TD-3D MICROWAVE RADIO
TRANSMITTER-RECEIVER BAYS
COMMON EQUIPMENT TEST
FADE MARGIN TESTS USING J68492A TEST SET

CONTENTS PAGE

1. GENERAL

1.01 Field measurements have shown that many protection switching sections have radio channels that are not switching at their correct fade level. When a radio channel switches to protection at a shallower fade level than it should, it will switch more often and will stay longer on the protection channel. This may deny the other channels in the same section the full use of the protection channel, thus degrading the message service. Switching of radio channels carrying high-speed data under voice (DUV) will always cause some data errors, so it is desirable to eliminate as much unnecessary switching as possible. Conversely, when a radio channel switches at a fade deeper than it should, message and data may both be degraded. The fade depth where a radio channel should switch to protection normally depends on the thermal noise of the radio channel and the adjustment of the protection switching system's channel initiator. The thermal noise of the radio channel depends on the received signal power and the "front end" noise of the receiver. Also, for a normal radio hop, it should be possible to fade the channel to the switch point before any noise or tones in the lower end of the baseband can cause errors to DUV service.

1.02 This section is reissued for the following reasons:

(a) To change the last line of the title

(b) To completely revise Part 1

(c) To rearrange and change existing charts

(d) To add DUV fade margin information

(e) To add a chart for space diversity tests

(f) To add the J68448A portable pilot/noise monitor.

Since this is a general revision, the arrows normally used to indicate changes will not appear. This reissue will not affect the Equipment Test List.

1.03 This is a troubleshooting section. It will help locate and isolate the problems which are causing radio channels to switch too soon, too late, or even not at all. Often, incorrect adjustment of the switching system channel initiators is the primary cause. However, it must be realized that, even though the switching system may be properly adjusted and in good working condition, other factors, such as a defective or misadjusted carrier resupply, microwave generator tones, or outside interference can influence the operation of the switching system. For example, adjacent channel interference from either low cross-polarization discrimination (XPD), low antenna side-to-side coupling loss, or excessive cross-modulation interference produced in the receiver modulator—IF preamplifier due to the presence of the adjacent channel 80 MHz lower or higher in frequency (same polarization) might also cause the radio channel to switch too soon, or unnecessarily. A defective receiver modulator—IF preamplifier can cause excessive 9-MHz noise to be applied to the radio channel from the adjacent channel 80 MHz higher in frequency due to excessive cross-modulation in the receiver modulator—IF preamplifier. The excessive 9-MHz noise causes the noise detector to operate sooner than would normally be the case. Cochannel interference, on the other hand, may cause a channel to switch late or even not at all. Also, when a radio channel carrying DUV service is faded, excessive cochannel interference will cause errors to occur before the proper switch point is reached.

1.04 For these tests it is necessary to define the following terms:

DUV—Data Under Voice—Digital DATA-PHONE® Service (1A RDS).

Fade Depth at Switch Point—That amount of fade that just causes the protection switching system to switch.

Critical Noise Level—That noise level where data errors are expected to occur. For this series of tests, the critical noise level corresponds to a -39 dBrn indication on the 6G noise meter; or to a -50 dBm indication on an HP-3400A RMS voltmeter that is calibrated to read power (dBm at 75 ohms) and is terminated in 75 ohms.

Critical Fade Depth—The amount of fade necessary to reach the critical noise level.

DUV Fade Margin—The DUV fade margin is equal to the critical fade depth minus the fade depth at switch point. If the critical fade is reached ***before*** the switch point, the DUV fade margin is ***negative.*** If it is reached ***after*** the switch point, it is ***positive.***

1.05 There are four principal parts to these tests. Each hop of each radio channel in the switching section under test is deliberately faded, one at a time from the transmitting end, by attenuating each transmitter's output in turn, down the line. At the receiving end of the switching section, measurements are performed to find the exact switch points resulting from each of the test fades for each radio hop.

(a) The fade at the switch point for that radio hop is measured and compared to the requirement for a given path length and transmitter output power.

(b) The noise at 9 MHz is then measured to see if the channel initiator is operating at the desired noise power.

(c) The channel is then refaded to find the DUV fade margin. For a normal radio hop it should be possible to fade the channel to the switch point before any noise or tones in the lower end of the baseband can cause errors to the DUV service. However, if cochannel interference or other sources of noise are severe enough, data errors will occur before the switch point is reached. The purpose of this test is to locate those radio hops which will cause DUV errors before the proper switch point is reached.

(d) The channel is then refaded to the carrier resupply trip point to ensure that the carrier resupply is operating properly.

1.06 Cochannel interferences are caused when the receiving antenna picks up another radio channel operating on the same frequency. Reflections from buildings and other structures are generally the main cause of cochannel interferences being out of limits. Adjacent or parallel radio routes also can cause cochannel interferences due to poor separation of these routes or, again, reflections. The effect of cochannel interference on DUV signals does not depend on the fact of whether or not the interfering carrier is spread (such as from a TV channel or another DUV channel) or on the frequency offset between the normal carrier and the interfering carrier. This is because the phase deviation applied to the normal channel carrier by the DUV signal causes the interference to be spread across the DUV band. In order to measure the effect of cochannel interference, a similar mechanism is employed. A 64-kHz baseband signal is applied to an FM transmitter at the transmitting end of the switching section under test to deviate the normal channel carrier approximately 800 kHz. At the receiving end of this switching section a DUV bandpass filter, a 64-kHz narrowband rejection filter, and a wideband power meter are employed to measure the effect of this interference.

***Caution:** Unless the 64 kHz at the transmitting end of the switching section is exactly tuned to the frequency of maximum loss of the 64-kHz narrowband rejection filter, the indication may contain more of the 64-kHz signal than of the effect of the cochannel interference. The importance of this fine tuning procedure is expanded on in Chart 2 of this section.*

1.07 Chart 1 of this section checks the switch point of a frequency diversity switching system and the 9-MHz noise at that point. If the radio hop being tested is equipped with space diversity protection, Chart 2 must now be performed. Chart 3 is a continuation of the tests started in Chart 1 and checks DUV fade margin and carrier resupply operation. These tests require personnel to be stationed at the transmitting end of the switching section, the receiving end of the switching section, and at the transmitter being faded. In addition, if a space diversity radio hop is being tested, the receiver of that hop must also be manned.

***Caution:** These are out-of-service tests. Switch service to the protection channel.*

Note: These tests require components from several different test sets. Stations not having the equipment listed in the charts must arrange to borrow the necessary units.

1.08 To assure accuracy for the 9-MHz noise measurement and the fade margin requirements, a terminated FM transmitter should be placed on the channel under test at the transmit end.

2. CHARTS

CHART 1

FREQUENCY DIVERSITY PROTECTION SWITCHING SYSTEM SWITCH POINT AND 9-MHZ NOISE MEASUREMENT

APPARATUS:

Transmitting Station

1—J68392A Test Set

1—61B, 20-dB, 5-Watt Waveguide Pad

2—20-dB Waveguide Variable Attenuators

1—KS-20498, L2 10-dB Calibrated RF Coaxial Pad

2—24A Transducers

2—ED-51567( ), G1 Type N Female to Waveguide Probe (for monitor shutter assembly)

2—KS-19986, L4 Calibrated 8-Foot RF Cords (N connectors each end)

1—KS-19987, L2 or L3 Adapter (N fematel to N female for calibration)

CHART 1 (Cont)

APPARATUS:

3—ED-51568( ), G1 Shutters

Receiving Station

1—3A or 4A FM Receiver

1—W&G AT463 Selective Receiver or equivalent

In order to find the fade margin requirement, the received carrier power for that hop must be known. If it is posted on the radio bay and that number is known to be ***correct,*** then that received carrier power may be used provided that any deviations in the transmitter output power be used to correct the received carrier power.

Example: The posted received carrier power is -30 dBm, the transmitter output power that is transmitting to this receiver is +32 dBm instead of its normal output of +33 dBm; therefore, 1 dB is subtracted from the -30 dBm to give a -31 dBm received carrier power.

