TMC SPECIFICATION

NO. S 1113

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TITLE:

Typed by mtp 7/6/66

TEST PROCEDURE

for

PTE-4A

This specification outlines the testing and check out procedure for the PTE Spectrum Analyzer which consists of three major units (FSA, VOX and TTG).

When testing is required for only unracked units that make up a PTE Spectrum Analyzer, i.e. FSA, VOX and TTG, these units will be inter-connected as an Analyzer system with an external voltage regulator for the FSA, and all checks and tests will be performed. Under "Remarks" on the Test Data Sheet, the following notation will be inserted:

"Unracked Spectrum Analyzer units, FSA, VOX and TTG tested as a system."

PRELIMINARY

A routine mechanical check and inspection of inter-connection cabling etc., must be made before proceeding with the checks and tests covered by Steps 1 thru 59 . The tester is cautioned that the checks and tests outlined below must be accomplished in the order given, from Steps 1 thru 59. If trouble is experienced at any step, it must be found and corrected before proceeding to the next step.

Set controls on panels as follows:

UNIT	PANEL DESIGNATION	SETTING
FSA	Sweep Width	Fully CW
"	IF Bandwidth	Fully CW
"	Video Filter, Hi/Off/Lo	Off
"	Sweep Rate	Fully CW
"	Input Attenuator	All switches up
"	5 KC Marker	Off
"	Illumination, Power Off	Off
"	Cal OSC Level	Off
"	IF Atten.	0 db
"	Sweep Width Selector	VAR
"	Amplitude Scale	LIN
"	Center Frequency	Center On Pan 1 Mark
"	AFC	Off

Cont'd.....

PRELIMINARY - Cont'd fr. pg. 2

UNIT	PANEL DESIGNATION	SETTING
FSA	Gain	Fully CW
"	Manual Sweep	Auto
VOX	Beat	Switch down (off)
"	Meter	VMO
"	Power	Switch down (off)
"	HFO/IFO/BFO	All switches down (off)
"	Output	Fully CW
"	Band - MCS	2-4
"	XTAL	VMO
TTG	Audio Tone Selector	Off
"	RF Tone Selector	Off
"	Power	Off

The portions of all other controls are optional.

CONNECTIONS

Connect Power Cable, TMC #CA-575-1, to line voltage supply. Connect test cable, (TMC #CA-480-1-18.00) from signal input jack of FSA to RF TONE OUT jack of Control Panel.

