# HIGH SEAS AND OVERSEAS RADIO
# WESTINGHOUSE LINEAR AMPLIFIER
# TYPE MS AND TYPE MS (MODIFIED)
# TESTS

The MS linear amplifier is tested for normal operation with the LD-T2 transmitter. Test signals are generated and measured with the 40B transmission measuring set (TMS).

If a test cannot be completed as specified, determine if the trouble is in the MS amplifier and refer to Section 403-331-502 (alignment) or to Section 403-331-503 (trouble location). Tests should be performed in the order specified.

**CHART** **PAGE**



**APPARATUS:**

1—40B Transmission Measuring Set

4—Patch Cords, 6 ft long, Belden No. 8412 shielded wire, with type 241 plugs

1—Coaxial Patch Cord (provided with LD-T2 transmitter)

## CHART 1

## TEST OF MONITOR GAIN

The signal monitor (LD-T2 transmitter) is adjusted for use with the MS linear amplifier. The 40B TMS and patch cord are used in this test.

| CHART 1 (Cont) | |
|---|---|
| **STEP** | **PROCEDURE** |
| | ***Caution: Section 403-331-502 is prerequisite to this test.*** |
| 1 | Place the LD-T2 transmitter and the MS amplifier in operation. |
| 2 | At the LD-T2 transmitter, set the following controls:<br>LOAD CONTROL switch to IN<br>GROUP A key to TEST TONE<br>GROUP B key to SPLIT<br>CARRIER RESUPPLY switch to −20 DB<br>HF INPUT SELECTOR switch to EXT AMP |
| 3 | At the jack field of the transmitter, patch the MON OUTPUT jack to the REC 600 OHMS jack of the 40B TMS. |
| 4 | At the LD-T2 transmitter and the MS linear amplifier, set CONTROL keys (K3) to REMOTE. |
| 5 | At the master control panel, set the CONTROL key (K4) to LOCAL. |
| 6 | At the master control panel, select the lowest operating frequency. |
| 7 | At the transmitter, adjust HF GAIN control to obtain proper test tone values on RF OUTPUT and CATHODE meter (setup card).<br>***Requirement:*** Record audio output level on 40B TMS. |
| 8 | Repeat Steps 6 and 7 for each operating frequency. |
| 9 | Select the operating frequency with the lowest audio output measured on the 40B TMS.<br>***Requirement:*** On the MONITOR, adjust the HP INPUT control for −10 dBm on the 40B TMS. |
| 10 | Disconnect all test connections; set test controls to normal. |

**CHART 2**

**SSB SIGNAL-TO-DISTORTION MEASUREMENT**

Third order intermodulation products (2A-B) are measured in this test. The 40B TMS and patch cords are used.

CHART 2 (Cont)

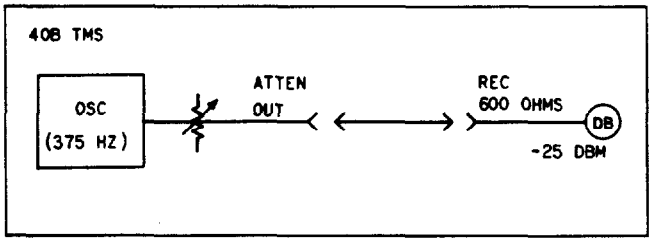
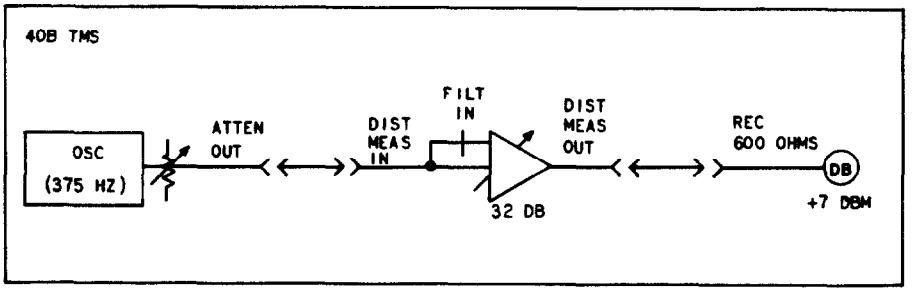
| STEP | PROCEDURE |
|---|---|
| | ***Caution: The test equipment, the LD-T2 transmitter, and the MS linear amplifier must be warmed up for at least 15 minutes prior to this test.*** |
| 1 | At the LD-T2 transmitter, set the following controls:<br><br>LOAD CONTROL switch to OUT<br><br>CARRIER RESUPPLY switch to −20 DB<br><br>HF INPUT SELECTOR switch to EXT AMP |
| 2 | On the 40B TMS, set the MEAS key to OSC and adjust the FREQ, OUTPUT, and ATTEN controls for an output of 375 Hz at −25 dBm (Fig. 1).<br><br>  <br><br><br>**Fig. 1** |
| 3 | On the 40B TMS, set FILT key to IN, connect the AMP FILTER, and adjust the MEAS AMP control for a gain of 32 dB (Fig. 2).<br><br>***Requirement:*** +7 dBm<br><br>***Note:*** Trim the FREQ control for maximum indication before setting the gain of the amplifier.<br><br>  <br><br><br>**Fig. 2** |
| 4 | Disconnect the AMP FILTER. |