If the received carrier power is not posted or if the posted number is felt to be incorrect, Fig. 4 may be used to calculate the received carrier power. The data in Fig. 4 is based on the following:

(a) The radio towers at both ends of the radio hop are 200 feet tall. The total filter/waveguide loss for both the transmitting and receiving ends of the radio hop is 4.8 dB (the channel dropping and combining networks in the radio bays and the system combining and separating networks in the antenna and waveguide systems included). Add or subtract 0.4 dB from the requirements for each 100-foot difference in antenna height.

(b) The antennas at both ends of the radio hop are assumed to be KS-15676 horns which have a total midband gain of 79.2 dB (39.6 dB each). If other antennas are used, appropriate changes in requirements should be calculated to include their gain. See Section 415-100-508, Received Signal Power.

(c) The radio path is approximately in a no-fade condition, with the received signal power stable within ±1 dB. If the radio path loss is known to be higher or lower than typical, the requirements should be adjusted accordingly.

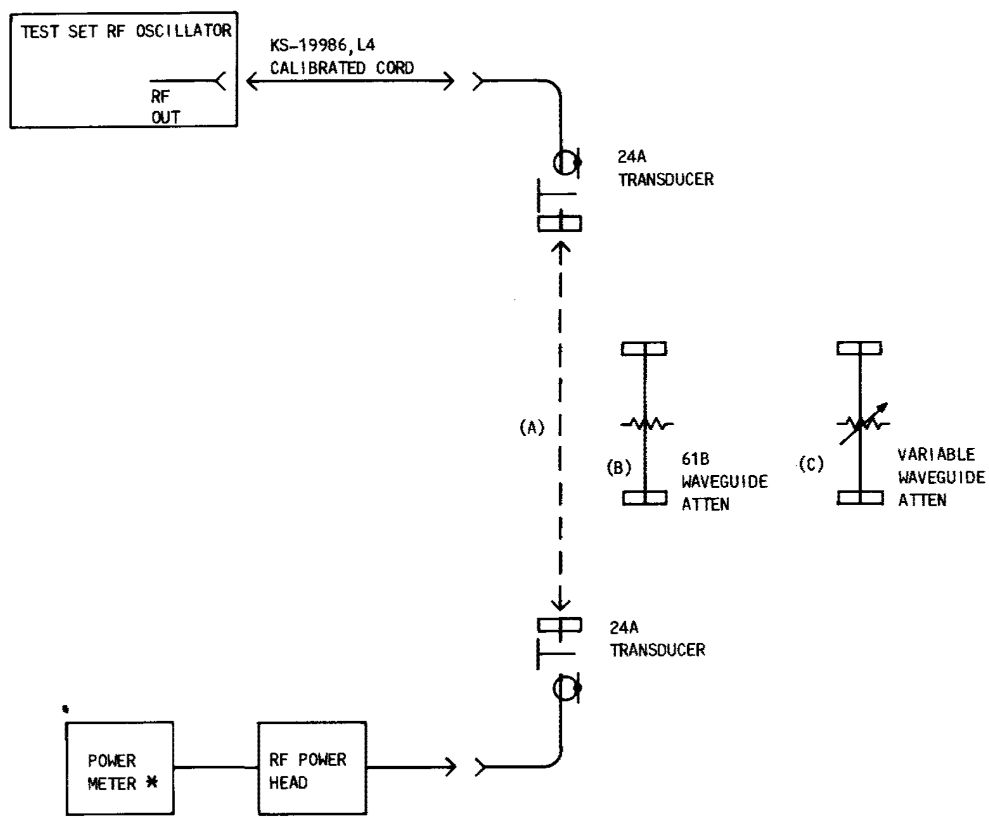
(d) If waveguide pads are used at either end of the radio hop, the received carrier power should be reduced by the amount of their loss.

If uncertainty still exists on the correct received carrier power to be used, measurements as outlined in Section 415-100-508 should be made.

Note: When RF waveguide amplifiers are installed, the received signal power is referred to the input to the waveguide amplifier. The actual measurement is made at the input to the radio receiver and the gain of the waveguide amplifier is subtracted to get the received carrier power at the input to the amplifier.

CHART 1 (Cont)

STEP	PROCEDURE
1	Calibrate the cords and attenuators used in Fig. 5 at the frequency of the channel to be measured, by using the test arrangement in Fig. 1.
2	Measure the power output of the transmitter to be faded to ensure accuracy in the following steps. Have the personnel at the receiving end of the switching section under test record



NOTES:

1. BE SURE THAT THE LOSS OF THE CALIBRATED CORD, AT THE FREQUENCY OF THE CHANNEL UNDER TEST, IS KNOWN. IF IN DOUBT, CALIBRATE THE CORD.
2. CONNECT THE TEST APPARATUS AS IN (A)(ANY RADIO BAY TEST SET EXCEPT THE 45A). TUNE THE OSCILLATOR (CW MODE) TO THE FREQUENCY OF THE CHANNEL TO BE TESTED AND ADJUST THE OU PUT TO INDICATE +5 DBM ON THE POWER METER.
3. CONNECT THE TRANSDUCERS TO THE 61B AS IN (B) ABOVE, AND MEASURE ITS LOSS. RECORD THIS VALUE.
4. CONNECT THE TRANSDUCERS TO THE VARIABLE ATTENUATOR (C) AND MEASURE ITS LOSS AT THE 0, 5, 10, 15, AND 20 DB POSITIONS. RECORD THESE VALUES.

* ALWAYS ZERO THE POWER METER (WITHOUT RF INPUT) BEFORE EACH MEASUREMENT TO ENSURE ACCURACY.

Fig. 1—Calibration of Test Attenuators

CHART 1 (Cont)

STEP	PROCEDURE
	this value on the form given in Fig. 2. (Do not use the meter panel reading for power measurement.)
3	Obtain the path length of the radio hop from the station license. If this distance is given only in kilometers, convert to miles, using Fig. 3. Have this value recorded on the form in Fig. 2.
4	Record the ***correct*** received carrier power on the form in Fig. 2.
5	On the radio transmitter, insert the two probes into the monitor shutter assembly and then insert three shutters into the monitor shutter assembly. Arrange the attenuators to fade the transmitter at the transmitting end of the radio hop to be measured as given in Fig. 5. If this is a space diversity hop, have the personnel at the receiver force-switch (lock) the switch to the REGULAR antenna.
6	When ready to fade the channel, notify the personnel at the receiving end of the switching section to watch for the channel FAIL lamp in the receiving protection switching bay.
7	Fade the transmitter (add attenuation) until the receiving-end personnel report that the channel FAIL lamp has lit. Reduce the attenuation 5 dB (FAIL lamp should go out) and slowly fade the transmitter until the point of initiator operation is found. Repeat two or three times until the exact point of initiator operation is found. The total of the cord and attenuator losses equals the amount that the transmitter output has been faded. Record this value on the form in Fig. 2 as ACTUAL FADE AT SWITCH POINT.
8	With the channel faded to exactly the switch point, the average thermal noise at 9 MHz should be measured immediately, by using the test arrangement in Fig. 6. (Do not use a de-emphasis network with the FMR.) ***Note:*** Plugging the FMR IF input into the receiving switch bay will interrupt the IF path to the initiator, so it should not be plugged in until the switch point has been found.
9	Record this value on the 9-MHz NOISE MEASUREMENT line of the form in Fig. 2 for the bandwidth of the selective meter in use. If using a selective meter with other than a 400-Hz or 1.74-MHz bandwidth, subtract the correction factor from Fig. 7 and record next to CORRECTED TO 400-Hz BW. ***Requirement:*** The channel initiator shall switch to within ±2 dB of the requirements given in Table A. If this requirement is not met, the channel initiator BSP routine should be performed. Enter the requirement on the form in Fig. 2.
10	Subtract the corrected 9-MHz noise measurement from the requirement given in Table A to get the 9-MHz noise difference and record on the form in Fig. 2.

