

TMC SPECIFICATION

NO. S 982

REV: 0 A B

COMPILED: LEL

CHECKED: *LEL*

APPD: *AWM 6/29/65*

SHEET 1 OF 12

TITLE:

FINAL TEST PROCEDURE

for

DDR-5K SYSTEM

and

DDR-5KA SYSTEM

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TITLE: FINAL TEST PROCEDURE - DDR-5K SYSTEM AND DDR-5KA SYSTEM

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A. PRELIMINARY

1. Test Equipment Required

- a. Frequency Counter - HP 524C or equivalent.
- b. Signal Generator (1) - Measurements Corp. Model 82 or equivalent.
- c. AC VTVM - Ballantine 314 or equivalent.
- d. 50 ohm, 20 db attenuator pad.
- e. Spectrum analyzer PTE-4 or equivalent.
- f. VOM-Simpson 260 or equivalent.
- g. SONIC ANALYZER LP-1A or equivalent.

2. It is assumed that individual units have been aligned and tested, that all units are installed in the cabinet, and that all inter-connections have been made.

3. Connect the power cable to 117V, 60 cps single phase source.

4. Place all switches and controls in the following positions:

* a. HFP-1:

STANDBY-OFF Toggle Switch at rear to STANDBY. The main blower should commence to run. the GREEN STANDBY indicator should light. OVEN indicator on MCG-1 unit should commence to cycle.

b. MSA-1:

- (1) STANDBY-ON switch to STANDBY.
- (2) AGC DECAY controls - 1/4 turn CW.
- (3) SQUELCH controls - fully CCW.
- (4) MONITOR LEVEL control - fully CCW.
- (5) MONITOR SELECT switch - A₁.
- (6) LINE LEVEL controls - 1/4 turn CW, except A₁ control which should be 1/2 turn CW.

c. MCG-1:

INT-AFC-SYN switch to SYN.

d. AFC-3:

- (1) SENSITIVITY control - fully CW.
- (2) TUNING KCS control - "0".
- (3) CARRIER SELECTOR switch - OSC.

* RECORD ON TEST DATA SHEET

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A. PRELIMINARY - Cont'd

e. HFR-2:

- (1) BAND - BAND 1 (2-3 mcs).
- (2) NOISE SILENCER-OFF-ALIGNMENT SIGNAL switch to ALIGNMENT SIGNAL.
- (3) TUNE-SYNC-OPERATE switch - SYNC.
- (4) TUNE control - 2 mcs.

f. HFS-1: Control setting insignificant at this time.

g. HSS-8:

- (1) CHANNEL MONITOR - A₁
- (2) AGC - SEP.
- (3) VOLUME control - 1/2 turn CW. The VOLUME control may be adjusted to any convenient listening level during the test.

B. CHECKOUT PROCEDURE

* 1. On MSA-1, place STANDBY-ON-POWER switch to ON. The YELLOW time delay indicator should light, and the GREEN standby indicator should go out. After approximately 60 seconds, YELLOW time delay indicator should go out, and the RED operate indicator should come on. At the same time, the following should occur:

- a. HFR-2 dial should be illuminated.
- b. The NIXIE indicators on the HFS-1 should light.
- c. The GREEN channel indicators on the MSA-1 unit should light.

* 2. With a Simpson 260 VOM, measure the voltage at the convenience outlets on the HPP-1 panel. It should be 117V AC, +10%.

* 3. Pull out HFP unit. Measure the d-c voltage at test points TP8001 and TP8002 with a VOM. It should be +200V, exactly. If necessary, adjust the appropriate potentiometer(s) located adjacent to the test point(s). Replace HFP-1 drawer.

* 4. Check of Synthesizer, HFO Circuits & Synthesizer Stability

- a. Remove the plug from J1313 on HFR-2. Connect the frequency counter to J1313.
- b. Set the NIXIE selectors on HFS-1 to 02.0000.

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B. CHECKOUT PROCEDURE - Cont'd

c. Carefully move the TUNE control on RF head around 2.0 mcs until an audible zero beat is obtained. The SYNC light may chatter during this operation.

d. Place TUNE-SYNC-OPERATE switch to OPERATE. The SYNC indicator should come on and remain on. Move the TUNE control on RF head so that the SYNCHRONIZE meter reads "0" center scale. The frequency counter should read 3.75 mc.

e. Place the TUNE-SYNC-OPERATE switch on RF head to SYNC. Place the 100 KC selector on HFS-1 to Position 1. Carefully move the TUNE control on RF head until an audible zero beat at 2.1 mcs is obtained. Place the TUNE-SYNC-OPERATE switch on RF head to OPERATE. SYNC light should come on. The frequency counter should read 3.85 mc.

f. Continue this procedure for the remaining positions of the 100 KC selector as shown in the following table. Move the NIXIE selector to the position shown. With the TUNE-SYNC-OPERATE switch at SYNC, move the TUNE control until a zero beat is obtained, then throw the switch to OPERATE, and note that the SYNC indicator comes on. Read the counter.

