

5/14/56

MANCINO

May 14, 1956

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comments
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TO: Members of TR8.1 - Transmitter Subcommittee

CC: Ed Chapin

FR: Fred Hilton, Chairman TR8.1

Enclosed you will find copy of the proposed radiation measurement technique. Will you please review this data and send me any comments prior to June 1. I will try to edit the original and have copies with revisions available for our use when we meet at the FCC Laboratories to measure the transmitter. This measurement, which will be a committee activity, is scheduled for June 14, at the FCC Laboratories in Laurel, Maryland.

By memorandum, opinion and order the Commission has amended Part 2 of its Rules to change the date from May 15, to December 1, for requirement of field intensity measurements to be submitted with request for type acceptance.

FH/ml
Att.



5/14/56

PROPOSED DETAILED TECHNIQUE FOR TRANSMITTER SPURIOUS AND STRAY RADIATION MEASUREMENT

Test Site

The test site should be on level ground which is of uniform electrical characteristic. The site should be clear of metallic objects, overhead wires etc., and should be as free as possible from undesired signals such as ignition noise, other carriers etc. The distance from the transmitter under test, or the field strength meter, to reflecting objects such as rain gutters, house plumbing etc. should be not less than 300 feet. At the transmitter end a turntable should be provided which ^{MAY} be remotely controlled. A platform 4 feet high should be provided on this turntable to hold the transmitter which is under test. The field intensity measurement is made at a point 100 feet from the center of the turntable. At this point a wood pole with movable horizontal boom should be arranged so that the search antenna can be raised and lowered through an elevation of 20 feet. If desired, radome shelters may be provided for the equipment and personnel at both ends of the test site. All such construction should be of wood or plastic except for nails, hinges, etc. There should be no metal over 3 inches long. All 60 cycle power to the site should be supplied by means of underground cable, buried at least 12 inches deep. This requirement also applies to telephone lines or other control circuits between the two test positions. *No one near*

Installation of Equipment

The transmitter to be tested should be placed on the 4 foot platform on the turntable. The power cable for this equipment should extend downward for at least 3 feet, the balance of the cable to be coiled on the turntable. The transmitter is loaded into a Bird Wattmeter or other non-radiating load. The field intensity meter (hereafter abbreviated FIM) search antenna should be mounted on the end of the boom with its cable lying horizontally on the boom back to the supporting mast. The FIM is placed on a suitable table or tripod at the foot of the mast. *through a hole*

Measurement Procedure

1. Tune-up the transmitter and adjust its output into the wattmeter to rated value.
2. For each spurious measurement the FIM antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler which is normally supplied with the equipment.
3. For each spurious frequency raise and lower the receiver antenna to obtain a maximum reading on the FIM with the antenna at horizontal polarity. Then the turntable should be rotated to further increase this maximum reading. Repeat this procedure raising and lowering the antenna and rotating the turntable until the highest possible signal has been obtained. Record this maximum reading. then without moving the turntable, raise or lower the search antenna to obtain a minimum reading, which should also be recorded.

4. Repeat step 3 for each spurious frequency with the antenna polarized vertically.
5. Remove the transmitter and replace it with a half wave antenna (the antenna should be 1/2 wave length for each frequency involved). The center of the half wave antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies where half wave length antenna is very long ~~this will be impossible to achieve when the antenna is polarized vertically.~~
6. Feed the half wave antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiated cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency raise and lower the receiver antenna to obtain a maximum reading at the FIM. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the antenna and generator output. ~~Then an equivalent maximum reading has been obtained raise or lower the receiver antenna to obtain a minimum reading.~~
7. Repeat step 6 with both antennas vertically polarized for each spurious frequency.
8. Calculate watts into the half wave antenna from the surge impedance and signal generator voltage obtained in the previous readings.
- ~~9. The effective value of the signal as determined from step 8 may be obtained from the curve of figure 1 and the max/min readings of step 6. Note that the effective signal is less than the maximum signal by as much as 6 db depending on the max to min ratio.~~
- ~~10.~~ The level of the spurious in db can be calculated from the following formula:

$$\text{Spurious level, db} = 10 \log \frac{\text{Transmitter Power}}{\text{Calculated Spurious Pwr.*}}$$

*from step 8 and 9

→ 5 (in excess of 6 ft.) it should be placed at the transmitter position with the end one foot above ground level.

