

TD-3A MICROWAVE RADIO
J68386G AND J68386H TRANSMITTER-RECEIVER BAYS
COMMON EQUIPMENT TESTS
FADE MARGIN TESTS

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411-100-508, Received Carrier Power. 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.

Note: The measurements in this section should be made when the radio path is in a stable, essentially nonfading condition; ie, when the received carrier power is stable within ± 1 dB. The received carrier indication on the receiver control panel should be used to verify a stable condition.

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 when switching, 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. The factors which control the received signal power are more fully discussed in Section

1.02 This section is reissued for the following reasons:

- (a) Revise Table A to include requirements for 1800 circuit loading.
- (b) Provide the 1800 circuit loading fade margin requirement.
- (c) Provide a new procedure for fade margin tests using the J68448A() portable pilot/noise monitor.
- (d) Revise Fig. 14 pertaining to the carrier resupply fade depth.

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; however, it does not change the mandatory work requirements specified in the Equipment Test List. The fade margin tests should be performed once on each new channel before it is placed in service

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SECTION 411-502-512

and then performed as necessary in the troubleshooting process.

1.04 This section 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), or 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. This 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.

1.05 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 approximately 3 to 5 noise seconds in one minute on the J68448A() portable

pilot/noise monitor; or to a -39 dBm indication on the 6G noise meter; or to a -50 dBm indication on the 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**.

1.06 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.

1.07 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.

1.08 These tests require that personnel be at the transmitting end of the switching section, the receiving end of the switching section, and at the transmitter being faded. Additionally, if the radio hop is equipped for space diversity operation, this feature must be disabled at the receiving end of the **radio hop** being faded.

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

Note: These tests require components from several different test sets and the Microwave Research transducer associated with the portable microwave repeater (PMR). Stations not having the equipment listed in the charts must arrange to borrow the necessary units.

1.09 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.

1.10 Form E-10108, entitled Fade Margin Test Form, is provided to facilitate standard record-keeping and the recording of pertinent information pertaining to the radio hop and switch section to be tested, and the test results. In those instances where it is normally beyond the resources of local operations personnel to handle abnormal trouble situations, the district or area transmission personnel should be notified and a completed copy of the E-10108 form should be forwarded to those concerned people for the appropriate action.

2. CHARTS

CHART 1

PROTECTION SWITCHING SYSTEM SWITCH POINT

APPARATUS:

Transmitting Station

1—J68392A or J68428A Test Set

1—61B, 20-dB, 5-Watt Waveguide Pad

CHART 1 (Contd)

APPARATUS:

2—20-dB Waveguide Variable Attenuators

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

2—24A Transducers

2—Microwave Research Corp. B40-186 Transducers

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

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

Receiving Station

1—3A or 4A FM Receiver

1—Selective Level Meter (W&G, Siemens, 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 at +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, then the received carrier power should be measured as outlined in Section 411-100-508. Figure 1 can be used as a guide. The data in Fig. 1 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 411-100-508, 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.

CHART 1 (Contd)

- (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.

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.

STEP	PROCEDURE
1	Calibrate the cords and attenuators in Fig. 2 at the frequency of the channel to be measured, by using the test arrangement in Fig. 3.
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 this value on the form given in Fig. 4. (Do not use meter 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. 5. Have this value recorded on the form in Fig. 4.
4	Record the correct received carrier power on the form in Fig. 4.
5	Turn off the TWT. Remove the short piece of flex waveguide above the transmitter and attach the two Microwave Research Corp. B40-186 transducers to the exposed flanges. Attach the fade test arrangement of Fig. 2 to the transducers and turn the TWT back on.
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 3 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. 4 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. 4 for the bandwidth of the selective meter in use. If using a selective meter with other than