E-10108

FADE MARGIN TEST FORM

DATE ____________________ MAIN STATION REPORTING ____________________

SWITCH SECTION ____________________ TO ____________________

RADIO HOP ____________________ TO ____________________

RADIO CHANNEL ____________________ HOP LENGTH ____________________ MILES

TRANSMITTER POWER ____________ dBm RECEIVED CARRIER POWER ____________ dBm

ACTUAL FADE AT SWITCH POINT ____________________ dB

9-MHz NOISE MEASUREMENT

400-Hz BW ____________________ dBm REQUIREMENT ____________ dB

OR

1.74-kHz BW ____________________ dBm REQUIREMENT ____________ dB

OR

CORRECTED TO 400-Hz BW ____________ dBm REQUIREMENT ____________ dB

DIFFERENCE (REQUIREMENT − MEASURED) ____________ dB

CORRECTED FADE AT SWITCH POINT ____________ dB REQUIREMENT ____________ dB

CRITICAL FADE DEPTH ____________________ dB

DUV FADE MARGIN (CRITICAL FADE DEPTH − ACTUAL FADE AT SWITCH POINT) ____________ dB

CARRIER RESUPPLY FADE DEPTH ____________ dB REQUIREMENT ____________ dB

REMARKS:

RECORDED BY ____________________

TELEPHONE NUMBER ____________________

Fig. 2—Fade Margin Test Form

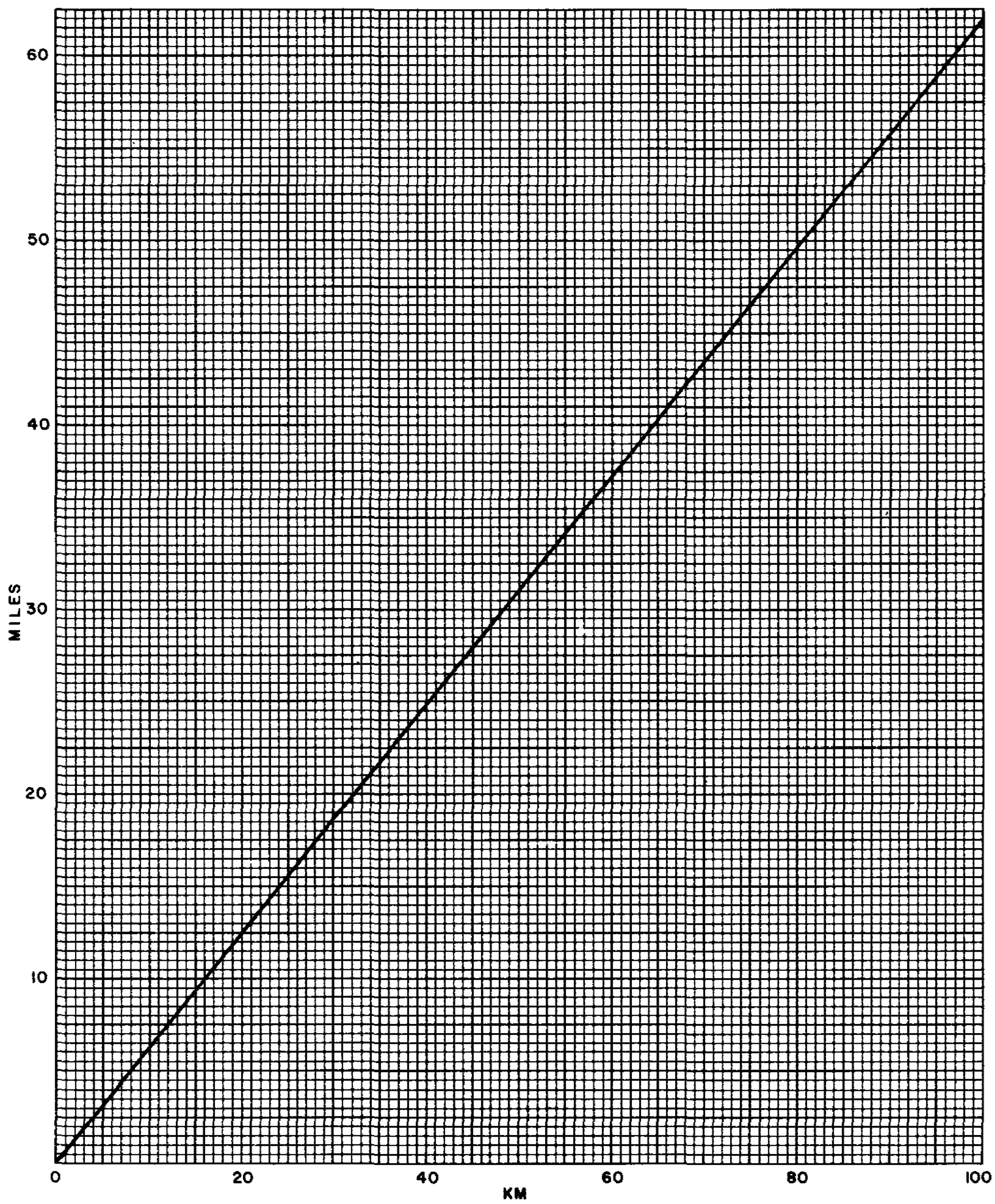


Fig. 3—Kilometers to Statute Miles

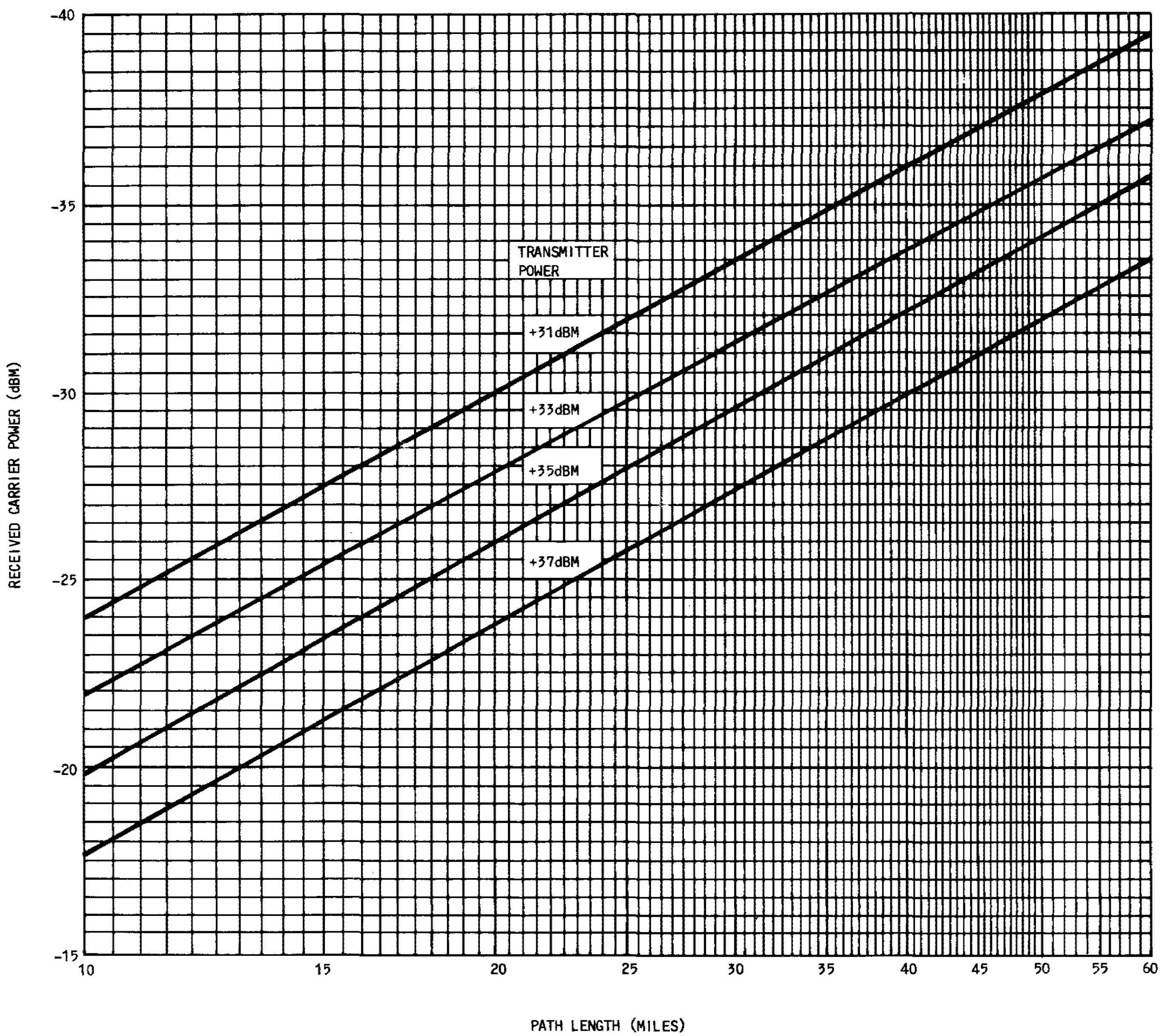


Fig. 4—4-GHz Received Carrier Power vs Path Length and Transmitter Output Power

CHART 1 (Cont)