Proceed with the test and checkout of PTE-4A as outlined below - Steps 1 thru 59.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
1.	Place POWER switch of VOX in ON position.	Supplies power to VOX tube filaments and oven heater elements.	MAIN POWER indicator light ignites and remains lit. INNER OVEN & OUTER OVEN indicator lights ignite cycling times: OUTER OVEN light goes on for about 5 seconds, and off for about 30 seconds; INNER OVEN goes on for about 90 seconds and off for about 90 seconds.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
2.	Wait for INNER and OUTER OVEN lights to cycles as described in Step 1. while waiting, proceed with Steps 3 thru 45.	VOX oven temperature becomes stabilized, which in turn stabilizes master oscillator frequency components contains therein.	
3.	Turn ILLUMINATION knob clockwise.	Supplies all plate and fila-power to FSA. Also turns on and controls brightness of illumination lights surrounding screen.	Indicator light ignites. Illumination lights around screen will brighten from CW turning of knob and dim from CCW turning. In about a minute, a straight base-line trace will appear on screen.
4.	Adjust BRILLIANCE knob until trace is just discernible. Allow at least 30 minutes warmup. Then adjust FOCUS knob for sharpest trace.	Focuses electron beam on screen.	Brightness of trace responds to movement of BRILLIANCE knob. Sharpness of trace responds to movement of FOCUS knob.
5.	Adjust V POS knob so that baseline trace coincides with bottom edge of grid marked on scre n.	Calibrates verticle beam movement to grid.	Baseline trace responds vertically to V POS movement.
6.	Adjust H POS knob to approximately center baseline on grid of screen.	Approximately centers sweep on grid.	Baseline trace responds horizontally to H POS knob movement.
7.	Turn CAL OSC LEVEL knob fully CW. If pip is beyond calibrated position of screen, insert enough attenuation to reduce peak-to-peak amplitude. Turn GAIN knob clockwise slightly.	Connects a 500KC test signal to FSA input. CW rotation of knob increases 500KC signal amplitude.	A small pip appears at or near center of screen and grows in height as knob is rotated.
7a.	Set sw ep width in VAR position; remove top con-verter of FSA. Adjust LINE SIZE control (inter-nal adj.) for proper base-line size (1/4" on ea.	Achieves optimum resolution.	Pip base narrows to optimum resolution point and further sweep rate reduction has no indicated effect.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
7a. Cont'd	side of graticule). Slowly turn sweep rate control CCW until optimum resolution is obtained. Readjust pip to full scale.		
8.	Turn GAIN knob clockwise until pip reaches full scale deflection on screen (1.0 in LIN scale).	Further increases 500KC input.	Pip heightens with clockwise movement of the GAIN knob.
8a.	With sweep width control at 3.5KC position, AFC off and center freq. control on center line, adjust CF pad control (internal adjustment) for pip centering on screen. Turn sweep width control to 500 cycle position and adjust rear screw on Z102 (internal adjustment) for pip centering on scr n, (remove tool after each adjustment; very critical).		
9.	In VAR position, turn SWEEP WIDTH knob to completely counterclockwise or until pip widens into an elevated line.	Decreases sweep width in KC thereby magnifying pip width.	Pip disappears. Trace may become elevated.
10.	Adjust CENTER FREQ. knob for maximum height of trace. If trace is below 10 on LIN scale with CENTER FREQ on marker, adjust CF pad on chassis for maximum height.	Tunes V3 mixer in RF chain to 500KC, passing through a greater amount of the test signal.	Trace height is raised by adjustment of CENTER FREQ knob.
11.	Turn SWEEP WIDTH knob to fully clockwis position.	Increases sweep width, thereby decreasing pip width. Also, as a result of turning in Step 10, th 500KC has been brought to the center of the sweep.	Pip reappears and is at, or near, cent r of grid on screen.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
12.	Adjust H POS knob until the pip coincides with the center frequency calibration on the screen.	Centers sweep on grid.	Adjustments of H POS knob brings pip to center calibration. About 1/4" of trace extends beyond grid markings on either side.
13.	Place 5KC MARKER switch in ON position. Turn GAIN knob to bring up 5KC pips.	Activates built-in 5KC oscillator which hetrodynes with 500KC signal to produce sum and difference frequencies at 5KC intervals above and below 500KC.	At least fourteen 5KC marker pips appear across screen - 7 above and 7 below - 500KC pip in center.
14.	Turn SWEEP WIDTH knob in counter-clockwise direction. Then return knob to maximum clockwise position.	Counter-clockwise movement of SWEEP WIDTH knob decreases sweep width.	5KC pips move away from center as SWEEP WIDTH knob is turned counter-clockwise.
15.	Place 5KC MARKER switch in OFF position and adjust GAIN knob to bring pip back to full scale deflection.	Turns 5KC oscillator off.	5KC pip disappears.
16.	Turn SWEEP RATE knob to fully counter-clockwise position.	Changes sawtooth wave width from sweep generator, thereby changing sweep rate.	As SWEEP RATE knob is turned counter-clockwise, electron beam slows down in its motion across the screen. At its CCW extreme position, spot moves from right to left at the rate of 0.1 cps (or once within a 10 second period). Pip amplitude increases.
17.	Turn SWEEP RATE knob to fully clockwise position.	Changes sweep rate back to 30 cps.	Trace reappears as a solid line. Pip amplitude returns to full scale deflection.
17a.	Slowly turn SWEEP RATE control CCW with optimum resolution is obtained.	Achieves optimum resolution.	Pip base narrows to optimum resolution point and further sweep rate reduction has no indicated effect.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
18.	Adjust SWEEP WIDTH knob until the pip base covers approximately one third of the screen.	Decreases sweep width from its maximum position.	Pip width is increased with decrease of sweep width. Pip height increases.
19.	Turn IF BANDWIDTH knob in CCW direction until ringing appears on trailing edge (left side) of 500KC pip. Adjust until first ringing notch beyond the apex of the pip dips into the baseline.	Decrease IF bandwidth to a point suitable for optimum resolution with a 30 cps sweep rate and the sweep width as set in Step 18.	When IF BANDWIDTH knob is turned CCW, Pip base width decreases. At the sam time, there may be a change in pip height.
20.	Turn AFC switch ON.	Turns on AFC feedback circuit from V3 mixer to V4 reactance modulator. Changes maximum sweep width adjustment from 100KC to 2KC.	500KC pip distorts into an elevated line.
21.	Turn SWEEP WIDTH knob fully CW. Adjust SWEEP RATE knob until spot moves across screen at the rate of approximately 5 times per second. Adjust IF BANDWIDTH knob to obtain optimum resolution ringing.	Adjusts sweep width to 2KC. Adjusts sweep rate and IF bandwidth for optimum resolution for 2KC sweep width.	Pip may now appear shifted off center.
22.	If 500KC pip has shifted off center, turn CENTER FREQ knob to center pip exactly.	Retunes V4 circuit which became detuned by switching in AFC feedback.	As AFC knob is turned CW, the display may shift to the left, then to the right. Normally, with CENTER FREQ knob manipulated as described in Operation column, the pip should center.
23.	Adjust GAIN knob for full scale deflection of pip. Place AMPLITUDE SCALE switch in LOG position.	Switches in a feedback circuit from V10 detector to V9 IF amplifier which has the effect of presenting pip amplitudes on the screen in a log relationship rather than linear.	Pip height reduces to 20 db on LOG scale on screen.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
24.	Set IF ATTEN switch in 20 db position.	Inserts 20 db of attenuation in the IF amplifier input.	Pip height reduces to 40 db mark on LOG scale.
25.	Set all attenuator switches to UP position. Turn GAIN knob CW to bring pip back to full scale deflection.	Sets pip to full scale for comparisons to follow.	Another pip with ringing may appear at right edge of screen.
26.	Operate INPUT ATTENUATOR switches so as to insert attenuations up to 40 db.	Inserts attenuations (which are additive) in the SIGNAL INPUT section. At final setting, signal is reduced by 40 db from its level in Step 25.	At each setting, the pip height coincides with the corresponding screen calibration within ±1 db.
27.	Set IF ATTEN switch in 0 db position.	Switches out 20 db attenuation in IF amplifier input.	Pip height increases to 20 db mark on screen.
28.	Continue to insert more attenuation with INPUT ATTENUATOR switches, until pip is brought down to 30 db calibration on screen.	At this point, pip has been reduced by 50 db from its level in Step 25 which would appear 20 db over full scale if INPUT ATTENUATOR switches were returned to UP position.	Pip reads 30 db on screen with all INPUT ATTENUATOR switches down.
29.	Return all INPUT ATTENUATOR switches in the up (off) position. Place IF ATTEN switch in 20 db position.	Switches out the 50 db attenuation. Returns controls to positions set in Step 25.	Pip returns to full scale deflections.
30.	Place VIDEO FILTER switch in HI position.	Filters out frequencies above 400 cps in V10 output.	Most noise indications on screen eliminated.
31.	Place VIDEO FILTER switch in LO position. Decrease sweep rate with SWEEP RATE knob to bring spot movement down to 1 cps or less.	Filters out frequencies above 0 cps in V10 output. Sweep rate is decreased for more effective results from 40 cps DW filter.	A more effective elimination of noise is observed. Pip height is raised, no sweep rate is decreased.
32.	Place VIDEO FILTER switch in OFF position. Set AFC knob in OFF position. Set SWEEP WIDTH and IF	Switches out both 400 cps and 40 cps filters in V10 output. Switches out AFC and retunes sweep width, IF bandwidth, and	Pip appears at full scale deflection with solid state trace.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
32. Cont'd	BANDWIDTH knobs in their clockwise positions. Place AMPLITUDE SCALE switch in LIN position. Adjust GAIN knob and input attenuator to bring pip back to full scale deflection. Increase sweep rate fully CW. Adjust CENTER FREQ knob to bring pip back to center calibration.	sweep rate to maximum settings. Returns amplitude representations to linear. Adjusts gain for reference point. Retunes V4 circuit which became detuned by turning off AFC.	
32a.	Slowly turn SWEEP RATE control CCW until optimum resolution is obtained.	Achieves optimum resolution.	Pip base narrows to optimum resolution point and further sweep rate reduction has no indicated effect.
33.	Set SWEEP WIDTH SELECTOR knob in 14KC position.	Sets sweep width at 14KC and sweep rate at 1 cps. Sets IF bandwidth for optimal resolution. AFC remains off and 400 cps video filter is in.	Pip appears at or near center screen. Amplitude may vary slightly. Beam takes about 1 second to cross screen. In Steps 33 - 37, SWEEP WIDTH, IF BANDWIDTH, VIDEO FILTER, SWEEP RATE controls are all inoperative.
34.	Set SWEEP WIDTH SELECTOR knob in 7KC position.	Sets sweep width at 7 KC and sweep rate at 1 cps. Sets IF bandwidth for optimal resolution. AFC remains off and 400 cps video filter is in.	Same as Step 33. Pip position and amplitude remain essentially unchanged from Step 34.
35.	Set SWEEP WIDTH SELECTOR knob in 3.5 position.	Sets sweep width at 3.5KC and sweep rate at 1 cps. Sets IF bandwidth for optimal resolution. AFC remains off and 400 cps filter is in.	Same as Step 34. Pip position and amplitude remain essentially unchanged from Step 34.
36.	Set SWEEP WIDTH SELECTOR knob in 500 cycle position.	Sets sweep width at 500 cps & sweep rate at 0.1 cps. Set IF bandwidth for optimal resolution. AFC is tuned on and 400 cps video filter is replaced by 40 cps video filter.	Pip position may shift noticeably from that of Step 35. Amplitude is essentially unchanged from Step 35. Sweep takes about 10 s conds to cross screen.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
37.	Re-center pip by using CENTER FREQ knob (26).	Retunes V4 circuit which became detuned when AFC feedback became switched in.	Pip is re-centered.
38.	Set SWEEP WIDTH SELECTOR knob in 150 cps position.	Sets sweep width at 150 cps and sweep rate at 0.1 cps. Sets IF bandwidth for optimal resolution. AFC remains on and 40 cps video filter remains in.	Same as Step 37. Pip position and amplitude remain essentially unchanged from Step 37.
39.	Place CENTER FREQ knob on panel marker. Set SWEEP WIDTH SELECTOR knob to VAR position. Turn SWEEP WIDTH knob fully CCW. Adjust CENTER FREQ knob to obtain maximum height of trace. Set SWEEP WIDTH knob vully CW.	Retunes V4 circuit which became de-tuned when AFC feedback became switched out.	Pip appears at or near center of screen.
40.	Place POWER knob of TTG in ON position. Wait 2 seconds for TTG to warm up.	Supplies voltages to TTG plate and filament circuits.	MAIN POWER lamp lights.
41.	Set RF TONE SELECTOR knob in TWO TONE position.	Generates 1,999KC and 2001KC test signals to TTG unit.	
42.	Using patchcord supplied with PTE, connect RF TONE OUT jack of Control Panel to SIGNAL INPUT jack of FSA.	Connects TTG RF output to FSA.	
43.	Place SWEEP WIDTH SELECTOR knob in 14KC position. Place CENTER FREQ knob on panel mark and then adjust H POS knob to bring 500KC pip to center screen calibration. Turn CAL OSC LEVEL knob to OFF position.	Sets sweep width at 14KC and sweep rate at 1 cps. Sets IF bandwidth for optional resolution. AFC is off and 400 cps video filter is in. Turns off 500KC oscillator.	Beam speeds up to 1 cps. Pip remains around full scale deflection mark and is centered by adjustment to H POS knob. Pip disappears when CAL OSC LEVEL knob is placed in OFF position.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
44.	Set GAIN knob fully CW (maximum) and set AMPLITUDE SCALE switch in LOG position. Set IF ATTEN switch in 0 db position.	Sets equipment for presentation of signals with a 60 db relationship (with only lower 40 db portion displayed).	No change from Step 43.
45.	If INNER & OUTER oven lamps are cycling as described in Step 1, set BEAT switch to ON position.	Turns on 100KC calibrating signal in VOX.	ZERO BEAT lamp lights.
46.	Turn MASTER OSCILLATOR FREQUENCY knob to bring a reading of 2.5MC (000 cps on counters). Vary CALIBRATE knob until ZERO BEAT light flashes at the rate of about once or twice per s cond.	Sets VOX output frequency at 2500KC within an error of one or two cycles.	Adjustment of CALIBRATE knob causes ZERO BEAT lamp to flash.
47.	Set BEAT switch to down position (off).	Turns of 100KC calibrating signal.	ZERO BEAT lamp goes out.
48.	Set HFO switch in ON position.	Turns RF amplifier plate voltage in VOX.	
49.	Set METER knob in HFO position.	Connects meter to sample output from RF amplifier.	
50.	Watch VOX meter. Turn OUTPUT knob CW to bring a reading of approximately ".1" on meter dial.	Turns up VOX output level to approximately 0.1 ma to get a good reading for next step. 1,999KC and 2,001KC combine to produce 499KC and 501KC signals.	Two test tone pips now appear on screen about 1KC above and below center calibration.
51.	S t TUNING knob of VOX in 2.5 area to bring highest reading on VOX meter.	Tunes VOX RF amplifier.	Pips may shift and become more defined.
52.	Set IF ATTEN switch in 20 db position. Then adjust INPUT ATTENUATOR switches to reduce pips down to 0	Sets display to show lower 40 db portion of 65 db presentation with 2 test tones repr - senting 0 db.	Odd-ord r distortion pips appear on screen.

