DATE 25 February 1965	TMC SPECIFICATION NO. S-925	D
SHEET COVER OF		
OP COMPILED / CHECKED	TITLE:	
APPROVED	Typed by mtp	

TEST PROCEDURE

for

LFSB-1

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

DATE [illegible]	TMC SPECIFICATION NO. S - 925	0
SHEET 1 OF 15		
JD COMPILED / CHECKED	TITLE: [illegible] 1-8 MC GENERATOR MODULE	
APPROVED	REFERENCE: [illegible] #A-3743 - 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 524CL or equivalent.

4. Card Extender

a. Remove card A-3743 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 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.

f. 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.

DATE 3 December 1964	TMC SPECIFICATION NO. S-925	Ø
SHEET 2 OF 15		
RDV COMPILED / CHECKED	TITLE: ALIGNMENT OF SPECTRUM GENERATOR MODULE	
APPROVED	Typed by mtp	

A. EQUIPMENT REQUIRED

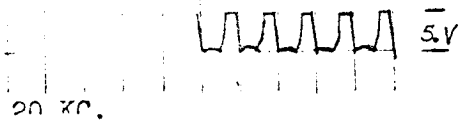
1. Tektronix Scope - Type 544A with L head.
2. Standard CSS-2.
3. Extension Card - A3304-4
4. Alignment Tool - TP120
5. CK-772
6. HP Counter - Mod. 5261A

B. ALIGNMENT

1. Remove A3740 from the unit, and insert the extension module.
2. Insert A3740 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 μs/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 μs/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.

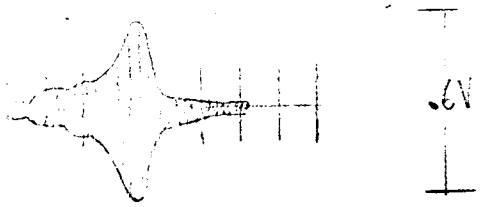
* FOR FREQUENCY READING ON THE COUNTER, THE SCOPE MUST BE SET TO .2V/CM.

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

B. ALIGNMENT - Cont'd

11. Re-connect the 100kc into J401. The counter should read 10KC ±0 cps*.

12. Connect the 1 MC output from the CSG-2 into J-402, connect the scope to [illegible], and adjust L501 and L502 for maximum height of the pattern shown below:



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

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 LFSB and the 100 kc from the CSS-2 into J 481.

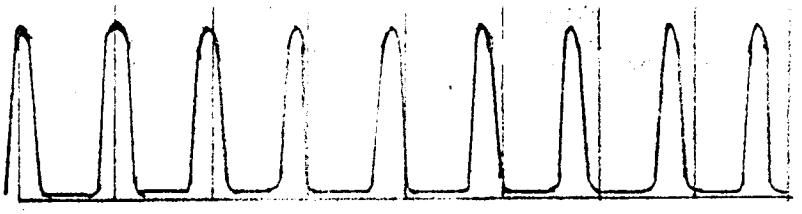
2. Connect the scope to J 452 and the counter and the PTE-3 to the vertical output of the scope.

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.

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 attenators 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 indentical.

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 10 July 1964 SHEET 6 OF 15	TMC SPECIFICATION NO. S-925	0
COMPILED / CHECKED	TITLE: ALIGNMENT - + MIXER MODULE	
APPROVED	REFERENCES: Ass'y #A-3742 - 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 0.1 V 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".

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

DATE 8 July 1964	TMC SPECIFICATION NO. S - 925	0
SHEET 7 OF 15		
COMPILED / CHECKED	TITLE: ALIGNMENT - ÷ 10 MODULE	
APPROVED	REFERENCES: Ass'y #A-3741 - Schematic CK-704	

A. EQUIPMENT REQUIPMENT

1. Scope - Tektronix 541A with "L" head or equivalent.

2. Frequency Counter - Hewlett-Packard 5245L pr equivalent.

3. Place scope probe at junction of C605 and R602. Frequency should be 10. mc +ΔF. Voltage should be .5V P/P.

4. Place scope probe at collector of Q601. Adjust C604 for maximum 10 mc +ΔF output.

5. This amplifier should be tuned for maximum output with ΔF 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 +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.

