PRELIMINARY

PRE-PRODUCTION TEST PROCEDURE

PART III

PERFORMANCE TEST

UNDER

LABORATORY CONDITIONS

FOR

WJ-8618

VHF/UHF RECEIVER

DOCUMENT NO. STP-15003

Total pages in procedure - 60

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WJ WATKINS-JOHNSON
GAITHERSBURG MARYLAND USA

WJ-8618
VHF/UHF Receiver

SIZE	CODE IDENT NO.	DRAWING NO
A	14632	STP- 15003

2.2 Test Engineering Documents

Pre-production Test Data Sheet STD-15006

1. SCOPE

This document describes the necessary electrical tests to ascertain that the WJ-8618 VHF/UHF Receiver is operational, properly aligned and meets its applicable specifications. The document is designed to test the equipment independently, rather than as part of a system.

2. REFERENCES

2.1 Schematic Diagrams

Nomenclature	Type	Schematic
Main Chassis	WJ-8618	670030
Rectifier Filter PCA	764005	670030
Signal Monitor Assy	794103	570086
IF Amplifier Assy	724005	470156
8 kHz IF Amplifier PCA	18107-1	34168
Output Amplifier PCA	15801-2	51097
Control Board	824001	470149
Oscillator Assy	774007	370315
Sweep Oscillator PCA	15799-2	32369
Focus and Intensity PCA	794099	270343
DC-DC Converter	764006	32874
DC-DC Converter PCA	16533	32874
RF/IF Mother Board	794084	570079
UHF Preselector PCA	794111	470162
UHF Preamp/Mixer/ LO PCA	794114	470172
UHF LO Synthesizer	370334	470169
UHF Variable Divider PCA	370325	470169
UHF VCO	270407	470169
High Band Preselector PCA	794094	570057
Low Band Preselector PCA	794095	570058
Preamplifier PCA	794097	470140
500 MHz Filter Assy	370285	470140
1st Converter PCA	794096	470139
1st Converter	714005	470139
Mixer IF	270359	470139
Filter Chassis	370284	470139
2nd Converter PCA	714006	570072
AGC PCA	784001	570085
21.4 MHz IF Amplifier (20 kHz)	724006-2	370348
21.4 MHz IF Amplifier (100 kHz)	724006-4	370348
21.4 MHz IF Amplifier (250 kHz)	724006-5	370348
21.4 MHz IF Amplifier (1 MHz)	724007-1	470164
21.4 MHz IF Amplifier (2 MHz)	724007-2	470164
21.4 MHz IF Amplifier (4 MHz)	724008-1	370349
Video/Audio/COR PCA	794112	470163
IF Output/AM Demod PCA	724009	570083

Nomenclature	Type	Schematic
20 kHz FM Demod PCA	794106-2	370347
100 kHz FM Demod PCA	794107-2	370346
250 kHz PM Demod PCA	794107-3	370346
1 MHz FM Demod PCA	794104-1	470157
2 MHz FM Demod PCA	794105-1	470158
4 MHz FM Demod PCA	794105-2	470158
Synthesizer Motherboard	794082	570082
Reference Generator PCA	794098	570063
1st LO Synthesizer PCA	794003	570059
Prescaler/LO Buffer/Amplifier	370280	570059
LO Buffer/Amplifier PCA	270345	570059
Prescaler PCA	24784	570059
2nd LO Synthesizer PCA	774004	570060
Oscillator/Mixer	370281	570060
VCO Buffer PCA	270347	570060
4.6-5.6 MHz Amplifier PCA	24727	570060
3rd Synthesizer PCA	774005	570064
3rd Synthesizer Chassis	370282	570064
Digital Motherboard	794083	570076
Receiver Interface PCA	794108	570075
Microprocessor PCA	794109	570074
IEEE Interface PCA	794116	570081
Async Interface PCA	794115	570080
Digital Refreshed Display	794120	570065
DRD PCA	794122	570084
Synthesizer Inferface PCA	794110	570073
Front Panel Display and Control	794093	570070
Phone Jack	791275	23519
Antenna Switch Assy	794128	470188
RF Switch PCA	270450	470188
Switch Driver PCA	270451	470188
WB IF Output Amplifier	724011	470190
WB IF Output Amplifier PCA	270465	470190
Encoder Assy	34836-1	
Input Amplifier PCA		
3rd LO RF PCA	370324	570064