<u>100 KC SELECTOR</u>	<u>TUNE CONTROL</u>	<u>FREQ. COUNTER</u>
2	2.2 mcs	3.95 mcs
3	2.3 mcs	4.05 mcs
4	2.4 mcs	4.15 mcs
5	2.5 mcs	4.25 mcs
6	2.6 mcs	4.35 mcs
7	2.7 mcs	4.45 mcs
8	2.8 mcs	4.55 mcs
9	2.9 mcs	4.65 mcs

g. Place the 10 KC NIXIE selector to Position 1. Repeat the foregoing procedure with the TUNE control at 2.91 mcs. The counter should read 4.66 mcs. Continue this procedure through the remaining positions of the 10 KC selector switch, in accordance with the following table:

<u>10 KC SELECTOR</u>	<u>TUNE CONTROL</u>	<u>FREQ. COUNTER</u>
2	2.92 mcs	4.67 mcs
3	2.93 mcs	4.68 mcs
4	2.94 mcs	4.69 mcs
5	2.95 mcs	4.70 mcs
6	2.96 mcs	4.71 mcs
7	2.97 mcs	4.72 mcs
8	2.98 mcs	4.73 mcs
9	2.99 mcs	4.74 mcs

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B. CHECKOUT PROCEDURE - Cont'd

h. Place the 1 KC NIXIE selector to Position 1. Repeat the foregoing procedure with the TUNE control at 2.991 mcs. The counter should read 4.71 mcs. Continue this procedure through the remaining positions on the 1 KC selector switch in accordance with the following table:

<u>1 KC SELECTOR</u>	<u>TUNE CONTROL</u>	<u>FREQ. COUNTER</u>
2	2.992 mcs	4.742 mcs
3	2.993 mcs	4.743 mcs
4	2.994 mcs	4.744 mcs
5	2.995 mcs	4.745 mcs
6	2.996 mcs	4.746 mcs
7	2.997 mcs	4.747 mcs
8	2.998 mcs	4.748 mcs
9	2.999 mcs	4.749 mcs

i. Place the .1 KC NIXIE selector to Position 1. Repeat the foregoing procedure with the TUNE control at 2.9991 mcs. The counter should read 4.7491 mcs. Continue this procedure through the remaining positions of the .1 kc selector switch in accordance with the following table:

<u>.1 KC SELECTOR</u>	<u>TUNE CONTROL</u>	<u>FREQ. COUNTER</u>
2	2.9992 mcs	4.7492 mcs
3	2.9993 mcs	4.7493 mcs
4	2.9994 mcs	4.7494 mcs
5	2.9995 mcs	4.7495 mcs
6	2.9996 mcs	4.7496 mcs
7	2.9997 mcs	4.7497 mcs
8	2.9998 mcs	4.7498 mcs
9	2.9999 mcs	4.7499 mcs

j. Place the NIXIE selectors to 03.0000. Repeat the synchronization procedure at this frequency. The counter should read 4.75 mcs.

k. Move the BAND control on RF head to Band #2, (3-4 mcs). Repeat the synchronization procedure at 3 mcs. The counter should read 4.75 mcs.

l. Continue this procedure for the remaining positions of the MC NIXIE selector switch, conducting the check at the high and low ends of each band. In each case, the counter should read 1.75 mc above the selected frequency.

<u>MC SELECTOR</u>	<u>BAND</u>	<u>TUNE CONTROL</u>	<u>FREQ. COUNTER</u>
4	2	4 mcs	5.75 mcs
4	3	4 mcs	5.75 mcs
5	3	5 mcs	6.75 mcs
6	3	6 mcs	7.75 mcs
6	4	6 mcs	7.75 mcs

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B. CHECKOUT PROCEDURE - Cont'd

c. On AFC-3, depress and hold down the RED RESET button, and carefully adjust the TUNING KCS control until the following occur simultaneously:

- LEVEL meter.
- (1) Maximum level is noted in the GREEN scale on the CARRIER
 - (2) The FADE indicator is extinguished.
 - (3) The DRIFT meter reads "0" center scale.
 - (4) The DRIFT ALARM lamp is extinguished. When the proper conditions are obtained, release the RESET button. The conditions noted above should remain, and the DRIFT METER indicator should be steady at "0" center scale.

d. On AFC-3, place CARRIER SELECTOR switch to RCC. The indications noted in "c" above should be unchanged. Return the CARRIER SELECTOR switch to OSC position.

e. On HFR-2, place the NOISE SILENCER-OFF-ALIGNMENT SIGNAL switch to OFF, and the following conditions should appear on AFC-3:

- (1) The CARRIER LEVEL indication should fall.
- (2) The FADE ALARM should light.