STEP	PROCEDURE

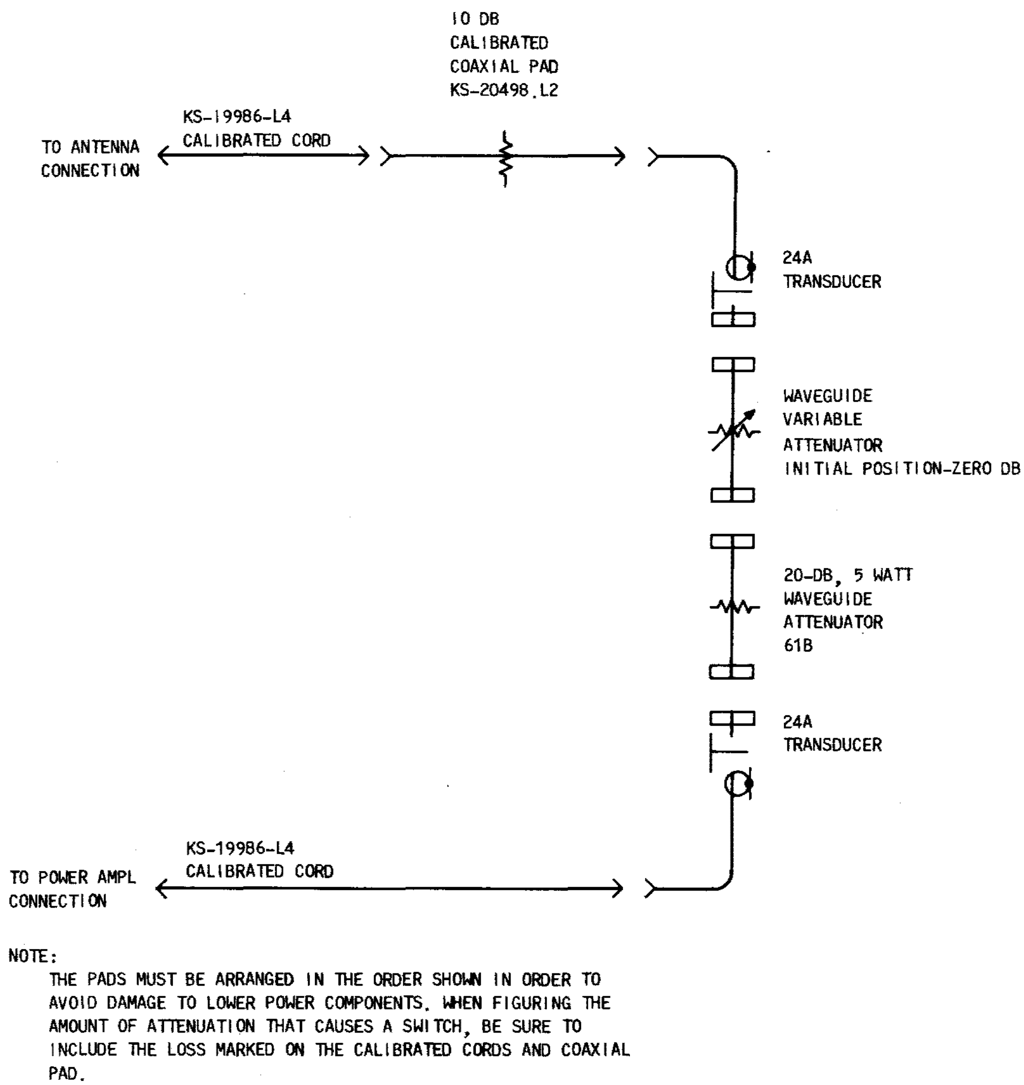


Fig. 5—Fade Test Arrangement

Example: The 400-Hz bandwidth, 1200 circuit loading, regular channel initiator operate requirement from Table A is -57 dBm. If the 9-MHz noise corrected to 400-Hz bandwidth is -55 dBm, then the difference is (-57 dBm) - (-55 dBm) = -2 dB. This number would then be entered next to DIFFERENCE on the form in Fig. 2.

11 Find the corrected fade at switch point by adding the 9-MHz noise difference to the actual fade at switch point and record on the form in Fig. 2.

CHART 1 (Cont)

STEP	PROCEDURE

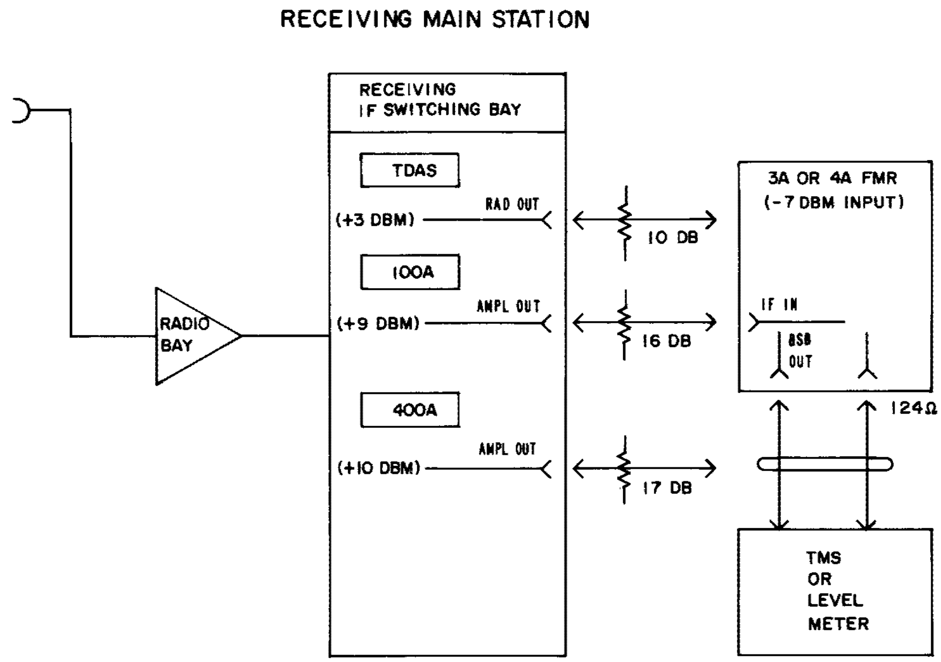


Fig. 6—Measurement of 9-MHz Noise

Example: If the actual fade at switch point was 40 dB and the difference was -2 dB, then the corrected fade at switch point would be (40) + (-2) = 38 dB.

12 Using the transmitter output power and the received carrier power, find the fade margin requirement in Fig. 8 (1200 circuits) or Fig. 9 (1500 circuits) and enter on the form in Fig. 2 next to REQUIREMENT dB (on the same line as CORRECTED FADE AT SWITCH POINT).