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

TMC SPECIFICATION NO. S-925

0

COMPILED OP | CHECKED

TITLE: LFSB-1 TEST PROCEDURE

APPROVED

mtp REFERENCE: CARDS A-3791; A-3788; A-3789 & A-3790

A. EQUIPMENT REQUIRED

1. VLRB
2. CSS-2
3. TEKTRONIX Scope - Type 544H with "L" head, or equivalent.
4. Frequency Counter - up to 10 mcs.
5. RF Signal Generator.
6. Extension Card - A-3304-4.
7. Inter-connect LFSB and CSS as shown on CK-788.
8. Connect counter to scope vertical inputs.

B. PROCEDURE

1. A-3788 Card:

a. Frequency multiplier switch to X10.

b. Monitor TP701 with scope.

c. Tune C-704, C-703 and T-701 alternately for maximum indicati n on scope.

d. Monitor TP-702 with scope.

e. Tune T-702 for maximum indication on scope.

f. Monitor TP703 with scope.

g. Tune T-703 for maximum indication on scope.

h. Monitor test point 704 with scope.

i. Tune T-704, C-717, C-718, and T-705 alternately for maximum indication on scope.

j. Retouch all previous controls for this chain for maximum indication on scope. Level must be 1 V P/P or greater. Frequency must be 9 mc xactly.

k. Switch fr qu ncy multipli r switch to X1. Output must disapp ar.

l. Monitor TP-705 with scop .

m. Tune C-723, C-722, and T-706 alternately for maximum indication on scope.

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B. PROCEDURE - Cont'd

1. n. Monitor TP-706 with scope.

o. Tune T-707 for maximum indication on scope.

p. Monitor TP-707 with scope.

q. Tune T-708 for maximum indication on scope.

r. Monitor TP-708 with scope.

s. Tune T-709, C-736, C-737, and T-710 alternately for maximum indication on scope.

t. Retouch all previous controls for this chain for maximum indication on scope. Level must be 1V P/P, or greater frequency must be 9.9 mc exactly.

2. A-3791 Card

a. Set R-914 fully CCW.

b. Remove 1.1 mc crystal (Y702) from A-3788 card.

c. Set frequency multiplier switch to X10 position.

d. Apply 1.050 mc signal from signal generator to TP-902.

e. Jumper TP-902 to ground.

f. Monitor TP-903 with scope (frequency counter attached to vertical output), Scope sensitivity to .1V/CM.

g. Signal generator level high enout to observe a tuneable signal, (use as little drive as possible).

h. Tune L-901 for maximum indication on scope.

i. Remove jumper from TP-904.

j. Tune L-902 for minimum indication on scope.

k. Monitor TP-905 with scope.

l. Reduce signal generator level to observe a tuneable signal, (us as little drive as possible).

m. Tune L-903 for maximum indication on scop .

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

B. PROCEDURE - cont'd

2. n. Monitor TP-906 with scope.

o. Jumper TP-907 to ground.

p. Move signal generator input to TP-905.

q. Set signal generator to 5.25 mc at a level high enough to observe a tuneable signal, (use as little drive as possible).

r. Tune L-904 for maximum indication on scope.

s. Remove jumper from TP-907.

t. Tune T-901 for minimum indication on scope.

u. Monitor TP-908 with scope.

v. Jumper TP-909 to ground.

w. Tune L-905 for maximum indication on scope.

x. Remove jumper from TP-909.

y. Tune T-902 for minimum indication on scope.

z. Monitor junction of CR-901 and CR-902 with scope.

aa. Tune T-903 for maximum indication on scope.

bb. Monitor TP-910 with scope.

cc. Jumper TP-911 to ground.

dd. Tune T-904 and L-906 alternately for maximum indication n sc pe.

ee. Remove jumper from TP-911.

ff. Tune T-905 for minimum indication on scope.

gg. Monitor TP-912 with scope.

hh. Tune T-907 for maximum indication on scope.

ii. Remov signal gen rat r input.

jj. Set nixie s lector to "0".

kk. M nitor TP-909 with sc pe.

