TMC SPECIFICATION

REV: A B C | NO. S 1229

COMPILED: | CHECKED: | APPD: | SHEET OF

TITLE: TEST PROCEDURE MMX-( )

TEST PROCEDURE

FOR

MMX-( )

1. Equipment Used

   A. Signal Generator H.P. Model 606A
   B. Scope Tektronix Model 541A or equivalent
   C. Spectrum Analyzer Lavoie Laboratories Inc. Model LA-40A
   D. Audio Generator H.P. 200CD or equivalent
   E. Ballantine VTVM Model 314 or equivalent.
   F. 0-10V, DC Power Supply
   G. Telonic D=550 Attenuator or equivalent.
   H. Millivolt Meter, Millivac MV-28B or equivalent.
   J. VTVM Hewlett-Packard Model 410B.

2. Preliminary Test (1MC and 3MC Oscillators inserted)

   A. With AC line cord removed, no cards inserted and power switch to "ON" position, Exciter Switch to "ON" position, measure resistance from Pin 1 J101 to ground. (150 ohms minimum)

   B. Measure resistance fron J115 Pin F to ground. (8K ohms minimum in all positions)

   C. Measure resistance from J114 Pin 9 to ground. (2.5K ohms minimum in positions 0-19 mhz) (1.2K ohms minimum in positions 20-30mhz)

   D. Turn power switch to "STANDBY" position and insert PC-329 and PC-330 into unit. (Before inserting PC-330, turn R3 and R12 fully cw)

   E. Check for any visible shorts.

   F. Plug in AC line cord. The standby lamp should light.

   G. Turn power switch to "ON" position. The red "POWER" lamp should light.

   H. Measure DC voltage at Pin 6 at J304 (approximately 45V).

I. Allow fifteen (15) minutes warm-up.

NOTE: In Test Procedure all pin numbers refer to their respective connectors.

I. PC-329 Power Supply Board "A"

A. Using Simpson 260A measure DC voltage level at J304 Pin A (approximately +40V)

B. Measure DC voltage level at Pin E. (approximately +20V)

II. PC-330 Power Supply Board "B"

A. Measure DC voltage level at J303 Pin E (approximately +20V)

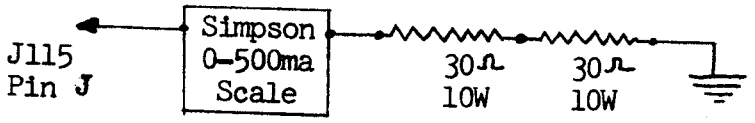
B. Measure DC voltage level at Pin A (approximately +40V). Turn R3 and R12 fully cw.

C. Measure DC voltage at Pin F. Adjust R8 for exactly 12.0V (All cards tested and inserted*). Connect scope to Pin F. Maximum AC ripple should be 5mv. Adjust R3 until voltage level just starts to drop. Back off slightly to full voltage.

D. Measure DC voltage at Pin 4. Adjust R18 for exactly 24.0V. Connect scope to Pin 4. Maximum AC ripple should be 2mv. Adjust R12 until voltage level just starts to drop. Back off slightly to full voltage.

E. Measure DC voltage at J301 Pin E (30V $\pm$ 1V).

F. Turn power switch to standby position and meter switch to Q1 position. Adjust R106 meter adjust control (Located at rear of meter switch) for equal readings on front panel meter and Simpson Model 260, in following set-up:



* Do not insert RF output card PC-391 until, XVI of test procedure has been followed.

III. PC-383 (J101) Spectrum Generator Card

1 MC A. Set 1mc switch (S108) on rear panel to internal position. Place scope between Pin A and ground and adjust T1 for maximum output. (Place cards PC-304, PC-300 and PC-302 into unit for 1mc load)

1 MC B. Place scope between Pin 3 and ground and adjust R60 for 0.6vpp output.

C. Measure level at collector of Q3 with scope (1mc spectrum of 1.5vpp).

D. Measure level at Pin D of J101 (100Kc spectrum of approx..2vpp).

12 MC E. Place scope to TP3 and ground. Adjust T2 and C12 for maximum output. (PC-324 inserted and 10mc switch of front panel set to position 21-30. All other switches on front panel set to 0(position.)

12 MC F. Place scope to Pin 8 and ground lead to Pin J. Adjust T3 for maximum output. (approximately 0.4vpp) Switch position 11-20MHz .

13 MC G. Place scope between TP6 and ground. Adjust C50 and T8 for maximum signal.

13 MC H. Place scope between Pin P and ground lead to Pin R. Adjust T9 for maximum output. (approximately .4vpp)

8 MC I. Place scope between TP9 and ground. Adjust C73 and T10 for maximum output. All position mc switch.

8 MC J. Place scope between Pin S and ground lead to Pin 15. Adjust T11 for maximum output. Output should be approximately 1.5vpp)

14 MC K. Place scope between TP5 and ground. Adjust C36 and T6 for maximum output. (PC-301 inserted and 10mc switch on front panel set to Position 0-10).

14 MC L. Place scope between Pin 13 and ground lead to Pin 12. Adjust T7 for maximum output. Output level should be approximately .4vpp..

40 MC M. Place Millivac MV-28B meter between Pin 11 and ground lead to Pin 10. Set analyzer to read 40Mc. Adjust C86 and C89 for maximum output. Output should be approximately 70mv rms (PC-323 inserted)

IV. PC-304, Comb Filter A (J102) all following Front Panel Switches In Blank Position (100Hz, 1KHz, 10KHz and 100KHz). Comb Filter B into Unit.

.8Mc A. Place scope on TP11 and ground lead on ground. Adjust C54 and T11 for maximum output.

.8MC B. Place scope on Pin S and ground lead on Pin (15) Adjust T12 for maximum output. Adjust R42 for 0.7vpp output.

1.0MC C. Place scope on TP9. Adjust C43 and T9 for maximum output.

1.0MC D. Place scope on Pin 14. Adjust T10 for maximum output. Adjust R35 for 0.7vpp.

1.2MC E. Place scope on TP7. Adjust C32 and T7 for maximum output.

1.2MC F. Place scope on Pin J. Adjust T8 for maximum output. Adjust R28 for 0.7vpp.