13 Compare the corrected fade margin of Step 11 with the calculated fade margin of Step 12.

Requirement: The corrected fade margin shall be within ±2.5 dB of the calculated fade margin. If this requirement is not met, check the received signal power at the receiving end of the hop being faded and the XPD (Section 415-410-513) at that station. These fade depth requirements are based on the following assumptions:

The fade margin requirements assume a roll-off at 9 MHz of approximately -0.5 dB between the receiving end of the faded hop and the end of the switching section. The requirements may have to be changed somewhat when there is a large number of hops

CHART 1 (Cont)

STEP	PROCEDURE

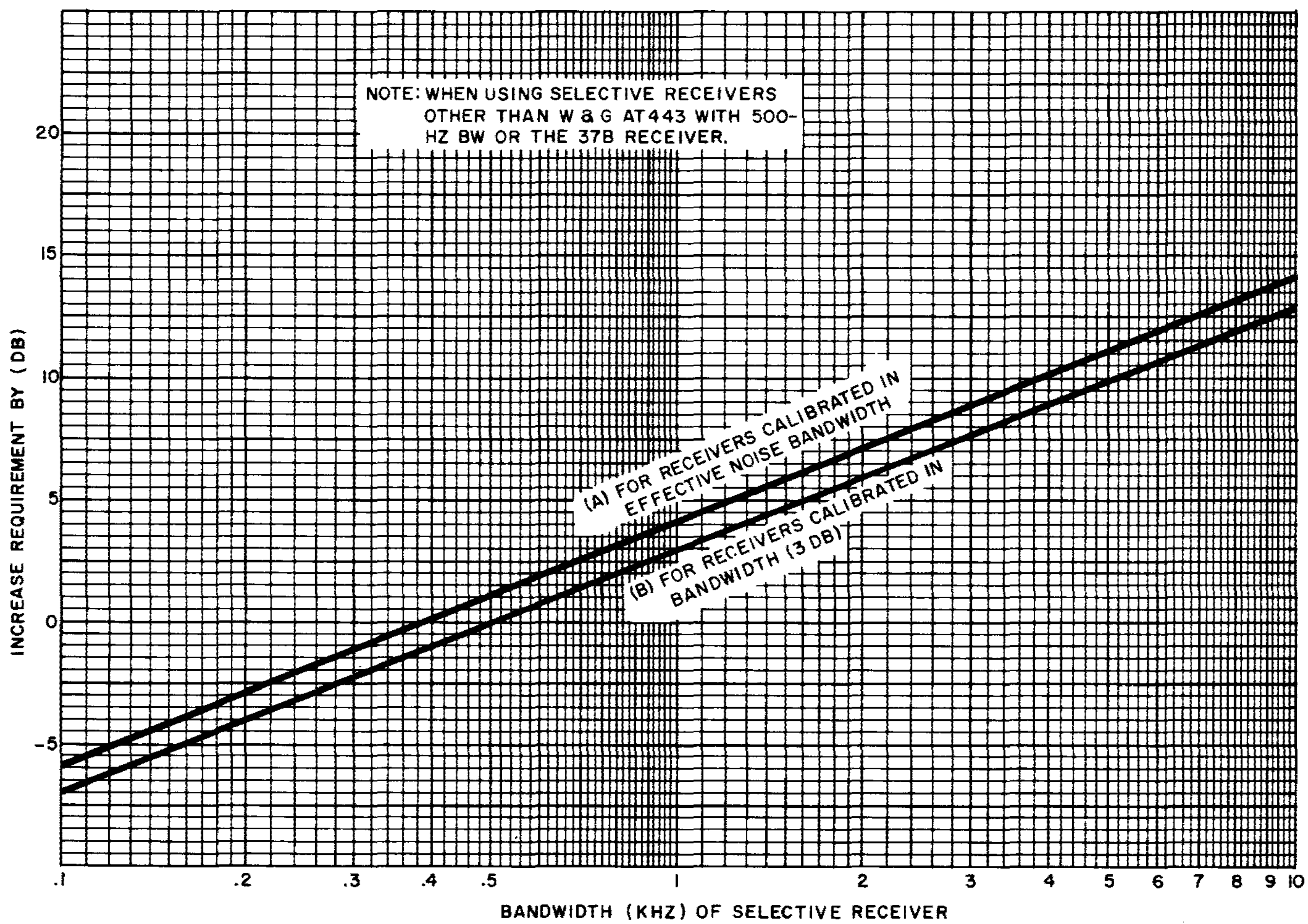


Fig. 7—Correction Factor for Thermal Noise Requirement

between the faded hop and the receiving main station and where there is considerable baseband roll-up or roll-off at 9 MHz.

Note: When fading the last radio hop (one closest to the receiving main station) and the switch section is equipped with a 100A Protection Switching System using J68381BG or J68381EF initiators, the channel may switch up to 2 dB sooner than given by the requirements and limits. This condition is under investigation.

CHART 1 (Cont)

STEP | PROCEDURE

TABLE A

CHANNEL INITIATOR OPERATE POINT

MESSAGE CAPACITY OF RADIO CHANNELS*	9-MHz NOISE — dBm			
	REGULAR CHANNEL		PROTECTION CHANNEL	
	400-Hz BW†	1.74-kHz BW†	400-Hz BW†	1.74-kHz BW†
600 Circuit Loading	−52	−45.5	−55.5	−49.5
1200 Circuit Loading	−57	−50.5	−61.0	−55.0
1500 Circuit Loading	−63	−56.5	−67	−60.5

* For video channels, the sensitivity shall be set to the same point as for 1200 circuit loading.

† BW is the effective noise bandwidth of the level meter. Use Fig. 7 to calculate the requirement for level meters having different bandwidths.

14 Proceed with Chart 2 if the hop under test is equipped with space diversity. If not so equipped, proceed to Chart 3. In either case, keep the same fade arrangement as set up for this chart.

CHART 2

SPACE DIVERSITY
PROTECTION SWITCHING SYSTEM SWITCH POINT

APPARATUS:

Same fade arrangement as in Chart 1.