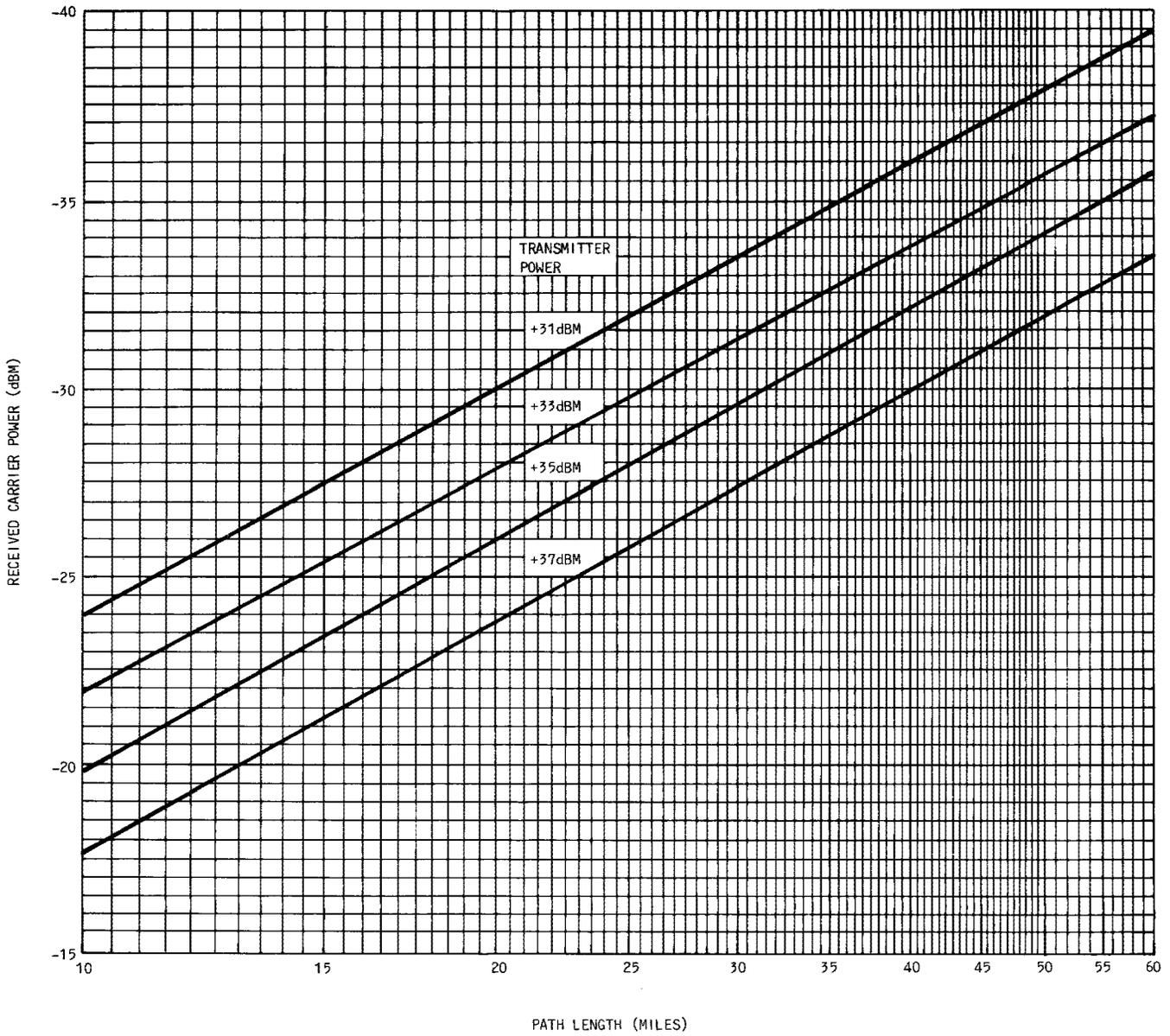
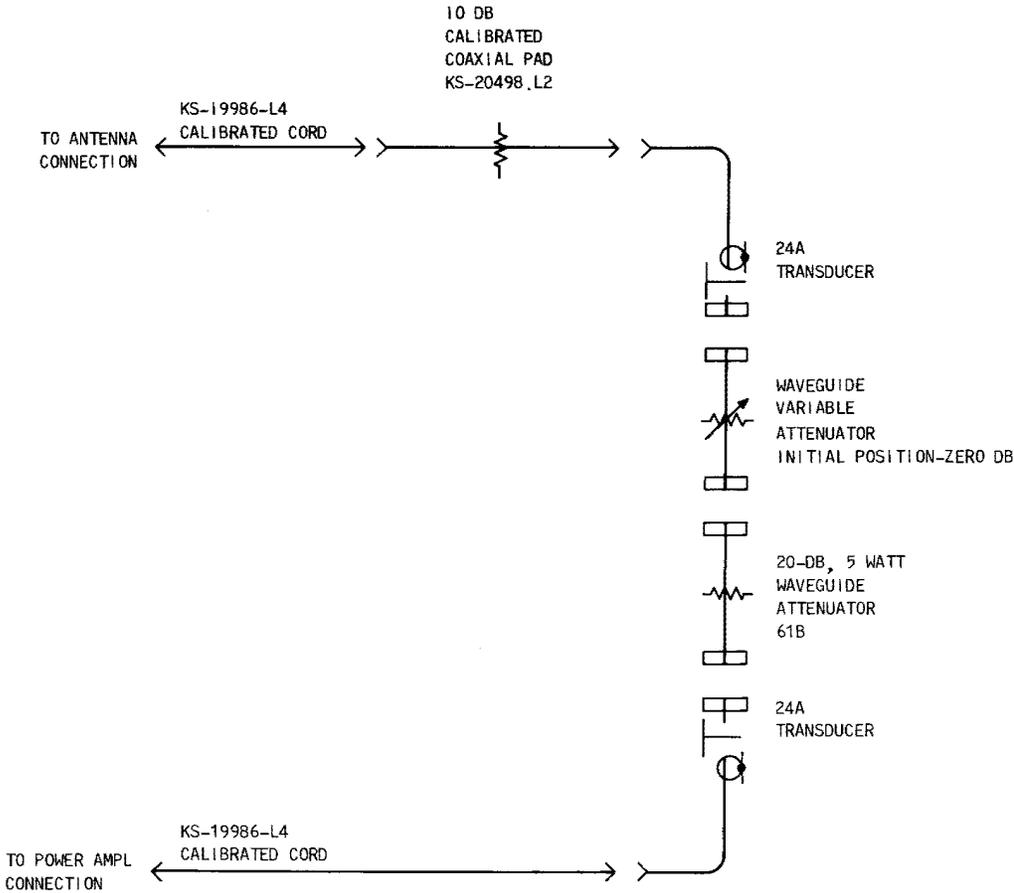


Fig. 1—4-GHz Received Carrier Power VS Path Length and Transmitter Output Power

CHART 1 (Contd)

STEP	PROCEDURE
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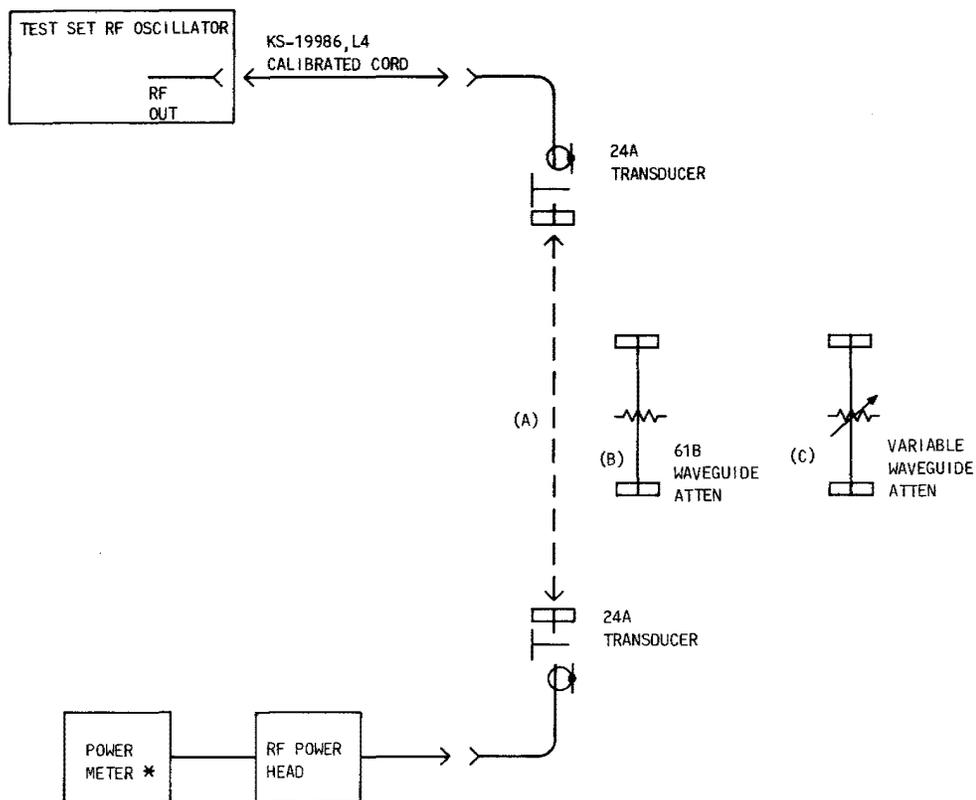
NOTE:
THE PADS MUST BE ARRANGED IN THE ORDER SHOWN IN ORDER TO AVOID DAMAGE TO LOWER POWER COMPONENTS. WHEN FIGURING THE AMOUNT OF ATTENUATION THAT CAUSES A SWITCH, BE SURE TO INCLUDE THE LOSS MARKED ON THE CALIBRATED CORDS AND COAXIAL PAD.