CHART 2 (Cont)

| STEP | PROCEDURE |
|---|---|
| 5 | At the 40B TMS, set the FREQ dial to 1625 Hz, the ATTEN control to zero, and patch the ATTEN OUT jack to the REC 600 OHMS jack; adjust the oscillator output level.<br><br>***Requirement:*** +11 dBm |
| 6 | Set the MEAS key to 1000 CY; adjust the oscillator output level.<br><br>***Requirement:*** +11 dBm |
| 7 | On the 40B TMS, set the following controls:<br><br>MEAS key to 1000 CY + OSC<br><br>FILT key to OUT<br><br>ATTEN to 2 dB |
| 8 | Make the following test connections between the LD-T2 transmitter and the 40B TMS (Fig. 3).<br><br>GROUP A input jack to ATTEN OUT jack<br><br>MON jack to DIST MEAS IN jack<br><br>DIST MEAS OUT jack to REC 600 OHMS jack<br><br>***Requirement:*** Record the 2-tone output from the monitor. |

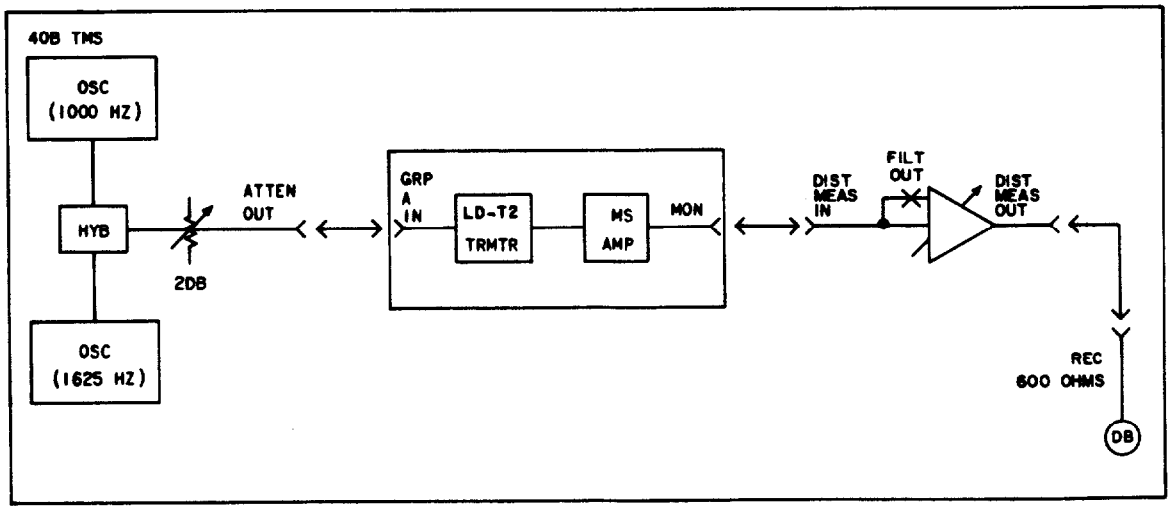



Fig. 3

**CHART 2 (Cont)**

| STEP | PROCEDURE |
|---|---|
| 9 | On the 40B TMS, set the FILT key to IN and measure the 375-Hz distortion product. |
| 10 | Calculate the signal-to-distortion (S/D) ratio as follows:<br><br>S/D = 2-tone output (Step 8) − 375-Hz output (Step 9) + gain of AMP FILTER (Step 3) −2 dB.<br><br>***Example:*** Step 8: −10 dBm<br>Step 9: −15 dBm<br>Step 3: +32 dB<br>S/D = −10 − (−15) + 32 − 2 = 35 dB |
