

**TYPE N AND ON2 CARRIER TELEPHONE SYSTEMS
DEVIATION REGULATOR
IN-SERVICE LINE-UP PROCEDURE
METHOD A AND METHOD B**

The choice of procedure to be used when lining up a deviation regulator is an engineering consideration and is not the responsibility of the employee adjusting the equipment. The line-up method to be used on a regulator should be shown on the carrier system circuit layout card.

There are three parts to the in-service line-up procedure. They consist of adjusting the four control amplifiers to provide proper regulation; checking the gain frequency characteristics of the deviation regulator; and measuring the total carrier output.

The deviation regulator must be given the out-of-service tests and adjustments described in this division of sections before the following in-service tests may be made. An illustration of the circuits involved in this test and the arrangement of the test equipment is shown in Fig. 1.

APPARATUS:

CFVM, with W20C Cord
VTVM, with W2DW Cord
3AF Test Set
SHORTING Cord

ADJUSTMENT OF CONTROL CIRCUIT UNIT OUTPUT

This test must be completed before either the Method A or Method B line-up procedure is performed.

STEP	PROCEDURE
1	Insert CONNECTOR plugs in jacks J1 and J2.
2	Insert the SHORTING plugs supplied with the deviation regulator in the TERM SL, TERM BU, TERM CU, and TERM QU jacks.
3	Insert the DUMMY plugs supplied with the deviation regulator in the SLOPE TST, BULGE TST, CUBIC TST, and QUARTIC TST jacks.
4	Prepare the 3AF test set as follows: <ul style="list-style-type: none"> (a) Operate the CAL potentiometer to the OFF position. (b) Set the toggle switch to the 10 MA position. (c) Set the rotary switch to the ALIGN position. (d) Insert the two-prong plug into the TST PWR jack.

STEP	PROCEDURE
5	Short the IN jacks of the shape network associated with the control amplifier being adjusted. (The IN jacks are located on the front of the deviation regulator filter and network panel. They are designated SL, BU, CU, and QU.) <i>Begin the series of tests on the SL shape network.</i>
6	Remove the DUMMY plug from the TST jack of the control circuit unit being tested and insert the 310 plug (P1) of the 3AF test set cord.
7	Press the ADJ button on the 3AF test set and adjust the control amplifier ADJ potentiometer for a reading of — <i>Requirement: 7.0 ± 0.5 ma</i> on the test set meter.
8	Remove the plug (P1) from the TST jack and reinsert the DUMMY plug. Remove the shorting strap from the control circuit unit IN jacks.
9	Repeat Steps 4 through 8 on all of the control circuit units.
10	Disconnect the 3AF test set.

METHOD A LINE-UP PROCEDURE
CHECK OF PICK-OFF FILTER ADJUSTMENT

In this test the four control amplifiers are adjusted to provide the proper regulating range and to give a regulator output slope that approximates 7 db. The test is a measurement of the channel pick-off filter output levels. The levels should be recorded for reference in subsequent maintenance tests.

STEP	PROCEDURE
1	Remove all of the SHORT and DUMMY plugs from the deviation regulator TERM and TST jacks. Allow 10 minutes for the regulator thermistors to stabilize before proceeding with the test.
2	Using a W2DW cord, or equivalent, connect the lower (ground) INPUT terminal of the VTVM to the chassis ground; and connect the upper (hot) INPUT terminal to terminal 3 (middle terminal) on each of the channel pick-off filter output potentiometers. <i>Record the readings for future reference.</i>

METHOD B LINE-UP PROCEDURE
ADJUSTMENT OF PICK-OFF FILTER POTENTIOMETER

This test is an adjustment of the deviation regulator channel pick-off filter output levels. The purpose of the test is to provide maximum regulating range for the input carrier levels as determined at the time of line-up.