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PRODUCTION TESTS

SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 6 OF 60

N15670

4. TEST EQUIPMENT LIST

4.1 The following equipment, or equivalent, is required to perform the tests outlined in this procedure. "Or equivalent" is defined as an alternate item which will perform in the stated test to the degree of accuracy required.

Qty	Type	Description	Manufacturer
1	W5MT3W	Variable Autotransformer	General Radio
1	501	Power Amplifier	Elgar
1	401V	Variable Oscillator Plug-In	Elgar
1	8100A	Digital Multimeter	Fluke
1	92B	RF VTVM	Boonton
1	91-12F	Probe	Boonton
1	91-14A	"T" Adapter	Boonton
1	91-15A	50Ω Termination (Type N)	Boonton
2	400EL	AC VTVM	H-P
1	332A	Distortion Analyzer	H-P
1	T932	Oscilloscope	Tektronix
1	5328A	Counter	H-P
3	011-0092-00	600Ω Feedthru Termination	Tektronix
2	8640B	Signal Generator	H-P
1	N-HJ-302G-11	Combiner	Olektron
1	PB-50	Step Attenuator	Texscan
1	VS-80	Sweep Generator	Texscan
1	2A-3	3 dB Coaxial Attenuator	Weinschel
1	TRB-4	Impedance Comparator	Telonic
1	TRM-1-1.00F	1.00:1 Termination	Telonic
1	TRM-1-2.00F	2.00:1 Termination	Telonic
1	141T	Display Section	H-P
1	8552B	IF Section	H-P
1	8554B	RF Section	H-P
1	7512-004	Noise Figure Indicator	Ailtech
1	7615	Noise Source	Ailtech
1	AFA-10	10 dB Coaxial Attenuator	AEL
1	TF-10141	Calibrated Step Attenuator	WJ-CEI
1	TF-10142	21.4 MHz Post-amplifier	WJ-CEI
1	106A	Pulse Generator	Datapulse
1	612A	UHF Signal Generator	H-P
1	9825A	Controller	H-P
1	98210A	ROM	H-P
1	98213A	ROM	H-P
1	98034A	Interface	H-P
1	8660C	Synthesizer	H-P
1	86602B	RF Section	H-P
1	86632B	Modulation Section	H-P
1	8471A	Detector	H-P
1	3040A	Network Analyzer	H-P
1	7044A	X-Y Recorder	H-P
1	1201B	Storage Oscilloscope	H-P

5. ELECTRICAL TESTS

5.1 General

5.1.1 Read each paragraph carefully from beginning to end before attempting to perform the test described in the paragraph.

5.1.2 All tests are to be performed under the following environmental conditions unless otherwise specified:

Temperature	+25°C ± 5°C
Altitude	Room ambient
Humidity	Room ambient

5.1.3 All test equipment shall be allowed a warm-up period of at least thirty minutes before the start of any test.

5.1.4 All inputs to and outputs from the equipment under test which are not in use during any particular test are to be terminated with their characteristic impedances.

5.1.5 All equipment covers shall be in place unless a particular test requires their removal.

5.2 Standard Test Set-up

5.2.1 Connect the equipment as shown by the solid lines in Figure 1. Use RF Input Configuration A (Figure 2).

5.2.2 Set the controls and switches on the WJ-8618 to the following positions:

Front Panel:

Receiver	
DETECT MODE	AM
GAIN MODE	AGC ON
BANDWIDTH	250
TUNING SPEED	SLOW
FREQUENCY MHz	255.5550
AFC	OFF
AUDIO GAIN	Midrange
RF/IF GAIN	Maximum CW
POWER	ON
MEMORY SELECT	00
COR LEVEL	00
DWELL	Maximum CW
ANTENNA	1
MEMORY/CONTROL	CLR and MAN
Spectrum Monitor	
INTENSITY	As required
FOCUS	As required
GAIN	As required
MARKER	ON
SWEEP WIDTH	Maximum CW
SWEEP RATE	Midrange
CENTER FREQUENCY	Midrange
LIN-LOG	LIN

Rear Panel:

REF SEL (S2)	INT
FL1S1	120 V
LINE ADJ	Midrange

5.2.3 Set the output frequency of generator #1 to 255.5550 MHz. Lock the generator to this frequency. Set its output level to -85 dBm modulated 30% at 1 kHz.

5.2.4 Set the output level of generator #2 to -145 dBm.

5.2.5 Set the step attenuator to 3 dB insertion loss.

5.2.6 Set the output of the variable autotransformer to 117.0 Vrms as indicated by the digital multimeter.

5.2.7 Set the AUDIO GAIN control for 2.45 Vrms as indicated by AC VTVM #1.

5.2.8 Set the LINE ADJ control (rear panel) for 7.75 Vrms as indicated by the distortion analyzer (VOLTMETER FUNCTION).

5.3 Power Supply Operation

5.3.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).

5.3.2 Power Consumption

1. Read and record the receiver power consumption as indicated by the variable autotransformer meter. This power shall be no greater than 100 W.

5.3.3 Voltage Checks

1. Using the digital multimeter probe, measure and record the voltage of the DC supplies as indicated below. In no case shall the measured voltages exceed those limits shown.

Supply	Test Point	Limits
+15	A1J15 //	15.00 ± 0.75 Vdc
+9	A1J19	9 Vdc nominal
+5 A	A5J1-5	5.00 ± 0.25 Vdc
+5B	A4J1-5	5.00 ± 0.25 Vdc
-15	A1J17 / 3	-15.00 ± 0.75 Vdc

2. Use the digital multimeter to set the output of the variable autotransformer to 99.5 Vrms and with the probe, measure and record the voltage of the DC supplies as indicated below. In no case shall the measured voltages exceed those limits shown.

Supply	Test Point	Limits
+15	A1J15 //	15.00 ± 0.75 Vdc
+5 A	A5J1-5	5.00 ± 0.25 Vdc
+5B	A4J1-5	5.00 ± 0.25 Vdc
-15	A1J17 /3	-15.00 ± 0.75 Vdc

3. Use the digital multimeter to set the output of the variable autotransformer to 134.5 Vrms and with the probe, measure and record the voltage of the DC supplies as indicated below. In no case shall the measured voltages exceed those limits shown.

Supply	Test Point	Limits
+15	A1J15 //	15.00 ± 0.75 Vdc
+5A	A5J1-5	5.00 ± 0.25 Vdc
+5B	A4J1-5	5.00 ± 0.25 Vdc
-15	A1J17 /3	-15.00 ± 0.75 Vdc

4. Set the frequency of the power amplifier oscillator to 62 Hz.

5. Use the digital multimeter to set the output amplitude of the power amplifier to 269.1 Vrms.

6. Set FL1S1 to the 240 V position and connect the receiver to the power amplifier output.

7. Use the digital multimeter probe to measure and record the voltage of the DC supplies as indicated below. In no case shall the measured voltages exceed those limits shown below:

Supply	Test Point	Limits
+15	A1J~~15~~ 11	15.00 ± 0.75 Vdc
+5A	A5J1-5	5.00 ± 0.25 Vdc
+5B	A4J1-5	5.00 ± 0.25 Vdc
-15	A1J~~17~~ 13	-15.00 ± 0.75 Vdc

8. Reset the frequency of the power amplifier oscillator to 48 Hz.

9. Monitor each of the DC supplies, as indicated below, with the oscilloscope probe. Decrease the output amplitude of the power amplifier until spikes appear on the oscilloscope display. Using the digital multimeter, measure and record the input voltage to the receiver at this point. In no case shall the input voltage be greater than 198.9 Vrms.