After a wait of approximately ten seconds, return the NOISE-SILENCER-OFF-ALIGNMENT SIGNAL switch on RF head to ALIGNMENT SIGNAL. The conditions of Para. 5 "c", (1) through (4), should be restored on the AFC-3 unit without adjustment of controls.

f. On AFC-3, turn the SENSITIVITY control fully CCW. The FADE indicator should light and the CARRIER LEVEL indication should fall. Return the SENSITIVITY control fully CW.

NOTE: A FURTHER TEST OF THE AFC-3 WILL BE MADE IN CONJUNCTION WITH THE MSA-1.

6. Check of MSA-1 (in conjunction with AFC-3 & HSS-8)

- a. Ascertain that the receiver is still synchronized at 2.0000 mcs.
- b. On HFR-2, place NOISE SILENCER-OFF-ALIGNMENT SIGNAL to NOISE SILENCER.
- c. On MSA-1, rotate each SQUELCH control fully CCW.
- d. On MSA-1, manipulate each LINE LEVEL control until the appropriate LINE LEVEL meter reads approximately -10VU.

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B. CHECKOUT PROCEDURE - Cont'd

e. On MSA-1, move each SQUELCH control slowly CW, until the appropriate channel just cuts off, as indicated by the extinction of the GREEN channel light.

f. On HFR-2, place NOISE SILENCER-OFF-ALIGNMENT SIGNAL switch to ALIGNMENT SIGNAL.

g. With the INT-AFC-SYN switch on MCG-1 still in AFC position, hold down the RESET button on AFC-3 and move TUNING KCS control to the 3KC position. Release RESET button. Channel B₂ LINE LEVEL meter should indicate, and the B₂ GREEN channel indicator only should light.

h. As the TUNING KCS control on AFC-3 is moved slowly CCW to the -3KC position, Channels B₁, A₁ and A₂ should activate in turn, to the exclusion of the other channels. Leave the TUNING KCS control at -3 KC with Channel A₂ activated.

i. Plug headphones into the MONITOR jack on MSA-1, and rotate the MONITOR LEVEL control fully CW. Put MONITOR SELECTOR switch in the A₂ position.

j. On HSS-8, place CHANNEL MONITOR to A₂, and advance GAIN control CW for a convenient listening level. A tone should be heard in both phones and monitor speaker.

k. Slowly move the TUNING KCS control on the AFC-3 CW toward +3KC. As Channels B₁ and B₂ activate, move the MONITOR SELECTOR switch on MSA-1 #1 and the CHANNEL MONITOR on the HSS-8 to the appropriate position, and listen for a tone in the phones and monitor speaker. Leave AFC TUNING KCS control at +3 KC.

* 7. Dynamic AGC Check

a. Set controls on Receiver as follows:

(1) HFR-2 -

BAND - BAND #1 (2-3 mcs)

TUNE - 2.5 mcs

NOISE SILENCER-OFF-ALIGNMENT SIGNAL - OFF

TUNE-SYNC-OPERATE - SYNC

(2) HFS-1 - NIXIE SELECTORS TO 02.5000.

(3) MCG-1 - INT-AFC-SYN switch to SYN.

(4) MSA-1 - No adjustment.

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B. CHECKOUT PROCEDURE - Cont'd

* 7. Dynamic AGC Check

- b. Connect an RF signal generator to antenna jack on HFR-2 via a 20 db 50 ohm pad. Adjust signal generator for 100,000 uv at 2.5 mcs.
- c. Synchronize the RCVR system at 2.5 mcs, and lock the TUNE control on HFR-2.
- d. Vernier tune the signal generator to activate Channel A₁, MSA-1.
- e. Adjust Channel A₁ LINE LEVEL control on MSA-1 until Channel A₁ level meter reads 0 VU.
- f. Reduce signal generator output to 10 uv (on signal generator calibrated attenuator). The indication on Channel A₁ level meter, MSA-1, should not fall below -3 VU.
- g. Repeat Para B7 at: 3.5; 5; 7; 10; 14; 20 and 28 mcs.