Fig. 2—Fade Test Arrangement

CHART 1 (Contd)

STEP

PROCEDURE



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 OUTPUT 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. 3—Calibration of Test Attenuators

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. 4—Fade Margin Test Form

CHART 1 (Contd)

STEP

PROCEDURE

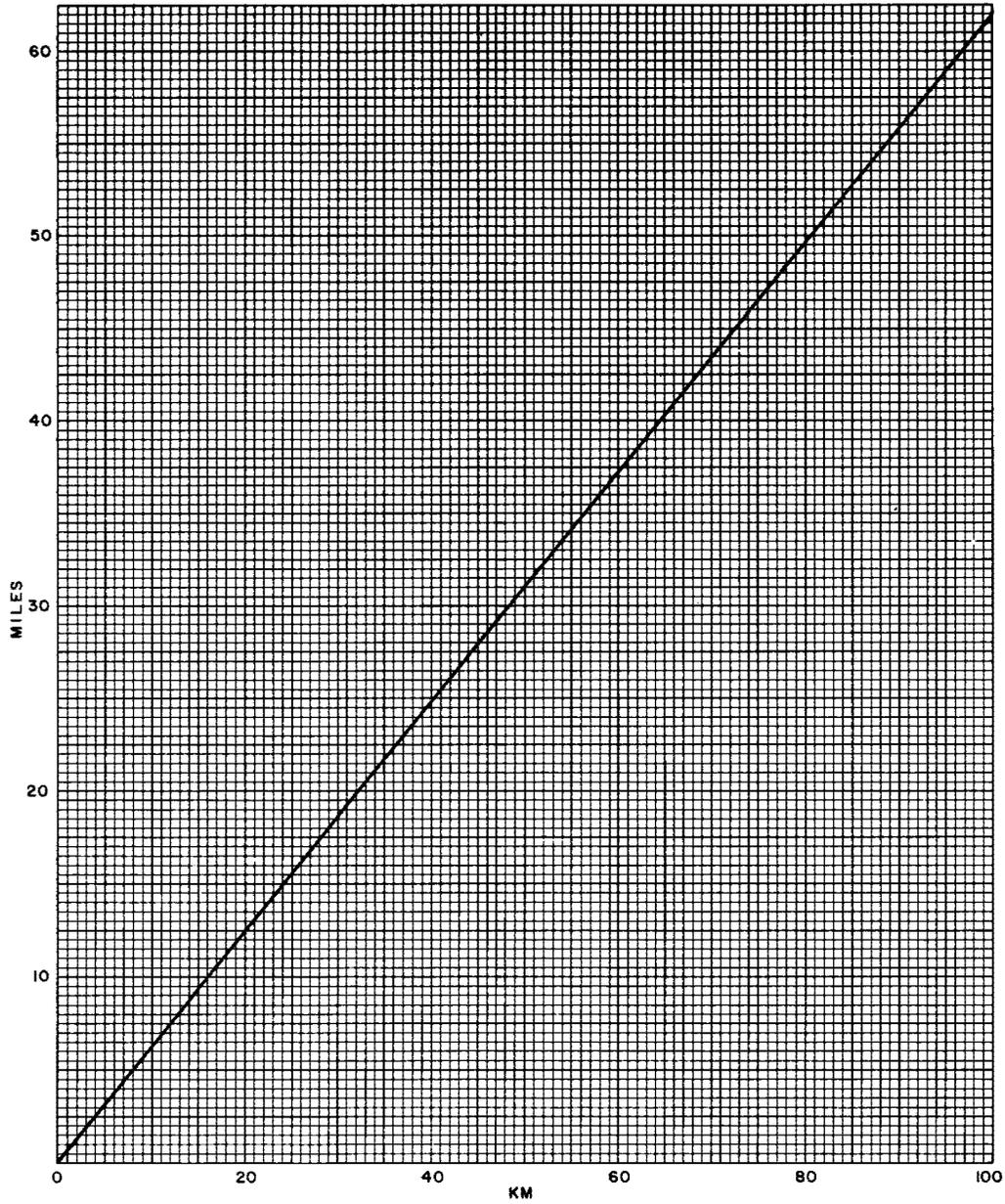


Fig. 5—Kilometers to Statue Miles

CHART 1 (Contd)

STEP

PROCEDURE

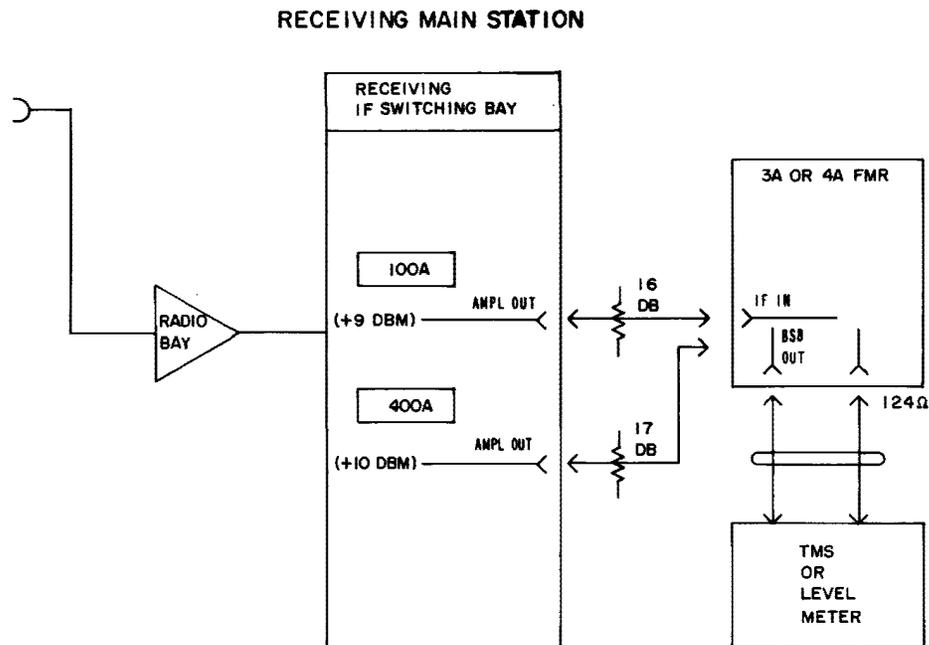


Fig. 6—Measurement of 9-MHz Noise

a 400-Hz or 1.74-kHz bandwidth, subtract the correction factor from Fig. 7, subtract the amount from the selective meter indication, and record the corrected value in Fig. 4 in the space labeled 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. 4.

