OUTGOING REPEATERS
PULSING TESTS
PER CENT BREAK METHOD
USING PULSE REPEATING TEST SET SD-31667-01 (J34720A) AND PULSING TEST SET SD-31481-01 (J34717A)
STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes a per cent break method of testing the pulse repeating relays of outgoing repeaters associated with trunks to other step-by-step or call indicator offices, other than pulse correcting types, for which the circuit requirement tables specify pulse repeating requirements A1, A2, etc.

1.02 This section is reissued for the following reasons:

(a) To revise the title to include the test sets used.

(b) To include 355A and 35-E-97 community dial offices.

(c) To delete detailed information on the calibration of the per cent break meter and checks of the pulsing relay in the pulse repeating test set.

(d) To delete detailed information concerning the use of 35-type test sets for readjustment purposes while performing tests.

(e) To generally revise the section.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The test covered employs the per cent break method of checking pulsing relays of outgoing repeaters.

1.04 When the use of a 35-type test set is required for readjustment purposes while tests are being made, consult Section 040-012-711 for connecting information.

1.05 In order to insure reliability in the test described in this section, it is imperative that the per cent break meter is properly calibrated and the pulsing relays within the pulsing and pulse repeating test sets are adjusted properly. Methods of testing these meters and relays are found in the circuit description sections for the test sets. When these test sets are used for prolonged periods, these checks should be made before testing is begun and at intervals of several hours thereafter.

1.06 The per cent break limits shown on the circuit requirement tables are those which are necessary to insure correct operation under the most adverse circuit conditions. These limits should be employed in connection with initial tests of any circuits to which they apply and all subsequent readjustments should be made to those limits. When per cent break tests are applied on a routine basis, however, it will be permissible, in order to avoid unnecessary readjustments, to use test limits 3 higher than the maximum value and 3 lower than the minimum value specified on the circuit requirement tables.

1.07 While the pulsing tests covered in this section are, in effect, an alternative to the over-all pulsing tests covered in other sections when applied on a routine basis, they do not completely replace the over-all pulsing tests.

1.08 The 1200-ohm loop and leak A conditions, specified herein for use in conjunction with the per cent break measurements, are intended to provide an adjustment of the pulse repeating relay which will give minimum pulse distortion under the conditions encountered on the particular outgoing trunks with which the repeaters are associated. These loop and leak conditions may not, therefore, be the same as those specified for making the over-all pulsing test of the repeaters and for the pulsing tests of the selectors and connectors in the same office.

1.09 When testing repeaters associated with trunks to a call indicator office, the call indicator trunk group make-busy key should be in the normal position in order not to interfere with the tests.

1.10 Where the repeater is preceded by a plunger type out-trunk switch, the repeater should be made busy in the approved manner before performing these tests and the associated master switch should be rotated to pick up disengaged plungers.

Caution: Care should be taken to see that out-trunk switches are not held busy when the repeaters are made busy.

1.11 When these tests are performed during periods of light traffic, the work can be expedited by busying several repeaters at one time or by making the master switch busy where the repeaters are preceded by plunger type out-trunk switches.

1.12 The detailed methods covered herein assume that the repeaters are equipped with 6-spring test jacks on which the outgoing tip and ring conductors are terminated. The same testing procedure can be followed where these conductors do not terminate at the test jacks, however, in this case it will be necessary to provide a suitable connecting cord for attaching to the tip and ring conductors at the repeater shelf jack springs.

1.13 Actions and verifications will be required at the distant office.

1.14 The test equipment specified in this section is designed to apply proper marginal tests (simulated critical circuit conditions) when the circuits under test and the test equipment have an applied voltage of 48.5 to 50. In those offices where power plants are normally operated at more than 50 volts, the battery voltage should be reduced and maintained within the required limits while the tests are being made.

2. APPARATUS

Required at Outgoing Office

2.01 Pulsing test set J34717A (SD-31481-01).

2.02 Pulse repeating test set J34720A (SD-31667-01).

2.03 36B (remote control) test set.

2.04 1011G handset, equipped with W2CL cord, 471A jack, and 240A plug (2W39A cord).

2.05 Patching cord, P3K cord, 12 feet long, equipped with two 310 plugs (3P15B cord), used to connect pulsing and pulse repeating test sets together.