STEP	PROCEDURE																																							
1	Using a W2DW cord, or equivalent, connect the lower (ground) INPUT terminal of the VTVM to the chassis ground; and connect the upper (hot) INPUT terminal to terminal 3 (middle terminal) on the channel 2 pick-off filter output potentiometer.																																							
2	Adjust the channel 2 pick-off filter output potentiometer for a reading on the VTVM as shown in Table A. If the individual carrier level varies while the test is being performed, adjust for the average of the variation.																																							
<p>TABLE A</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="683 600 776 621">CHANNEL</th> <th data-bbox="875 600 987 621">FREQUENCY</th> <th data-bbox="1086 579 1268 621">ADJUST FOR VTVM READING OF</th> </tr> </thead> <tbody> <tr><td data-bbox="724 636 740 657">2</td><td data-bbox="883 636 971 657">176 kc</td><td data-bbox="1118 636 1235 657">-26.0 db</td></tr> <tr><td data-bbox="724 674 740 695">3</td><td data-bbox="883 674 971 695">184 kc</td><td data-bbox="1118 674 1235 695">-25.3 db</td></tr> <tr><td data-bbox="724 711 740 732">4</td><td data-bbox="883 711 971 732">192 kc</td><td data-bbox="1118 711 1235 732">-24.7 db</td></tr> <tr><td data-bbox="724 749 740 770">5</td><td data-bbox="883 749 971 770">200 kc</td><td data-bbox="1118 749 1235 770">-24.1 db</td></tr> <tr><td data-bbox="724 787 740 808">6</td><td data-bbox="883 787 971 808">208 kc</td><td data-bbox="1118 787 1235 808">-23.4 db</td></tr> <tr><td data-bbox="724 825 740 846">7</td><td data-bbox="883 825 971 846">216 kc</td><td data-bbox="1118 825 1235 846">-22.8 db</td></tr> <tr><td data-bbox="724 863 740 884">8</td><td data-bbox="883 863 971 884">224 kc</td><td data-bbox="1118 863 1235 884">-22.2 db</td></tr> <tr><td data-bbox="724 900 740 921">9</td><td data-bbox="883 900 971 921">232 kc</td><td data-bbox="1118 900 1235 921">-21.5 db</td></tr> <tr><td data-bbox="708 938 756 959">10</td><td data-bbox="883 938 971 959">240 kc</td><td data-bbox="1118 938 1235 959">-20.9 db</td></tr> <tr><td data-bbox="708 976 756 997">11</td><td data-bbox="883 976 971 997">248 kc</td><td data-bbox="1118 976 1235 997">-20.3 db</td></tr> <tr><td data-bbox="708 1014 756 1035">12</td><td data-bbox="883 1014 971 1035">256 kc</td><td data-bbox="1118 1014 1235 1035">-19.6 db</td></tr> <tr><td data-bbox="708 1052 756 1073">13</td><td data-bbox="883 1052 971 1073">264 kc</td><td data-bbox="1118 1052 1235 1073">-19.0 db</td></tr> </tbody> </table>		CHANNEL	FREQUENCY	ADJUST FOR VTVM READING OF	2	176 kc	-26.0 db	3	184 kc	-25.3 db	4	192 kc	-24.7 db	5	200 kc	-24.1 db	6	208 kc	-23.4 db	7	216 kc	-22.8 db	8	224 kc	-22.2 db	9	232 kc	-21.5 db	10	240 kc	-20.9 db	11	248 kc	-20.3 db	12	256 kc	-19.6 db	13	264 kc	-19.0 db
CHANNEL	FREQUENCY	ADJUST FOR VTVM READING OF																																						
2	176 kc	-26.0 db																																						
3	184 kc	-25.3 db																																						
4	192 kc	-24.7 db																																						
5	200 kc	-24.1 db																																						
6	208 kc	-23.4 db																																						
7	216 kc	-22.8 db																																						
8	224 kc	-22.2 db																																						
9	232 kc	-21.5 db																																						
10	240 kc	-20.9 db																																						
11	248 kc	-20.3 db																																						
12	256 kc	-19.6 db																																						
13	264 kc	-19.0 db																																						
3	Repeat Steps 1 and 2 on channel pick-off filter potentiometers 3 through 13. <i>Note:</i> If any of the adjustments in Step 2 can not be made, the frequency characteristics (slope) of the high-frequency line preceding the deviation regulator should be checked for trouble.																																							
4	Remove the SHORT and DUMMY plugs from the deviation regulator TERM and TST jacks. Allow 10 minutes for the regulator thermistors to stabilize before proceeding with the test.																																							
5	Using the VTVM, remeasure each of the levels at the channel pick-off filter potentiometers. <i>Record the readings for future reference.</i>																																							
6	Disconnect the VTVM.																																							
CHECK OF TOTAL CARRIER OUTPUT																																								
The purpose of this test is to measure the total carrier output of the deviation regulator. The test is made after either the Method A or Method B line-up tests have been completed.																																								
STEP	PROCEDURE																																							
1	Remove the CONNECTOR plug from jack J2.																																							
2	Connect the 2J repeater test set to jack J2.																																							