- 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. 4.

Example: In Table A under WITHOUT SPACE DIVERSITY, REGULAR CHANNEL, 400-Hz BW, 1200 Circuit Loading, the initiator operate requirement is -57 dBm. If the 9-MHz noise corrected to 400-Hz bandwidth is -55 dBm, then the difference is $(-57 \text{ dBm}) - (-55 \text{ dBm}) = -2$ dB. This number would then be entered as DIFFERENCE on the form in Fig. 4.

CHART 1 (Contd)

STEP	PROCEDURE
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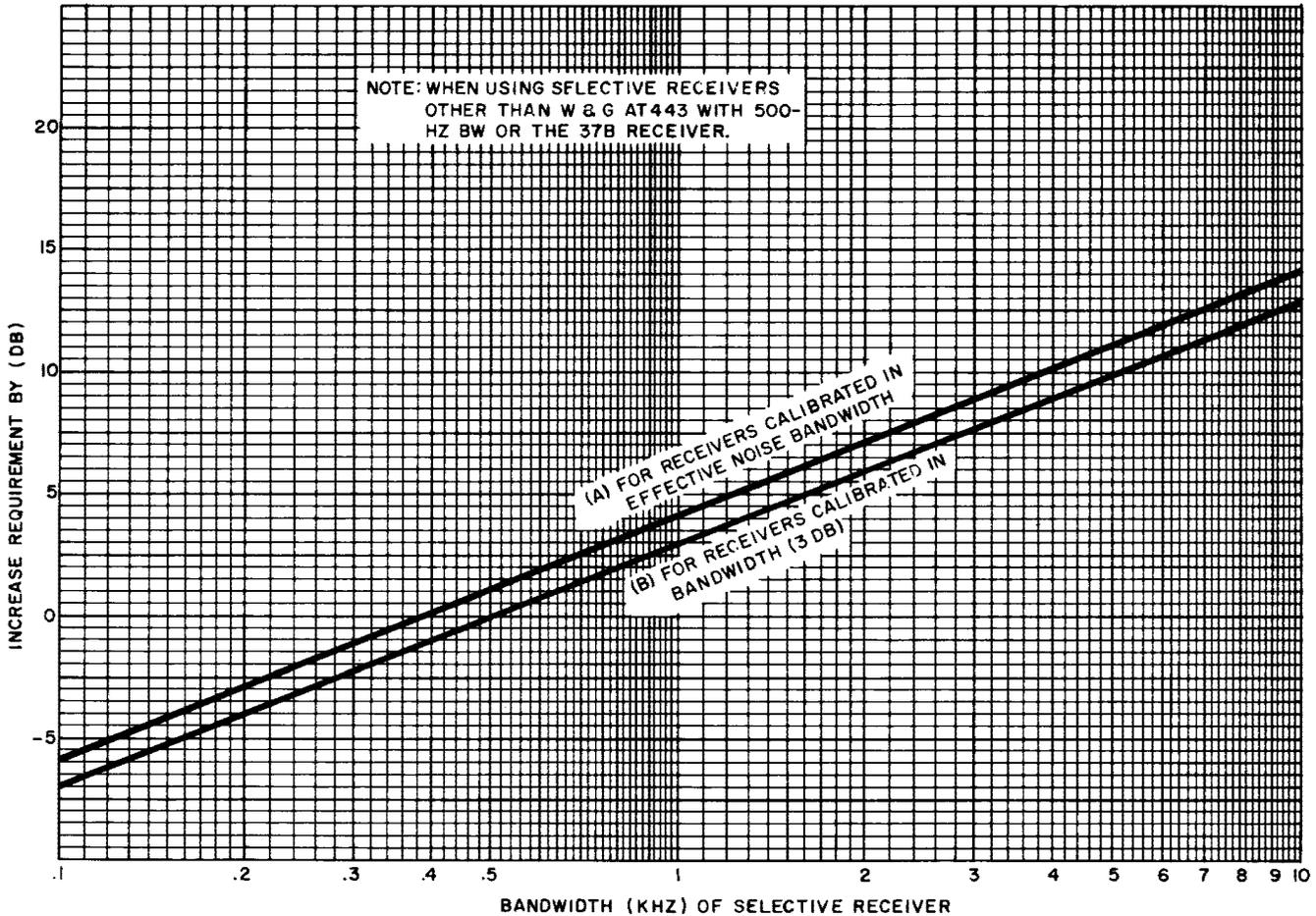


Fig. 7—Correction Factor for Thermal Noise Requirement

- 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. 4.

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.

- 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) or Fig. 10 (1800 circuits)

CHART 1 (Contd)

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†
1200 or less Circuit Loading	—57	—50.5	—61.0	—54.5
1500 Circuit Loading	—63	—56.5	—67.0	—60.5
1800 Circuit Loading	—63	—56.5	—67.0	—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.

and enter on the form in Fig. 4 as 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 carrier power (Section 411-100-508) at the receiving end of the hop being faded and the XPD (Section 411-502-513) at that station. These fade depth requirements are based on the following assumption:

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 shifted somewhat when there are a large number of hops 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 100A Protection Switching System using J68381BG or