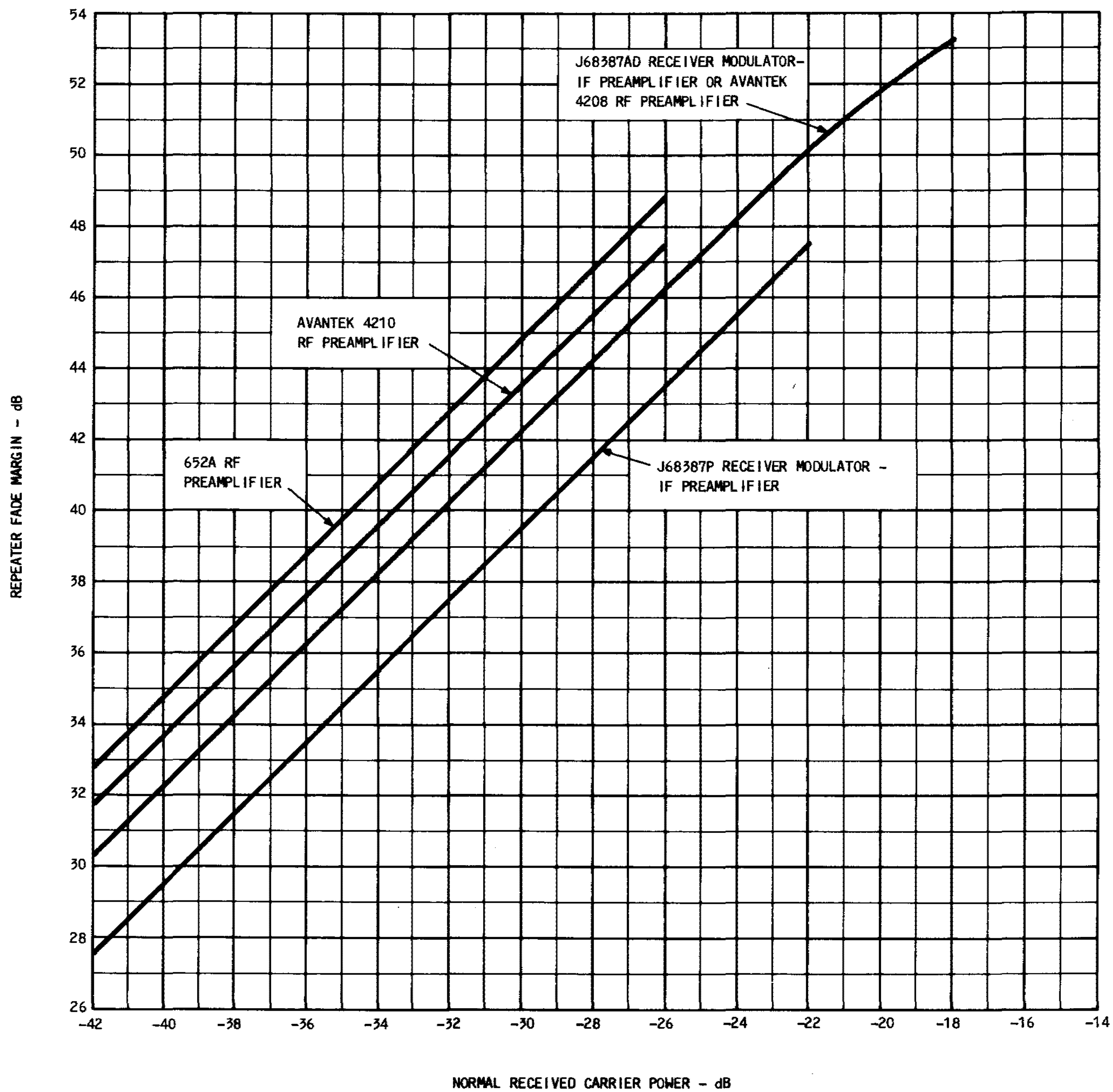


Fig. 8—Fade Margin of TD-3D Repeater—1200 Circuit Loading

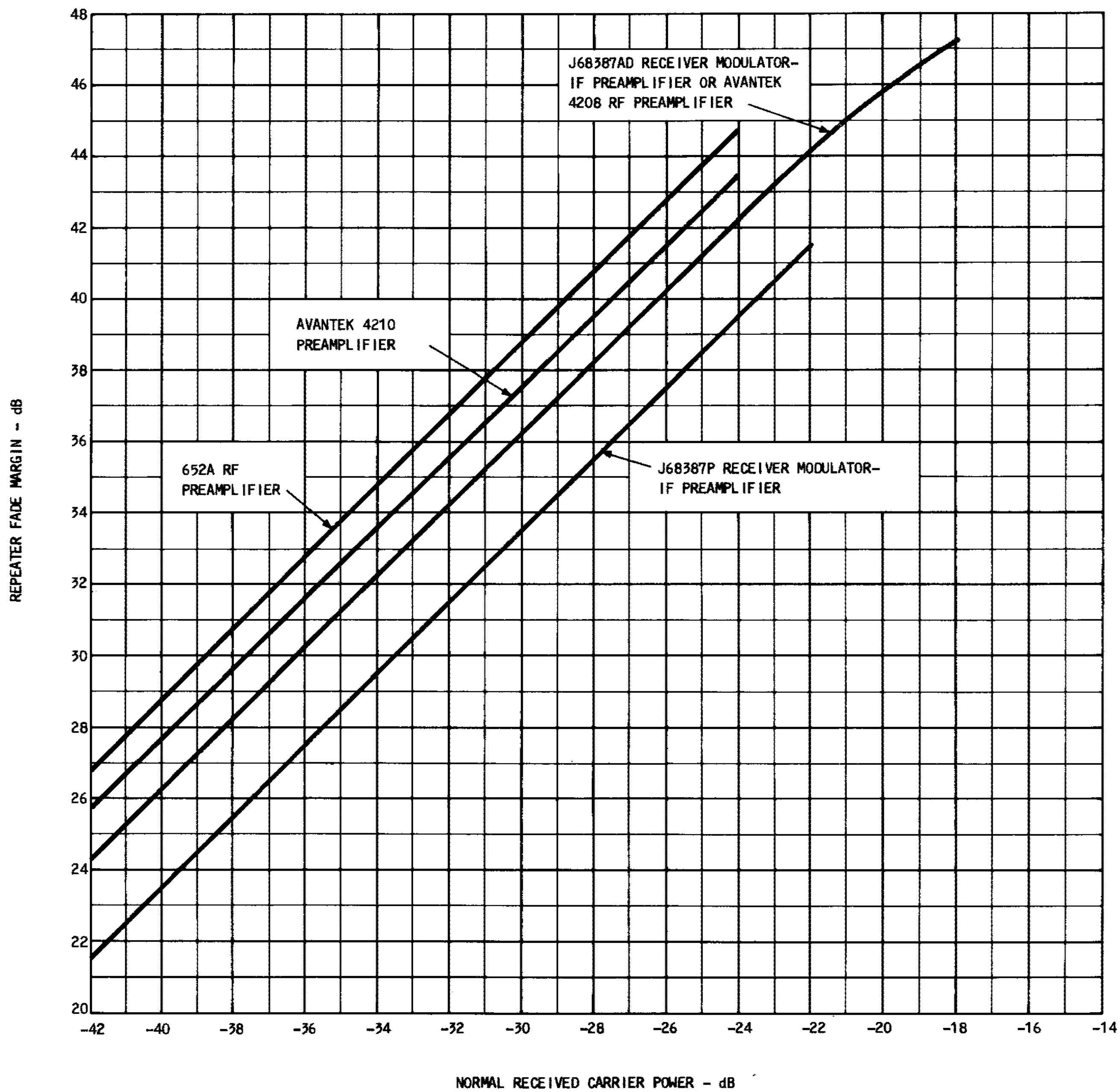


Fig. 9—Fade Margin of TD-3D Repeater—1500 Circuit Loading

CHART 2 (Cont)

STEP	PROCEDURE
1	With the channel ready to be faded as set up for Chart 1, have the receiver personnel operate the diversity switch to REGULAR, in normal (not forced) operation.
2	Slowly fade the transmitter until the receiver personnel report that the diversity switch has operated to the DIVERSITY antenna. Since both antennas are experiencing the fade, the switch will operate back and forth between the two antennas. Note the fade depth where this occurs. ***Requirement:*** The switch must operate at a fade of 3 dB less (earlier) than the ACTUAL FADE AT SWITCH POINT recorded on the form in Fig. 2 of Chart 1. Enter this amount of fade under the REMARKS heading of the form in Fig. 2. If this requirement is not met, adjust the trip point as given in Section 415-401-500.
3	Have the receiver personnel force-switch (lock) the switch to the DIVERSITY antenna. Fade the transmitter until the switch point of the ***frequency*** diversity switching system is reached. Note this value under the REMARKS heading of the form in Fig. 2 for future use in Chart 3 with the diversity antenna. There is no requirement for this value.
4	Force-switch (lock) the switch to the REGULAR antenna and proceed with the tests of Chart 3.
5	At the conclusion of all tests, leave the diversity switch in the normal operating position.

CHART 3

DUV FADE MARGIN AND CARRIER RESUPPLY OPERATION TESTS

APPARATUS:

(In addition to the transmitter fade apparatus of Chart 1.)

Transmitting Main Station

1—3A or 4A FM Transmitter

1—Baseband Level Generator (W&G, Siemens, or equivalent)

P2BJ Cords (unbalanced) or P3AH Cords (balanced) as required

Pads as required

CHART 3 (Cont)

APPARATUS (Cont):

1—26A Splitting Pad

1—Frequency Counter

Receiving Main Station

1—3A or 4A FM Receiver

1—124:75-ohm Transformer (197B or C) or 840956486 Cable Assembly

1—1017A 64-kHz Band-Elimination Filter

1—1051F Low-Pass Filter

1—J68448A-( ) Portable Pilot/Noise Monitor

1—Baseband Selective Meter (W&G, Siemens, or equivalent)

or

1—6G Noise Measuring Set or HP-3400 with Option H72, 75-ohm termination and a 5-dB pad.