B. PROCEDURE - Cont'd

2. ll. Slowly adjust R-914 CW until first peak on scope is observ d.

mm. Set 10 KC nixie selector to "9". Output as appears on scope should be approximately the same. If not, slightly readjust R-914 until the amplitude is the same for both the "0" and the "9" positions of the 10 KC nixie selector.

nn. Check all positions from "0" to "9" on 10 KC nixie selector. Output level must remain above 1.5V P/P. While observing levels, also obs rv frequency as indicated on:

"0" position	5 MC
"1" position	5.05 MC
"2" position	5.10 MC
"3" position	5.15 MC
"4" position	5.20 MC
"5" position	5.25 MC
"6" position	5.30 MC
"7" position	5.35 MC
"8" position	5.40 MC
"9" position	5.45 MC

oo. Set nixie selector to 500 KC.

pp. Monitor TP-912 with scope. Output must be .15V P/P or gr ater. Frequency must be 10.5 mc exactly.

qq. Frequency multiplier switch to Xl.

rr. Nixie selectors to 50 KC.

ss. Tune T-906 for maximum indication on scope.

tt. Output must be .15V P/P or greater. Frequency must be 10.05 mc exactly.

3. A-3789 Card

a. Set nixie selectors to 300 kc.

b. Monitor TP-752 with scope. Level should be .15V P/P or gr ater.

c. Observe 10.3 mc on counter exactly.

d. Monitor TP-751 with scope.

. Replace Y-702 on A-3788 board. Level must b .6V P/P r gr ater. Observe 9.9 mc exactly on counter.

B. PROCEDURE - Cont'd

3. f. Monitor TP-754 with scope. Observe 400 KC on counter. Level must be .5V P/P or greater.

g. Monitor test point 756 with scope.

h. Set VLRB to 300 KC.

i. Connect 5.8 mc input from VLRB to J-454 on LFSB.

j. Remove A-3788 card.

k. Tune L-752 for maximum indication on scope. Must be .2V P/P or greater. Observe frequency on counter. Should be approximately 6.1 mc.

l. Monitor R-773 with scope. Adjust R-774 for minimum indication on scope.

m. Replace A-3788 card.

n. Monitor TP-757 with scope.

o. Tune T-751 for maximum indication on scope. Observe counter. Frequency must be 6.5 mc ±2 KC. If not, readjust VLRB to obtain it, and retune T-751. Output level must be .5V P/P or greater.

p. Monitor test point 753 with scope. Level must be .4V P/P or greater. Frequency must be 400 KC exactly.

4. 3790 Card

WARNING: PLACE INSULATION MATERIAL BETWEEN EDGE OF CHASSIS AND PC BOARD TO PREVENT SHORTING.

a. Set R-817 and R-827 to mid-position.

b. Monitor TP-801 with scope.

c. Adjust T-805 for maximum indication on scope. Level must be 3V P/P or greater.

d. Monitor TP-807 with scope.

e. Adjust T-807 for maximum indication on scope. Level must be 2V P/P r greater.

f. Disconnect 5.8 mc input from J-454. Output sh uld disappear from scope.

B. PROCEDURE - Cont'd

4. g. Connect 6.5 mc from VLRB to J-453 on LFSB.

h. Monitor TP-802 with scope.

i. Adjust T-801 and T-802 for maximum indication on scope. Level must be 3V P/P or greater.

j. Monitor TP-801 with scope.

k. Adjust T-803 and T-804 for maximum indication on scope. Level must be 3V P/P or greater. Observe frequency. Must be 6.5 mc ±5 cps.

l. Monitor TP-807 with scope.

m. Adjust T-806 for maximum indication on scope. Level must b 3V P/P or greater.

n. Re-connect 5.8 mc input.

o. Connect d-c loop from VLRB to d-c loop out of LFSB (J-455).

p. Turn VLRB to BAND 3.