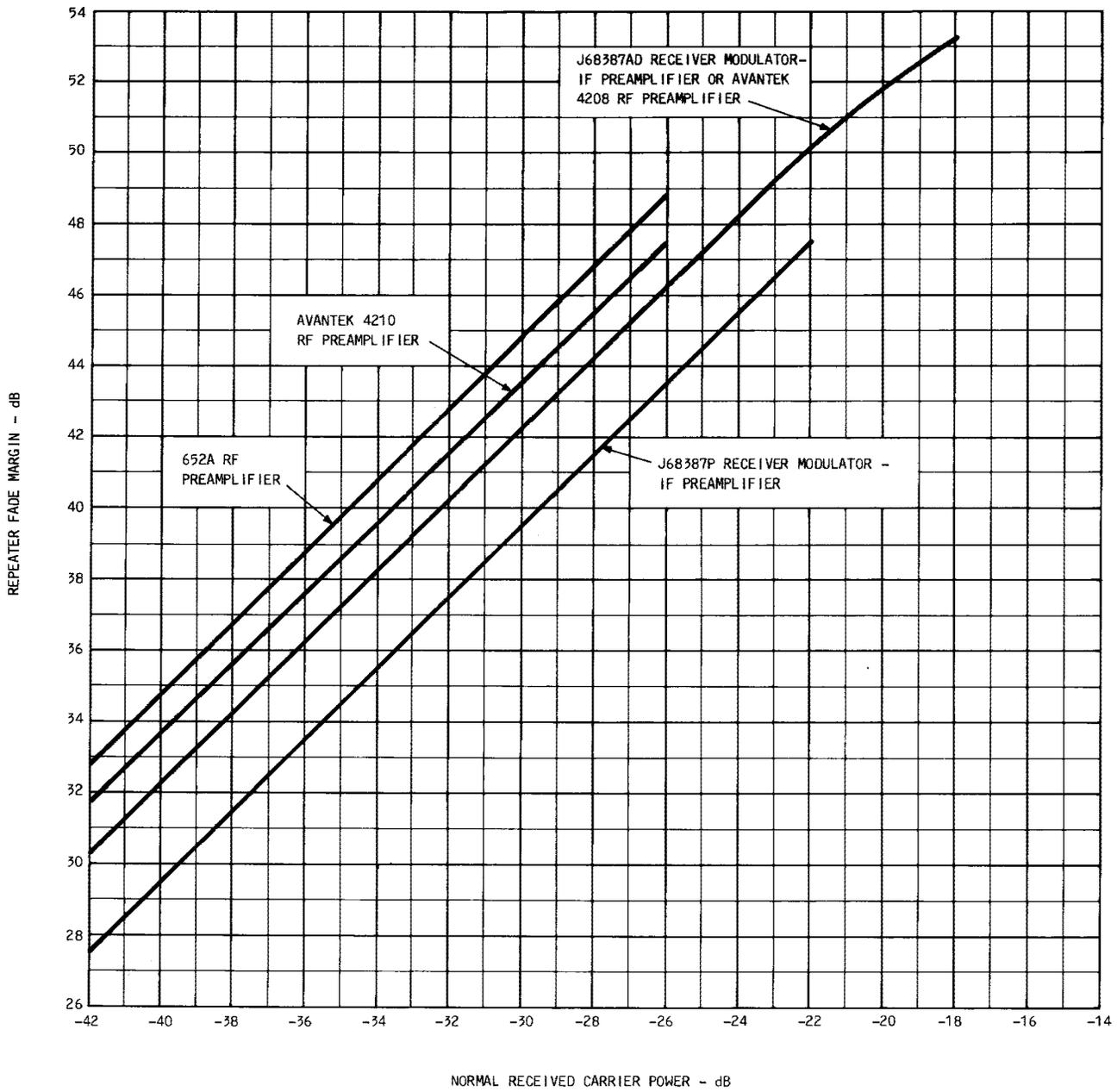


Fig. 8—Fade Margin of TD-3 Repeater—1200 Circuit Loading

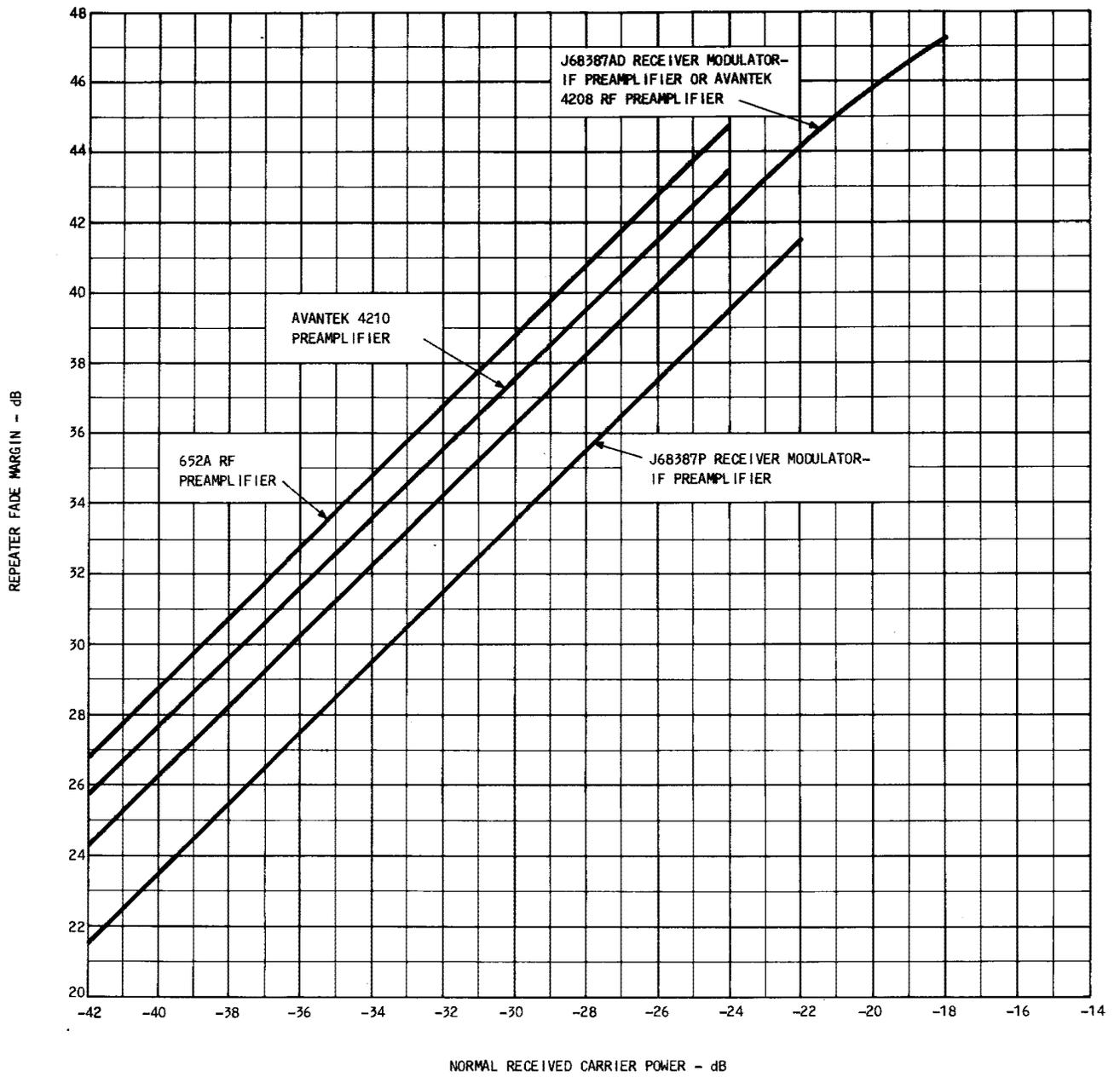


Fig. 9—Fade Margin of TD-3 Repeater—1500 Circuit Loading

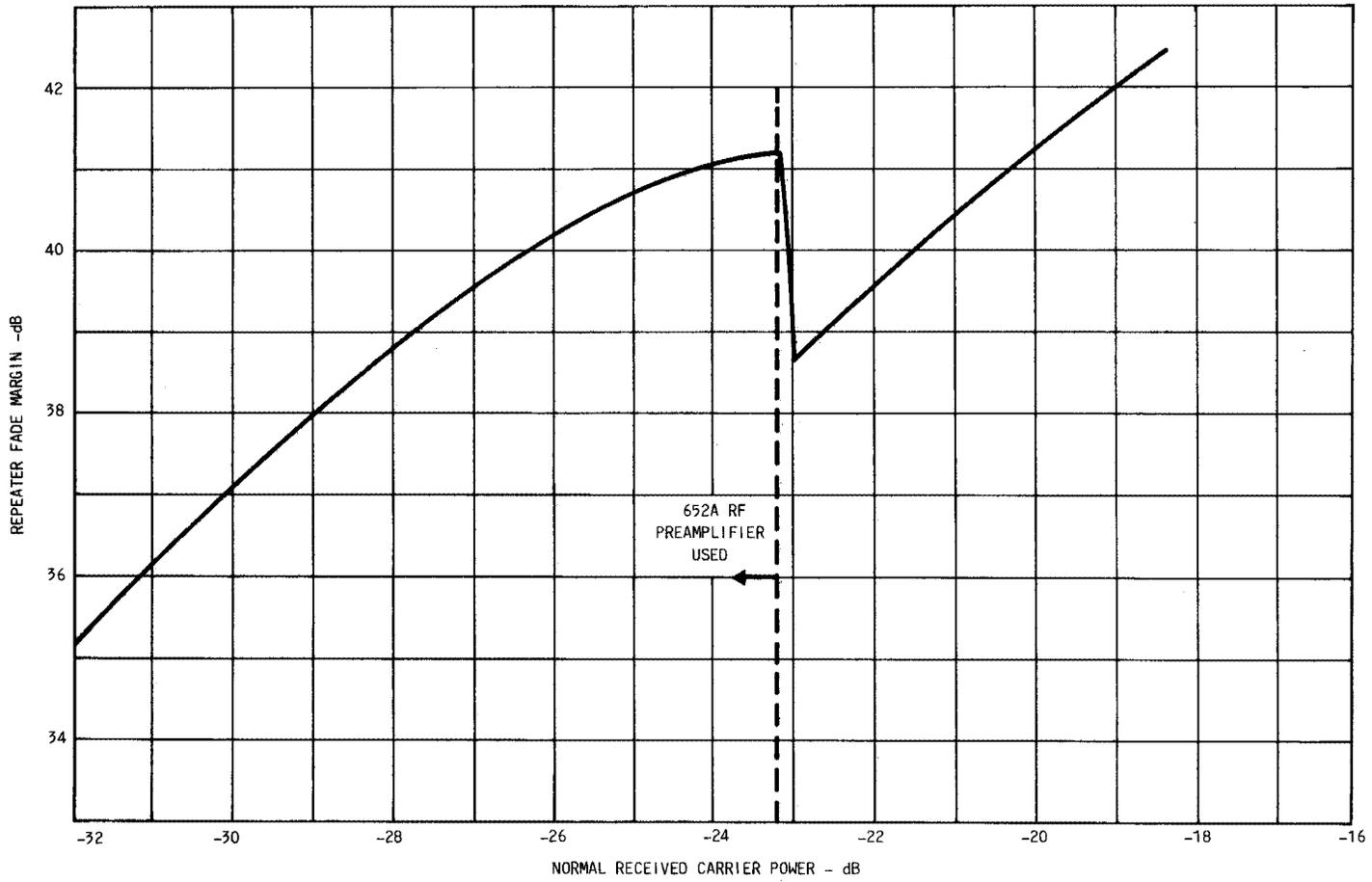


Fig. 10—Fade Margin of TD-3A Repeater—1800 Circuit Loading

CHART 1 (Contd)

STEP**PROCEDURE**

J68381EF initiators, the channel may switch up to 2 dB sooner than given by the requirements and limits. This condition is under investigation.

14 Proceed with Chart 2.

CHART 2
**COCHANNEL INTERFERENCE—DUV FADE MARGIN AND
CARRIER SUPPLY OPERATIONAL TEST**

APPARATUS:

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

Transmitting Main Station

1—3A or 4A FM Terminal Transmitter

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

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

Pads as required

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—J68448A() Portable Pilot/Noise Monitor

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

