

DATE 5-2-60

SH. 1 OF 6

COMPILED BY

TMC SPECIFICATION NO. S-483 A

TITLE: Production Testing of the TMC Model

JOB

APPROVED

PTE-1

I INTRODUCTION

- A. The Model PTE-1 is a Single Sideband Analyzer comprising:
1. A Model FSA Spectrum Analyzer.
 2. A Model VOX Variable Frequency Oscillator.
 3. A Model TTG Tone Generator.
- B. The Model TTG Tone Generator supplies two audio frequency tones and two radio frequency tones. The AF tones are to permit visual analysis of the 3rd, 5th, and 7th order distortion products. The RF tones are for the purpose of checking the proper operation of the spectrum analyzer.
- C. The Model VOX Variable Frequency Oscillator is used as a heterodyne oscillator for mixing with the signal to be analyzed to provide a difference frequency of 500 KC's, which is the center input frequency of the FSA Spectrum Analyzer.

II TEST EQUIPMENT REQUIRED

- A. TMC Model SBE-2 or SBE-3.

III PRELIMINARY

- A. Inspect the unit for mechanical fit and workmanship.
- B. Inspect for obvious wiring errors.
- C. Apply power to the PTE-1 and to the SBE.
- D. Turn all front panel power switches to "ON" and check that appropriate indicators are functioning and that units are in fact "ON".

IV ADJUSTMENTS AND CHECKS

- A. Model VOX.
1. Turn the ON/BEAT switch to the "ON" position.
 2. Turn the BAND-MC's switch to the 2-4 MC's band.
 3. Turn the XTAL switch to the VMO position.
 4. Set the VMO dial to 2500 KC.
 5. Vary the calibrate control until a zero beat is obtained on the front panel indicator.
 6. Turn the ON/BEAT switch to "OFF".
 7. Set the HFO switch to "ON".
 8. Set the meter switch to "HFO".
 9. Rotate the HGO tuning control to a position approximating the VMO dial setting (2500 KC).

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10. Advance the output control for an indication on the output meter.
11. Adjust the tuning control for a peak indication on the output meter.
12. Adjust the output control for a reading of .1 milliamperes.

B. Model FSA

- a. Set the front panel controls as follows:

INPUT ATTENUATOR	All switches UP
GAIN	Fully counterclockwise
CAL OSC LEVEL	OFF
CENTER FREQ	Center
AFC	OFF
AMPLITUDE SCALE	LIN
FOCUS	For a sharp trace
BRILLIANCE	As desired
SWEEP WIDTH SELECTOR	VAR
IF ATTN	0 DB
VIDEO FILTER	OFF
SWEEP RATE	Fully clockwise
IF BANDWIDTH	Fully clockwise
SWEEP WIDTH	Fully clockwise
V POS	So that baseline trace coincides with the frequency scale.
H POS	To approximately center the baseline on the CRT screen.

- b. Turn the CAL OSC LEVEL control fully clockwise. Advance the GAIN control until a "pip" is displayed at approximately full screen deflection.
- c. Rotate the SWEEP WIDTH control counterclockwise until the "pip" opens up into a horizontal line. Adjust the CENTER FREQ control for maximum height of the trace. Set the SWEEP WIDTH control fully clockwise. A "pip" should appear near the center frequency calibration. Adjust the H POS control until the "pip" coincides with the center frequency calibration.
- d. Rotate the SWEEP RATE control through its range. At its clockwise extreme (30 cps) the trace will appear as a line. At its counterclockwise extreme (0.1 cps) a spot should move from right to left on the CRT screen with a 10 second period.

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- e. Turn the SWEEP RATE control fully clockwise. Adjust the SWEEP WIDTH control until the "pip" base covers approximately one-third of the screen. Turn the IF BANDWIDTH control counterclockwise; the "pip" width should decrease. At the same time, there may be a change in "pip" height. It will also be noticed that "ringing" will appear on the trailing edge of the "pip". Optimum resolution occurs when the first "ringing" notch beyond the apex of the "pip" dips into the baseline.
- f. Turn on the AFC by clockwise rotation of the control. This automatically provides a maximum scanning width of approximately ± 1 Kc with the necessary center frequency stability. Counterclockwise rotation of the SWEEP WIDTH control reduces the scanning width from ± 1 Kc to nominally zero. The AFC control is used as the CENTER FREQ control. As it is rotated in a clockwise direction, the display may shift to the left, then to the right. Normally, the best centering action is had with the AFC control in approximately a "2 o'clock" position. The CENTER FREQ control is used as a vernier.
- g. Set the controls as outlined for CENTER FREQ test. Carefully adjust the GAIN control for full scale deflection of the "pip". Switch AMPLITUDE SCALE to LOG. The "pip" should read 0 db (center of screen). The LOG calibration appears at the left edge of the screen. Dots are engraved at 5 db intervals on the screen. Set IF ATTEN to 20 db. The "pip" should now reach the -20 db calibration.
- h. Increase the GAIN and CAL OSC LEVEL controls until full screen deflection is obtained. Operate the INPUT ATTENUATOR switches so as to insert attenuations up to 40 db in 5 db steps. At each setting the "pip" height should coincide with the corresponding screen calibration within ± 1 db.
- i. Set the IF ATTEN to 0 db and continue to insert attenuation as before until the "pip" is at the -20 db calibration. At this point the signal has been reduced 60 db from its original level, which is 20 db over full scale. With all switches down (65 db) the "pip" should go below the -20 db calibration point.

