

**TYPE N AND ON CARRIER REPEATERS — REPEATERED HIGH-FREQUENCY LINE
ELECTRON TUBE REPEATER POINTS
METHOD OF SWITCHING ELECTRON TUBE REPEATERS
WITH THE 2M REPEATER SWITCHING SET**

The substitution of an alternate N repeater for a working unit may be done without interruption to service by the use of the 2M repeater switching set. ON repeaters cannot be switched unless the 2M set has been modified as discussed later in this section. When a repeater is to be removed from its jack for test or replacement, or to replace tubes, the 2M switching set with an alternate repeater is patched to the repeater switching jack. A key on the switching set provides means for switching back and forth between regular and alternate repeaters. It is important that the steps be executed in the sequence outlined to avoid interrupting service. Potential hits on systems with SAGE or telegraph transmissions may be reduced to a minimum by using the *specified* cord from the switching set to the repeater switching jacks, *by following the sequence outlined for plugging the cord into the switching jack* and the sequence of tests as outlined in this section and the use of apparatus specified.

APPARATUS:

- 1 — W2DW Cord (used with 400C or D VTVM)
- 1 — 2M Repeater Switching Set (J94002M)
- 1 — 400C or D — Hewlett-Packard Vacuum Tube Voltmeter
- 1 — W20C Cord (6-foot cord for connecting switching set to switching jack of repeater)
- 1 — W8D Cord (6-foot cord for connecting power to the switching set)
- 1 — 2J Repeater Test Set (J94002J)
- 1 — 2P Tube Test Set
- 1 — Alternate Repeater, of the same type as the one to be replaced, with the 20,000-ohm resistor R24 in place of the thermistor

| STEP | PROCEDURE |
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| | Modification of 2M Repeater Switching Set |
| 1 | To switch an ON repeater, 2-F1D4 retard coils and 2-2507P transformer must be added to the set as shown in Fig. 1. |
| | Method of Switching Repeaters |
| 1 | Determine the type of repeater to be replaced and insert an alternate repeater of the same type in the 2M switching set with the 20,000-ohm resistor R24 in place of the thermistor in each half of repeater. |
| 2 | Set the SLOPE control of the alternate repeater the same as the regular repeater. |
| 3 | Check that both switching keys on the 2M switching set are in REG position and turn the W-E GAIN and E-W GAIN potentiometers maximum counterclockwise. |

| STEP | PROCEDURE |
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| 4 | Connect the BAT jack to the test power supply on repeater frame using the W8D cord. |
| 5 | Allow the alternate repeater to warm up for a few minutes. |
| 6 | Make heater and dc regulator circuit measurements and adjustments on the alternate repeater in accordance with Section 362-410-501. |
| 7 | Remove the connector from either J2 or J3 jack of the repeater to be switched. Plug the W20C cord into the vacant jack then into the REG REP jack of the 2M switching set. Caution: <i>Do not use any other cord than the W20C.</i> |
| 8 | Remove the connector from the other switching jack (J2 or J3). |
| 9 | Connect the 2J test set to the TEST jack of the 2M switching set. |
| 10 | Operate the rotary switch of the 2M set to W-E REG and observe reading on the 2J test set and then operate the switch to W-E ALT and adjust the W-E GAIN potentiometer to obtain the same reading on the 2J test set. Note: If the W-E direction has a LL (List 1) repeater transmitting toward an ON terminal or junction, the 2J test set is not capable of measuring the output. In this case, connect the 400C or D VTVM to the dbm jacks of the 2J test set with the GRND lead of the 400C or D VTVM to the top jack. This patch must be made correctly. Remove the 400C or D VTVM before performing a switching operation. Caution: <i>Do not connect the 2J test set with the 400C or D VTVM connected to the 2J set to the high level side of a repeater. A fuse will blow causing a service interruption.</i> |
| 11 | Operate the rotary switch of the 2M set to E-W REG and observe reading on the 2J test set and then operate the switch to E-W ALT and adjust the E-W GAIN potentiometer to obtain the same reading on the 2J test set. Note: If the E-W direction has a low level output, the 2J test set is not capable of measuring the output. In this case, connect the 400C or D VTVM to the dbm jacks of the 2J test set with the GRND lead of the 400C or D VTVM to the top jack. This patch must be made correctly. Caution: <i>Do not connect the 2J test set with the 400C or D VTVM connected to the 2J set to the high level side of a repeater. A fuse will blow causing a service interruption.</i> |
| 12 | Operate the W-E and E-W keys to ALT. The regular repeater may now be removed without interrupting service. |
| 13 | To restore the regular repeater to service, replace the repeater or a similar unit in its mounting. Set the slope switch on the regular repeater for the required slope setting. |
| 14 | After allowing about 10 minutes for the output to stabilize, measure the output of the regular repeater by setting the rotary switch to E-W REG and W-E REG. Requirements: H-L or LL Repeater +3.0 ± 1.5 dbm (see note) L-H Repeater +12.0 ± 1.5 dbm Note: For unmodified ON-LL repeater REC (J98706 List 1) the requirement is: -20.5 ± 1.5 dbm. |