| 11 | On the 40B TMS, increase loss in the attenuator in 2-dB increments to 10 dB (4 steps) repeating Steps 8, 9, and 10.<br><br>***Requirement:*** S/D ratio as specified per LD-T2 transmitter. |
| 12 | Disconnect all test connections; set test controls to normal. |

**CHART 3**

**SIGNAL-TO-NOISE MEASUREMENT**

The signal-to-noise ratio is measured using the 40B TMS and patch cords equipped with type 241 plugs.

| STEP | PROCEDURE |
|---|---|
| 1 | Place the LD-T2 transmitter and the MS linear amplifier in operation. |
| 2 | At the LD-T2 transmitter, set the following controls:<br><br>GROUP A key to SPLIT<br><br>GROUP B key to SPLIT<br><br>CARRIER RESUPPLY switch to −10 DB |
| 3 | Prepare the 40B TMS as follows (Fig. 4): |

CHART 3 (Cont)

| STEP | PROCEDURE |
|---|---|
| | MEAS key to 1000 CY<br><br>MEAS AMP IN patched to RF OUTPUT (MS ampl)<br><br>DIST MEAS OUT patched to REC 600 OHMS |

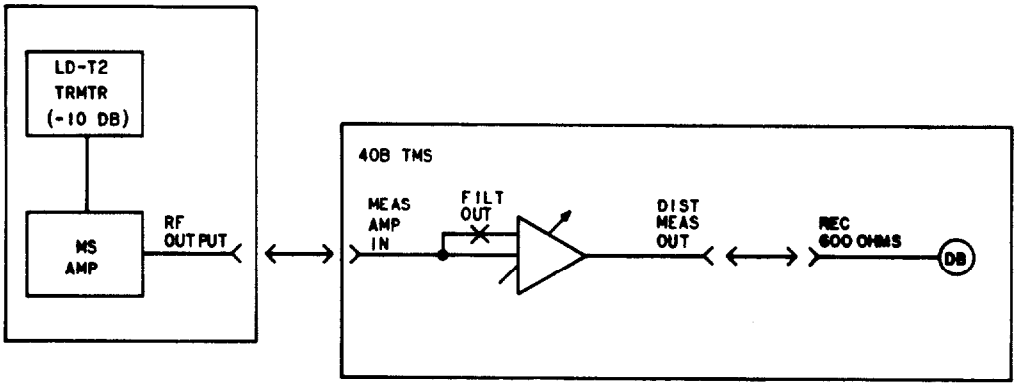



Fig. 4

| | |
|---|---|
| 4 | On the 40B TMS, set FILT key to OUT. |
| 5 | Adjust MEAS AMP gain for a noise reading of −20 to −30 dB; record. |
| 6 | At the LD-T2 transmitter, set GROUP A key to normal (center position). |
| 7 | At the 40B TMS, disconnect the MEAS AMP patches. |
| 8 | Patch the ATTEN OUT jack to the REC 600 OHMS jack (Fig. 5); adjust attenuator for an output of −17 dBm. |

