TMC SPECIFICATION				NO. S -734
REV: F				
COMPILED: REB	CHECKED:	APPD:	SHEET 1	OF 15
TITLE:				

SPU-2 TEST PROCEDURE

I. DESCRIPTION OF CONTROLS:

A. Power switch connects or removes the SPU-2 from AC power mains.

B. GAIN control varies input to audio amplifier stage.

C. CLIPPER IN/OUT switch inserts or by-passes pre-emphasis and speech clipping circuits.

D. LINE LEVEL varies audio input to power amplifier.

E. INPUT selector switch selects LOCAL, REMOTE, or CW input.

F. VOX GAIN varies VOX enable threshold.

G. VOX RELEASE varies VOX disable threshold.

H. SQUELCH varies VOX enable threshold to prevent incidental background noise from keying VOX relay.

I. OUTPUT selector switch selects upper sideband (USB), lower sideband (LSB), or double sideband (DSB).

J. MODE PTT/VOX switch selects push-to-talk or VOX operation.

II. TEST EQUIPMENT REQUIRED:

A. Audio Signal Generator, HP 200CD, or equivalent.

B. 600 ohm, 40db, attenuating and matching pad.

* CAUTION: Do not make any resistance measurements except where specifically required in test procedure

C. AC VTVM, Ballantine 310A, or equivalent.

D. VTVM, HP 410B, or equivalent.

E. * VOM, Simpson 260, or equivalent.

F. High impedance desk mike, MK-102-4, or equivalent.

G. Low impedance mike handset, HS-100-3D, or equivalent.

H. Carbon mike handset, HS-100-3C, or equivalent.

I. PJ-309, telephone plug, or equivalent.

J. Oscilloscope, Tektronix Model 310A, or equivalent.

K. Distortion Analyzer, HP-330C, or equivalent.

L. 300 ohm, 1/2 watt carbon resistors, 4 each.

M. Frequency Counter, HP-524C, or equivalent.

N. 600 ohm, balanced, 20db, attenuating and matching pad.

O. MF/HF receiver, GPR-90, or equivalent, with loudspeaker.

III. PRELIMINARY

A. Check SPU for mechanical defects.

B. Check SPU for wiring defects.

C. Connect 300 ohm loads, as shown in figure 1, at the 600 ohm balanced output terminals of E2; 17, 18, 19 20, 21 and 22.

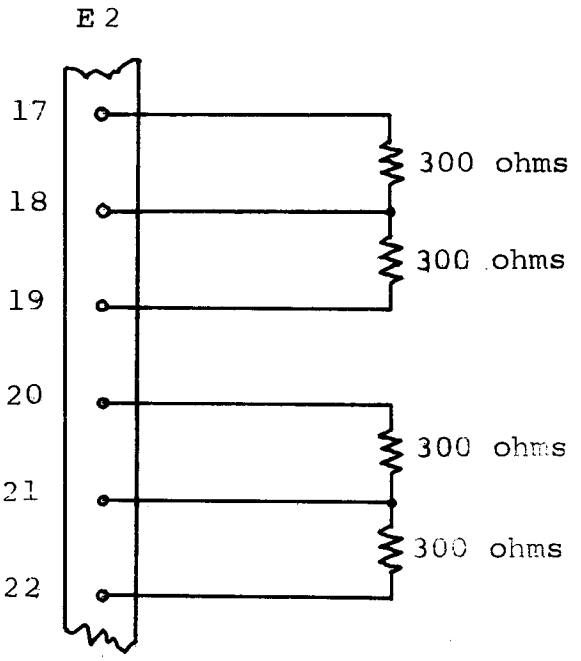


Figure 1

IV. TEST PROCEDURE:

A. POWER SUPPLY VOLTAGES:

*1. With line voltage adjusted to 115VAC, connect SPU-2 power cord. Turn power switch ON, measure and record the following in reference to chassis ground:

*a. DC voltage at the positive side of C53 (B+) shall be +10.5 to +12.0 VDC.