2.06 Patching cord, P3K cord, 12 feet long, equipped with two 310 plugs (3P15B cord), used where a battery supply jack is used to provide battery and ground to pulse repeating test set.

2.07 Patching cord, P2J cord, 6 feet long, equipped with two 310 plugs (2P9B cord), used where a battery supply jack is used to provide battery and ground to pulsing test set.

2.08 Two testing cords, W2M cords, 9 feet long, each equipped with 310 plug, tip and sleeve connections, two 59 cord tips (2W12A cord) and two 108 cord tips, used where a 35-type fuse (not to exceed 5 amperes) and frame ground or a battery and ground block is used to supply battery and ground to test sets.

2.09 Two patching cords, P3H cords, 5 feet long, equipped with one red shell 310 plug, one black shell 310 plug, and one 240B plug (6P3A cord). See 1.12.

2.10 477A (or 375A) (make-busy) tools, as required.

Required at Incoming Office

2.11 1011G handset, equipped with W2CL cord, 471A jack and 240A plug (2W39A cord).

2.12 258C (or 258B) (make-busy) plugs, as required.

3. PREPARATION

STEP	ACTION	VERIFICATION
1	Connect battery and ground to BAT-G jacks of pulsing and pulse repeating test sets. *Note 1:* If using W2M cords, connect white (tip) conductor to battery and red (sleeve) conductor to ground. *Note 2:* To avoid possible grounding of battery supply lead, connect cord to test set first and, when disconnecting, remove cord from test set last.	
2	Connect 36B remote control set to jacks A and B of pulsing test set. Stay cord of 289B plug should be on the bottom.	
3	Insert red shell and black shell plugs of P3H cords into R and B jacks, respectively, of pulse repeating test set.	
4	Using P3K cord assembly, connect TL jack of pulsing test set to INT jack of pulse repeating test set.	
5	Operate 400, 800 and LKA keys of pulsing test set.	
6	Establish talking connection to distant office, using 1011G handset and an idle trunk.	
7	Insert 240B plug of 6P3A cord assembly into test jack of repeater.	BY lamp of pulse repeating test set does not light. *Note:* If BY lamp lights, remove 240B plug and proceed to another repeater.
8	Operate SL key of pulse repeating test set.	
9	Operate TRK key of pulse repeating test set.	Deflection observed on per cent break meter.
10	Restore TRK key.	

STEP	ACTION	VERIFICATION
11	Operate AT key of pulse repeating test set.	Deflection observed on per cent break meter, same as in Step 9. ***Note:*** If meter deflection is not same, position R keys and variable resistance R (if required) so as to give same deflection as in Step 9.
12	Restore AT key.	
13	At distant office — Remove battery and ground from trunk associated with repeater under test. ***Note 1:*** In step-by-step offices, this may be done by inserting a 477A (or 375A) make-busy tool between S and G springs of test jack and then raising shaft off-normal. ***Note 2:*** In call indicator offices, this may be done by inserting a 258B (or 258A) make-busy plug into the trunk test jack, provided this jack is arranged to open the tip and ring conductors. If it is not so arranged, then it will be necessary to use other suitable means, depending upon the particular circuit arrangement.	
14	At test set — Operate PR key of pulsing test set.	
15	Operate LP key of remote control set momentarily.	Pulsing test set pulses continuously. Per cent break meter reading holds steady, not exceeding upper limit (see 1.06). ***Note:*** An unstable reading may be the result of the B relay failing to hold. Operate SC key for approximately one second and recheck reading. If reading is still unstable, due to failure of the B relay to hold under conditions of continuous pulsing, it will be necessary to hold the B relay operated manually while taking reading.
16	Operate RLS key of remote control set momentarily.	All pulsing stops. Per cent break meter restores to normal.
17	Operate LK key of remote control set momentarily.	Pulsing test set pulses continuously. Per cent break meter holds steady at not less than lower limit (see 1.06). ***Note:*** An unstable reading may be the result of the C relay failing to hold. In such a case, the C relay should be held operated manually while taking reading. Adjustment of the C relay should, however, be checked before placing repeater in service.

STEP	ACTION	VERIFICATION
18	Operate RLS key of remote control set momentarily.	All pulsing stops. Per cent break meter returns to normal.
19	Unless further tests are to be made — Remove all cords, restore all keys and restore all equipment to normal.	