STEP	PROCEDURE
1	Set up the test equipment at the transmitting end of the switching section as given in Fig. 10. The level generator and frequency counter should be warmed up to ensure that they are stable. Initially, set the frequency of the level generator to 64 kHz ±10 Hz and the power output to 0 dBm (-26 dBm into FMT). Temporarily reduce the fade as much as possible before adjusting the 64 kHz.
2	Set up the test equipment at the receiving end of the switching section as given in Fig. 11, option (X). Adjust the frequency of the selective level meter to peak (maximum) indication of the 64-kHz signal. Have the personnel at the transmitting end slowly and carefully adjust the 64-kHz frequency in order to center the generator frequency at the maximum insertion loss of the 64-kHz band-elimination filter. This is a very sharp filter. See Fig. 12 for explanation. The selective meter indication should be within the range of -65 to -75 dBm. When the signal is properly centered in the notch of the filter, record the selective level meter power indication. At the transmitting end, record the frequency.
	Note: If great difficulty is encountered, send 64 kHz from the receiving end and loop it back at the transmitting end of the section.

CHART 3 (Cont)

STEP	PROCEDURE

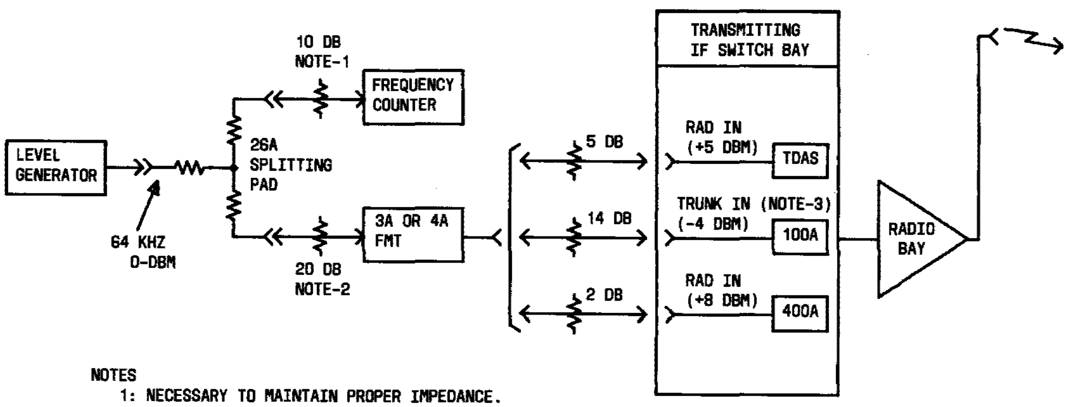


Fig. 10—Transmitting Location—Fade Margin Test Arrangement

3 Immediately after centering the 64-kHz signal in the BEF, connect option (Y) and fade the channel to the same switch point as was found in Step 6 of Chart 1 and see if the critical noise level has been reached. To determine this point with a 6G noise set, set the dBrn dials to 20 and to 4 and see if the average noise reading is greater or less than a reading of 15 on the 6G scale. With the HP-3400 (option 72, and a 75-ohm termination) connect a 5-dB pad at the input to the meter and set the RANGE switch to -50 dB. See if the average noise reading is greater or less than a reading of -5 dB on the scale. If the reading is greater, slowly reduce the amount of fade until the reading is averaging around the scale reading of 15 (6G) or -5 dB (3400A). If the reading is less, slowly increase the amount of fade until the reading is averaging around the scale reading of 15 (6G) or -5 dB (3400A). When the correct fade point is found, the amount of the fade should be recorded on Fig. 2 next to CRITICAL FADE DEPTH. Calculate the DUV fade margin by subtracting the fade at switch point from the critical fade depth.

Requirement: If the DUV fade margin is 0 dBm or less (negative), then a copy of the form in Fig. 2 shall be sent to the transmission or radio engineering group. As it is normally beyond the resources of local operations personnel to cure poor DUV fade margins caused by cochannel interference, the district or area transmission personnel should be notified so that they can more fully investigate the sources of cochannel interferences. However, if the problem is caused by the protection switching channel initiators not being set properly, steps should be taken to readjust them and repeat these tests.

4 If the channel is equipped with carrier resupply, reconnect option (X) and observe the level meter indication of the 64-kHz signal. Continue fading the channel until the 64-kHz

CHART 3 (Cont)

STEP	PROCEDURE

signal disappears. This is the carrier resupply operate point. Record this value on the form in Fig. 2, (CARRIER RESUPPLY FADE DEPTH line).

Requirement 1: The fade depth at resupply operation shall be within ±2 dB of the requirement given in Fig. 13.

Requirement 2: The fade at CRS trip point shall be 2 dB or more below the fade depth at switch point.

If the requirement is ***not*** met, but the requirements of Chart 1 ***were*** met, check the CRS trip point adjustment of the IF main amplifier at the receiving end of the radio hop under test. Also, check the gain of the IF preamplifier. The output of the IF preamplifier should not be greater than 0 dBm.

Note: Under certain conditions of 1200 circuit loading on the channel, there will be little or no margin between the fade at the carrier resupply operate point and the channel switch point. These conditions are as follows:

(a) The channel has 1200 circuit loading and is equipped with the J68387P receiver modulator—IF preamplifier and the received carrier power is around -22 dBm.

(b) The channel has 1200 circuit loading and is equipped with the J68387AD receiver modulator—IF preamplifier and the received carrier power is -27 dBm or greater (-25 dBm).

(c) The channel has 1200 circuit loading and is equipped with 652A RF preamplifier and the received carrier power is around -27 dBm.

If there is no margin between the CRS operate point and the channel switch point and the above conditions apply, then it will be necessary to readjust the CRS trip point of the IF main amplifier to give a 2-dB margin. (This means the CRS trip point will be adjusted to operate below 0 dB output from the IF main amplifier.) The IF main amplifier shall be tagged with a note stating where the CRS trip point should be set and why.

5 If the hop under test has a diversity antenna, repeat this chart with the receiver force-switched (locked) to the DIVERSITY antenna. When calculating the DUV fade margin, use the switch point of IF protection switching recorded under the REMARKS heading of the form in Fig. 2 as found in Chart 2. When this DUV fade margin for the diversity antenna has been measured and calculated, also record this value under the REMARKS heading of the form in Fig. 2.

