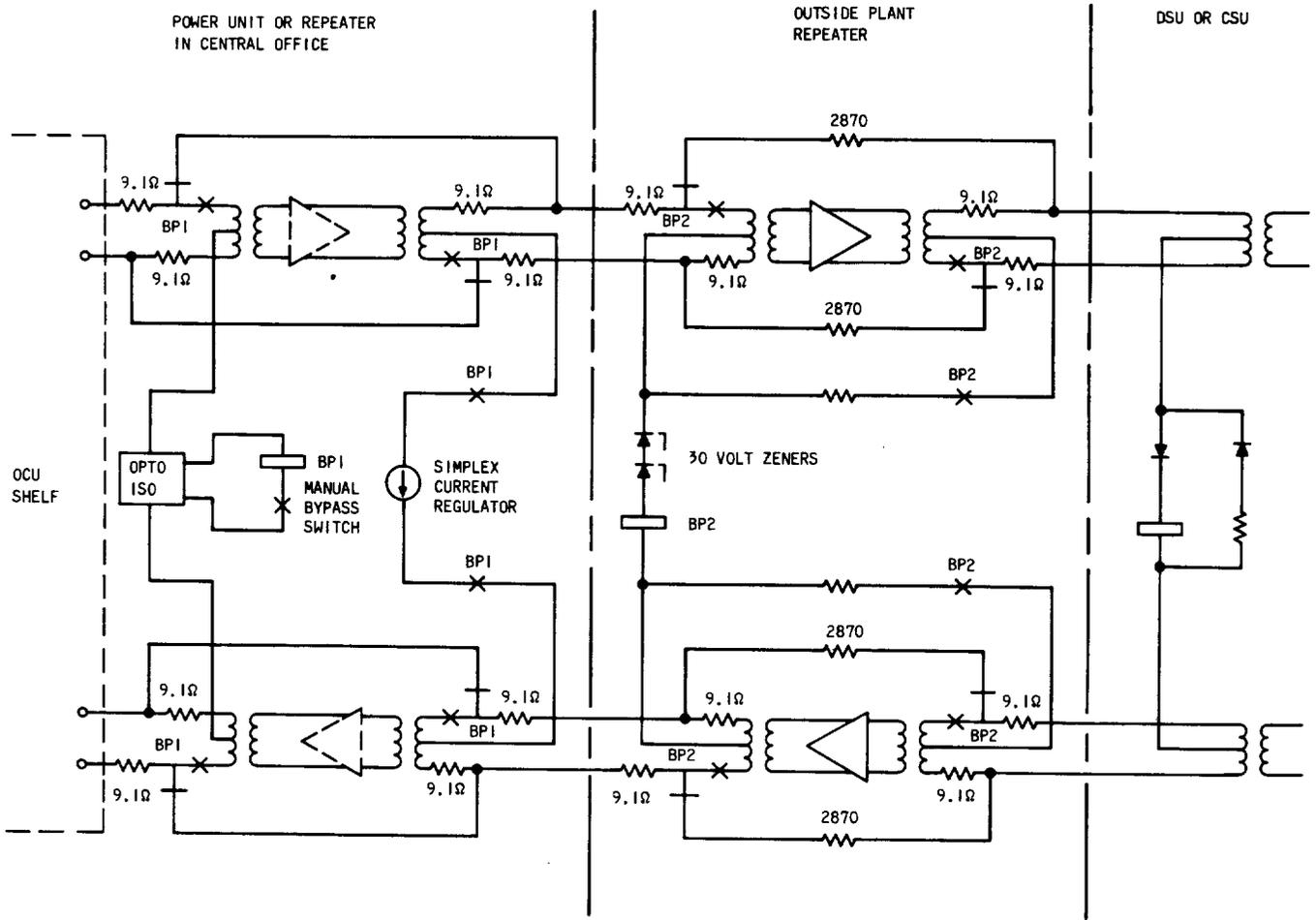


Fig. 1—Bypass Arrangements for Outside Plant and Central Office Repeaters

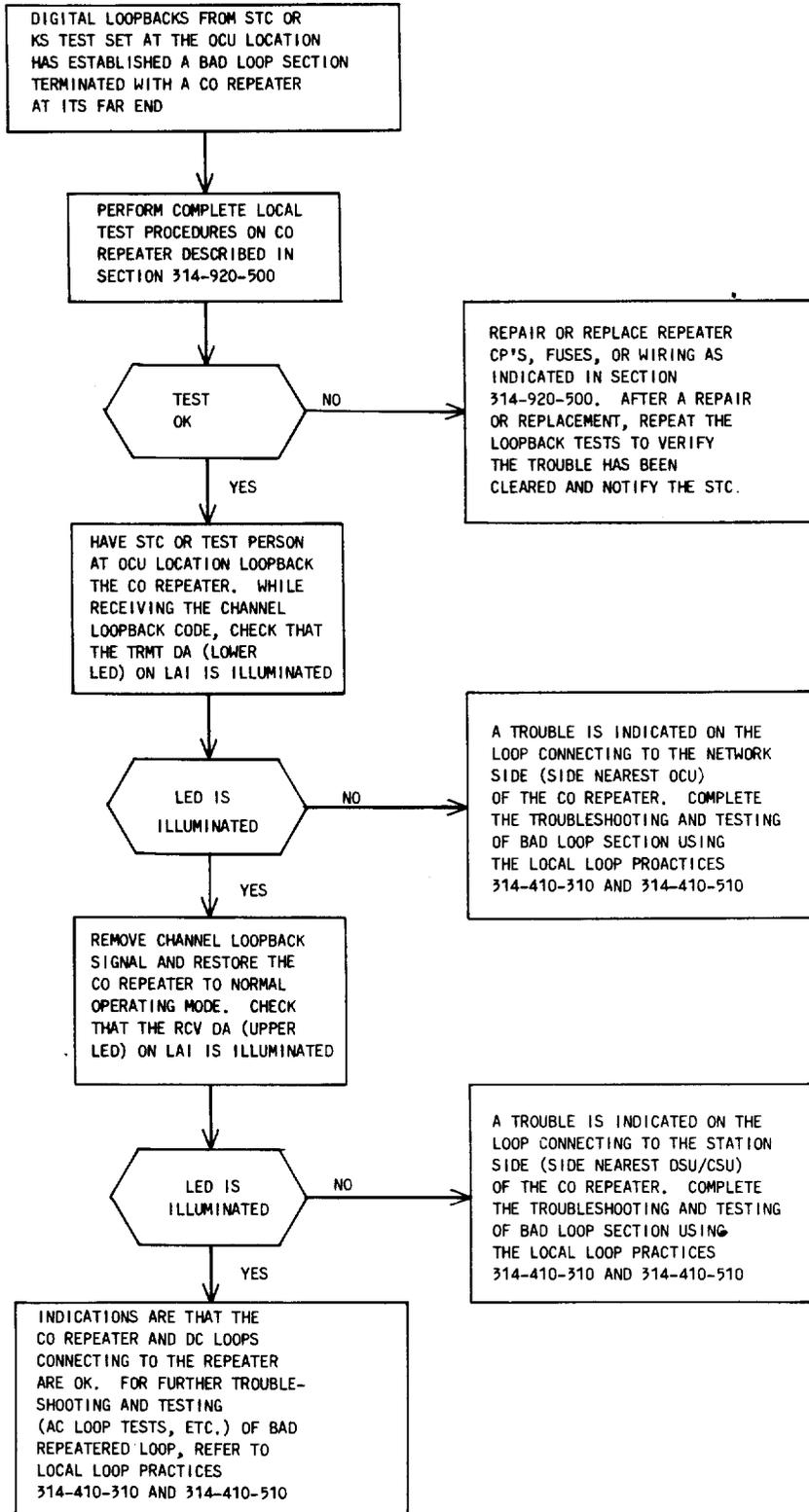


Fig. 2—Flowchart for Troubleshooting Procedures

TABLE B

LOOP LOSS COMPENSATION OPTIONS

OPTION FEATURE AND DESCRIPTION		OPTION DESIG.	OPEN SCREW SWITCH	CLOSE SCREW SWITCH
Line Side (Nearest to OCU)	FLBO network removed	V	S1	S2
	FLBO network installed	W	S2	S1
Drop Side (Nearest to Station)	FLBO network installed	U	S4	S3
	FLBO network removed	T	S3	S4