STEP	OPERATION	FUNCTION	NORMAL INDICATIONS
52. Cont'd	db calibration on screen. Adjust VOX output knob to a point where pip increases to its maximum amplitude. Using GAIN knob, adjust pip for 0 db calibration on screen. (GAIN knob should be used between settings 5 and 10 for optimum results.)		
53.	Check all odd-order distortion pips.	Checking to see if all odd-order distortion products fall below 60 db down from two test tones.	Maximum level of odd-order distortion pips do not exceed 40 db mark on screen. (60 db below two test tone pips).
54.	Tune VOX to 3.5 mc, RF test to ON.	Two tone should appear on screen.	Same as Steps 52 & 53.
55.	Set IF ATTEN switch in 20 db position. Set MANUAL SWEEP switch in UP (manual) position.	Disconnects sweep generator from horizontal deflection plates and connects in MANUAL SWEEP control of plate voltage.	Horizontal movement of beam stops. Beam becomes stationary spot on screen. CAUTION: DO NOT LEAVE BEAM STATIONARY FOR MORE THAN 60 SECONDS.
56.	Crank MANUAL SWEEP knob CW, then CCW.	Changes voltage of horizontal deflection plates.	CW movement of MANUAL SWEEP knob causes spot on screen to move from left to right. CCW movement causes spot to move from right to left. The same distortion products should be observed as in Step 53. A slight adjustment of the GAIN knob may be necessary to bring distortion pips to the same level as in Step 53.
57.	Return MANUAL SWEEP switch to AUTO position.	Re-connects sweep generator to horizontal deflection plates.	Horizontal motion of beam resumes automatically.

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TITLE: PTE-4A TEST PROCEDURE

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STEP	OPERATION	FUNCTION	NORMAL INDICATION
58.	Measure between Pins A and B on probe power jack on front panel.		6.3 volts a-c.
59.	Measure between D and C.		27 volts ±10% d-c.

THE TECHNICAL MATERIEL CORP.
MAMARONECK, N.Y.

TEST DATA SHEET

PTE-4A SPECTRUM ANALYZER
(FSA-TTG-VOX)

STEPS	CHECKS	TESTED (INITIAL)
1-6	FUNCTIONAL CONTROL CHECKS	_____
7-19	500KC CALIBRATE OSCILLATOR & 500KC MARKER CHECKS	_____ _____
20-22	AFC CHECKS	_____
23-39	ATTENUATOR CHECKS	_____
30-32	VIDEO FILTER CHECKS	_____
33-39	SWEEP WIDTH SELECTION CHECKS	_____
40-44	SYSTEM INHERENT ODD-ORDER DISTORTION - REGM'T AT LEAST 60 DB	_____ DB (reading)
53-54	THIRD ORDER PRODUCT DISTORTION REGM'T AT LEAST 60 DB	_____ DB (reading)
55-57	MANUAL SWEEP CHECKS	_____
58-59	PROBE POWER VOLTAGES	_____

TESTED BY: _____ SERIAL NO.: _____

APPROVED BY: _____ MFG. NO.: _____

DATE: _____

REMARKS: _____

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REVISION SHEET

THE TECHNICAL MATERIEL CORP.
MAMARONECK NEW YORK

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