1.4MC G. Place scope on TP5. Adjust T5 and C22 for maximum output.

1.4Mc H. Place scope on Pin F. Adjust T6 for maximum output. Adjust R21 for 0.7vpp.

1.6MC I. Place scope on TP4. Adjust T3 and C11 for maximum output.

1.6MC J. Place scope on Pin L. Adjust T4 for maximum output. Adjust R14 for 0.7vpp.

1.8MC K. Place scope on TP1. Adjust C10 and T2 for maximum output.

1.8MC L. Place scope on Pin 4. Adjust T1 for maximum output. Adjust R3 for 0.7vpp.

V. PC-304, Comb Filter B (J103) Set 100Hz, 1KHz, 10KHz, and 100KHz. Switches in Blank Position. Comb Filter A into Unit.

.9MC A. Follow same procedure as IV A and B. Substitute 0.9Mc.

1.1MC B. Follow same procedure as IV C and D. Substitute 1.1MC

1.3MC C. Follow same procedure as IV E and F. Substitute 1.3MC.

1.5MC D. Follow same procedure as IV G and H. Substitute 1.5MC

1.7MC E. Follow same procedure as IV I and J. Substitute 1.7Mc.

1.9MC F. Follow same procedure as IV K and L. Substitute 1.9MC.

VI. PC-336 (J104) Single Mixer Divider

8 MC A. Place scope probe from cathode side of CR1 to ground. Adjust T1 for maximum output. Place scope probe on TP1. Jumper Pin B of J104 to ground. Adjust R7 for minimum output. Level at cathode of CR1 should be 0.5vpp minimum. Remove PC-383 Spectrum Generator card from unit.

9.0MC B. Place scope probe from TP5 to ground. Place generator input from TP1 to ground. Adjust generator to 9.05mc, terminate generator input with 47 ohms. Adjust T2, T3, T4, T5 and T6 for maximum output. Connect scope to TP6 and adjust R23 for minimum output. With generator set to 10mv rms, the output should be 0.5vpp minimum at TP5. Remove short from Pin B of J104.

10-10.9MC C. Place generator input through a 220 ohm resistor to TP6. Place the ground lead to ground. Adjust generator to 10.4mc.

1. Place the scope probe at TP6 and the ground lead to ground. Short TP7 to ground. Adjust T7 for maximum output. Remove the short from TP7. Adjust T8 for minimum reading at TP6.

10-10.9MC 2. Place scope probe from TP8 to ground. Short TP9 to ground. Adjust T9 for maximum output. Remove short from TP9 and adjust T10 for minimum output at TP8.

10-10.9MC 3. Place scope probe at TP10- Adjust T11 for maximum output. With a generator input of 10mv rms in. The output should be 0.2vpp minimum for the range of 10mc to 11mc.

1-1.09MC D. Disconnect generator and reconnect PC-383 into J101. Place scope probe on Pin 15 and the ground lead to Pin R. Turn 100Hz switch from position 0 to position 9. Output should be minimum of 0.6vpp with frequency variation of 1.0mc to 1.09mc.

VII. PC-300 (J105) Double Mixer Divider Cards

8 MC A. Place scope probe from cathode side of CR1 to ground. Adjust the 100Hz switch to a blank position. Adjust T1 for maximum output. Place scope on TP1. Adjust R9 for minimum output. Output at cathode of CR1 should be 0.5vpp minimum.

9-9.09MC B. Place the scope probe on cathode side of CR3 and ground lead to ground. Set 1Kc switch to blank position. Adjust 100Hz switch to position 5. Adjust T2, T3, T4, T5 and T6 for maximum output. Place probe on TP5 and adjust R23 for minimum output. Output at cathode of CR3 should be 0.5vpp minimum in 100Hz switch position from 0 through 9.

10-10.99MC C. Rotate 100Hz switch to the blank position. Place signal generator through a 220 ohm resistor to TP5. Adjust generator output for 10.4mc and terminate generator line with a 47 ohm resistor.

1. Place scope probe at TP5. Groundlead to ground. Short TP6 to ground and adjust T7 for maximum output. Remove short from TP6 and adjust T8 for minimum output.

2. Place scope probe at TP7 with a ground lead grounded near this point. Short TP8 to ground. Adjust T9 for maximum output. Remove short from TP8 and adjust T10 for minimum output.

3. Place scope probe between TP9 and ground. Adjust T11 for maximum indication. With a generator input of 10mv rms the output should be 0.2vpp minimum for the range of 10mc to 11mc.

1-1.099MC D. Disconnect generator. Place scope probe on the junction of L4 and R46. With the 100Hz switch in position 5, rotate the 1KHz switch from position 0 to position 9. The output should be 0.6vpp.

8 MC E. Rotate the 1KHz switch to a blank position. Place the scope probe between the cathode end of CR6 and ground. Adjust T12 for maximum output. Place scope probe at TP10. Adjust R54 for minimum output. Output at cathode of CR6 should be 0.5vpp minimum.

9-9.099MC F. Place scope probe between cathode side of CR8 and ground. Rotate the 1KHz switch to position 5. Adjust T13, T14, T15, T16 and T17 for maximum output. With the 1KHz switch in position 5, place the scope probe between TP14 and ground. Adjust R69 for minimum indication. Output at cathode of CR8 should be 0.5vpp minimum with the 1KHz switch in positions 0 through 9.

10-10.999MC G. Rotate the 1KHz switch to the blank position. Connect the signal generator through 220 ohm resistor to TP14 and connect the ground lead to ground. Make sure the signal generator lead is terminated with 47 ohms.

1. Place scope probe between TP14 and ground. Adjust signal generator for 10.4mc. Short TP15 to ground. Adjust T18 for maximum output. Remove short from TP15 and adjust T19 for minimum output.

2. Place scope probe between TP16 and ground. Short TP17 to ground. Adjust T20 for maximum output. Remove short from TP17. Adjust T21 for minimum output.

3. Place scope probe between TP18 and ground. Adjust T22 for maximum output. With a generator input of 10mv rms in, the output should be 0.2vpp minimum for the range of 10mc to 11mc.

1.0-1.0999MC H. Disconnect generator and rotate 1KHz switch to position 5. Place scope probe at Pin 15 and ground lead to Pin R. Rotate 10KHz switch from position 0 through position 9. Output should be 0.6vpp over a frequency variation from 1.0 to 1.0999mc.

