

DATE 17 December 1964

SHEET COVER OF

TMC SPECIFICATION NO. S- 887

A

JD
DRAWN

CHECKED

TITLE:

APPROVED

SS

TEST PROCEDURE
of
MODEL
LFSA

DATE 24 February 1965

SHEET 1 OF 1

TMC SPECIFICATION NO. S - 987

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TITLE: ALIGNMENT OF 1-2-10 MC GENERATOR MODULE

APPROVED

REFERENCES: Ass'y #A-3308 - Schematic CK-701

A. PRELIMINARY CHECKS

1. B+ (+12 VDC)
2. B- (-12 VDC)
3. Battery Operation

B. PRELIMINARY ALIGNMENT

1. 1 MC and 100 KC source (TMC model CSS-2).
2. Scope - Tektronix 541A with "L" head, or equivalent.
3. Frequency Counter - HP 5245L or equivalent.
4. Card Extender
 - a. Remove card A-3308 and insert it into card extender. Insert card extender into printed circuit connector. Connect 1 MC (Hi Z) to J 452. Connect counter to vert out of scope.
 - b. Place scope probe at junction of R 414 and Pin 6 of P 401. Indication should be 1 MC at 1 VPP minimum.
 - c. Place scope probe at bottom of C 422. Tune L 403 for maximum indication. Indication should be 1 MC at 3 V P/P minimum.
 - d. Place scope probe at bottom of C 417. Tune L 402 for maximum indication. Indication should be 1 MC at 1 V P/P minimum.
 - e. Place scope probe at bottom of C 412. Tune L 404 for maximum indication. Indication should be 1 MC at 1 V P/P minimum.
 - f. Place scope probe at bottom of C 442. Tune L 404 for maximum indication. Indicator should be 1 MC at 1 V P/P minimum.
 - g. Place scope probe at the collector of Q 402. Tune C 403 until indication is at 8 MC. Tune C 408 until indication is maximum. Alternately tune C 404 and C 403 for maximum indication with a minimum of ripple on the envelope.
 - h. Place scope probe at Pin 13 of P 401. Tune C 408 for maximum indication. Indication should be 8 MC 2 V P/P minimum.
 - i. Place scope probe at the collector of Q 406. Tune C 438 until indication is at 10 MC. Tune C 433 until indication is maximum. Alternately tune C 437 and C 438 for maximum indication with a minimum of ripple on the envelope.
 - j. Place scope probe at Pin 3 of P 401. Tune C 433 for maximum indication. Indication should be 10 MC at .2 V P/P minimum.

DATE 8 December 1964
SHEET 2 OF 11

TMC SPECIFICATION NO. S 887

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TITLE:

ALIGNMENT OF SPECTRUM GENERATOR MODULE

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A. EQUIPMENT REQUIRED

1. Tektronix Scope - Type 544A with L head.
2. Standard CSS-2.
3. Extension Card - A3304-4
4. Alignment Tool - TP120
5. CK-772
6. HP Counter - Mod. 5261A

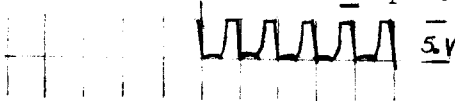
B. ALIGNMENT

1. Remove A3739 from the unit, and insert the extension module.
2. Insert A3739 into the extension module.
3. Turn the power on. Disconnect 1 MC and 100 KC from unit.
4. Set R512 fully counter-clockwise, and R516 to the mid-position.
5. Connect the scope to TP504, and the counter set to 1VRMS sensitivity to the vertical output of the scope.
6. Set the scope to 10 μ s/cm (calibr), the triggering mode to AUTO, and adjust R516 until 2 steady going pips are exactly 5 cm apart, and the counter reads 20 KC +30 cps.*



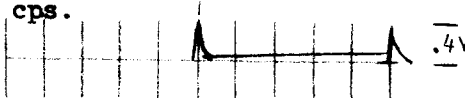
If this can not be done, add 10-330 pf into two holes marked C515.

7. Connect 100 kc output from the standard into J481, and observe 5 cycles occupying exactly 5 cm, and the counter reads 100KC+0cps*.



a. Check TP 503 for 20 KC.

8. Remove 100 kc from J481.
9. Set the scope to 20 μ s/cm (calibrated), and connect the scope to TP502.
10. Adjust R512 until two steady positive going pips are exactly 5 cm apart, and the counter reads 10KC +30 cps.