6 At the conclusion of all tests, restore the bay to normal and return the channel to service.

7 File all copies of the form in Fig. 2 with the other switching section test results for that particular channel.

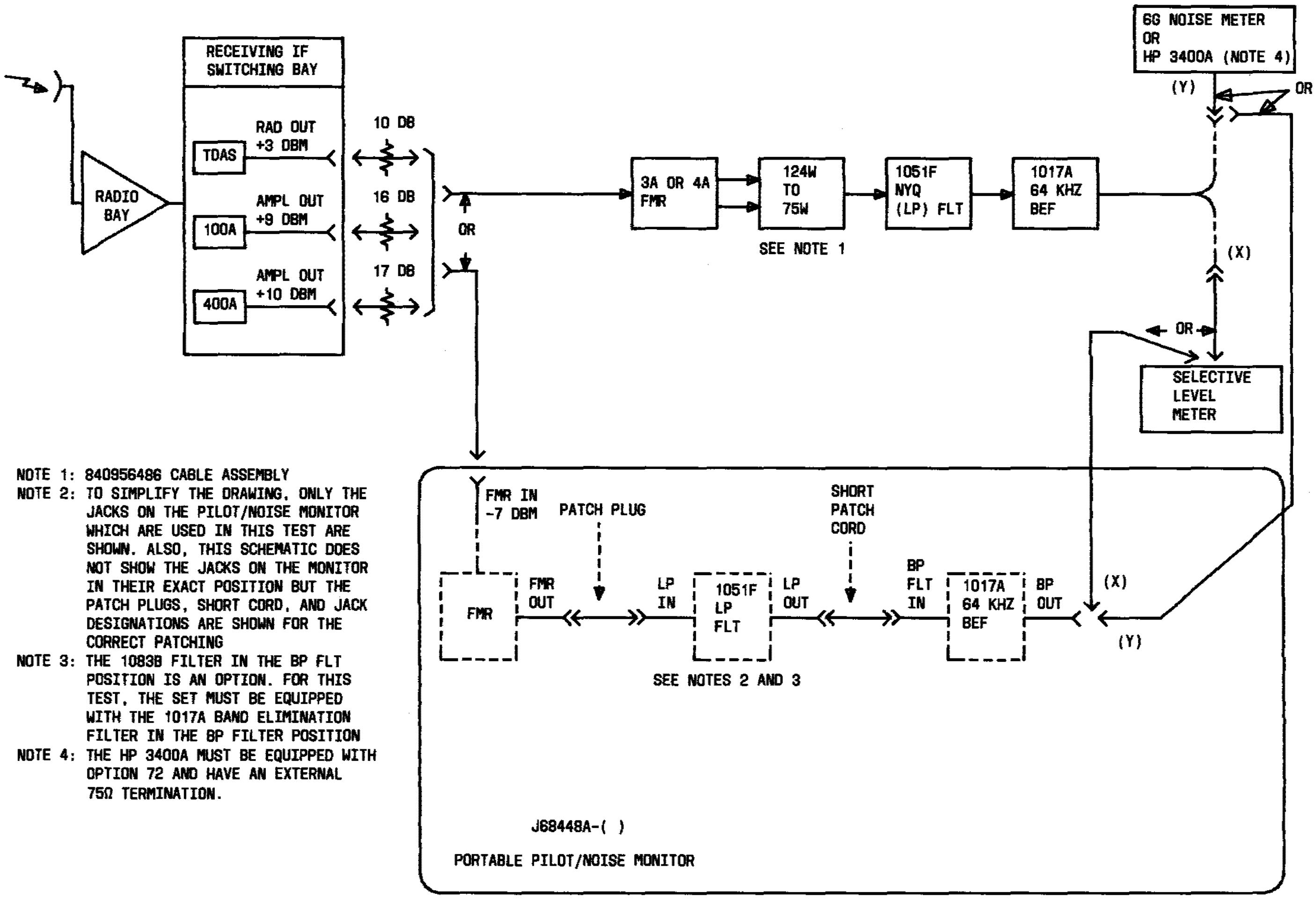


Fig. 11—Receiving Location—Fade Margin Test Arrangement

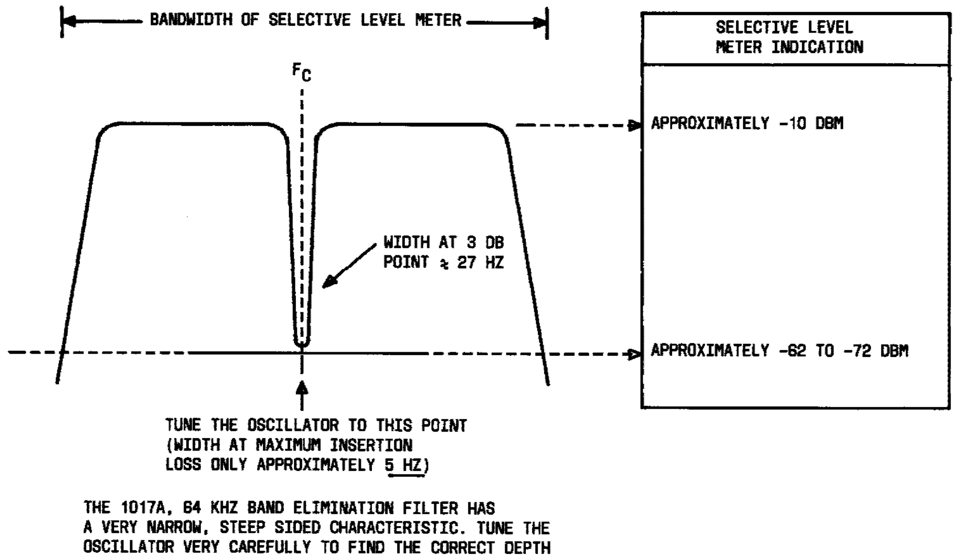


Fig. 12—64-kHz Filter Characteristic

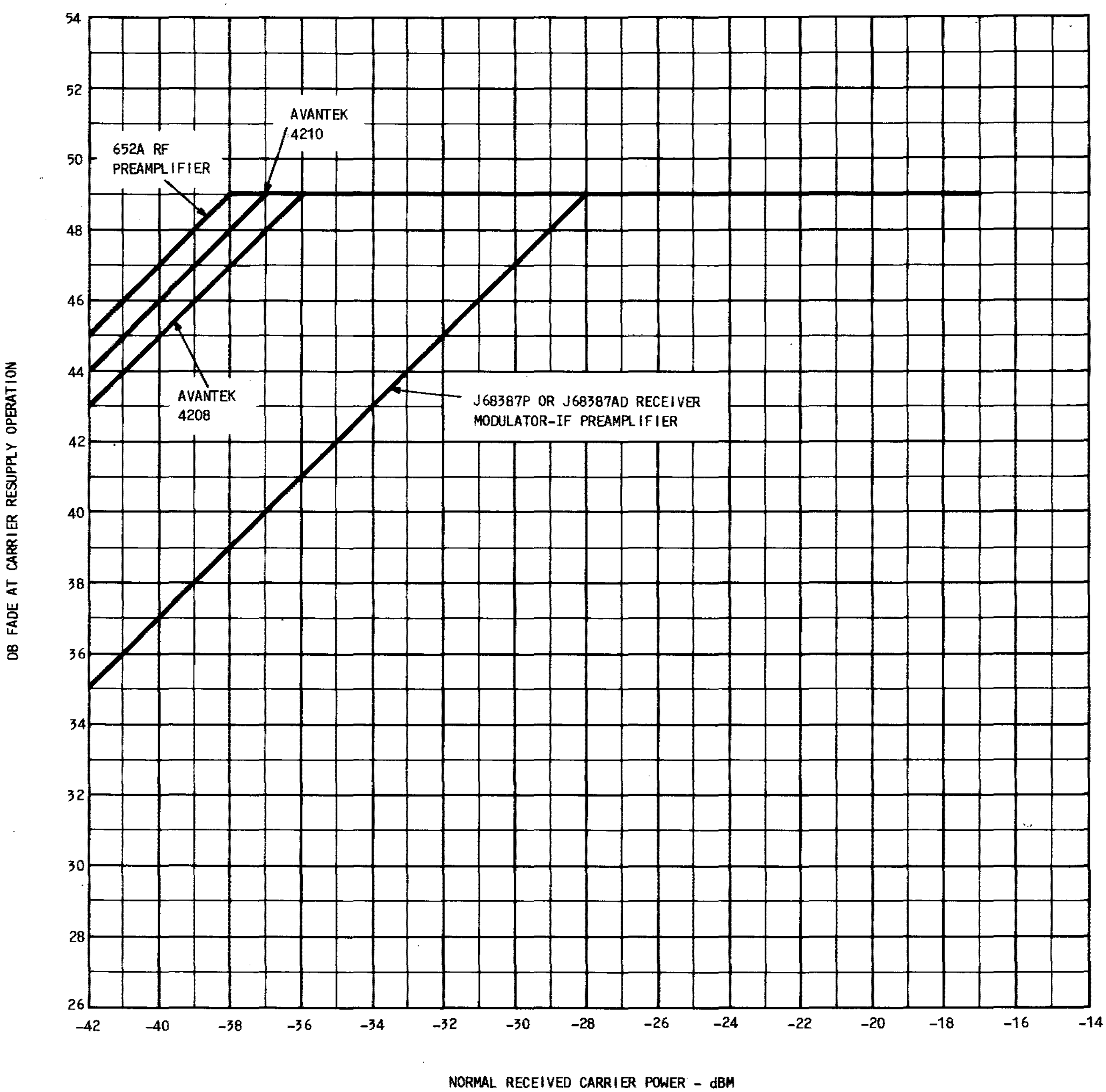


Fig. 13—Carrier Resupply Fade Depth vs Normal Received Carrier Power