1—6G Noise Measuring Set of HP-3400A with Option H72, 75-ohm Termination and a 5-dB Pad.

CHART 2 (Contd)

STEP	PROCEDURE
1	Set up the test equipment at the transmitting end of the switching section as given in Fig. 11. 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 \pm 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. 12, 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 1017A 64-kHz band elimination filter (1017A filter). This is a very sharp filter. See Fig. 13 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 back at the transmitting end of the section.
3	Critical fade depth determination:

Preferred Method Using the J68448 () Portable Pilot/Noise Monitor (P/N Mon)

Note 1: The P/N MON must be equipped with the 1017A filter and modified according to CN 6953 MV.

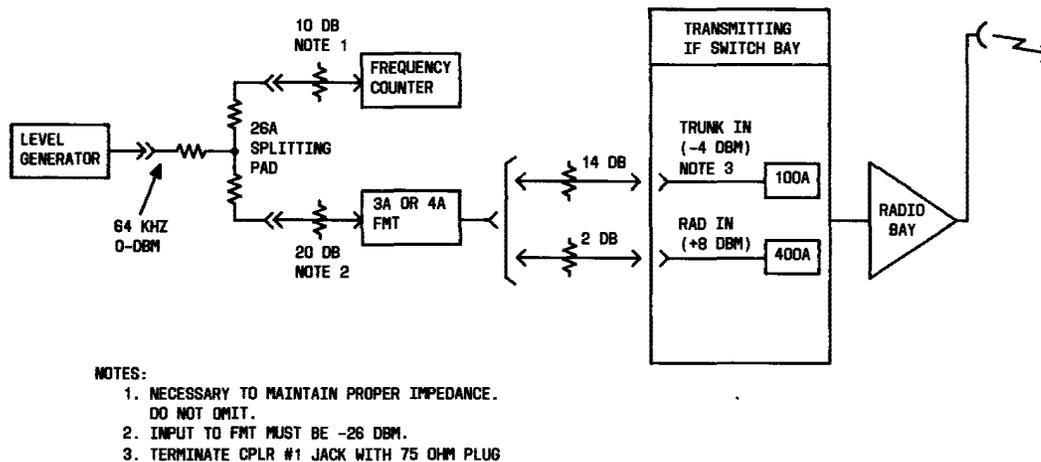


Fig. 11—Transmitting Location—Fade Margin Test Arrangement

CHART 2 (Contd)

STEP

PROCEDURE

Note 2: The baseband gain of the FMR in the P/N MON must be within limits.