Supply	Test Point
+15	A1J~~15~~ 11
+5A	A5J1-5
+5B	A4J1-5
-15	A1J~~17~~ 13

5.4 Input Impedance and VSWR

5.4.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration B (Figure 3).
2. Set the oscilloscope controls for 2mV/div vertical sensitivity and external horizontal input.
3. Set the sweep generator for 10 MHz markers and adjust the RF output level to display approximately half-scale deflection on the oscilloscope. Set the controls to display the range from 20.0 to 250.0 MHz.

5.4.2 VSWR

1. Note the amplitude of the reflected power display on the oscilloscope.
2. Disconnect the 2.0:1 termination from Z2 of the impedance comparator and connect A8J-1 of the receiver to this point.
3. Note that the amplitude of the reflected power display on the oscilloscope does not exceed that amplitude noted in step 5.4.2.1.
4. Perform the following receiver adjustments while observing the oscilloscope display. Note that the amplitude of the reflected power display on the oscilloscope does not exceed that amplitude noted in step 5.4.2.1.
   A. Tune the receiver down to 20.0000 MHz and up to 250.000 MHz.
   B. Select the 20, 100 and 250 kHz bandwidths.
   C. Select the AGC OFF GAIN MODE and rotate the RF/IF GAIN control maximum CCW and maximum CW. Select the AGC ON GAIN MODE.

   Indicate acceptable performance by a check mark on the data sheet.
5. Set the controls of the generator to display the range from 250.0 to 500.0 MHz.
6. Recalibrate the oscilloscope display using the 2.0:1 termination.
7. Reconnect the receiver and repeat steps 5.4.2.3 and 5.4.2.4, except, tune the receiver up to 500.000 MHz. Indicate acceptable performance by a check mark on the data sheet.
8. Set the controls of the generator to display the range from 500.0 to 800.0 MHz.
9. Recalibrate the oscilloscope display using the 2.0:1 termination.
10. Reconnect the receiver and repeat steps 5.4.2.3 and 5.4.2.4, except, tune the receiver up to 800.0000 MHz. Indicate acceptable performance by a check mark on the data sheet.
11. Set the controls of the generator to display the range from 800.0 to 1100.0 MHz.

12. Recalibrate the oscilloscope display using the 2.0:1 termination.

13. Reconnect the receiver and repeat steps 5.4.2.3 and 5.4.2.4, except, tune the receiver up to 1099.9999 MHz. Indicate acceptable performance by a check mark on the data sheet.

14. Set the ANTENNA switch to 2 and use A8J2 on the reciever.

15. Repeat steps 5.4.1.3 through 5.4.2.13. Indicate acceptable performance by check marks on the data sheet as required.

5.5 RF Input Protection

5.5.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Measure the sensitivity of the receiver as follows:
   - A. Increase the output modulation of generator #1 to 50%.
   - B. Note the reading on the meter of the distortion analyzer.
   - C. Remove the modulation from the output of generator #1.
3. Note the decrease in the meter reading. This is the receiver sensitivity.

5.5.2 RF Power Protection

1. Set the step attenuator to 0 dB and increase the output level of generator #1 to +19 dBm. Maintain this level for approximately 15 seconds.
2. Reset the output level of generator #1 to -85 dBm and reset the step attenuator to 3 dB.
3. Measure the receiver sensitivity as outlined in step 5.5.1.2. This sensitivity shall be no less than that measured in step 5.5.1.3. Indicate acceptable performance by a check mark on the data sheet.

5.6 Noise Figure

5.6.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, select the AGC OFF GAIN MODE and set the tuned frequency of the receiver to 20.0000 MHz. Use RF Input Configuration C (Figure 4). SELECT 4 MHz IF BW
2. Connect the input of the RF VTVM to J1 of the receiver and connect the input of the post-amplifier to J1 of the receiver.
3. Set the step attenuator to 0 dB attenuation.
4. Depress the CAL button on the noise figure indicator and adjust the CAL ADJ knob for a reading of 15.5 on the CALIBRATE scale of the meter.
5. Increase the attenuation of the step attenuator until the AGC light on the noise figure indicator extinguishes. The attenuation of the step attenuator shall be no less than 5 dB and no greater than 55 dB.
6. Reset the step attenuator to 0 dB attenuation.
7. Depress the AUTO button on the noise figure indicator and adjust the ADD TO NOISE FIGURE control for an on-scale reading of the meter.