8. Signal Plus Noise/Noise Check (Sensitivity)

a. Receiver:

- (1) Synchronize the RCVR system at 2.5 mcs. Lock the TUNE control on HFR-2, and leave the TUNE-SYNC-OPERATE switch at OPERATE.
- (2) Connect a Ballantine Model 314 VTVM (or equivalent) to terminals 7 and 8 (A₁ audio output) of terminal board E6501 at rear of MSA-1.
- (3) Advance all SQUELCH controls on MSA-1, except A₁ control, fully CW. Leave A₁ SQUELCH control fully CCW.
- (4) Connect an RF signal generator, at 2.5 mcs, via a 20 db, 50 ohm pad, to the antenna input on HFR-2. Set signal generator frequency at 2.5 mcs, output to minimum.
- (5) On MSA-1, adjust Channel A₁ LINE LEVEL control for a reading of -20 VU on the A₁ LINE LEVEL meter. Note the DB indication on the Ballantine meter at this time.
- (6) On HSS-8, place CHANNEL MONITOR to A₁, and advance the GAIN control for a convenient listening level.
- (7) Adjust signal generator output to 1000 uv, and vernier tune the signal generator to obtain approximately a 1 KC tone in Channel A.

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B. CHECKOUT PROCEDURE - Cont'd

8. Signal Plus Noise/Noise Check (Sensitivity)

a. Receiver:

(8) Adjust signal generator output until Ballantine meter reads 15 db above the reading obtained in Step (5). Read the signal generator output, and divide by 10. The reading must be 1 uv or less.

(9) Repeat the signal plus noise/noise check as required on Test Data Sheet.

9. AF Distortion/Hum Level/Intermodulation (Adjacent Channel)

a. AF Distortion:

(1) Connect TTG RF tones through attenuator to J6501 on MSA. Set attenuator for 60 db in.

NOTE: The TTG should have such RF crystals as to produce a 1KC separation between tones; e.g. 2000KC and 2001KC.

(2) Set up signal generator to 1.75MC with 1V output. Connect to J6502 of MSA-1.

(3) Connect Sonic Analyzer LP-1A to Channel B2 on terminal box, (gnd to cabinet/input to 600 ohm load).

(4) Vary generator for indication on B2 VU meter. Set LINE LEVEL for 0 VU with one RF tone.

(5) Slowly vary generator to center two tones on analyzer.

(6) Set tones on analyzer for zero db reference.

(7) Increase tones 20 db. AF distortion should be 40 db or better.

(8) Leave equipment connected. DO NOT CHANGE ANY SETTINGS.

b. Hum Level:

(1) With equipment and settings the same as in previous steps turn off the RF tones on the TTG.

(2) Hum Level on analyzer should be down 50 db or better.

(3) Turn on RF tones. DO NOT REMOVE EQUIPMENT.

c. Intermodulation (Adjacent Channel):

(1) Vary signal generator to obtain an indication on the adjacent channels VU meter. Set for 0 VU.

(2) Any tones on analyzer must be down 60 db or better.

(3) Leave all test equipment connected.

(4) Repeat parts D-1,2, and 3 for Channels B1, A1 and A2.

(5) Upon completion of Step d, disconnect all test equipment and re-connect all cables to proper jacks.

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THE TECHNICAL MATERIEL CORP.
MAMARONECK, N.Y.

TEST DATA SHEET #1

MFG. NO.: _____

SERIAL NO.: _____

- | | | |
|-----------|--|-------------------------|
| A-4a | Blower operate
GREEN STANDBY indicator
MCG-1 oven indicators | _____

_____ |
| B-1 | YELLOW time delay indicator
RED operate indicator | _____
_____ |
| B-2 | Conv. outlet voltage | _____ |
| B-3 | Voltage at TP8001 & 8002 | _____ |
| B-4 | SYNTH, HFO, STABILITY | _____ |
| B-5 | Check of AFC-3 | _____ |
| B-6 | Check of MSA-1 | _____ |
| B-7 & B-8 | AGC and SENSITIVITY
(-3db or less) (luv or less) | |

<u>FREQ.</u>	<u>AGC CHECK</u>	<u>SENSITIVITY</u>
2.5 mcs	_____	_____
3.5 mcs	_____	_____
5 mcs	_____	_____
7 mcs	_____	_____
10 mcs	_____	_____
14 mcs	_____	_____
20 mcs	_____	_____
28 mcs	_____	_____

DATE: _____

TESTER: _____

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TEST DATA SHEET #2

B. 9(a)7 AF Distortion _____ DB
(down 40 DB or better)

B. 9(b)2 Hum Level _____ DB
(Down 50 DB or better)

B. 9(c) Intermodulation (Adjacent Channel)
(down 60 DB or better)

Channel A1 _____ db

Channel B1 _____ db

Channel A2 _____ db

Channel B2 _____ db

DATE: _____

TESTER: _____