If this can not be done, add 10-500 pf into the two holes marked C513.
* FOR FREQUENCY READING ON THE COUNTER, THE SCOPE MUST BE SET TO .2V/CM.

DATE 8 December 1964
SHEET 3 OF 11

TMC SPECIFICATION NO. S-887

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TITLE:

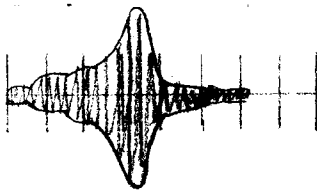
ALIGNMENT OF SPECTRUM GENERATOR MODULE

APPROVED

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B. ALIGNMENT - Cont'd

11. Re-connect the 100kc into J481. The counter should read 10KC \pm 0 cps*.
12. Connect the 1 MC output from the CSS-2 into J-402 connect the scope to TP505, and adjust L501 and L502 for maximum height of the pattern shown below:



.6V

* FOR FREQUENCY READING ON THE COUNTER, THE SCOPE MUST BE SET TO .2V/CM.

TMC SPECIFICATION

NO. S - 887

REV: 0 A

COMPILED:

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SHEET 4

OF 11

TITLE:

ALIGNMENT OF SPECTRUM FILTER

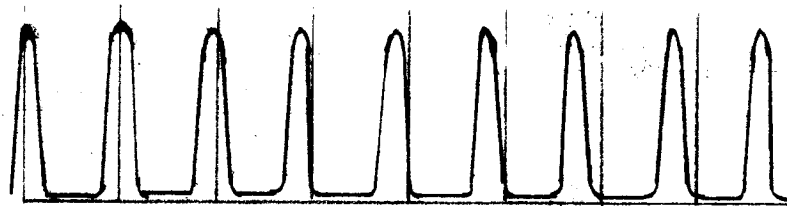
Typed by SS 12/11/64

EQUIPMENT REQUIRED

1. Counter, HP 5245.
2. TekTronik scope, Model 545A with L head.
3. PTE-3
4. CSS-2
5. HP VTVM 410B
6. CK-700
7. Measurement Signal Generator, Model 82

ALIGNMENT

1. Connect 1 mc from the CSS-2 into J 452 on the LFSA and the 100 kc from the CSS-2 into J 481.
2. Connect the scope to J 452 and the counter and the PTE-3 to the vertical output of the scope.
3. Adjust the scope for an indication of the 1 mc, signal the peak to peak should be 2 volts and the counter should read 1 mc plus minus 0 cps.
4. Connect the Measurements signal generator to the VFO input of the analyzer and adjust the signal generator for 1.5 mc at .5 volts. Set IF attenuator on the analyzer to 20 db. The input attenuator to -20 db the sweep width and IF bandwidth fully clockwise and the sweep width selector to Var.
5. Adjust the signal generator until the 1 mc appears on the first left line on the screen.
6. Connect the scope to TP 505 of the spectrum generator module and observe the following pattern on the scope:



7. Observe ten (10) spikes representating 1 mc to 1.09 mc in steps of 10 kc.
8. Adjust L 501 and L 502 alternately until all 10 spikes are within approximately 5 db on the analyzer.

TMC SPECIFICATION

NO. S- 887

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COMPILED:

RDV

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SHEET 5

OF 11

TITLE:

ALIGNMENT OF SPECTRUM FILTER

Typed by SS 12/11/64

9. Connect the scope to center pin J 471 and set 1 cps. knob on front of the LFSA to indicate 0 in the display window.
10. Set all input attenuators on the analyzer to out and the analyzer gain to maximum gain, and scope to .005 scale.
11. Adjust C 35-0 on top of spectrum filter for maximum indication of the 1 mc spike on the analyzer.
12. Repeat step #11 by tuning C 35-1 thru C 35-9 and observing 1.01 mc thru 1.09 mc on the analyzer. At the same time the lighted numbers on the display window should be indicating the appropriate number.
13. Tune L 35-1 for maximum indication on the analyzer (1.09 mc).
14. Switch the spectrum filter to position 0 and retune L 35-1 to obtain the same height as in step #13.
15. Repeat step #14 and step #13 until 1.09 mc and 1.000 mc are indential.
16. Switch the spectrum filter from position 0 thru position 9, the output of the individual spikes should not vary by more than 5 db.
17. Set the IF attenuator on the analyzer to 0 db and the spectrum filter to position 0.
18. Adjust C 36-0 for minimum noise on the analyzer, the noise should be at least 50 db down.
19. Repeat #18 by adjusting C 36-1 thru C 36-9 and observing the noise around the individual spikes.
20. Switch the filter from position #0 thru position #9 and readjust 1 mc thru 1.09 mc respectively.
21. Repeat step #9 thru step #20 for the following 4 spectrum filters:
10 cps J 473, 100 cps J 475, 10 kc J 477, 1 kc J 479.

