TMC SPECIFICATION

NO. S 1037

REV: Ø			
COMPILED: JA	CHECKED: J Unger	APPD: 11/11/65	SHEET 1 OF 15

TITLE:

Typed by mtp 11/11/65

TEST PROCEDURE

for

CHG-3; CHGR-3; CHGR-3A

Typed by mtp 11/11/65

A. TEST EQUIPMENT REQUIRED

1. Standard Signal Generator - Measurements Model 82.
   a. Cable - TMC CA480-3-48.
2. Power Supply - TMC HFP-1 (tested).
   a. Cable - TMC CA-704 (to J8010 & J1305).
   b. Connector Plug - TMC PL212-3 modified (jump U & P).
   c. Line Cord (for A-C power connection).
3. Vacuum Tube Voltmeter - H.P. Model 410C.
4. RF Microvoltmeter - Millivac Instruments MV28B.
5. Multi-meter - Simpson 260.
6. Electronic Counter - H.P. Model 5244L or equivalent.
   a. Cable - TMC CA480-3-48.

#7. Thermometer - Rascher & Betzold Inc., #14-4470.

B. TOOLS - SPECIAL OR MODIFED

1. Alignment Tool - TMC TP114.
2. Alignment Tool - TMC TP115.
3. 5/16" Spintite, Xcelite HS-10 - Modified 3/16" hole drilled through plastic handles.
4. 1/8" Blade Screwdriver, 8" long Xcelite R188 (modify - hollow ground to .013").
5. Miniature Tube Puller (7-pin), Kellems #1116.
6. Noval Tube Puller (9-pin), Kellems #1316.

C. PRELIMINARY

1. Check the unit for mecahnical faults.
2. Ch ck for obvious wiring errors.

#NOTE: ITEM A-7 NOT APPLICABLE TO CHGR-3A.

TMC SPECIFICATION

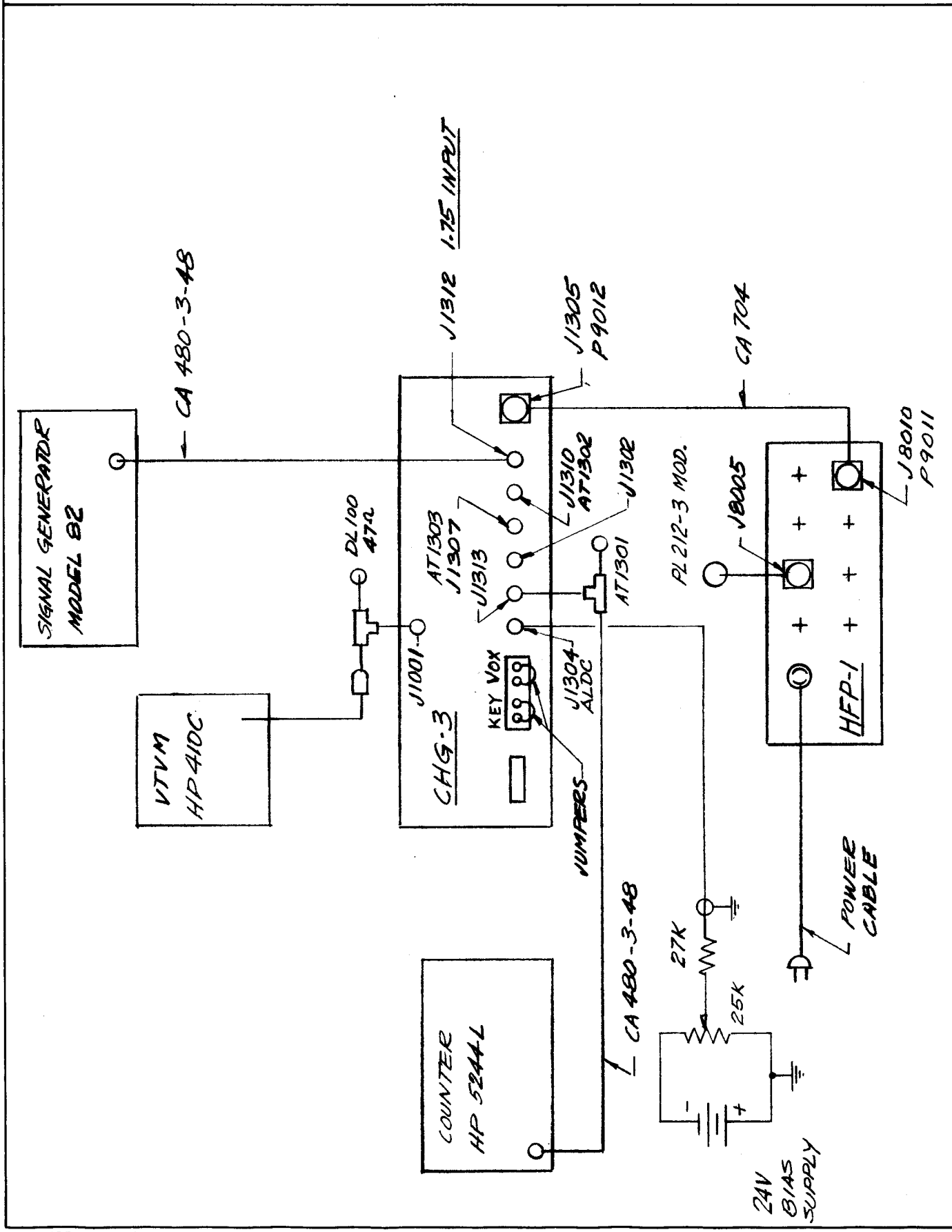
NO. S 1037

REV:

COMPILED: J.A, | CHECKED: | APPD: | SHEET 3 OF 15

TITLE: TEST PROCEDURE FOR CHG-3; CHGR-3 & CHGR-3A

CONNECTION DIAGRAM



C. PRELIMINARY - Cont'd

3. Connect P1104 to J1306 and P1008 to J1303.

4. Measure the resistance to ground on pin K of J1305 (+200v). Resistanc should be 175.3K ohms. Rotate bandswitch through 8 bands.

5. Measure resistance to ground on pin H (-105v).

   a. TB1301 3 & 4 VOX open; resistance should be infinite.

   b. TB1301 3 & 4 jumped; resistance should be 12,443 ohms.

*6. Connect power cable to J1305 and P1301 to J1 on OVEN AMPLIFIER. Turn the power on and measure the following voltages:

Between J1306 pin 13 & ground		+200VDC (if this voltage is incorrect, adjust pot. on HFP-1).
" " " 11 " "		+33 VDC ±10% (CHGR-3A not applicable).
" " " 10 " "		+150VDC ±5%.
" " " 1 " "		+6.5VDC ±0.33v.
" J1305 " C " "		+27VDC ±1.6v.
" J1303 pin 13 " "		+200VDC.
" " " 8 " "		-105VDC.

D. ALIGNMENT OF HF OSCILLATOR CIRCUITS

1. Connect counter as per Connection Diagram (disconnect signal generator and VTVM).

2. Set Bandswitch to Band 1, tuning dial to 2 mc.

3. Tune inductor L1013 to 3.7500 mc on counter.

4. Set tuning dial to 3 mc.

5. Tune capacitor C1047 to 4.7500 mv on counter.

6. Repeat procedure D-2, 3, 4, 5 until further adjustment become unnecessary.

7. Align all bands. Use procedure s t forth in D-2,3,4,5,6. Use table b low for band and tuning dial setting. Tune inductors and capacitors to the frequency shown.

* RECORD ON TEST DATA SHEET

TMC FORM SPEC 1

CIRCUIT CK922 CHG-3, & SK966 CHGR-3A

SYMBOL & TUBE	FUNCTION	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1002 6GM5	RF OUTPUT	+200	X	X	0	6.3	-4.6	+0.5	X	+200
V1003 6GK6	DRIVER	+0.46	(I) -7.5	0	0	6.3	X	+200	+200	0
V1004 6AH6	RF AMPLIFIER	0	0	0	6.3	+200	+137	+1.1	----	----
V1005 12AU7	BALANCED MODULATOR	+150	0	(II) +4.85	6.3	6.3	+150	0	(II) +4.85	0
V1006 6AH6	ISOLATION AMPLIFIER	0	(III) +1.72	0	6.3	+140	+140	(III) +1.72	----	----
V1007 6AB4	HF OSCILLATOR	+112	----	0	+6.3	-1.5to -2.5 (IV)	-1.5 to -2.5(IV)	0	----	----
V1302 0A2	+150 VOLTAGE REGULATOR	+150			0	+150				
V1304 12AU7	SYNCHRONIZE	195	0	(V) +10.5	0	0	+195	0	(V) +10.5	6.3

(I) Measured with VTVM. (II) R1007 adjusted for balance. (III) J1313 terminated with 47 ohms (AT-1301).
(IV) After alignment, Band 1 to 8. (V) R1321 adjusted for balance.
NOTES: All voltages are ±10% and referred to ground. All voltages are measured with Simpson Model 260 meter unless otherwise indicated.

D-C VOLTAGE CHART - MAIN CHASSIS & TUNER

TITLE: TEST PROCEDURE FOR CHG-3; CHGR-3 & CHGR-3A

TMC SPECIFICATION

REV:	COMPILED: JA	CHECKED:	APPD:	NO. S 1037
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D. ALIGNMENT OF HF OSCILLATOR CIRCUITS - Cont'd

BAND	SET TUNING DIAL TO	TUNE OSC. TO	USE ADJUSTMENT
1	2	3.7500	L1013
	3	4.7500	C1047
2	3	4.7500	L1021
	4	5.7500	C1073
3	4	5.7500	L1053
	6	7.7500	C1093
4	6	7.7500	L1054
	8	9.7500	C1113
5	8	9.7500	L1055
	12	13.7500	C1132
6	12	13.7500	L1042B
	16	17.7500	C1151
7	16	17.7500	L1147B
	24	25.7500	C1172
8	24	25.7500	L1052B
	32	33.7500	C1193

8. Replace inner cover, insulation and outer cover (use hardware called for on assembly).

#9. Connect proportional oven control jack to P1301 power cable and let oven temperature rise to a stable point. This temperature may be between 72°C and 78°C as an initial setting. Once this setting is obtained, stability must be within ±0.5°C. Approximate time required for oven temperature to stabilize is 1-1/2 hrs. Record stabilized oven temperature.

#10. Once oven stability has been attained, all oscillator circuits must be retuned. The normal frequency drift is approximately -1/2% of the indicated frequency. To retune circuits, use procedure D-7.

E. ALIGNMENT OF 1.75 MC CIRCUIT

1. Connect Signal Generator as per connection diagram. Set frequency to 1.75 mc, modulation to OFF, attenuator to 0.3V.

#NOTE: ITEMS D-9 and D-10 ARE NOT APPLICABLE TO CHGR-3A.

E. ALIGNMENT OF 1.75 MC CIRCUIT - Cont'd

2. Connect a-c probe of VTVM to pin 2 of V1005. Select 1.5V scale.

3. Disable HFO by disconnecting P1004.

4. Tune T1001 for maximum output on VTVM. Output should be 0.9V ±0.1V.

5. Disconnect VTVM from V1005 and reconnect as per connection diagram. Select 5V scale.

6. Connect P1004 to reactivate HFO.

F. BALANCED MODULATOR - HFO SUPPRESSION

1. Set Signal Generator attenuator to zero.

2. Connect RF microvoltmeter across R1012 resistor in RF amplifier grid circuit, (V1004, 6AH6). The presence of an HFO voltage will appear on meter.

3. Set CHG-3 Bandswitch to Band 7, tuning dial to 24 mc.

4. Adjust R1007 potentiometer for minimum output. The voltage app aring on the microvoltmeter should be less than 10 MV, the normal being 8 mv on band 8, 2 mv on bands 6 and 7, and 1 mv on bands 1 through 5.

5. Remove microvoltmeter from circuit.

G. ALIGNMENT OF RF CIRCUITS

1. Connect Signal Generator and VTVM as per connection diagram.

2. Set CHG-3 bandswitch to Band 1, tuning to 2 mc RF gain to maximum output.

3. Set Signal Generator to 1.75 mc, modulation OFF, attenuator to 0.3V (reduce as needed to 35 mv).

4. Tune inductors (use tool TP115) L1005, L1007, L1008, L1009 for maximum output on VTVM. Reduce input as needed to prevent output from exceeding 5V. A clear and distinct indication of tuning should result on each stage except the output (L1009) where the circuits are of lower Q and the tuning somewhat sluggish.

5. S t CHG-3 tuning to 3 mc RF gain control to maximum or as ne d d.

G. ALIGNMENT OF RF CIRCUITS - Cont'd

6. Tune capacitors (use tool TP114) C1024, C1027, C1030, C1033 for maximum output. The same conditions as in G4 will prevail.

7. Repeat procedure G4 and G6 (in that order) until no further improvement is discernible on VTVM. Output shall be at least 5V at the output frequency for a 35 MV input of 1.75 mc input frequency.

8. Procedures G4 and G6 are used to align all other bands. All bands are aligned at the end frequencies.

H. PERFORMANCE MEASUREMENTS

1. Sensitivity:

1.1 Connect Signal Generator and VTVM as per connection diagram.

1.2 CHG-3 RF Gain control at maximum.

1.3 Set Signal Generator to 1.75 mc, modulation OFF, attenuator to produce 3.5V output across 47 ohm load. Read attenuator and record. Output shall be at least 3.5V for a 35 MV input.

TYPICAL SENSITIVITY DATA

BAND	FREQ. MC	FOR 5V OUTPUT MV INPUT AT 1.75 MC	FOR 3.5V OUTPUT MV INPUT AT 1.75 MC
1	2	46	32
	2.5	30	22
	3	24	17
2	3	42	29
	3.5	33	23
	4	26	18
3	4	44	31
	5	30	22
	6	23	16
4	6	33	24
	7	24	16
	8	19	13
5	8	25	19
	10	20	15
	12	19	13
6	12	38	27
	14	47	32
	16	44	30

H. PERFORMANCE MEASUREMENTS - Cont'd

BAND	FREQ. MC	FOR 5V OUTPUT MV INPUT AT 1.75 MC	FOR 3.5V OUTPUT MV INPUT AT 1.75 MC
7	16	42	30
	20	28	20
	24	28	19
8	24	38	26
	28	40	28
	32	38	27

In case of low gain, the use of the stage-by-stage gain chart is recommended as an aid in localizing the fault.

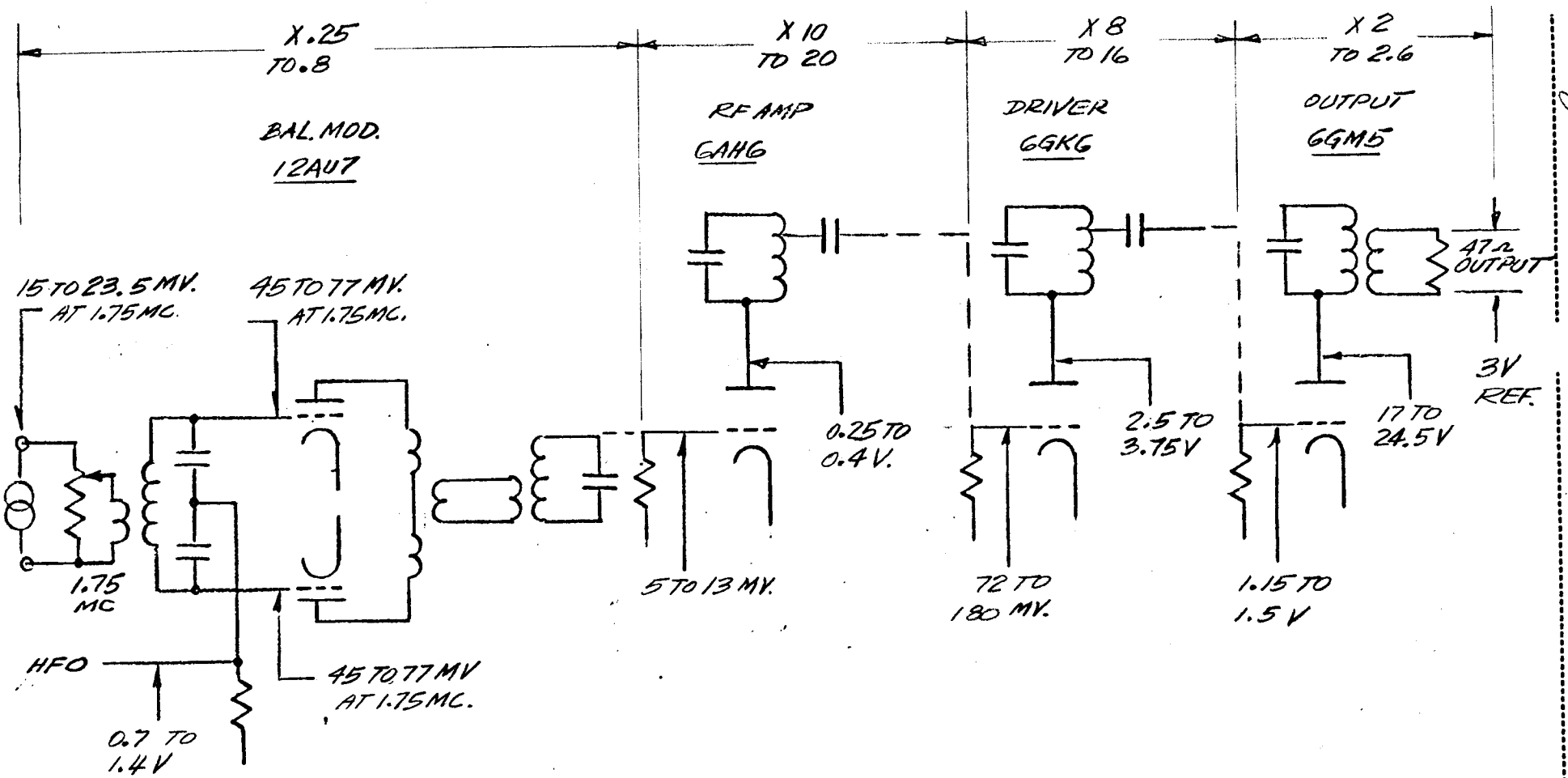
*2. HF Oscillator Output:

2.1 Connect VTVM across R-1001, 270 ohm resistor in grid circuit of 12AU7, V1005 balance modulator.

2.2 Set bandswitch and tuning dial as per table. Output across R-1001 shall be at least .8V and not more than 1.5V. Output across J-1313 shall be at least 0.2V and not more than .7V. Output across J-1302 shall be at least 30 MV and not more than 100 MV. Output across J-1310 shall be at least 20 MV and not more than 110 MV.

TYPICAL OUTPUT DATA

BAND	DIAL FREQ.	R1001 VOLTS	J1313 (AT1302) VOLTS	J1302 UV	J1310 (AT1301) UV
1	2	1.0	0.26	29	64
	2.5	1.14	0.32	32	56
	3	1.14	0.32	33	44
2	3	1.45	0.46	45	34
	3.5	1.45	0.47	45	30
	4	1.44	0.46	45	24
3	4	1.15	0.33	33	113
	5	1.17	0.34	33	94
	6	1.09	0.31	30	71



BY L. AUGER DATE 9/25/65 SUBJECT STAGE BY STAGE GAIN MEASUREMENT

CHKD. BY K. DATE

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JOB NO. S1037

CHASE-34

FOR STAGE BY STAGE GAIN MEASUREMENT

1. ISOLATE GRID FROM TUNED CIRCUIT BY USING THIN VINYL SLEEVING BETWEEN CONTACT & PIN
2. USE TERMINATED (47Ω) GENERATOR COUPLED TO GRIDS THROUGH .01 CAPACITOR
3. USE HP 410C RF VOLTMETER ON RF STAGE GRIDS OR PLATES — RETUNE GENERATOR WHEN MEASURING ACROSS TUNED CIRCUITS (PLATES)
4. USE #314 BALLANTINE VOLTMETER ON BALANCED MODULATOR CIRCUITS OF 1.75 MC. COMPONENT — DISABLE HFO BY PULLING HFO POWER CONNECTOR.
5. ALL THE VOLTAGES SHOWN ARE REFERED TO 3V OUTPUT FROM BAND 1 TO 8
6. THE OVERALL GAIN MUST BE AT LEAST 130 AND NOT MORE THAN 200
   TYPICAL-BAND 6. OVEALL GAIN = .48 x 15 x 10 x 2 = 144 OR $\frac{3V\ OUTPUT}{20.8\ MV\ INPUT} = \frac{3000}{20.8} = 144$

H. PERFORMANCE MEASUREMENTS - Cont'd

BAND	DIAL FREQ.	R1001 VOLTS	J1313 (AT1302) VOLTS	J1302 MV	J1310 (AT1301) MV
4	6	1.31	0.41	37	48
	7	1.27	0.4	36	37
	8	1.2	0.37	34	31
5	8	1.15	0.34	33	45
	10	1.09	0.34	33	32
	12	0.93	0.30	29	22
6	12	1.17	0.39	36	42
	14	1.06	0.37	34	30
	16	0.88	0.31	30	20
7	16	1.32	0.47	50	87
	20	1.22	0.60	56	63
	24	1.09	0.55	51	39
8	24	1.21	0.66	61	81
	28	1.15	0.66	64	60
	32	1.33	0.57	60	38

*3. Calibration:

3.1 Connect counter as per connection diagram.

3.2 Dial calibration shall be as follows:

CHECK POINTS	BAND	±TOLERANCE IN KC	± DIAL DIVISION	±% OF ΔF
100 KC	1	10	1	1
100 KC	2	10	1	1
200 KC	3	20	2	1
200 KC	4	20	2	1
.5 MC	5	40	1.6	1
.5 MC	6	40	1.6	1
1 MC	7	80	1.6	1
1 MC	8	80	1.6	1

H. PERFORMANCE MEASUREMENTS - Cont'd

4. Oven Temperature and Stability: (not applicable to CHGR-3A)

4.1 Insert thermometer into the oven through the hole marked "C" (capacitor alignment hole) until it comes to rest.

CAUTION: BANDSWITCH KNOB MUST NOT BE TURNED DURING THIS OPERATION.

The oven temperature shall be between 72°C and 78°C as an initial setting, (this variation may be found between one unit and another. It is not be be construed as a temperature variation tolerance in a single unit.). The temperature stability shall be ±0.5°C. EXAMPLE: If oven temperature was found to be 75°C at one reading, and 76°C at another, and never less than 75°C nor more than 76°C, then the initial setting can be considered as 75.5°C, and the stability ±0.5°C.

5. HF Oscillator Attenuation Test:

5.1 Turn Signal Generator Attenuator to zero output, or disconnect from J1312.

5.2 Set CHG-3 RF Gain control to maximum output, and turn dial to high end of band.

5.3 Connect RF Microvoltmeter across 47 ohm load at CHG-3 output jack (J1001). Record on Test Data Sheet.

The output shall be less than 3 millivolts from Band 1 through Band 6, 13 millivolts or less on Band 7, and 11 millivolts or less on Band 8.

NOTE: Output consists of some noise; therefore, it is important that noise voltage be subtracted when result is questionable. To determine amount of noise voltage, pull out oscillator power plug from J1306.

6. RF Gain Control:

6.1 Set Signal Generator, frequency to 1.75 MC CW, attenuator to produce 3.5V output at J1001 with RF Gain control at maximum output.

6.2 Turn RF Gain control to minimum output.

6.3 Connect RF Microvoltmeter to J1001 across 47 ohm load, and record output on Test Data She t. Output should be 15 mv or 1 ss on all bands.

6.4 Disconnect RF Microvoltm ter.

H. PERFORMANCE MEASUREMENTS - Cont'd

7. ALDC Characteristics Test:

7.1 Set CHG-3 Bandswitch to BAND 1, frequency to 2 mc, RF Gain to maximum.

7.2 Set Signal Generator attenuator to produce 3.5V at CHG-3 output jack.

7.3 Connect -24V bias supply to ALDC jack (J1304); set bias until RF output at J1001 is reduced to 0.35V. Measure and record bias voltage. Voltage should be -13.2V ±10%.

7.4 Connect RF Microvoltmeter to J1001, and repeat procedure 7.3. Reduce output to 35 MV and 3.5 MV. Record data. Voltage should be -16V & -18V respectively, ±10%.

7.5 Disconnect Microvoltmeter.

8. VOX and KEY Function Check:

8.1 Test conditions 7.1 and 7.2 prevail.

8.2 Disconnect jumper to open KEY circuit. RF output should drop to zero. Indicate on Test Data Sheet as OK.

8.3 Replace KEY jumper and disconnect jumper to open VOX circuit. CAUTION: Where circuit is broken, -105V will be present on terminal #4.

RF output should drop to zero. Indicate on Test Data Sheet.

9. Intermodulation Distortion:

9.1 Connect the CHG-3 as follows - 1.75 mc input jack (J1312) to TTG, RF output jack J501. Replace 47 ohm dummy load connected to output jack J1001 with 5:1 (14 db attenuator) and connect to signal input jack of the analyzer.

9.2 Turn on PTE and let warm up until oven indicators are cycling. Tune VOX to a frequency 0.5 MC higher then the RF signal to be displayed, i.e. 2 MC +0.5 MC = 2.5 MC on the VOX.

9.3 Turn CHG-3 Bandswitch to Band 1. Tune frequency dial to 2 MC, and adjust RF Gain control to 4.18V (two-tone) output on 410C VTVM (0.35W PEP).

9.4 Set PTE Analyz r controls as follows -

9.4.1 VOX output f r 0.1 ma.
9.4.2 Gain approximately full clockwise.

H. PERFORMANCE MEASUREMENTS - Cont'd

9.4.3 Scale switch to log.
9.4.4 Sweep frequency to 14KC.
9.4.5 IF attenuator switch to -20 DB.

Input attenuator switches as required to place the two-tone signal peaks on the ZERO DB reference line, but maintaining the Gain control at approximately full clockwise. Adjust the VOX frequency slightly to position the two-tone signal presentation in the center of the analyzer screen. The displayed signal represents 0.35W PEP output on a scale from 0 to 40 DB.

9.4.6 Place the IF Attenuator switch to 0 DB position, thus expanding the scale to 60 DB (0 DB line becomes 20 DB, and 10 DB line becomes 30 DB etc.).

9.4.7 Read the 3rd and higher order of products from this presentation, and record on Test Data Sheet.

Requirement: The 3rd and higher order intermodulation distortion products shall be not less than 45 DB below either tone of the two-tone signal at the 0.35W PEP level.

10. Repeat procedures 9.2 through 9.4.7 for all bands at the low end of each band and record.

FILL OUT UNDERLINED BOXES OF THE TEST DATA SHEET FOR EACH EQUIPMENT TESTED.

TMC SPECIFICATION

NO. S 1037

REV:

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

TITLE: TEST DATA FOR CHG-3, CHGR-3, & CHGR-3A

MFG. NO. _____ SERIAL NO. _____

BAND	FREQ. MC.	HF OSCILLATOR OUTPUT AT J1313 VOLT	HF OSCILLATOR OUTPUT AT J1302 MV	HF OSCILLATOR OUTPUT AT J1310 MV	SENSITIVITY MV INPUT TO J1312 FOR 3.5V OUTPUT AT J1001	DIAL CALIBRATION MAXIMUM DIVISION ERROR	HF OSC. ATTENUATION MV AT J1001	INTER-MODULATION DISTORTION DB
1	2							
	2.5							
	3							
2	3							
	3.5							
	4							
3	4							
	5							
	6							
4	6							
	7							
	8							
5	8							
	10							
	12							
6	12							
	14							
	16							
7	16							
	20							
	24							
8	24							
	28							
	32							

DC VOLTAGES

JACK	PIN	VOLTS
J1306	13	
"	11	
"	10	
"	1	
J1305	C	
J1303	13	
"	8	

OVEN TEMPERATURE _____ °C

RF GAIN CONTROL AT MIN. _____ MV OUTPUT

VOX _____ KEY _____

ALDC CHARACTERISTIC

-VOLTS	RF OUTPUT
0	3.5V REF.
	0.35V
	35. MV
	3.5 MV

TESTER SIGNATURE

DATE

TMC FORM SPEC 1