- (1) Connect option (Z), Fig. 12, immediately after centering the 64-kHz signal in the 1017A filter.
- (2) Adjust the threshold voltage to the proper level in accordance with Section 103-628-100.
- (3) Set the NOISE-PLT PH switch to NOISE.
- (4) Fade the channel and monitor the NOISE SEC display for the correct fade point.

Requirement: Approximately 3 to 5 NS (noise seconds) in one minute.

- (5) When the correct fade point is found, the amount of fade should be recorded in Fig. 4 in the space provided for CRITICAL FADE DEPTH.

Alternate Method Using the 6G Noise Measuring Set or HP-3400A Voltmeter With Option H72, 75-ohm Termination and a 5-dB Pad.

Immediately after centering the 64-kHz signal in the 1017A filter, connect option (Y), Fig. 12, and fade the channel to the same point as was found in Step 7 of Chart 1 and see if the critical noise level has been reached. To determine this point with a 6G noise set, set the dBm 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-3400A (option H72, 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 (HP-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 (HP-3400A). When the correct fade point is found, the amount of the fade should be recorded in Fig. 4 in the space provided for CRITICAL FADE DEPTH.

- 4 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. 4 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 initiators not being set properly, steps should be taken to readjust them and repeat these tests.

- 5 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 2 (Contd)

STEP

PROCEDURE

signal disappears. This is the carrier resupply operate point. Record this value on the form in Fig. 4, (CARRIER RESUPPLY FADE DEPTH line).

Requirement 1: The fade depth at resupply operation shall be within ± 2 dB of the requirement given in Fig. 14.

Requirement 2: The fade at the 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 at the receiving end of the radio hop under test. Also, check the gain of the IF preamplifier.

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.

- 6 With the channel faded, the FAIL lamp will be lit at the receiving switch bay. Remove the patch to this bay from the FMR. The FAIL lamp should remain lighted.
- 7 Reduce the fade by removing approximately 20 dB from the attenuation at the transmitter.

Requirement: The FAIL lamp shall go out.

- 8 Slowly increase the attenuation until the FAIL lamp lights. Compare this amount of fade with the amount found in Step 4.

Requirement: The fade that calls for a protection switch shall occur 2 dB or more before the fade that causes the carrier resupply to operate.

CHART 2 (Contd)

STEP	PROCEDURE
9	If this requirement is not met, check the frequency and power output of the carrier resupply generator. It should be determined that the sideband frequency is correct for the type of protection used.
10	At the conclusion of all tests, restore the bay to normal and return the channel to service.
10	File all copies of the form Fig. 4 with the other switching section test results for that particular channel.

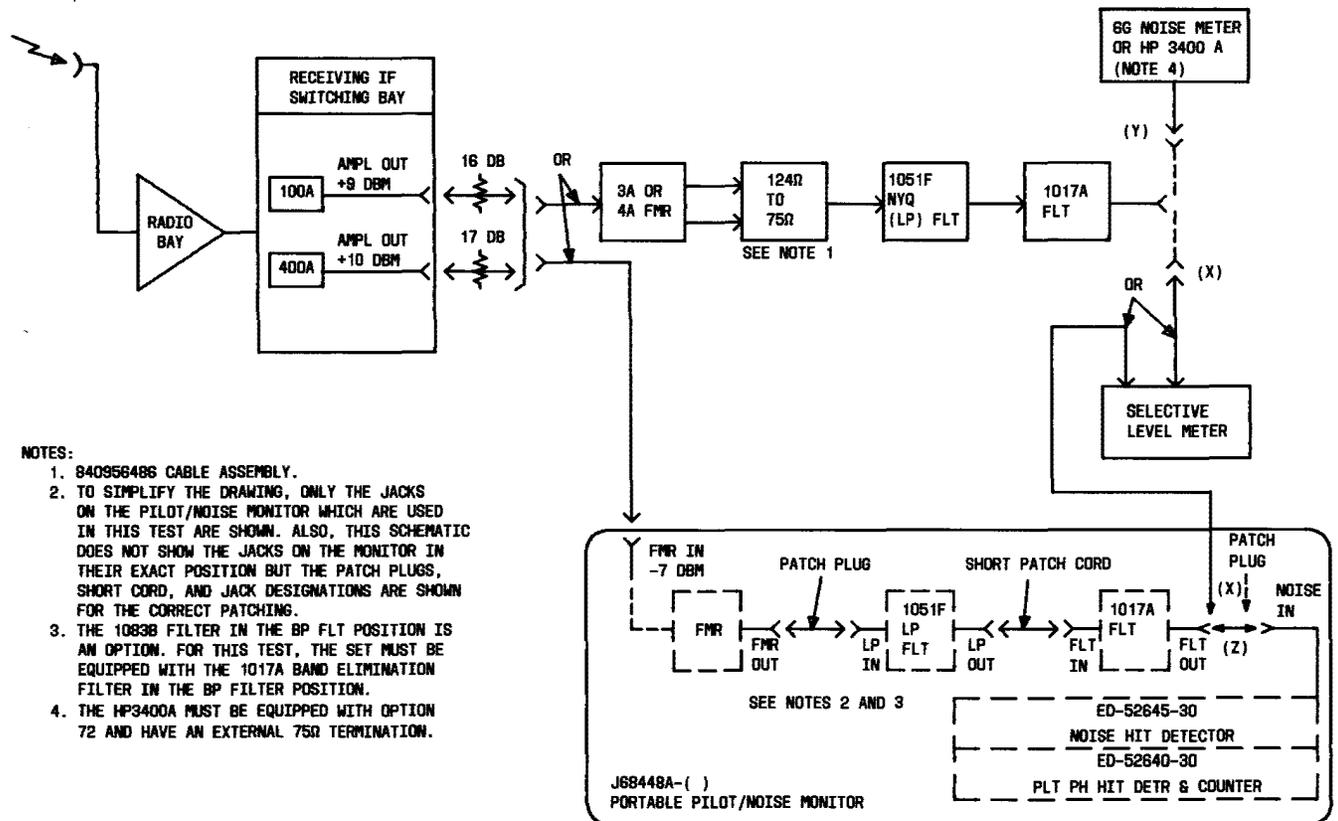
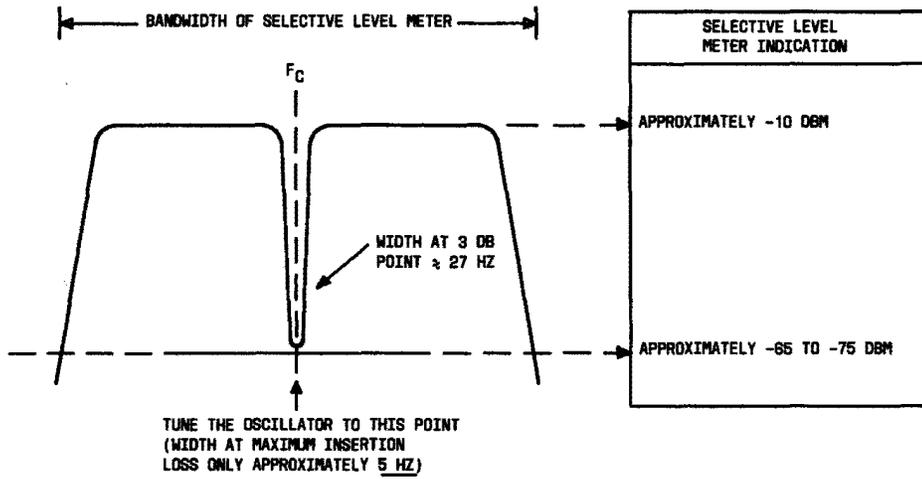
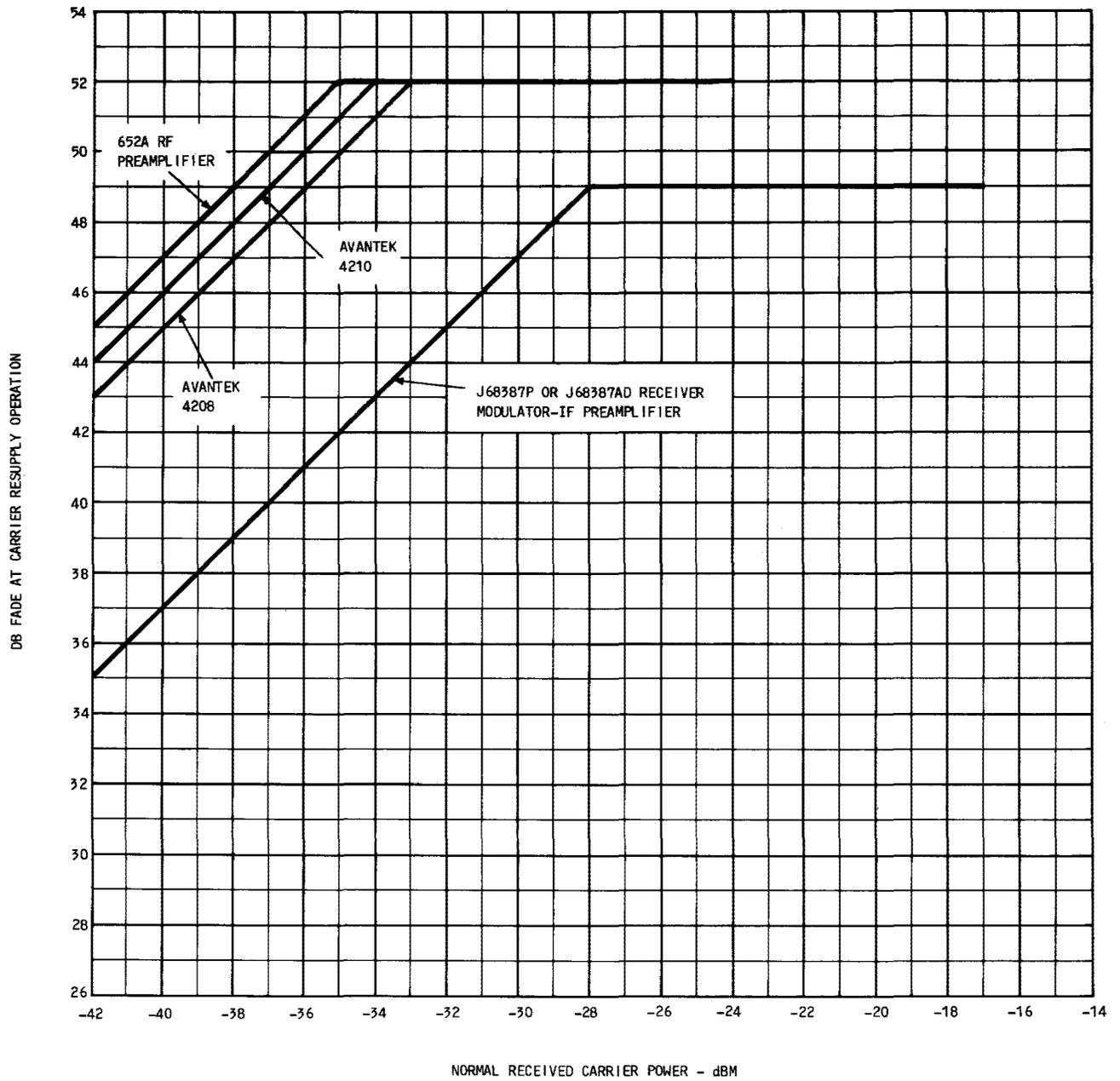


Fig. 12—Receiving Location—Fade Margin Test Arrangement



THE 1017A 64 KHZ BAND ELIMINATION FILTER HAS A VERY NARROW, STEEP SIDED CHARACTERISTIC. TUNE THE OSCILLATOR VERY CAREFULLY TO FIND THE CORRECT DEPTH

Fig. 13—1017A, 64-kHz Filter Characteristic



NOTE:
 WHEN AN RF PREAMPLIFIER IS USED, THE OUTPUT OF THE IF PREAMPLIFIER IS SET FOR A +3 DB OUTPUT WHICH WILL GIVE 3 DB MORE FADE MARGIN BEFORE CARRIER RESUPPLY OPERATION.

Fig. 14—Carrier Resupply Fade Depth VS Normal Received Carrier Power