DATE 8 July 1964
SHEET 7 OF 11

TMC SPECIFICATION NO. S - 887

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TITLE: ALIGNMENT - + 10 MODULE

APPROVED

REFERENCES: Ass'y #A-3311 - Schematic CK-704

A. EQUIPMENT REQUIREMENT

1. Scope - Tektronix 541A with "L" head or equivalent.
2. Frequency Counter - Hewlett-Packard 5245L or equivalent.
3. Place scope probe at junction of C605 and R602. Frequency should be 10. mc \pm Δ F. Voltage should be .5V P/P.
4. Place scope probe at collector of Q601. Adjust C604 for maximum 10 mc \pm Δ F output.
5. This amplifier should be tuned for maximum output with Δ F settings at 5. Voltage should be 3 V P/P.
6. Place scope probe at top of R607.
7. Adjust L604 so that Q602 divides reliably over the range 10.0000 mc to 10.0900 mc. (Output frequency = 1.000 mc to 1.009 mc or 1 mc \pm Δ F).
8. Place scope probe at junction of C621 and C622. Adjust L606 for maximum output at frequency of 1.005 mc. Output voltage should be + 1 V P/P minimum.

DATE 10 July 1964

SHEET 6 OF 11

TMC SPECIFICATION NO. S 887

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TITLE:

ALIGNMENT - + MIXER MODULE

APPROVED

REFERENCES: Ass'y #A-3310 - Schematic CK-703

A. EQUIPMENT REQUIRED

Scope - Tectronix 541-A with L head or equivalent.
 Frequency Counter H.P. 5245L or equivalent.
 Card Extender.

- *1. Remove Card A-3310 and insert in into Card Extender. Insert Card Extender into Printed-Circuit Connector.
2. Place Scope Probe at the left of R-648. Indication should be 8 mc at 0.2 V or greater.
3. Place Scope Probe at the left terminal of C-662. Tune C-657 for maximum indication. Indication should be 8 mc at .1 V P/P minimum.
4. Place Scope Probe at the collector of Q-643. Tune T-641 for maximum indication with corresponding spectrum filter set to frequency of 1.050 mc. Check positions 0-9 retune for flat response.
5. Place Scope Probe at the collector of Q-645. Tune C-660 for maximum indication at 9.050 mc.
6. Alternatly tune T-641 and C-660 for a flat bandpass over the frequency range of 9.000 mc to 9.090 mc. NOTE: Set the corresponding spectrum filter to positions 0 thru 9 to produce these frequencies.
7. Place Scope Probe on the bottom terminal of R-660. Alternatly adjust C-666 and C-671 for a flat bandpass over the frequency range of 9.000 mc to 9.090 mc.
8. Place Scope Probe on bottom terminal of R-657. Indication should be 1 mc at .1V P/P minimum. (1 MC + ΔF)
9. Place Scope Probe at the collector of Q-648. Tune C-683 and C-687 for maximum indication at frequency of 10.050 mc. (10 MC + ΔF)
10. Place Scope Probe at Pin 8 of P-641. Tune C-687 and C-676 for maximum indication at a frequency of 10.050 mc. (10 MC + ΔF)
11. Alternatly tune C-683, C-687 and C-676 for a flat bandpass over the frequency range of 10.000 mc to 10.090 mc. Leave in position 5.
12. Output indication should be 10.000 mc + ΔF at 0.1V P/P minimum.

* NOTE: Once a spectrum filter and its corresponding + mixer have been tuned, leave in position 5. The frequency as set on the spectrum filters (Nixies) will be called out as "ΔF".

DATE 24 February 1965

HEET 8 OF 11

TMC SPECIFICATION NO. S-887

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TITLE: ALIGNMENT OF MINUM MIXER MODULE & \emptyset DETECTOR

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MINUS MIXER MODULE

A. EQUIPMENT REQUIRED

1. Scope, TekTronix 541 AW/L head or equivalent.
2. Frequency Counter, Hewlett-Packard 5245 L or equivalent.

B. PROCEDURE

1. Remove card A3312 and insert it into extender card. Insert extender card into PC connector.
2. Inspect PC board for shorts and solder splashes.
3. Place scope probe at collector of Q703 and tune C717 for maximum. (10 MC 2 V P/P.)
4. Place scope probe at collector of Q701. Adjust C 706 for maximum output (about 6 V P/P) of 10 MC + Δ F.
5. Place scope probe on pin 3, P468. Observe sine wave of exact frequency as dial indicator lights ± 0 (Δ F).

 \emptyset DETECTOR

A. EQUIPMENT REQUIRED

1. Scope, TekTronix 541 AW/L head or equivalent.
2. Frequency Counter, Hewlett-Packard 5245L or equivalent.
3. Hewlett-Packard VTVM 410 B.
4. Phase Shift Network (sheet 11).

B. PROCEDURE

1. Remove A3313 and insert it into extender card. Insert extender card into PC connector.
2. High Voltage Check
 - a. Place scope probe at CR807 anode observe a perfect square wave of about 400 P/P.
 - b. Measure pin #14 of J469 with DC VTVM and read + 150 V DC.
3. \emptyset Detector Section Synthesizer to 55.555 KC
 - a. Place a 50 ohm load in J454 and adjust R861 for zero indication on the synchronize meter. Remove 50 ohm load.
 - b. Feed in Signal Output through phase shift box to TRF in shift to 0.
 - c. Place scope at the base of Q804 and adjust R815 for even pulses (2 X Δ F on counter).
 - d. Place scope at the base of Q805 and adjust R826 for even pulses (2 X Δ F).
 - e. Shift the phase by turning the knob on the phase shift box until sync. meter is in the red, and adjust R822 until alarm light goes on. (It may be necessary to change value of R842).
 - f. Check light and alarm circuit by turning knob on phase shift box until sync. meter is in yellow area. Sync. light should go out. Repeat adjustments of R822, alarm light, meter and phase shift until desired conditions are met.

DATE 25 February 1965

SHEET 10 OF 11

TMC SPECIFICATION NO. S- 887

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TITLE: ALIGNMENT OF LFSA-1

APPROVED

Typed by mtp

THE TECHNICAL MATERIEL CORP.
MAMARONECK, N.Y.

TEST DATA SHEET
for
TMC MODEL LFSA-1

SERIAL NO.: _____

MFG. NO.: _____

I. PRELIMINARY

- a. B+ (+12V) _____ OK
- b. B- (-12V) _____ OK
- c. Battery Operation _____ OK

II. ALIGNMENT

- a. 1-8-10 mc generator card
 - 1) 1 mc output (C417) _____ V P-P
 - 2) 8 mc output (#13) _____ V P-P
 - 3) 10 mc output (#3) _____ V P-P
- b. Spectrum generator cards
 - 1) 100 KC/KC division _____ OK
 - 2) Spectrum output (TP505) _____ V P-P
- c. Spectrum filters
 - 1) Crystal outputs within 5DB _____ OK
 - 2) Noise levels 50 DB down _____ OK
- d. Plus mixer cards
 - 1) Crystal frequencies +8 mc _____ OK
 - 2) 9 mc + ΔF _____ OK
 - 3) 10 mc + ΔF outputs _____ OK
- e. Divide by Ten cards
 - 1) 10 mc + ΔF inputs _____ OK
 - 2) 1 mc + ΔF outputs _____ OK

DATE 25 February 1965
SHEET 11 OF 11

TMC SPECIFICATION NO. S- 887

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TITLE: ALIGNMENT OF LFSA-1

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TEST DATA SHEET #2
for
TMC MODEL LFSA-1

f. Minus Mixer Card

- 1) 10 mc input _____ OK
- 2) 10 mc + ΔF input _____ OK
- 3) ΔF output _____ OK

g. Phase Detector Card

- 1) High voltage (#14) _____ VDC
- 2) Sync meter ZERO _____ OK
- 3) Sync meter swing _____ OK
- 4) D-c loop output _____ VDC

h. Overall Synthesizer Check _____ OK

DATE: _____

TESTER: _____