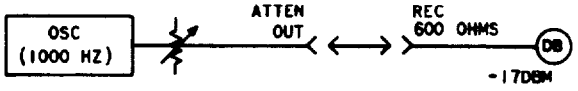



Fig. 5

| | |
|---|---|
| 9 | Disconnect the patch of Step 8; connect the 1000-Hz output of the 40B TMS to the GROUP A input of the LD-T2 transmitter and measure the output of the MS amplifier RF OUTPUT jack (Fig. 6). |

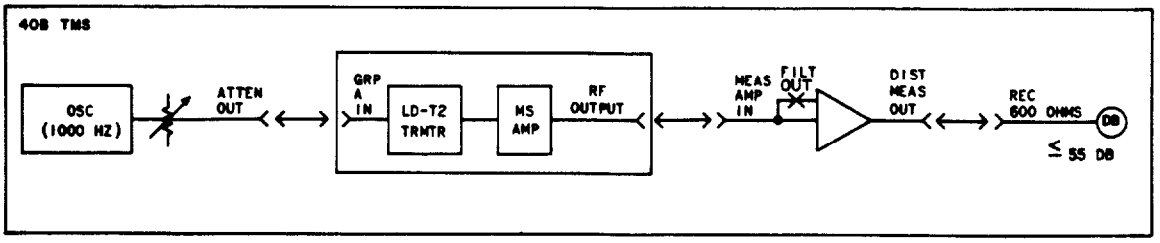



Fig. 6

**CHART 3 (Cont)**

| STEP | PROCEDURE |
|---|---|
| 10 | Calculate the S/N ratio as follows:<br><br>S/N ratio = Step 9 − Step 5 + 26 dB<br><br>***Requirement:*** S/N ratio greater than 50 dB.<br><br>***Example:*** Step 9: +7 dBm<br>Step 5: −22 dBm<br>S/N = +7 − (−22) + 26 = 55 dB |
| 11 | Disconnect all test connections; set test controls to normal. |

**CHART 4**

**FREQUENCY RESPONSE MEASUREMENT**

Frequency response of the MS amplifier is measured at selected frequencies from 100 to 6000 Hz. The 40B TMS and patch cords are used.

| STEP | PROCEDURE |
|---|---|
| 1 | Place the LD-T2 transmitter and the MS linear amplifier in operation on the frequency to be tested. |
| 2 | At the LD-T2 transmitter, set the following controls:<br><br>LOAD CONTROL switch to OUT<br><br>GROUP A key to NORMAL<br><br>CARRIER RESUPPLY switch to −20 DB |
| 3 | Connect the 40B TMS as shown in Fig. 7. |

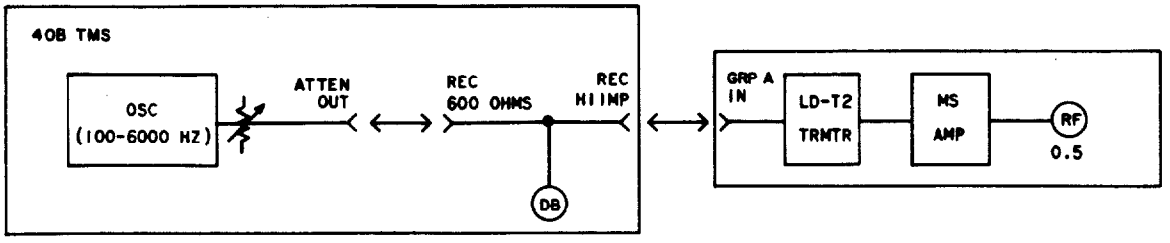



Fig. 7

| CHART 4 (Cont) | |
|---|---|
| **STEP** | **PROCEDURE** |
| 4 | At the 40B TMS, set the MEAS key to OSC; adjust the FREQ and ATTEN controls to obtain an indication of 0.5 on the RF OUTPUT meter of the MS amplifier for each of the following test tones: 100, 200, 500, 1000, 2000, 3000, 4000, 5000, and 6000 Hz. Record the input level for each tone.<br><br>***Requirement:*** Difference between maximum and minimum input levels not greater than 2 dB. |