STEP	PROCEDURE																																		
3	<p>Set the rotary switch of the 2J set to the ADD 10 position. Set the DBM toggle switch to the W-E position. Read the power output on the meter scale.</p> <p>Requirement: $+12.0 \pm 1.5$ dbm</p> <p>(a) Where an artificial line is used at the output of the deviation regulator the corrections in Table B should be added to the value read on the 2J test set before applying the above requirements.</p> <div style="text-align: center;"> <p>TABLE B</p> <p>DEVIATION REGULATOR OUTPUT CORRECTION FACTORS (TOTAL POWER)</p> <table border="1"> <thead> <tr> <th>ARTIFICIAL LINE (Miles)</th> <th>SPAN PAD (Db)</th> <th>CORRECTION FACTOR (Db)</th> </tr> </thead> <tbody> <tr> <td></td> <td>0</td> <td>+2.4</td> </tr> <tr> <td rowspan="5">1 Mile</td> <td>2</td> <td>+1.5</td> </tr> <tr> <td>4</td> <td>+0.9</td> </tr> <tr> <td>6</td> <td>+0.7</td> </tr> <tr> <td>8</td> <td>+0.4</td> </tr> <tr> <td>10</td> <td>+0.2</td> </tr> <tr> <td rowspan="5">2 Mile or 4 Mile</td> <td>0</td> <td>+4.8</td> </tr> <tr> <td>2</td> <td>+3.0</td> </tr> <tr> <td>4</td> <td>+1.6</td> </tr> <tr> <td>6</td> <td>+1.0</td> </tr> <tr> <td>8</td> <td>+0.6</td> </tr> <tr> <td></td> <td>10</td> <td>+0.4</td> </tr> <tr> <td>Not Used</td> <td>Any</td> <td>None</td> </tr> </tbody> </table> <p>+ Sign indicates that the measured value should be made more positive by the correction factor.</p> <p>(b) If the corrected requirement is not met, the deviation regulator will be considered satisfactory if the corrected output is within —</p> <p>Requirement: ± 1.0 db</p> <p>of the output measured at the preceding low-high N carrier repeater. <i>Record the 2J set reading for future reference.</i></p> </div>	ARTIFICIAL LINE (Miles)	SPAN PAD (Db)	CORRECTION FACTOR (Db)		0	+2.4	1 Mile	2	+1.5	4	+0.9	6	+0.7	8	+0.4	10	+0.2	2 Mile or 4 Mile	0	+4.8	2	+3.0	4	+1.6	6	+1.0	8	+0.6		10	+0.4	Not Used	Any	None
ARTIFICIAL LINE (Miles)	SPAN PAD (Db)	CORRECTION FACTOR (Db)																																	
	0	+2.4																																	
1 Mile	2	+1.5																																	
	4	+0.9																																	
	6	+0.7																																	
	8	+0.4																																	
	10	+0.2																																	
2 Mile or 4 Mile	0	+4.8																																	
	2	+3.0																																	
	4	+1.6																																	
	6	+1.0																																	
	8	+0.6																																	
	10	+0.4																																	
Not Used	Any	None																																	
4	Operate the rotary switch on the 2J set to MON and the DBM toggle switch to W-E and monitor the output on the 2J set. Normal carrier will be heard as varying tones. The absence of these tones or the presence of excessive noise is an indication of trouble in the deviation regulator or in the preceding high-frequency line.																																		
5	When the test has been completed, remove the 2J test set and replace the CONNECTOR plug in jack J2.																																		