q. Adjust R-817 for a center scale "0" reading on SYNCHRONIZE meter.

r. Monitor TP-806 with D-C VTVM.

s. Adjust R-827 for "0" volts.

t. Put VLRB back to BAND 4.

u. Tune VLRB for a "0" indication (center scale) on SYNCHRONIZE m ter of LFSB.

v. Monitor TP-806 with D-C VTVM.

w. Re-adjust T-807 for a maximum negative voltage -1V or greater.

x. Observing SYNCHRONIZE ALARM light and SYNCHRONIZE meter, tune VLRB for a center RED indication to the right. Adjust R-827 to a point wher the SYNC ALARM light just goes out.

y. Tune VLRB to a point where the SYNC ALARM light comes on. SYNCHRONIZE meter should return to center scale.

z. Tun VLRB slowly in opposite dir ction until SYNC ALARM light goes out. Continu in this dir ction until SYNC ALARM light com s ne again. SYNCHRONIZE m ter should return to center scale. Tune VLRB in opposite dir ction until SYNC ALARM light go s out.

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

DATE 25 February 1965	TMC SPECIFICATION NO. S- 925	0
SHEET 14 OF 15		
COMPILED / CHECKED	TITLE: ALIGNMENT OF LFSB	
APPROVED	SS	

THE TECHNICAL MATERIEL CORP.
MAMARONECK, N.Y.

TEST DATA SHEET
FOR
TMC MODEL LFSB-1

SERIAL NO: _____

MFG. NO: _____

I. PRELIMINARY

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

II. ALIGNMENT

a. 1-8

1) 1 mc output (C417	_____V P-P
2) 8 mc output (#13)	_____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 50DB 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

f. 9- 9.9 mc generator

1) 9 mc output	_____V P-P
multiplier switch X 1	_____OK
2) 9.9 mc output	_____V P-P

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 430M

DATE 25 February 1965 SHEET 15 OF 15	TMC SPECIFICATION NO. S- 925	0
COMPILED / CHECKED	TITLE: ALIGNMENT OF LFSB-1	
APPROVED	SS	

LFSB-1 TEST DATA SHEET #2

g. Output mixer - multiplier

1)	Alignment of tuned circuits	_____ OK
2)	Setting of R-914	_____ OK
3)	Output at TP-909	
a)	"0" 10KC nixie position	_____ V P-P
b)	"1" " " "	_____ V P-P
c)	"2" " " "	_____ V P-P
d)	"3" " " "	_____ V P-P
e)	"4" " " "	_____ V P-P
f)	"5" " " "	_____ V P-P
g)	"6" " " "	_____ V P-P
h)	"7" " " "	_____ V P-P
i)	"8" " " "	_____ V P-P
j)	"9" " " "	_____ V P-P
4)	Output at TP-912	
a)	10,500,000 cps	_____ V P-P
b)	10,050,000 cps	_____ V P-P

h. 6.5 mc IF and output

1)	Output @ TP-752 10.3 mc	_____ V P-P
2)	Output @ TP-751 9.9 mc	_____ V P-P
3)	Output @ TP-754 400 mcs	_____ V P-P
6)	Output @ TP-756 6.1 mcs	_____ V P-P
7)	Output @ TP-757 approx. 6.5 mc	_____ V P-P
8)	Output @ TP-753 400 kcs	_____ V P-P

i. Phase detector card

1)	Output @ TP-801	_____ V P-P
2)	Output @ TP-807	_____ V P-P
3)	Output @ TP-802	_____ V P-P
4)	Output @ TP-801 6.5 mc	_____ V P-P
5)	Output @ TP-807	_____ V P-P
6)	R-827 for 0 volts	_____ OK
7)	Output @ T-807	_____ -VDC
8)	Synchronize alarm light	_____ OK

DATE: _____

TESTER: _____

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 439M

REVISION SHEET

THE TECHNICAL MATERIEL CORP.
MAMARONECK NEW YORK

S-925 0
LIST NO.

DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
3/2/65		1 of	15	0=ORIGINAL RELEASE FOR PRODUCTION.	