5.6.2 Noise Figure

1. Tune the receiver slowly up to 1099.9999 MHz while observing the noise figure indicator for the point of highest noise figure. The AGC light should be ON during this step.
2. At the point of highest noise figure, depress the MANUAL-OFF button on the noise figure indicator and adjust the GAIN control for a convenient reference on the meter.
3. Depress the MANUAL-ON button on the noise figure indicator and increase the attenuation of the step attenuator to reattain the reference reading set in step 5.6.2.2. Note the step attenuator setting and determine the exact attenuation from the calibration chart on the attenuator. This is the Y Factor.
4. Refer to the noise source calibration chart and determine the Correction Factor of the noise source at the frequency at which the receiver is operating.
5. Using the Y Factor from step 5.6.2.3 and the Correction Factor from step 5.6.2.4, determine the noise figure of the receiver from the Y Factor vs. Noise Figure graphs, Figures 9, 10 and 11.
6. Record the maximum noise figure from step 5.6.2.5 and the frequency at which the receiver is operating. The noise figure shall be no greater than 10.0 dB.
7. Set the ANTENNA switch to 2 and move the noise source to A8J2 of the receiver. Set the tuned frequency of the receiver to 20.0000 MHz.

8. Repeat steps 5.6.1.3 through 5.6.2.5.

9. Record the maximum noise figure from step 5.6.2.8 and the frequency at which the receiver is operating. The noise figure shall be no greater than 10.0 dB.

5.7 RF/IF Gain Control Range and Linearity

5.7.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2). Disconnect the RF VTVM from J2 of the receiver and connect it to J1 instead. SET IF BW TO 20 KHz
2. Set generator #1 ~~to produce a CW output signal.~~ FOR -100 dBm
3. Select the AGC OFF GAIN MODE and ~~set the output level of generator #1 for an indication of 30 mVrms~~ on the RF VTVM. NOTE
4. ~~Note the output level of generator #1.~~

5.7.2 Range and Linearity

1. Increase the output level of generator #1 in 10 dB steps and rotate the RF GAIN control in a CCW direction in order to maintain the indication on the RF VTVM ~~at 30 mVrms~~. IN 5.7.1.3
2. Repeat step 5.7.2.1 for a total of 8 steps (80 dB generator output increase). At each step verify that the required rotation of the RF/IF GAIN control is approximately the same as each of the preceeding steps. Indicate acceptable performance by a check mark on the data sheet.

5.8 Receiver Frequency Stability

5.8.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2 Use RF Input Configuration A (Figure 2).
2. Press the TUNING SPEED-LOCK switch on the receiver.
3. Set the output of generator #1 to CW.
4. Connect the counter input to J1 on the receiver.

5.8.2 Long Term Stability

1. At 15 minute intervals for a period of eight hours, read and record the IF output frequency as indicated by the frequency counter. Each subsequent reading shall not vary from the initial reading by greater than ± 25 Hz.

5.8.3 Short Term Stability

1. Set the counter to read its input frequency over a 10 second period.
2. Read and record ten consecutive IF output frequencies with the counter set as above.
3. Calculate the difference between the lowest and the highest frequencies recorded in step 5.8.3.2. Divide the difference by 6 and record the result. This result shall be no greater than ± 20 Hz.

5.8.4 Stability vs Line Voltage

1. Read and record the IF output frequency as indicated by the frequency counter.
2. Set the output of the variable autotransformer to 99.5 Vrms and read and record the IF output frequency as indicated by the frequency counter.
3. Set the output of the variable autotransformer to 134.5 Vrms and read and record the IF output frequency as indicated by the frequency counter.
4. Calculate and record the difference between the readings taken in steps 5.8.4.1 and 5.8.4.2. The result shall be no greater than ± 20 Hz.
5. Calculate and record the difference between the readings taken in steps 5.8.4.1 and 5.8.4.3. The result shall be no greater than ± 20 Hz.