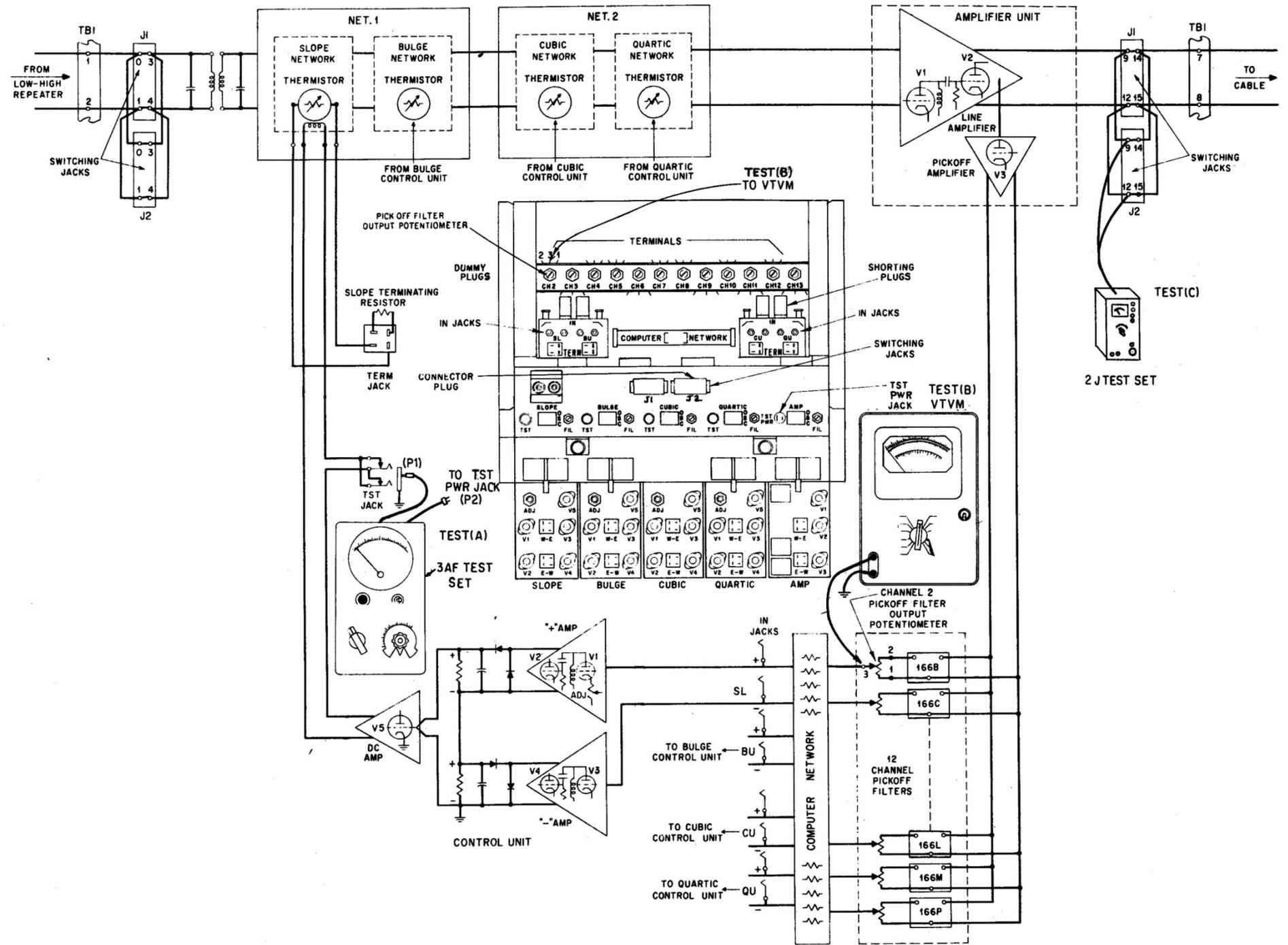


Fig. 1 - Test Arrangements for Making In-Service Line-Up Tests