VIII. PC-302 (J106) Final Mixer Card

8 MC A. Place scope probe from cathode end of CR2 to ground. Rotate 10KHz switch to the blank position. Rotate the 100KHz switch to position 5. Adjust T1 for maximum output. Place scope probe at TP1, and adjust R7 for minimum output. Place short between Pin H and Pin E. Output at cathode of CR2 should be 0.5vpp minimum.

9-9.0999MC B. Rotate the 1KHz and 10KHz switches to position 5. Place the scope probe between the cathode of CR3 and ground. Adjust T2, T3, T4, T5, T6 and T13 for maximum output. Place scope probe between junction CR4 and CR3 and ground. Adjust R18 for minimum output. Output at cathode of CR3 should be 0.5vpp minimum.

10.10.9999MC C. Rotate 10KHz switch to a blank position. Connect generator through a 220 ohm resistor to TP5. Connect ground lead to ground. Adjust signal generator for 10.4mc. Rotate 100KHz switch to position 4.

1. Connect probe to TP5. Short TP7 to ground. Adjust T7 for maximum output. Remove short from TP7 and adjust T8 for minimum output.

2. Place scope probe between TP8 and ground. Short TP9 to ground. Adjust T9 for maximum output. Remove short from TP9 and adjust T10 for minimum output.

3. Remove PC-323, the translator card, from unit. Place a 47 ohm resistor between Pin 12 and 13 of J106. Place scope probe on TP10. Place short across secondary of T12. Rotate the 100KHz switch to position 5. Adjust generator for a frequency of 10.75mc. Adjust T11 for maximum output. Remove short from T12 and adjust T12 for minimum output.

4. Rotate 100KHz switch to position 4. Adjust generator frequency for 10.1mc. Short secondary of T12. Adjust C36 for maximum output. Remove short from T12 and adjust C48 for minimum output.

10-10.9999MC 5. Place scope across 47 ohm resistor. Set generator for 10.5mc 100Mv rms out. With 100KHz, switch in position 4, output should be at least 0.2vpp with generator frequency of 10mc to 10.5mc. With the 100KHz switch in position 5, output should be at least 0.2vpp with a frequency input of 10.5mc to 11mc.

10-10.9999MC D. Remove generator input and set 10KHz switch to position 5. Remove short from Pin H and E. Rotate 100KHz swtich from position 0 to position 9. Output should be a minimum of 0.2vpp. Remove 47 ohm resistor from Pin 12 and 13. Replace PC-323 the translator card to J112.

IX. PC-339 (J109) Carrier Generator Card

1 MC A. Adjust R27 fully ccw, exciter switch "ON", mode switch to "AM" position. Place scope at TP-1. Voltage should be 10.0vpp.

250 KC B. Place scope at TP3 and adjust T1 for maximum level. (approximately 900mvpp)

250 KC C. Place scope at TP4 and adjust T2 for maximum level. (approximately 1.4vpp).

2.75MC D. Adjust R47 fully cw. Place scope at TP6 and adjust T3 for maximum level fo the following waveform. (approximately .4vpp).

6 and 5 cycles/envelope pattern alternately

2.75MC E. Place scope at TP7, adjust T4 for maximum level, and adjust R47 for70mvpp.

250 KC F. Place mode switch in AM position and remove sideband generator card PC-337. Place scope at collector of Q12 and adjust T5 for maximum level (approximately .8vpp). Replace sideband generator card PC-337.

X. PC-337 (J107) Sideband Generator Card

NOTE: (PC-339 Carrier Generator Card must be aligned and inserted into unit, PC-338 removed and R34 and R60 fully clockwise)

A. Connect audio generator with one side grounded to USB terminals on rear of unit.

B. Set audio generator for 1Kc with output level set to 69mv. (-20dbm)

C. Set mode switch and meter switch on front panel to USB positions.

D. Set USB mike/line control for 2/5 of full scale reading on front panel meter.

E. Place Ballantine 314 meter at TP4. Level should be approximately .016v rms.

F. Place scope at TP5 and adjust T1 for maximum level. Adjust USB mike/line control for full scale reading on meter.

G. Adjust R28 and C52 until waveform is symmetrical and crossover is sharp and clear as viewed on scope. See the following waveform.

If necessary- change value of C50 and repeat until sharp crossover can be obtained.

H.. Return USB mike/line control to 2/5 full scale reading on meter and adjust R34 for 200mvpp on collector of Q7. Check output of sideband filter for approximately 75mvpp.

I. Repeat Steps A thru H for LSB using:

1. TP1 for Step E
2. TP8 and T2 for Step F
3. R54, C53 and C51 for Step G
4. R60 and Q12 for Step H.

J. Connect audio generator to mike input on front panel or to Pin E of (J107) and ground.

K. Set audio generator for 1Kc with output level of 1.0mv as measured with Ballantine 314, and jumper C49 with short jumper or PTT internally shorted.

L. Connect Ballantine 314 to TP3 and adjust R9 for a level of 40mv rms.

XI. PC-338 (J108) Frequency Shift Card*

A. Remove PC-338 from unit. Place mode switch to ISB position and adjust R58 fully ccw. Turn carrier control on front panel fully clockwise.

*NOTE: Do not attempt the FSK and/or FAX adjustments without a one (1) hour warm-up period for the 3mc oven. (The oven is on as long as the AC line cord is plugged in.)

B. Set exciter switch to "ON" position and measure 2.75mc input at J108 Pin C. (approximately 70mvpp). Measure 250Kc input at J108 Pin 2 (approximately 70mvpp). Insert PC-338.

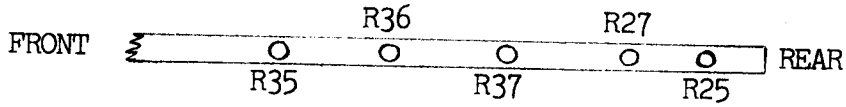
C. Place scope at TP4 and tune T1 for maximum level.