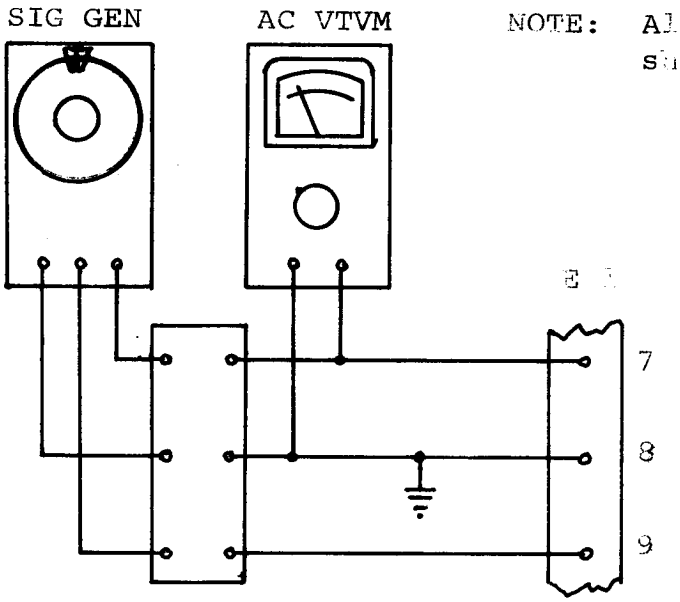
*b. DC voltage at the negative side of C52 (B-) shall be -10.5 to -12.0 VDC.

* RECORD ON TEST DATA SHEET

B. GAIN CONTROL SETTING:

Initial Settings:

Connect audio signal generator as shown in Figure 2.
Connect AC VTVM as shown in Figure 2.
INPUT switch to REMOTE.
OUTPUT switch to DSB.
GAIN fully CCW.
SQUELCH fully CCW.
MODE PTT/VOX to VOX.
CLIPPER IN/OUT to OUT.
LINE LEVEL fully CCW.
VOX GAIN fully CW.
VOX RELEASE fully CCW.



NOTE: All voltage readings should be multiplied by 2

600 ohm 20db balanced pad

Figure 2

1. Adjust the signal generator to 1000 Hz and a reading on the input VTVM of 38.75 millivolts (77.5 millivolts total across 600 ohm input) (-20dbm).

*2. Connect AC VTVM to the base of Q3 (stand-off #55). Slowly rotate the GAIN control clockwise, until a reading of .005 VAC is obtained.

NOTE: Since the setting of the GAIN control is now correct for all remaining checks, NO FURTHER ADJUSTMENT of this control is necessary and this setting should not be disturbed.

C. CLIPPER OPERATION:

Initial Settings:

CLIPPER IN/OUT to IN
Connect audio signal generator as shown in Figure 2.

1. Set signal generator input for a reading on the input VTVM of 387.5 millivolts (775 millivolts total across 600 ohm input) (Ødbm).

*2. Observe the scope pattern, as shown in Figure 3, at the junction of C20 and R43. Make particular note of equal clipping on positive and negative half cycles. Peak-to-peak voltage shall be between .215 and .235V.

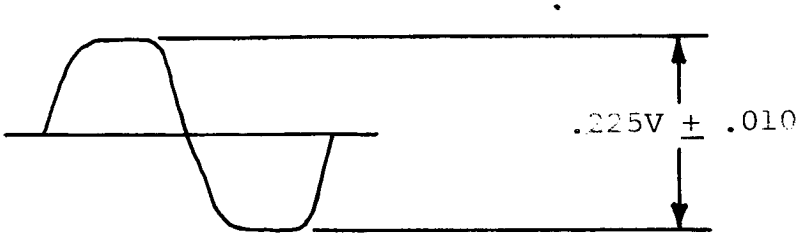


Figure 3

*RECORD ON TEST DATA SHEET

D. METER ACCURACY:

Initial Settings:

Connect AC VTVM across 300 ohm load at terminals 17 and 18 of E1.
Connect audio signal generator as shown in Figure 2.
INPUT switch to REMOTE.
OUTPUT switch to DSB.

1. Adjust the signal generator to 1000 Hz and a reading on the input VTVM of 38.75 millivolts (77.5 millivolts total across 600 ohm input) (-20dbm).

2. Rotate the LINE LEVEL control clockwise, until a reading of ØVU is obtained on the OUTPUT LEVEL meter.

*3. The AC VTVM shall indicate between .350 and .425 VAC (.70 - .85VAC across the 600 ohm load).

E. DISTORTION LEVEL:

Initial Settings:

Connect audio signal generator as shown in Figure 2.
Remove all test equipment from terminals 17, 18 and 19 of E1.
Connect distortion analyzer to terminals 17 and 19 of E1.
INPUT switch to REMOTE
OUTPUT switch to USB
CLIPPER IN/OUT switch to IN

* RECORD ON TEST DATA SHEET

1. Adjust the signal generator to 1.5kHz and a reading on the input VTVM of 387.5 millivolts (775 millivolts total across 600 ohm input) (Ødbm).

2. Adjust LINE LEVEL for an OUTPUT LEVEL meter reading of Ø VU.

*3. Measure distortion using the Ø VU output for a reference level. All distortion must be 26db down from the reference level or lower (-26db distortion level is equal to a distortion level of 5%)

F. HUM LEVEL:

Initial Settings:

Connect audio signal generator, through a 40db unbalanced attenuating and matching pad, to terminals 3 and 4 of E1.
Connect AC VTVM across 300 ohm load at terminals 20 and 21 of E1.
INPUT switch to LOCAL
OUTPUT switch to LSB
SQUELCH to CCW
MODE PTT/VOX to PTT
CLIPPER IN/OUT to OUT
VOX GAIN to CCW
VOX RELEASE to CCW

1. Short terminals 12 and 13 of E1. The EXCITER light shall energize.

*RECORD ON TEST DATA SHEET

2. Adjust the signal generator to 1000 Hz and an input at terminals 3 and 4 of E1, of 1 millivolt.

3. Adjust LINE LEVEL for an OUTPUT LEVEL meter reading of ØVU.

4. Note the reading on the OUTPUT VTVM.

5. Remove the signal generator from terminals 3 and 4 of E1.

*6. Short terminals 3 and 4 of E1. The VTVM shall indicate a minimum change of -40db from the reference level in step 4.

G. BANDPASS:

Initial Settings:

Connect the audio signal generator, through a 40db unbalanced attenuating and matching pad, to terminals 3 and 4 of E1.
Connect an AC VTVM across the 300 ohm load at terminals 17 and 18 of E1.
INPUT switch to LOCAL
OUTPUT switch to USB
CLIPPER IN/OUT to OUT
LINE LEVEL for a convenient reference level on the AC VTVM.

* RECORD ON TEST DATA SHEET

1. Adjust the signal generator for an input of 10 millivolts at terminals 3 and 4 of E1. During the bandpass check, maintain this input at a constant level.

2. Adjust the signal generator frequency for a peak reading on the AC VTVM.

*3. Sweep upward from the reference frequency until the output level reading drops 3db. This frequency shall be 3000 Hz or greater. Record this frequency.

*4. Sweep downward, past the reference frequency until the output level reading drops 3db. This frequency shall be 250 Hz or lower. Record this frequency.

H. DYNAMIC RANGE:

Initial Settings:

Connect the audio signal generator, through a 40db unbalanced attenuating and matching pad, to terminals 3 and 4 of E1.
Connect an AC VTVM across the 300 ohm load at terminals 17 and 18 of E1.
INPUT switch to LOCAL
OUTPUT switch to USB
CLIPPER IN/OUT to OUT.

1. Adjust the signal generator to 1000 Hz and an input of 1 millivolt at terminals 3 and 4 of E1.

2. Adjust LINE LEVEL for an OUTPUT LEVEL meter reading of ØVU.

*3. Increase the input signal at terminals 3 and 4 of E1, to 100 millivolts. The output reading on the AC VTVM shall not vary by more than ± 2db.

*RECORD ON TEST DATA SHEET

I. HIGH, LOW , AND CARBON MIKE INPUTS:

Initial Settings:

Connect a low impedance mike to the LO Z input at terminals 3 and 4 of E1; or at the MIKE jack, J1.
INPUT switch to LOCAL
CLIPPER IN/OUT to OUT.

*1. Talk in a normal voice into the mike, and adjust the LINE LEVEL control to obtain an indication of ØVU on the OUTPUT LEVEL meter.

*2. A clear sidetone shall be head on the earpiece portion of the handset.

*3. Repeat steps 1 and 2 for a high impedance mike and a carbon mike.

J. VOX AND SQUELCH OPERATION

Initial Settings:

Connect the MK-102-4 desk mike to terminals 1 and 2 of E1; or to the MIKE jack, J1.
Connect the audio signal generator, as shown in Figure 2.
Connect 600 ohm AF output from receiver to terminals 10 and 11 of E1.

* RECORD ON TEST DATA SHEET

INPUT switch to REMOTE
SQUELCH to CCW
MODE PTT/VOX to VOX
VOX GAIN to CW
VOX RELEASE to CCW

1. Adjust signal generator for 1000 Hz, and increase the signal generator output until the EXCITER light energizes.

*2. Measure and record the voltage at the base of Q3 with an AC VTVM. This voltage shall be no greater than .005 VAC.

*3. With the EXCITER light energized, measure the following resistance readings:

METER CONNECTIONS	RESISTANCE
Terminals 14 and 15	4.5-6.5 ohms
Terminals 15 and 16	infinite
Terminals 23 and 24	4.5-6.5 ohms
Terminals 24 and 25	infinite

*4. Reduce VOX GAIN and note EXCITER light going out. Measure the following resistance readings:

METER CONNECTIONS	RESISTANCE
Terminals 14 and 15	infinite
Terminals 15 and 16	4.5-6.5 ohms
Terminals 23 and 24	infinite
Terminals 24 and 25	4.5-6.5 ohms

* RECORD ON TEST DATA SHEET

5. Adjust the signal generator for a reading on the input VTVM of 38.75 millivolts (77.5 millivolts total across 600 ohm input) (-20dbm). Reduce VOX GAIN to CCW.

6. Slowly rotate VOX GAIN clockwise until EXCITER light energizes.

*7. Short terminals 7 and 9 of E1, EXCITER light shall go out immediately. Remove short from 7 and 9, EXCITER light shall energize.

8. Set VOX RELEASE to maximum clockwise.

*9. Short terminals 7 and 9 of E1, EXCITER light shall stay on for about one second. Return VOX RELEASE to mid-position.

10. Adjust receiver AF and RF GAIN controls to obtain a normal level of background noise from the receiver loudspeaker. EXCITER light shall be energized by the speaker output.

*11. Slowly rotate SQUELCH control clockwise until EXCITER light goes off. Speak normally into the mike. The EXCITER light shall energize. Remove receiver output from the SPU-2.

K. CW AND KEY OPERATION:

Initial Settings:

INPUT switch to REMOTE.

* RECORD ON TEST DATA SHEET

*1. Set INPUT switch to CW, the EXCITER light shall energize. Set INPUT switch to REMOTE, the EXCITER light shall go off.

*2. Measure a closed circuit (4.5-6.5 ohm) between terminals 26 and 27 of E-2.

*3. Plug PJ-309 into KEY input jack, and measure an open circuit between terminals 26 and 27 of E-2.

*4. Short PJ-309 and measure closed circuit, (4.5-6.5 ohm) between terminals 26 and 27 of E-2. Remove PJ-309 KEY input.

L. PUSH-TO-TALK OPERATION:

Initial Settings:

Connect the MK-102-4 desk mike to terminals 1, 2, 12 and 13 of E1; or the MIKE jack, J1.
INPUT switch to LOCAL
MODE PTT/VOX to PTT

*1. The EXCITER light shall be energized only by the push button on the mike, or by shorting terminals 12 and 13 of E1.

* RECORD ON TEST DATA SHEET

TMC SPECIFICATION

NO. S -734

REV: F

COMPILED: REB | CHECKED: | APPD: | SHEET 15 OF 15

TITLE: SPU-2 TEST DATA SHEET

DATE_____ SPEC. NO S-734_____

MFG. NO._____ SERIAL NO._____

A. POWER SUPPLY VOLTAGES:

A.1_____VAC A.1 a_____VDC A.1.b_____VDC

B. GAIN CONTROL SETTING: B.2_____VAC

C. CLIPPER OPERATION:

C.2 (Waveform)_____OK _____V peak-to-peak

D. METER ACCURACY: D.3 _____VAC

E. DISTORTION LEVEL: E.3 _____DB

F. HUM LEVEL: F.6 _____DB

G. BANDPASS:

G.3_____Hz G.4_____Hz

H. DYNAMIC RANGE: H.3_____DB

I. HIGH, LOW, AND CARBON MIKE INPUTS:

LO Z_____OK HI Z_____OK CARBON_____OK

J. VOX AND SQUELCH OPERATION:

J.2_____VAC J.3._____OK J.4_____OK

J.7 (VOX)_____OK J.9 (VOX RELEASE)_____OK J.11 (SQUELCH)_____OK

K. CW AND KEY OPERATION:

K.1 (CW)_____OK K.2-4 (KEY) _____OK

L. PUSH-TO-TALK OPERATION: L.1 _____OK

TESTED BY:_____ STAMP_____

REVISION SHEET

THE TECHNICAL MATERIEL CORP.
MAMARONECK NEW YORK

S-734
LIST NO.

DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
2/2/63	A	2	8187	Chg. value from 14 ohm to 490 ohm & 83 ohm to 120 ohm	LB
5/20/63	B	2-5	9094	Revised per EMN	LB
7-8-63	C	7,9	9551	Revised Sheets 7, 9 per EMN	LB
8-23-63	D	7	9844	Revised Sheet 7 per EMN	LB
1/4/66	E	all	15477	Revised per EMN	RS
4/5/66	F	all	16054	Revised per EMN	RS