MAX/MIN DIFFERENCE IN DB

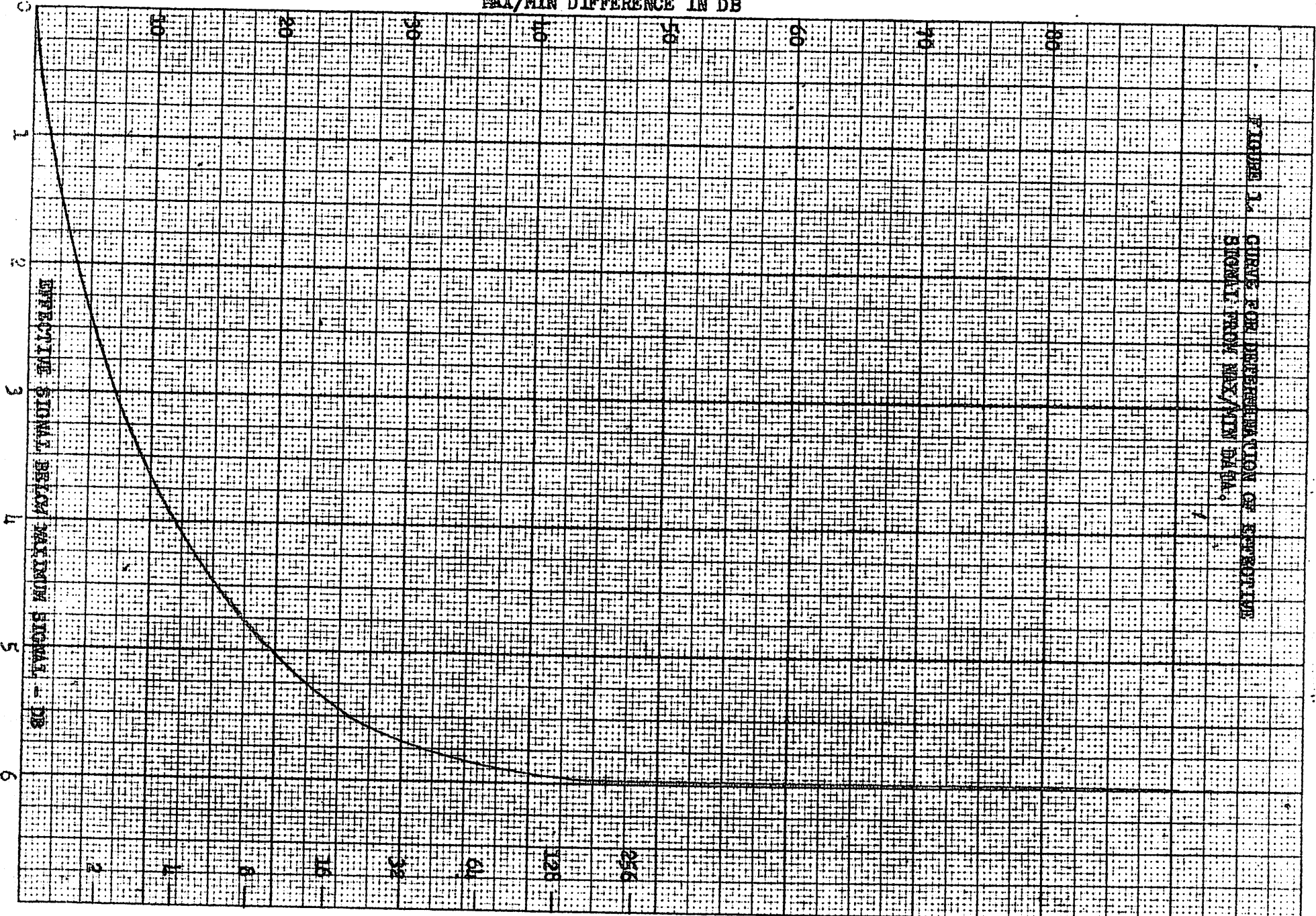


FIGURE 1. CURVE FOR DETERMINATION OF EQUIVOCAL SIGNAL FROM MAX/MIN DATA.

MAX/MIN RATIO IN MICROVOLTS

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