D. Place scope at J108 Pin 7 and tune T1 and T2 for maximum level. (approximately 0.4vpp).

E. Connect frequency counter to vertical output terminals of scope. Place mode switch in FSK position. On rear panel set:

1. R101 to mid-range.
2. Frequency shift switch to ±425cps (maximum) shift position.
3. Sense switch to + (up) positinn.

F. Adjust R56 for maximum level indication on scope. Note location of adjustments as follows: (These are 25 turn potentiometers).



G. Insert card into unit (not on extender), Set R35 and R36 fully ccw.

H. Adjust R37 for 3,000,000cps reading on frequency counter.

I. Adjust R36 for 2,999,575cps reading on frequency counter.

J. Set sense switch to (-) down position, and adjust R35 for 3,000,425cps reading on frequency counter.

K. Repeat Steps I and J until frequencies are within 5 cps.

L. Set frequency shift switch to ±212 position (rear panel) and set sense switch to (+) up position. Counter should read 2,999,788 ±15cps.

M. Set sense switch to (-) down position counter should read 3,000,212 ±15cps.

N. Repeat Steps L and M for ±106 shift position. Spec is ±10cps. Counter should read +2999894, -3000106.

O. Repeat Steps L and M for ±53 shift position. Spect is ±7cps. Counter should read +2999947, -3000053.

P. Place mode switch in FAX position and set R25 fully cw.

Q. Apply 0-10V power supply to FAX terminals on rear panel and set for 1.0V input.

R. Adjust R27 for 2,999,600 ±5cps reading on counter.

S. Reset input to 10.0V and adjust R25 for 3,000,400 ±5cps reading on counter.

T. Repeat Steps Q thru S.

U. Check for linearity by varying input from 1.0 to 10.0 volts. Counter should change 89 ±50cps for every 1.0 volts change from 1.0V to 10.0V.

VOLTS	FREQUENCY	VOLTS	FREQUENCY
1	2999600 ±5cps	6	3000045 ±50cps
2	2999689 ±50cps	7	3000134 ±50cps
3	2999778 ±50cps	8	3000223 ±50cps
4	2999867 ±50cps	9	3000312 ±50cps
5	2999956 ±50cps	10	3000400 ±50cps

XII. PC-301 Step Generator "A"

A. Remove both PC-304 cards (comb filters) from unit and set frequency selector switches on front panel to 03.0000mc.

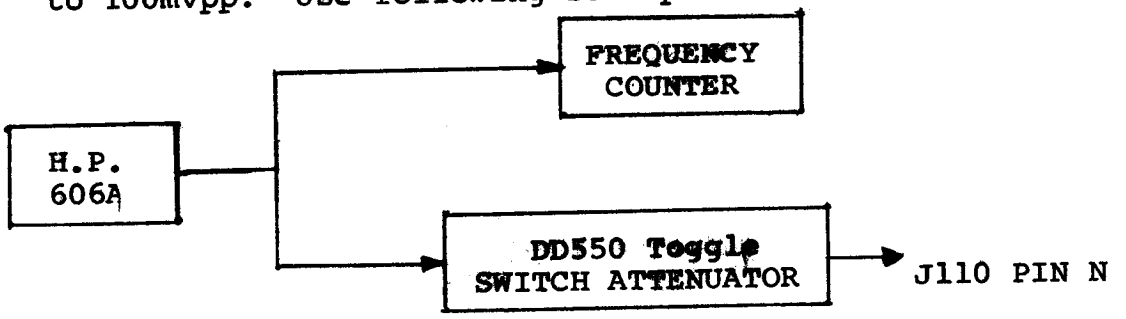
B. Place scope on collector of Q1 and adjust R1 for maximum level.

C. Place scope at junction of CR1 and T1. Adjust T1 for maximum level.

D. Place scope on collector of Q1 and adjust R1 for a level of 2vpp.

E. Place scope at junction of CR1 and CR2. Adjust R7 for minimum level.

F. Connect Hewlett-Packard Model 606A signal generator to pin N of J110. Set frequency to 1.05mc and output lev 1 to 100mvpp. Use following set-up:



G. Place scope at Pin R of J110 and adjust R28 for a level of .4vpp.

H. Connect short jumper across secondary of T3 and place Millivac Model MV-28B millivolt at junction of R8 and C8.

I. Adjust T2 for maximum level indication on meter.

J. Remove jumper and adjust T3 for dip or minimum indication on meter.

K. Repeat Steps H thru J using:

1. T5 and Q2 collector for step H.
2. T4 for Step I.
3. T5 for Step J.

L. Repeat Steps H thru J using:

1. T7 and Q3 collector for Step H.
2. T6 for Step I.
3. T7 for Step J.

M. Place scope at Pin 5 of J110 and adjust T8 for maximum level indication.

N. Vary frequency of 606A generator from .8mc to 1.2mc. Output level on scope should be approximately 2vpp minimum at frequ ncy of 13.2mc to 12.8mc correspondingly.

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O. Adjust 606A generator to 1.55mc and change frequency selector on front panel to 07.0000mc.

P. Repeat Steps H thru J using:

1. T11 and junction of R9 and C9 for Step H
2. T10 for Step I.
3. T11 for Step J.

Q. Repeat Steps H thru J using:

1. T13 and Q6 collector for Step H.
2. T12 for Step I.
3. T13 for Step J.

R. Repeat Steps H thru J using:

1. T15 and Q7 collector for Step H.
2. T14 for Step I.
3. T15 for Step J.

S. Repeat Steps M and N using:

1. T16 for Step M.
2. 1.3mc to 1.7mc and 12.7mc to 11.3mc for Step N.

T. Remove 606A generator from PinN of J110 and adjust frequency selector switches on front panel to 13.0000mc.

U. Repeat Steps B thru F using:

1. R61 and Q9 collector Step B.
2. CR3 and T17 for Step C.
3. R61 and Q9 collector for Step D.
4. CR3 and CR4 junction and R67 for Step E.

