TMC SPECIFICATION

NO. S 1236

REV:																																

COMPILED: GK	CHECKED: R.E.R	APPD: SPM	SHEET OF

TITLE: SBS-11 TEST PROCEDURE

TEST PROCEDURE

FOR

SBS-11

I. TEST EQUIPMENT REQUIRED

A. One AC VTVM Ballantine Model 314, or equivalent.
B. One RF VTVM Hewlett-Packard Model 410B, or equivalent.
C. One RF Generator - Measurements Corporation Model 82, or equivalent.
D. One Audio Generator - Hewlett-Packard Model 200AB, or equivalent.
E. One Counter - Hewlett-Packard Model 523C, or equivalent.
F. One Audio Analyzer - Panaramic Model LP-1A, or equivalent.
G. One TTG, two tone generator,or equivalent.
H. One Oscilloscope - Tektronix Model 515A, or equivalent.
I. Two 600 ohm 1-watt resistors.

ADDITIONAL INFORMATION:

Supporting test specifications - S-628 Power Supply
S-626 203 KC plug-in IF strip

II. PRELIMINARY

A. Inspect the unit for mechanical imperfections such as loose screws, terminal boards, etc.
B. Inspect for obvious wiring errors.
C. Check for B+ shorts with an ohmmeter.
D. Turn power switch to standby, then plug unit into appropriate power supply (e.g. HFP-1). Standby lights should go on immediately.
E. Turn power switch from STANDBY to ON. Filaments should light up. B+ should appear. Fan should start. On indicator should light; standby light should go off.
f. Check B+ on L6803 of A-3627 terminal board. It should be +200V Check B- on L6805 of same board. It should be -105V.

III. 250 KC OSCILLATOR

A. Turn AFC switch to the OFF position. This in effect engages the 250 KC crystal oscillator.
B. Turn the CHANNEL A DETECTION switch to the SSB position, and the CHANNEL B DETECTION switch to the AM position.
C. Connect VTVM to Pin 2 of V-6203, and adjust R-6249 for a reading of -1 volt.
D. Connect a counter to the output side (B1) of T-6204 (center conductor of coaxial cable is also on this point), and adjust C-6231 for 250,000 $\pm$1 cycle.
E. Check back to Pin 2 of V-6203 as in C, and re-adjust R-6249 if necessary. The final setting should be of C-6231 for the proper frequency reading on the counter.

F. Connect AC VTVM to the output of T-6204. It should be 1 volt ±10%.
G. With AC VTVM still connected as in F, turn the CHANNEL A DETECTION switch from SSB to AM. The output should drop to 0 volts. Leave in the AM position.
H. Turn the CHANNEL B DETECTION switch to the CW, then the SSB position. In both cases, the AC VTVM should read 1 volt ±10%.

IV. 705 KC OSCILLATOR

A. With the AFC switch in the OFF position, the 705 KC crystal oscillator is activated.
B. Connect VTVM to Pin 2 of V-6202, and adjust R-6215 for a reading of -1 volt.
C. Connect a counter to the output side (B1) of T-6203 (center conductor of coaxial cable is also on this point), and adjust C-6214 for 705,000 ±1 cycle.
D. Check back to Pin 2 of V-6202 as in B, and re-adjust R-6215 if necessary. The final setting should be of C-6214 for the proper frequency.
E. Connect AC VTVM to the output of T-6213. It should be 1 volt ±10%.

V. AGC COMPARITOR

A. Turn the AGC SELECTOR switch to the CH-A-B position.
B. Turn CHANNEL A & B AGC RESPONSE switches to the FAST position.
C. Connect the VTVM to Pin 2, then Pin 7 of V-6202. A reading of 0 volts should exist in both cases.
D. Rotate both pots R-6234 and R-6237 to the full clockwise position and place the VTVM on the slider arm of R-6234. Rotation of R-6234 should vary the DC voltage from a positive to negative voltage from CW to CCW position. Repeat the same operation with R-6237.
E. Adjust R-6234 to 0 DC volts with the VTVM on the slider arm of this pot and lock.
F. Place VTVM on the R-6237 slider arm. Adjust to 0 DC volts and lock.

VI. MANUAL GAIN CONTROL

A. Turn the AGC SELECTOR switch to the MANUAL position.
B. Connect the VTVM at the junction of CR-6202 and CR-6203, and rotate the MANUAL GAIN control to the full clockwise position. The VTVM should read 0 volts.
C. Rotation of the MANUALGAIN CONTROL to the full CCW position should bring the voltage to -20volts. Record the reading obtained on the Test Data Sheet.

VII. CONVERTER AND 250 KC AMPLIFIER-

A. Set the RF generator for 250 KC and 10 MV output. Connect to J-6800, (the LoZ input), and the AC VTVM on Pin 1 or 6 of V6200. Rotate R-6813 to full cw position, AFC switch to ON and MANUAL GAIN control to maximum.

B. Connect a temporary clip lead jumper across secondary to T-6200. This is to prevent inter-action of the secondary to the primary of T-6200.

C. Tune the top slug on T-6200 for maximum indication.

D. Remove jumper line connected in B, and adjust bottom slug for minimum indication on meter. Remove AC VTVM and adjust RF generator output for 1 MV.

E. Connect AC VTVM to J-6804. Adjust slug on T-6201 for maximum indication on VTVM. Meter should read 7 MV or better. Record on Test Data sheet.

F. Connect VTVM to J-6801 Hi Z input. With 1 MV on J-6800, there should be 3 to 4 MV on J-6801.

G. Place AC VTVM probe on Pin 2 or 7 of V-6200. Rotation of R-6813 in the CCW direction should reduce the reading to 0 volts. Rotate R-6800 back to full clockwise position. Record voltage on Test Data Sheet.

H. Converter and 250 KC response:

1. Set the RF generator for 455 KC and 1 MV output; AFC switch to OFF position.
2. Connect AC VTVM as in VII (E). Turn CHANNEL A DETECTION switch to SSB and CHANNEL B DETECTION switch to AM.
3. Vary the frequency of the signal generator above and below 455 KC. Record the 3db drop off points. Subtracting the two frequencies should give the overall bandpass of 20 KC $\pm$1 KC.

VIII. IF AMPLIFIER OUTPUT

A. The bandpass of the crystal filters may vary with the different customer orders. The 3.5 KC and 7.5 KC filters are more widely used and are illustrated in this procedure. The position of the filters in relation to USB and LSB may also vary with customer orders. In this procedure, the USB and LSB IF strips are plugged in as follows:

7.5 KC USB IF strip to J-6003
3.5 KC LSB IF strip to J-6000
3.5 KC USB IF strip to J-6002
7.5 KC LSB IF strip to J-6001

B. Turn the AGC SELECTOR switch to the CH-A-B position.
C. Turn CHANNEL A and B IF BANDWIDTH switches to the 7.5 KC position and connect AC VTVM to J-102 of the 7.5 KC USB IF strip.
D. Vary the RF generator approximately 1 KC below 455 KC and adjust for 10 MV output.
E. The VTVM should show a peak of 1 volt. If this does not occur, set R-116 for 1 volt and remove VTVM.
F. Turn CHANNEL A and B IF BANDWIDTH switches to the 3.5 KC position. Connect AC VTVM to J-102 of the 3.5 KC USB IF strip and proceed as in Steps D and E.
G. Turn CHANNEL A and B IF BANDWIDTH switches to the 3.5 KC position and connect AC VTVM to J-102 of the 3.5 KC LSB strip.
H. Vary the RF generator approximately 1 KC above 455 KC and proceed as in Step E.
I. Turn CHANNEL A and B IF BANDWIDTH switches to the 7.5 KC position. Connect AC VTVM to J-102 of the 7.5 KC LSB IF strip and proceed as in Steps E and H.

IX. AUDIO CHANNELS - A & B

A. Connect one 600 ohm 1 watt resistor between terminals 7 and 9, and one between terminals 17 and 19 of TB-9001 (audio box mounted on side of RAK). Turn CHANNEL A and B DETECTION switches to SSB. Adjust CHANNEL A and B LEVEL controls for 0 VU or 100% on the meters.
B. Connect AC VTVM between terminals 2 and 4 of TB-9001 (CHANNEL A). It should read between 22 and 24 volts. Record on Test Data Sheet.
C. Connect AC VTVM between terminals 12 and 14 of TB-9001 (CHANNEL B). It should read between 22 and 24 volts. Record on Test Data Sheet.
D. Remove RF generator from J-6800. Set IF BANDWIDTH switches A and B to OFF position, (OFF is midway between any two bandwidth positions). Switch to AC VTVM to a low range, and adjust R-6073 (CHANNEL B hum balance control) for minimum reading. It should read 230 MV or less. Record on Test Data Sheet. Turn CHANNEL B DETECTION switch to AM. The VTVM should read approximately 23 MV. Record on Test Data Sheet. Turn CHANNEL B DETECTION switch to SSB position.
E. Connect AC VTVM between terminals 2 and 4 of TB-9001 and adjust R-6036 (CHANNEL A hum balance control) for minimum reading. It should read 230 MV or less. Record on Test Data Sheet. Turn CHANNEL A DETECTION switch to AM. The VTVM should read approximately 23 MV. Record on Test Data Sheet. Turn CHANNEL A DETECTION switch to SSB position.

F. Connect audio generator on the post of R-6005, (15 K resistor to 5814 grid), and set frequency at 1 KC and 2.5 MV output. Adjust CHANNEL A and B LEVEL controls for 0 VU or 100% on the meters. Connect scope between terminals 2 and 4 of TB-9001. Set AFC switch to ON position.

G. Vary the audio generator above and below 1 KC. The 3 db points should be 200 cycles or lower and 10 KC or higher. A clean sine wave should appear on the scope. Record on Test Data Sheet.

H. Connect AC VTVM and scope between terminals 12 and 14 of TB-9001 (CHANNEL B) and repeat Step G.

I. Replace audio generator with TTG. Set controls as follows:

1. POWER switch to ON.
2. RF TONE SELECTOR to OFF.
3. AUDIO TONE SELECTOR to TWO TONE.
4. AUDIO OUTPUT control for 2.5 MV output.

J. Adjust CHANNEL A and B LEVEL controls for 0 UV or 100% on the meters.

K. Connect audio analyzer between terminals 2 and 4 of TB-9001 (CHANNEL A). Set controls as follows:

1. POWER switch ON.
2. VERT. CALIB. SELECTOR to DB.
3. SWEEP RANGE SELECTOR to 20 KC LOG.
4. SCALE SELECTOR to 0.5.
5. INPUT MULT. to XL K.
6. INPUT POT. - Set the control so that the top of the two tones is on the +20db line of the screen. The total distortion products should be 40db down. Record on Test Data Sheet.

L. Connect audio analyzer between terminals 12 and 14 of TB-9001, (CHANNEL B) and repeat Step K-6. Remove TTG and audio analyzer. Set AFC switch to OFF position.

X. PHONE MONITOR

A. Connect RF generator to J-6800. Connect earphones to MONITOR jack. Adjust CHANNEL A and B LEVEL controls for 0 VU or 100% on the meters.

B. A 1 KC tone should be heard on the phones, in the full CW and full CCW position of the MONITOR control.

C. Turn CHANNEL A IF BANDWIDTH switch to 7.5 KC LSB and rotate MONITOR control to full CW position. The 1 KC tone should be heard on the phones.
D. Connect AC VTVM to J-6202 MONITOR jack. It should read 2 volts ±20%. Record on Test Data Sheet at full CW and CCW position.

XI. SYNC. TONE

A. Connect audio generator to J-8001 "Audio Sync Tone". Set to 1KHz.
B. Activate sync. tone relax by setting tune-sync-operate switch on HFR to sync. (Alternately activate sync tone relay by momentarily grounding the wire passing from sync tone relay on rear panel SBS-11 to Pin V on J--8004.) The 1KHz tone will be heard immediately on Channel A. It will be adjustable for a comfortable level by means on line level adjust control on front panel.

XII. PRODUCT DETECTORS-

A. Connect AC VTVM to the post of R-6005. There should be 1 volt ±10% at 250 KC on this post. Record on Test Data Sheet.
B. Connect RF generator to the post of R-6082. Set generator for 249 KC and .33 volts output.
C. Adjust LINE LEVEL control on CHANNEL A for 0 VU or 100% on meter. Connect AC VTVM and scope to terminals 2 and 4 of E-6800. The VTVM should read between 22 and 25 volts, and there should be a clean sine wave on the scope. Record on Test Data Sheet.
D. Connect RF generator to the post of R-6083.
E. Adjust LINE LEVEL control on CHANNEL B for 0 VU or 100% on meter. Connect AC VTVM and scope to terminals 12 and 14 of E-6800. The VTVM should read between 22 and 24 volts and there should be a clean sine wave on the scope. Record on Test Data Sheet.

XIII. AM DETECTORS

A. Turn CHANNEL A and B DETECTION switches to AM.
B. Adjust RF generator for 250 KC with a 1 KC 50% modulation and .33 volts output.
C. Connect RF generator to Pin 3 of T-6002 on detector board A-3641. Adjust CHANNEL B LINE LEVEL control for 0 VU or 100% on meters. The VTVM should read between 22 and 24 volts, and there should be a clean sine wave on the scope. Record on Test Data Sheet.

D. Connect AC VTVM and scope to terminals 2 and 4 of TB-9001.
E. Connect RF generator to Pin 3 of T-6000 on detector board A-3640. Adjust CHANNEL A LINE LEVEL control for 0 VU 100% on meter. The VTVM should read between 22 and 24 volts, and there should be a clean sine wave on the scope. Record on Test Data Sheet.

XIV. AGC RESPONSE

A. Connect RF generator to J-6800 at 455 KC and 1 MV out.
B. Set CHANNEL A to 7.5 KC and CHANNEL B to 7.5 KC.
C. Vary generator 1 KC below 455 KC. Set CHANNEL B LINE LEVEL for 0 VU.
D. Set AGC selector MANUAL.
E. Turn MANUAL GAIN control to full CCW position. The output drops to 0.
F. Turn control to full CW position. The output should rise immediately.
G. Set AGC RESPONSE to MED position.
H. Turn MANUAL GAIN control full CCW, then back to CW. The output should hesitate before rising.
I. Set AGC RESPONSE to SLOW position.
J. Turn MANUAL GAIN control full CCW, then back to CW. The output should rise very slow.
K. Vary RF generator 1 KC above 455 KC. Set CHANNEL A LINE LEVEL for 0 VU.
L. Repeat Steps E to J for CHANNEL.

XV. IF AMPLIFIER BANDWIDTH CHECK

A. Connect RF generator to J-6800 at 455 KC and 1 MV out.
B. Connect 600 ohm load to terminals 7 and 9 of TB-9001.
C. Connect VTVM and Frequency Counter to terminals 2 and 4 of TB-9001.
D. Set CHANNEL A and B to 7.5 KC. Detection to SSB, AFC "OFF" and AGC to CHANNEL A/B.
E. Ground AGC to IF strip at R119 on strip terminal board.
F. Tune generator around 455 KC for output indication on VTVM.
G. Set CHANNEL A line level for reference DB around 22 V output. (0 VU on SBS meter).
H. Sweep generator through IF bandwidth, checking 3db points.
I. Minimum bandwidth of IF should be as indicated on strip (i.e. 7.5 LSB/BW-7500cps min).
J. Repeat Steps E to I for each IF strip. Record results.

XVI. EXTERNAL OSCILLATOR INPUT

A. 250 KC external oscillator input
   1. Remove crystals Z6200, Z6201.
   2. Connect RF Signal Generator to J-6806 (250 KC external oscillator input). Set it to 250,000 ±1 cycle, 1v rms. The frequency may be monitored with a counter through a "T" connector.
   3. Turn CHANNEL A DETECTION switch to SSB, CHANNEL B DETECTION switch to AM.
   4. Connect the counter to the output side (B1) of T-6204 (center conductor of coaxial cable is also at this point). It should read 250,000 ± cycles, at about 1v rms.

B. 2 megacycle external oscillator input
   1. Connect generator to J-6805, set to 2,000,000 ±1 cycles at 1v rms.
   2. Read the frequency at B1 on T-6203. It should be 2,000,000 ±1 cycles at about 1v rms.

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N. Y.

SBS-11 TEST DATA SHEET #1

SERIAL NUMBER: _____

MFG. NO.: _____

AGC COMPARATOR

BALANCE POTENTIOMETER _____ OK

MANUAL GAIN CONTROL

AGC _____ VOLTS
AGC POTENTIOMETER _____ OK

250 KC CONVERTER AND AMPLIFIER

250 KC AMPLIFIER OUTPUT _____ VOLTS
Lo Z INPUT AND INPUT POTENTIOMETER _____ OK
Hi Z INPUT _____ VOLTS
RESPONSE: 3db POINTS _____ KC AND _____ KC
BANDPASS _____ KC

IF AMPLIFIER BANDWIDTH TEST

7.5 LSB _____ OK
3.5 LSB _____ OK
3.5 USB _____ OK
7.5 USB _____ OK

AUDIO OUTPUT

CHANNEL A _____ VOLTS
CHANNEL B _____ VOLTS

TEST DATA SHEET #2

HUM BALANCE

	SSB	AM
CHANNEL A	_____ MV	_____ MV
CHANNEL B	_____ MV	_____ MV

AUDIO FREQUENCY RESPONSE (3db POINTS)

CHANNEL A _____ CYCLES AND _____ KC
CHANNEL A WAVESHAPE _____ OK
CHANNEL B _____ CYCLES AND _____ KC
CHANNEL B WAVESHAPE _____ OK

AUDIO DISTORTION

CHANNEL A _____ DB
CHANNEL B _____ DB

PHONE MONITOR OUTPUT

CW CONTROL _____ VOLTS
CCW CONTROL _____ VOLTS

PRODUCT DETECTORS

205 KC PRODUCT DETECTION INJECTION _____ VOLTS
CHANNEL A _____ OK
CHANNEL B _____ OK

AM DETECTORS

CHANNEL A _____ OK
CHANNEL B _____ OK

AGC RESPONSE

CHANNEL A _____ OK
CHANNEL B _____ OK

TEST DATA SHEET #3

250 KC External Oscillator Input

OSCILLATOR _____ VOLTS
OSCILLATOR FREQUENCY ____ CYCLES

2 Megacycles External Oscillator Input

OSCILLATOR _____ VOLTS
OSCILLATOR FREQUENCY ____ CYCLES

DATE: _____

TESTER: _____

REVISION SHEET	THE TECHNICAL MATERIEL CORP. MAMARONECK NEW YORK	S 1236

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