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- j. Set the INPUT ATTENUATOR to zero (all switches up) and adjust the GAIN control for full scale deflection. Switch the VIDEO FILTER to the HI position. This reduces the video bandwidth to about 400 cps. Any noise on the screen should be filtered, and signal "pips" will be integrated and shifted slightly. The SWEEP RATE should be reduced to prevent excessive distortion of the "pip" shape. Switch the VIDEO FILTER to the LO position. The video bandwidth is now about 40 cps, and a much greater filtering effect should be observed. This position of the VIDEO FILTER should only be used with sweep rates of the order of 1 cps or less.
- k. With a full scale optimally resolved "pip" (LIN amplitude scale) displayed in the center of the screen, set the SWEEP WIDTH SELECTOR to 30 Kc. The "pip" should appear at or near the center of the screen. The amplitude should be essentially unchanged. The sweep width is now +15 Kc, and the sweep rate is 1 cps. The SWEEP RATE, IF BANDWIDTH, and VIDEO FILTER controls are not effective on this and the other pre-set sweep width ranges.
- l. Set the SWEEP WIDTH SELECTOR to 10 Kc. The "pip" should appear with essentially the same amplitude near the center of the screen. In this position, the sweep width is ± 5 Kc.
- m. Set the SWEEP WIDTH SELECTOR to 2 Kc. The AFC circuit is automatically switched on for this and the 500 cycle and 150 cycle sweep widths and the sweep rate is 0.1 cps. The amplitude of the "pip" should be essentially constant in all ranges.

C. Model TTG

1. Set Audio Tone Selector to "OFF".
2. Set RF Tone Selector to "TWO-TONE".

V. TEST PROCEDURE

- A. Connect "VFO OUT" Jack to "VFO INPUT" Jack and "RF TONE OUT" Jack to "SIGNAL INPUT" Jack using coaxial patchcords supplied with the Model PTE-1.

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B. Set the controls on the Model FSA as follows:

IF ATTEN	0 DB
CENTER FREQ	On vertical marker
SWEEP WIDTH	Maximum clockwise
IF BANDWIDTH	Maximum clockwise
BRILLIANCE	For desired trace brightness
SWEEP WIDTH SELECTOR	30 Kc
FOCUS	Sharpest trace
AMPLITUDE SCALE	LOG
GAIN	Maximum clockwise
SWEEP RATE	Maximum clockwise
VIDEO FILTER	OFF
HORIZONTAL POSITION	For centered position of center-frequency "pip"
VERTICAL POSITION	For baseline coincident with bottom screen calibration
AFC	OFF
INPUT ATTENUATOR	All switches up
CAL OSC LEVEL	OFF

- C. Slowly search the spectrum by rotating the VMO dial until the two RF test tones appear at the center of the screen.
- D. Set IF ATTEN switch to 20 db.
- E. Adjust INPUT ATTENUATOR switches to reduce level of RF tones on the scope to 0 DB reference line using GAIN control for variations less than smallest attenuator switch position.
- F. Set IF ATTEN switch to 0 DB.
- G. Check all odd order distortion products. Maximum level not to exceed -60 db.
- H. Remove patchcord from "RF TONE OUT" - "SIGNAL INPUT" Jacks.
- I. Connect "MONITOR" Jack on SBE to "SIGNAL INPUT" Jack on FSA using 70 ohm coaxial cable.
- J. Connect one of the "AUDIO TONE OUT" Jacks on the PTE-1 to either 600 ohm audio inputs on the SBE.
- K. Set "RF TONE" selector on TTG to "OFF".

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- L. Set "AUDIO TONE" selector on TTG to "TWO TONE".
- M. Set audio level control on TTG to mid position.
- N. Insert a 2.270 MC Crystal (SBE-2) or 2.250 MC Crystal (SBE-3) in the MF Crystal socket of the SBE.
- O. Connect a 70 ohm dummyload to the RF output Jack of the SBE.
- P. Tune the SBE to an output frequency of 8.0 MC's using two tone input.
- Q. Set the VMO dial on the VOX to 2125 KC's.
- R. Set the "BAND-MCS" switch to the 8-16 MCS band.
- S. Rotate the HFO tuning control to a position approximating the VMO dial setting (2125.0 KC's).
- T. Advance the OUTPUT control for an indication on the OUTPUT meter.
- U. Adjust the TUNING control for a peak indication on the OUTPUT meter.
- V. Adjust the OUTPUT control for a reading of .1 milliamperes.
- W. Slowly search the spectrum by rotating the VMO dial until the test tones appear at the center of the screen.
- X. Set IF ATTEN switch to 20 db.
- Y. Adjust INPUT ATTENUATOR switches for a reference level of 0 DB using GAIN control for variations less than smallest attenuator switch position.
- Z. Check all odd order distortion products. Maximum level with a normal SBE not to exceed -45 db.