V. Repeat Steps H thru J using:

1. T19 and junction of R68 and C80 for Step H.
2. T18 for Step I.
3. T19 for Step J.

W. Repeat Steps H thru J using:

1. T21 and Q10 collector for Step H.
2. T20 for Step I.
3. T21 for Step J.

X. Repeat Steps H thru J using:

1. T23 and Q11 collector for Step H.
2. T22 for Step I.
3. T23 for Step J.

Y. Repeat Steps M and N using:

1. Pin 4 of J110 and T24 for Step M.
2. .8mc to 1.2mc and 12.2mc to 11.8mc for Step N.

Z. Repeat Step O using 17.0000mc.

AA. Repeat Steps H thru J using:

1. T26 and Junction of R69 and C81 for Step H.
2. T25 for Step I.
3. T26 for Step J.

BB. Repeat Steps H thru J using:

1. T28 and Q13 collector for Step H.
2. T27 for Step I.
3. T28 for Step J.

CC. Repeat Steps H thru J using:

1. T30 and Q14 collector for Step H.
2. T29 for Step I.
3. T30 for Step J.

DD. Repeat Steps M and N using:

1. Pin 4 of J110 and T31 for Step M.
2. 1.3mc to 1.7mc and 11.7mc and 11.3mc for Step N.

EE. Replace PC-304 cards into unit.

XIII. PC-322 Step Generator "B" and PC-324 Step Generator "C"

PC-324 Part 1

A. Remove both PC-304 cards (comb filters) from unit and set frequency selector switches on front panel to 28.0000mc.

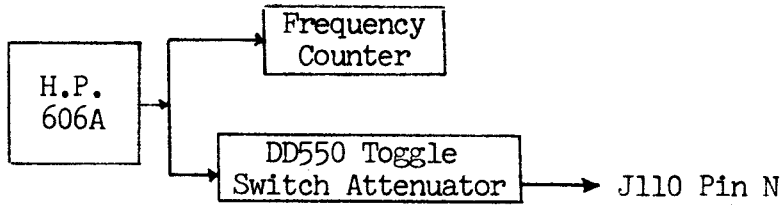
B. Place scope at collector of Q14 and adjust R78 for maximum level.

C. Place scope at junction of T11 and CR1 and adjust T11 for maximum level.

D. Place scope at junction of C104 and R88 and adjust C101 and R84 alternately until minimum level is obtained.

E. Place scope at collector of Q14 and adjust R78 for 2vpp level.

F. Connect Hewlett-Packard Model 606A signal generator to Pin N of J110. Set frequency to 1.6mc and output level to 100mvpp. Use following set-up:



G. Connect short jumper across secondary of T13 and place Millivac Model MV-28B millivolt meter at junction of R88 and C104.

H. Adjust T12 for maximum level indication on meter.

I. Remove jumper and adjust T13 for dip or minimum indication on meter.

J. Repeat Steps G thru I using:

1. T15 and Q15 collector for Step G.
2. T14 for Step H.
3. T15 for Step I.

K. Repeat Steps G thru I using:

1. T17 and Q16 collector for Step G.
2. T16 for Step H.
3. T17 for Step I.

L. Place scope at Pin N of J113 and adjust T18 for maximum level indication.

M. Vary frequency of 606A generator from 1.4mc to 1.8mc. Output level on scope should be approximately 1vpp minimum at frequency of 10.6mc to 10.2mc correspondingly.

N. Adjust 606A generator to 1.075mc with output level set at .4vpp and change frequency selector switches on front panel to 23.0000mc.

O. Repeat Steps G thru I using:

1. T20 and junction of R87 and C103 for Step G.
2. T19 for Step H.
3. T20 for Step I.

P. Repeat Steps G thru I using:

1. T22 and Q18 collector for Step G.
2. T21 for Step H.
3. T22 for Step I.

Q. Repeat Steps G thru I using:

1. T24 and Q19 collector for Step G.
2. T23 for Step H.
3. T24 for Step I.

R. Repeat Steps L and M using:

1. T25 for Step L.
2. .8mc to 1.3mc and 11.2mc to 10.7mc for Step M.

S. Replace PC-304 cards into unit.

XIV. PC-322 Step Generator "B" and PC-324 Step Generator "C"

PC-322

A. Set frequency selector switches on front panel to 25.0000mc and Place Millivac Model MV-28B millivolt meter on Pin 1 of J111.

B. Adjust C3, C9 and C19 for maximum level on meter.

C. Vary frequency selector switches on front panel from 21.0000mc to 31.0000mc in 1mc steps. Minimum level indication on meter should be .04v rms. If necessary, stagger tune capacitors in Step B.

D. Repeat Steps A thru C using:

1. 15.0000mc and Pin 2 of J111 for Step A.
2. C25, C30 and C41 for Step B.
3. 11.0000mc to 20.0000mc for Step C.

E. Repeat Steps A thru C using:

1. 05.0000mc and Pin 3 of J111 for Step A.
2. C45, C49 and C62 for Step B.
3. 01.0000mc to 10.0000mc for Step C.

PC-342 Part 2

F. Repeat Steps A and B using:

1. 25.0000mc and Pin 1 of J113 for Step A.
2. C10, C16, C22 and C28 for Step B.

G. There should be a minimum of .4v rms on meter.

H. Repeat Steps A and B using:

1. 15.0000mc and Pin 1 of J113 for Step A.
2. C39, C45, C51 and C56 for Step B.

I. Repeat Step G.

J. Repeat Steps A and B using:

1. 0.50000mc and Pin 1 of J113 for Step A.
2. C68, C75, C81 and C87 for Step B.

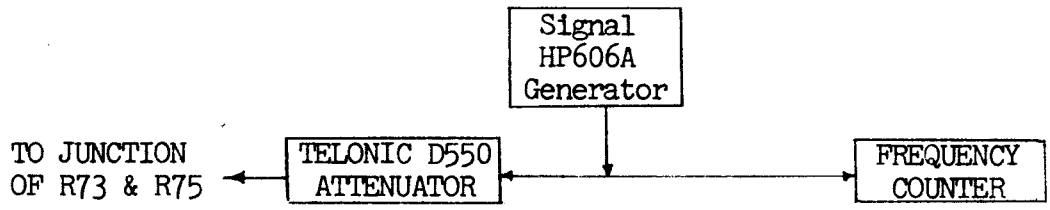
K. Repeat Step G.