5.9 Tuning Accuracy

5.9.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2.
2. Connect the counter input to J1 on the receiver.
3. Connect A8J1 on the receiver to the 1 MHz REF connector (J8) on the receiver.
4. Tune the receiver to 20.0000 MHz.

5.9.2 Accuracy

1. Read and record the IF output frequency of the receiver. This frequency shall be 21.400000 $\pm$ 0.000050 MHz.

5.10 IF Amplifier Characteristics

5.10.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A.
2. Select the AGC OFF GAIN MODE and connect the RF VTVM to J1 on the receiver.
3. Set the step attenuator to 63 dB insertion loss.
4. Set the output level of generator #1 to -20.0 dBm and remove the modulation from its output signal.
5. Set the RF/IF GAIN control for an IF output level of -13.0 dBm as indicated on the RF VTVM.

5.10.2 250 kHz IF Amplifier

1. Set the step attenuator to 60 dB insertion loss.
2. Increase the tuned frequency of the receiver until the RF VTVM again indicates -13.0 dBm. Record the receiver frequency.
3. Set the step attenuator to 3 dB insertion loss.
4. Increase the tuned frequency of the receiver until the RF VTVM again indicates -13.0 dBm. Record the receiver frequency.
5. Decrease the tuned frequency of the receiver, past 255.5550 MHz, until the RF VTVM again indicates -13.0 dBm. Record the receiver frequency.
6. Set the step attenuator to 60 dB insertion loss.
7. Increase the tuned frequency of the receiver until the RF VTVM again indicates -13.0 dBm. Record the receiver frequency.
8. Subtract the reading of step 5.10.2.5 from that of step 5.10.2.4 and record the result. This result is the -60 dB bandwidth of the 250 kHz IF and shall be no greater than ~~750.0~~ 1000.0 kHz.
9. Subtract the reading of step 5.10.2.7 from that of step 5.10.2.2 and record the result. This result is the -3dB bandwidth of the 250 kHz IF and shall be no less than 250.0 kHz.
10. Set the step attenuator to 63 dB insertion loss.
11. Carefully tune the receiver back and forth between 255.4300 MHz and 255.6800 MHz while observing the RF VTVM for peaks and dips in the response above and below the -13.0 dBm reference amplitude.
12. Identify the largest positive excursion from -13.0 dBm and note the amplitude of the excursion.

13. Identify the largest negative excursion from -13.0 dBm and note the amplitude of the excursion. Add the absolute values of the excursions noted above and record the result. This result shall be no greater than 2.0 dB. (This measurement does not include the "skirts" of the response curve).

5.10.3 100 kHz IF Amplifier

1. Set the tuned frequency of the receiver to 255.5550 MHz and set the output level of generator #1 to -24.0 dBm.
2. Select the 100 kHz BANDWIDTH.
3. Set the RF/IF GAIN control for an IF output level of -13.0 dBm as indicated on the RF VTVM.
4. Using the procedure outlined above, determine and record the -60 dB bandwidth of the 100 kHz IF. This bandwidth shall be no greater than 300.0 kHz.
5. Using the procedure outlined above, determine and record the -3 dB bandwidth of the 100 kHz IF. This bandwidth shall be no less than 100 kHz.
6. Using the procedure outlined above, determine and record the total of the largest positive and negative excursions of the IF output signal between the tuned frequencies of 255.5050 MHz and 255.6050 MHz. This total shall be no greater than 2.0 dB.

5.10.4 20 kHz IF Amplifier

1. Set the tuned frequency of the receiver to 255.5550 MHz and set the output level of generator #1 to -31.0 dBm.
2. Select the 20 kHz BANDWIDTH.
3. Set the RF/IF GAIN control for an IF output level of -13.0 dBm as indicated on the RF VTVM.
4. