TD-3 MICROWAVE RADIO

OVERALL SYSTEM

TESTS

CARRIER FREQUENCY MEASUREMENTS

1. GENERAL

1.01 Microwave radio carrier frequency measurements are required to reduce the effect of cochannel interference and to ensure that the microwave transmitting frequencies remain within FCC tolerances, especially on longer MURs. The purpose of this section is to outline methods and requirements for these measurements.

1.02 This issue will affect the Equipment Test List.

1.03 The frequency counters (KS-20884 and KS-21444), which are specified, have a long term accuracy of better than 1 part in 10^6. Therefore, if two counters measure the same 70-MHz carrier, they should not differ by more than 140 Hz. Information concerning field calibration of these counters is not presently available.

1.04 The 70-MHz carrier frequency measured in a switching system depends on the following factors:

(a) The frequency of the IF input to the main station transmitter at the head end of the switching section

(b) The frequency of the main station microwave generators

(c) The frequency of the 40-MHz shifters.

The frequency error which occurs within the switching section is caused, predominately, by the frequency of the transmitting end microwave generator and the receiving end microwave generator. Repeater stations equipped with main station radio bays (bays having two microwave generators) will also affect the carrier frequency.

1.05 Any frequency error occurring in the microwave generators of a normal repeater station is self-cancelling since the same generator is used for both transmitting and receiving. The only error in a repeater station is caused by the frequency of the 40-MHz shifter. Since the crystal frequency of the shifter oscillator (40 MHz) is not multiplied as compared to the microwave generator crystal frequency (123 MHz, nominal) which is multiplied (by 32), the error due to the 40-MHz shifter is much less than that of a microwave generator.

CHART 1

FREQUENCY MEASUREMENTS

APPARATUS:

1—Delay Distortion Test Set (70-MHz crystal output) or a spare FM Transmitter

CHART 1 (Cont)

APPARATUS:

2—Counters (ED-52479 or ED-52097 Frequency Counter Assembly) or

(Counter in the 92A test set) or

(Counter in the 428A test set) or

(Counter in the 100A switching test set)

STEP	PROCEDURE
1	Arrange to measure over a switching section as shown in Fig. 1.
2	Measure the IF input frequency at the transmitting main station to within 1 kHz.
3	Measure the IF output frequency at the receiving main station to within 1 kHz.
4	Subtract: f IF IN − f IF OUT = f OFFSET ***Requirement:*** The f OFFSET shall not be greater than $\pm$28 kHz. ***Note:*** This overall switching section requirement is tighter than the sum of the frequency limits of the individual main station microwave generators. However, the probability that all of the microwave generators would be at either their upper or lower limits at the same time is small. If the requirement is not met, all main station bay microwave generators on that radio channel must be measured and reset as closely as possible to their nominal frequency. If the requirement is still not met, the 40-MHz shifter oscillator in all of the repeater bays must be measured and reset as closely as possible to their nominal frequency.

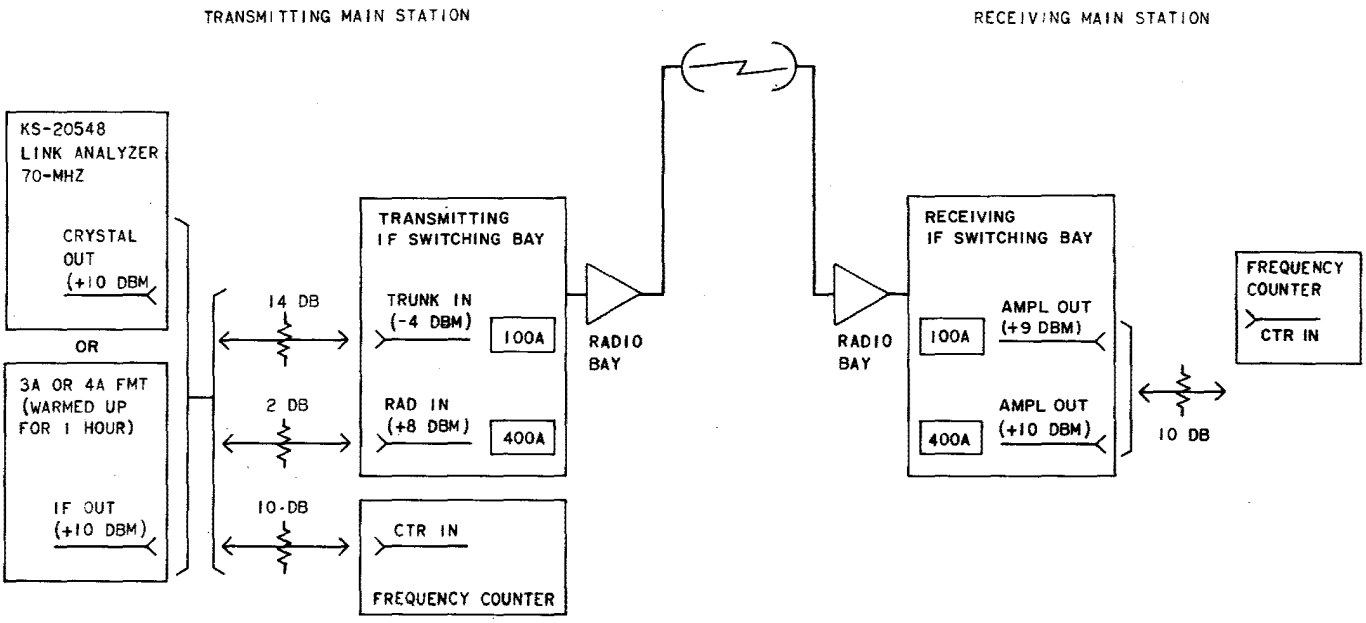

Fig. 1—Test Arrangement