XV. PC-323 (J112) Translator Card

A. Remove RF output card PC-306 from unit. Set all frequency dials on front panel to blank positions and remove PC-324 step generator "C" card from unit. (exciter switch OFF)

1. Pre-position R51, R97 and R109 to mid range. These will be adjusted in Part II.

B. Connect Signal Generator 606A between junction of R73 and R75 and ground. Set-up as indicated below:



C. With full attenuation on the toggle switch attenuator, adjust generator for 1 volt output at frequency of 13.3000mc. Set 100KHz switch on front panelt to Position 3.

D. Connect short jumper across secondary of T15 and Millivac MV-28B across primary of T13 observing proper ground. Set meter to .01 volt range.

E. Remove attenuation from telonic attenuator until midscale reading is observed on meter. (Maintain reading on .01 scale of meter using attenuator for the following steps)

F. Adjust T13 for peak indication on meter.

G. Remove jumper from T15 and adjust T15 for dip on meter.

H. Connect short jumperacross secondary of T17 and re-connect millivac meter across secondary of T16 observing proper ground.

I. Change attenuation of telonic attenuator for mid-scale reading on meter and adjust T16 for peak reading on meter.

J. Remove jumper from T17 and adjust T17 for dip on meter.

K. Reconnect meter to TP7 and adjust for maximum indication on meter.

L. Repeat Steps C thru K usning:

1. 13.8000mc and Position 8 for Step C.
2. T20 and T19 respectively for Step D.
3. T19 for Step F.
4. T20 for Step G
5. T22 and T21 respectively for Step H.
6. T21 for Step I.
7. T22 for Step J.
8. TP9 for Step K.

M. Remove 606A generator and turn mode switch to AM position. Set frequency dials on front panel to 05.5000mc. Turn exciter switch to "ON" position.

N. Using scope check for 10.5mc signal at level of .2vpp minimum on J112 Pin H and for 3mc signal of approxiamtely 90mvpp on J112 Pin D.

O. Adjust R71 to mid-position and tune T12 for maximum indication on meter. (meter still on TP7 or TP9).

P. Remove PC-338 frequency shift card from unit and connect Millivac meter to junction of R73 and R75 observing proper ground.

Q. Adjust R71, for minimum indication on meter, and return all frequency dials on frontpanel to blank positions.

R. Using millivac meter, check for 40mc signal at approximately 50mv rms level on J112 Pin B.

S. Connect meter to T3 secondary, observing proper ground, and tune T1, T2 and T3 for maximum indication.

T. Connect Lavoie LA-40 Spectrum Analyzer to TP7 and adjust R36 to one extreme position. Tune C20, C26 and C31 for maximum 120mc indication on analyzer.

U. Connect Lavoie LA-40 analyzer to TP3 and adjust R36 for minimum 120mc indication. Plug PC-338 frequency shift card into unit and adjust frequency dials on front panel to 05.5000mc.

V. Adjust C37 and C42 for maximum 133.5mc indication on analyzer.

W. Connect analyzer to TP4 and adjust C48, C42 and C37 for maximum 133.5mc indication. Connect analyzer to TP5 and adjust C54, C48, C42 and C37 for maximum 133.5mc indication. Connect analyzer to TP6 and adjust C60, C54, C48, C42 and C37 for maximum 133.5mc indication.

X. Replace PC-324 step generator "C" card and connect scope to J112 Pin R. There should be an output level of .2v minimum at a frequency corresponding to the front panel frequency controls.

Y. Connect a 0-10 volt power supply between J112 Pin 10 (+) and ground (-). Increase the voltage from 0 to 10 volts. The output level indication on scope should drop to zero as the voltage increases from 6.5 to 8.5 volts.

XVI. PC-306 RF Output Card*

A. Before inserting card into unit, adjust R1, R2 and R4 for maximum resistance. Turn RF output control on front panel fully ccw. Set mode switch to AM and turn exciter switch on. Turn carrier control fully cw. Insert RF card into units. Re-check power supply voltages and readjust as per section II of test procedure.

B. Turn meter switch to Q1 position. On RF output card, adjust R4 until meter on front panel reads in the center of the green region marked Q1.

C. Turn meter switch on front panel to Q2 and adjust R2 until meter on front panel reads in the center of the green region marked Q2.

D. Turn meter switch on front panel to Q3 and adjust R1 until meter on front panel reads in the center of the green region Marked Q3.

E. Connect 50 ohm load to RF output connector on rear panel of unit and a Hewlett-Packard Model 410B VTVM across the load. Turn ALDC control on rear panel fully ccw and set frequency of unit to 29.9999mc. Place short jumper from Pin S of J115 to Pin B of J114.

* NOTE: Do not attempt to adjust RF card without first having followed Section II F. of test procedure.

F. Connect scope to Pin B of J115. Turn RF control on front panel until scope reads 220mvpp. Hewlett-Packard Meter should read 3.55V rms. Remove jumper and insert PC-325 into J114. Output should not change more than 0.2V.

G. Using Simpson Model 260 meter, measure the DC voltage on Pin 12 of J115. It should vary from 0-12VDC with the ALDC adjust control on rear panel of unit. Return ALDC control fully ccw.

XVII. PC-325 Output Filter Card (Optional Equipment)

This card cannot be aligned in the unit. Use appropriate test jig.

A. Plug filter card into test jig for PC-325.

B. Connect 30VDC to test jig terminals and rotate selector switch to 20-33 position.

C. Connect 608E HF signal generator to input connector and the 50 ohm termination for the millivac MV28B, to the output connector of the test jig.

D. Set signal generator output to 1.0 volt level and adjust millivac to 1 volt range. Connect millivac to its 50 ohm termination.

E. Set signal generator to 31mc and tuen C60 for lowest dip indication on Millivac meter.

F. Set signal generator to 54mc and tune C61 for lowest dip indication on Millivac meter.

G. Repeat steps E and F twice. Replace 608E HF signal generator with 606A signal generator.

H. Rotate selector switch to 12-20 position.

I. Leaving 50 ohm termination on test jig output connector, connect millivac meter (using probe tip) to junction of C49 and C50.

J. Set signal generatorto 44.5mc and tune C54 for lowest dip on millivac meter.

K. Connect millivac meter to its 50 ohm termination and set signal generator to 24.5mc. Tune C51 for lowest dip on millivac meter.

L. Set signal generator to 28mc and tune C48 for lowest dip on millivac meter.

M. Repeat Steps I thru L twice.

N. Repeat Steps H thru M using:

1. (7-12) Positionfor Step H.
2. C38 and C39 for Step I.
3. 25.5mc andC43 for Step J.
4. 14.5mc and C40 for Step K.
5. 16mc and C37 for Step L.

O. Repeat Steps H thru M using:

1. (4-7) Position for Step H.
2. C27 and C28 for Step I.
3. 14mc and C32 for Step J.
4. 8mc andC29 for Step K.
5. 9mc and C26 for Step L.

P. Rotate selector switch to 1-2.5 position. Set generator to 1.5mc. Note db level on Millivac.

Q. Set generator to 3.0mc. Level should drop a minimum of 25db.

R. Set generator to 5.0mc level should have dropped a minimum of 30db.

S. Repeat Steps P thru R using:

1. (2.5-4) positionand 2.5mc for Step P.
2. 5.0mc and 30db for Step Q.
3. 8.0mc and 18db for Step R.

T. Repeat Steps P thru R using:

1. (4-7) position and 4mc for Step P.
2. 8mc and 25db for Step Q.
3. 14mc and 30db for step R.

U. Repeat Steps P thru R using:

1. (7-12) position and 7mc for Step P.
2. 14mc and 25db for Step Q.
3. 24mc and 30db for Step R.

V. Repeat Steps P thru R usign:

1. (12-20) position and 12mc for step P.
2. 24mc and 25db for Step Q.
3. 40mc and 25db for Step R.

W. Repeat Steps P thru R using:

1. (20-33) position and20mc for step P.
2. 40mc and 1db for Step Q.
3. 65mc and 8db for Step R.

MMX-( ) FINAL TEST SPEC.

Preliminary Settings

1. Check power supply voltages and readjust if necessary as per Part II of Test Procedure.
2. All cards aligned and inserted.
3. RF control fully ccw.
4. Output frequency set to 29.9999mc.
5. Carrier control fully ccw.
6. Mode Switch to ISB position.
7. Exciter switch to "ON" position.
8. Two-tone generator connected to both sidebands on rear panel.
9. Mike/line controls to zero.
10. Meter switch to Q1 position.
11. ALDC control on rear panel fully ccw.

PART I With Lavoie Analyzer, neutralize spectrum generator card and comb filter cards as follows:

A. Place PC-383 (J101) on extender card and connect Lavoie Model LA-40 spectrum analyzer to J101 Pin 8 and ground lead to Pin J. Adjust analyzer for 12mc display. Adjust C56 so that 11mc and 13mc are at least -80db from 12mc level.

B. Set frequency on front panel to 0.99999mc and connect analyzer to J101 Pin P and ground lead to Pin R. Display 13mc. Adjust C80 so that 12mc and 14mc are at least -80db from 13mc level. Return frequency to 1.99999mc.

C. Connect analyzer to J101 Pin S and ground lead to Pin 15. Display 8mc. Adjust C64 so that 7mc and 9mc are at least -80db from 8mc level.

D. Place PC383 into unit and place PC304 comb filter "A" on extender card. Remove PC304 comb filter "B" from unit. Connect analyzer to J102 pin S and ground lead to pin 15. Display .8mc. Adjust C67 so that 100kc spurs above and below .8mc are at least -80db from .8mc level.

E. Repeat Step D using:
1.0mc, Pin 14 and ground lead to Pin R, and C68.

F. Repeat Step D using:
1.2mc, Pin J and ground lead to Pin 8, and C69.

G. Repeat Step D using:
1.4mc, Pin F and ground lead to Pin 6, and C70.

H. Repeat Step D using:
1.6mc, Pin L and ground lead to Pin 10, and C71.

I. Repeat Step D using:
1.8mc, Pin 4 and ground lead to Pin D, and C72.

J. Place PC304 comb filter "B" on extender card and remove comb filter "A" from unit. Connect analyzer to J103 Pin S and ground lead to Pin 15. Display .9mc. Adjust C67 so that 100kc spurs above and below .9mc are at least -80db from .9mc level.

K. Repeat Step J using:
1.1mc, Pin 14 and ground lead to Pin R, and C68.

L. Repeat Step J using:
1.3mc, Pin J and ground lead to Pin 8, and C69.

M. Repeat Step J using:
1.5mc, Pin F and ground lead to Pin 6, and C70.

N. Repeat Step J using:
1.7mc, Pin L and ground lead to Pin 10, and C71.

O. Repeat Step J using:
1.9mc, Pin 4 and ground lead to Pin D, and C72.

P. Front panel meter should read in the green region marked Q1.

Q. Turn meter switch to Q2 position. Front panel meter should read in the green region marked Q2.

R. Turn meter switch to Q3 position. Front panel meter should read in the green region marked Q3.

S. Using Ballantine 314 meter, adjust audio input to rear panel to 69mv (-20dbm) single tone.

T. Connect scope to TP1 of PC-337 sideband generator card and set LSB mike/line control for .09vpp.

U. Set meter switch on front panel to LSB position. The front panel meter must read 2/5 of full scale. Return LSB mike/line control to zero.

V. Connect scope to TP4 of PC-337 sideband generator card and set USB mike/line control for .09vpp.

W. Set meter switch on front panel to USB position. The front panel meter must read 2/5 of full scale. Return USB mike/line control to zero.

X. Connect Lavoie spectrum analyzer (LA-40) to monitor jack on rear panel of unit.

Y. Connect RF VTVM Hewlett-Packard 410B to RF output jack across 47 ohm load resistor.

Z. Set carrier control on front panel fully cw and adjust RF output control on front panel for 3.5 volts on VTVM.

AA. Connect scope to output of unit. Displayed waveform should be sharp undistorted sine wave with no modulation signal appearing in any position of the time/cm dial of the scope.

PART II

A. 1. Set frequency of MMX to 29.250MHz. Adjust carrier control for maximum cw position ISB mode. Adjust for 2.5V rms output on HP-410B meter. Change frequency to 29.750MHz and adjust R109 on A4505 CArd 12 for equal output.

2. Find frequency in the 29.00 to 29.9999MHz range with the minimum output. Adjust R97 A4505 Card 12 for maximum output at that point.

3. Turn carrier control on front panel fully ccw and mode switch to ISB position. Switch audio input to two tones. Adjust mike/line controls for 4/5 full scale readings on meter in appropriate meter switch positions (both sidebands). Adjust RF control for 5.0 volts output indication on Hewlett-Packard 410B meter.

B. Touch up level of tones for equal display by decreasing R34 (USB) or R60 (LSB) on PC-337 sideband generator card.

C. Display 5.0 volt output signal on analyzer and adjust R51 and R71 on PC-323 translator card alternately for four (4) clear tones (distortion -40db). Readjust Rf control for 5.0 volts if necessary. Check distortion in sideband position of mode switch. Should be (-40db minimum). Check carrier suppression in USB, LSB and ISB should be (-55db minimum).

D. Repeat Step B. Return mode switch to ISB position.

E. Attenuate display -3db using input attenuator of analyzer. Turn carrier control on front panel fully cw and adjust R27 on PC-339 carrier generator card for center tone at top line of analyzer. See the following:

F. Turn mode switch to cw position and key unit by front panel key or by rear panel jumper across key terminals. Adjust R20 on PC-339 carrier generator card for top line on analyzer. Unkey unit. Output should drop to 0 (-60db minimum). Key unit.

G. Adjust R47 on PC-339 carrier generator card until just before signal starts to decrease.

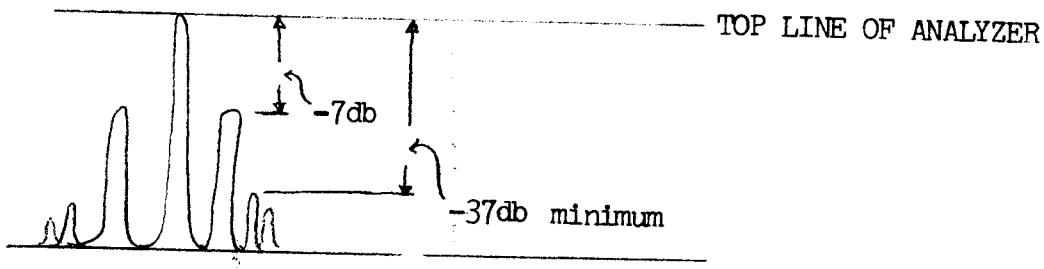
H. Turn mode switch to FSK position and adjust R56 on PC-338 frequency shift card for top line on analyzer. Turn mode switch to FAX position. Level should remain the same.

I. Return mike/line controls to zero positions, switch audio input to single tone and turn mode switch to AM position. Remove 3db of attenuation from input attenuator of analyzer.

J. Adjust R69 on PC-339 carrier generator for top line on analyzer.

K. Using LSB or USB mike/line control, modulate displayed carrier so that sidebands (as measured with input attenuator of analyzer) are 7db below carrier). (Approx. -2 on meter M101)

L. Repeat Steps J and K until the following is obtained: Distortion should be -37db minimum below carrier as shown.



M. Return mike/line control to zero and turn carrier control fully cw. Turn meter switch to carrier position. Meter should read approximately 4/5 full scale. Turn meter switch to RF position. Meter should indicate approximate RF output in volts.

N. Adjust R58 on PC-338 frequency shift card for an output voltage of 5.6 volts on Hewlett-Packard 410B meter, when RF output and carrier controls are fully cw, at frequency of 29.9999mc.

PART III

A. Connect 0-10 volt power supply to ALDC connector on rear of unit (+ to ground, - to ALDC jack) **Output of unit should drop to zero with between -7 and -8 volts of ALDC input.**

B. Connect counter to vertical output terminals of scope and turn mode switchs to FSK position. Check FSK and readjust if necessary as outlined in alignment procedure for PC-338 frequency shift generator card, except center frequency will be selected by frequency dials on front panel of unit. Check contact keying by shorting and unshorting contact key terminals at rear of panel.

C. Turn mode switch to FAX position and connect 0-10 volt DC supply to FAX terminals at rear of unit. Check FAX and readjust if necessary as outlined in alignment procedure for PC-338 frequency shift generator card, except center frequency will be selected by frequency dials on front panel of unit.

D. Fill out test data sheet at end of procedure as per customer requirement and unit operation.

E. Check output using carrier only for minimum output. Required using the following frequencies:

2.0000MHz	14.4999MHz	23.5000MHz
3.3333MHz	15.0000MHz	24.0000MHz
4.4444MHz	16.0000MHz	25.0000MHz
5.5555MHz	17.0000MHz	26.0000MHz
6.6666MHz	18.0000MHz	27.0000MHz
7.7777MHz	19.9999MHz	28.0000MHz
8.8888MHz	20.0000MHz	29.0000MHz
9.9999MHz	21.0000MHz	29.9999MHz
10.0000MHz	22.0000MHz	
11.1111MHz		
12.2222MHz		
13.5000MHz		

TMC SPECIFICATION NO. S 1229 C

COMPILED | CHECKED

TITLE: TEST PROCEDURE MMX - ( )

APPROVED

TEST DATA
HF EXCITER
MMX _____

SERIAL NO. _____

MFG. NO. _____

FREQUENCY MHz	POWER LEVEL	TWO TONE DISTORTION TEST		SINGLE TONE AM DISTORTION
		LSB	USB	
1.6				
2.5				
3.5				
5.0				
7.0				
9.0				
11.0				
13.5				
15.0				
17.5				
19.0				
21.0				
23.5				
25.0				

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DATE		TMC SPECIFICATION NO. S 1229	C
SHEET 32 OF 32			
COMPILED	CHECKED	TITLE: TEST PROCEDURE MMX - ( )	
APPROVED			

FREQUENCY MHz	POWER LEVEL	TWO TONE DISTORTION		SINGLE TONE AM DISTORTION
		LSB	USB	
26.5				
28.0				
29.0				
29.499				
29.500				
29.999				

2.003 MHz _____
2.182 MHz _____
2.638 MHz _____
CARRIER SUPPRESSION
_____

LSB _____db
USB _____db

ISB _____OK
CW _____OK
FSK, FAX _____OK
SIDEBAND FILTERS _____

Hardware _____
Stamping_____
Engraving_____
Mechanical
Assemblies_____
Soldering_____
Chassis Assemblies_____

TESTER: _____

DATE: _____

MFG. NO. _____

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