| STEP | PROCEDURE |
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| 15 | <p>The readings of Step 14 should be within approximately 0.25 db when the rotary switch is set on E-W REG and E-W ALT, or W-E REG and W-E ALT.</p> <p>Note: In order to minimize hits on SAGE and DATA SYSTEMS when service is restored to the REG repeater, the following procedure should be observed at this point:</p> <ol style="list-style-type: none"> (1) if the readings of Step 15 are within 0.25 db of each other proceed with Step 16. (2) if the readings of Step 15 differ by more than 0.25 db, perform the following: <ol style="list-style-type: none"> (a) operate rotary switch to W-E ALT and adjust W-E GAIN POT in steps of 0.5 db in each 1/2-minute interval until the reading obtained for the W-E direction in Step 14 is obtained. (b) repeat (a) in the E-W direction. |
| 16 | Operate the W-E and E-W keys to REG and replace the repeater connector in the switching jack (J2 or J3). |
| 17 | The W20C cord should be removed as follows to reduce the potential hits on systems with SAGE or telegraph transmissions. Remove the plug from the switching set before removing the one from the repeater switching jack. Replace the regular connector. |
| 18 | Disconnect the power cord from test power supply jack. |

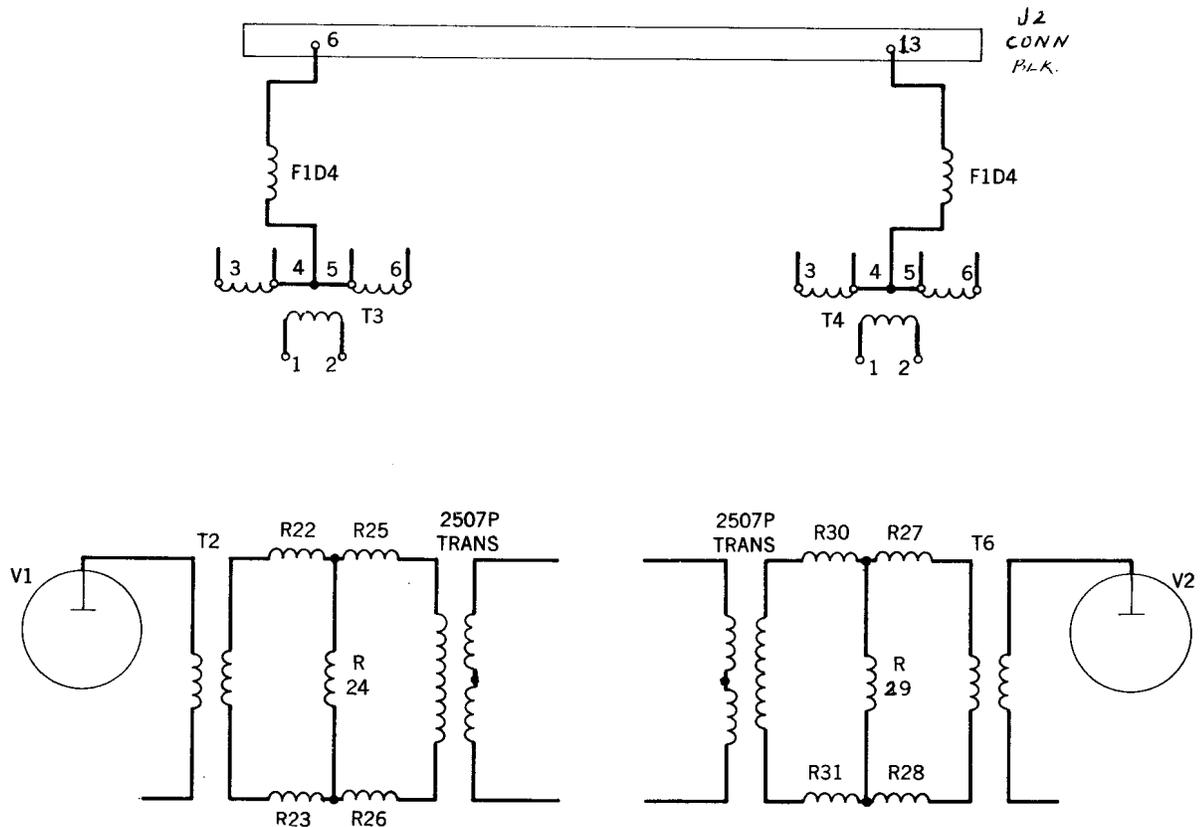


Fig. 1

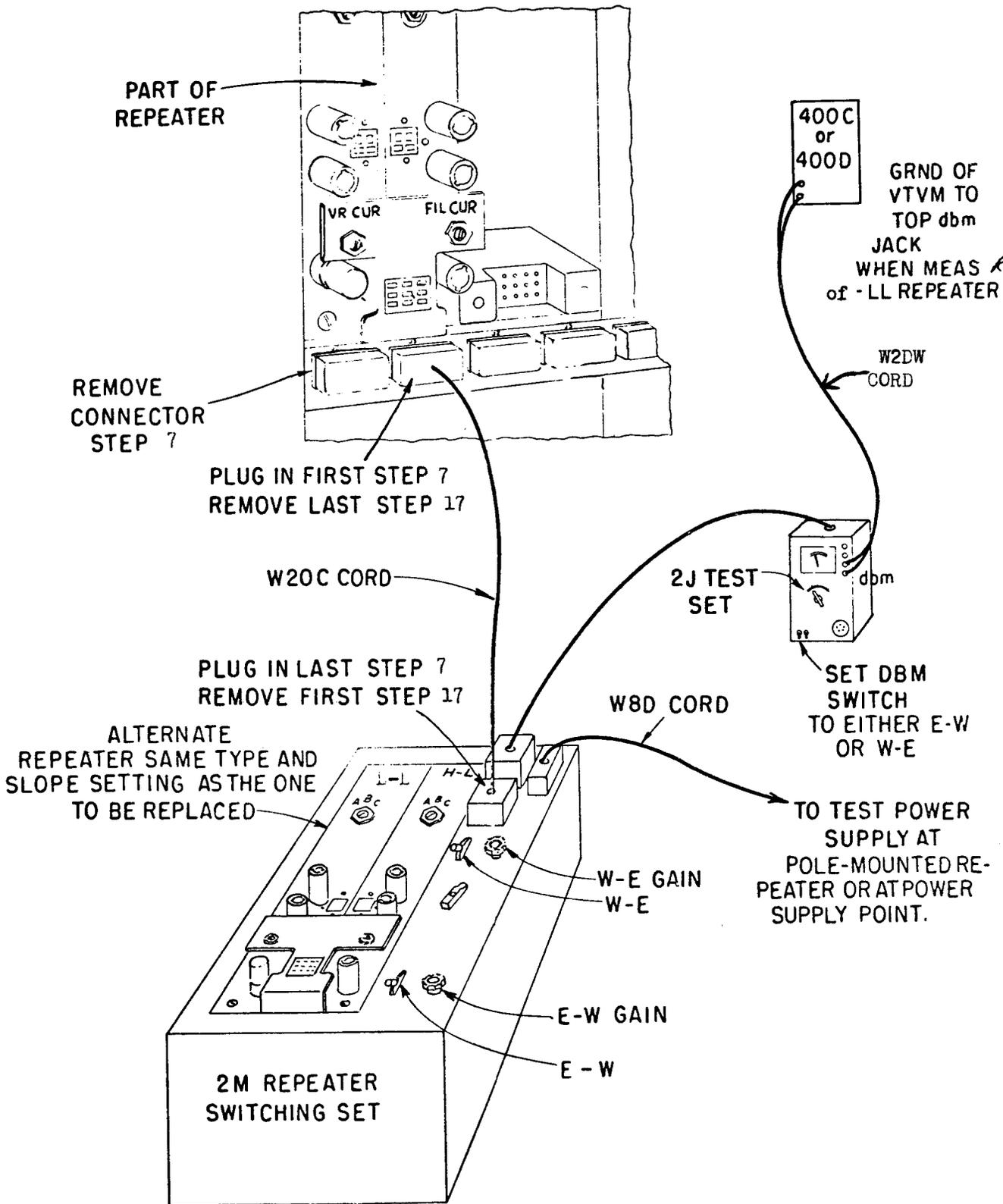


Fig. 2 - Switching Electron Tube Repeaters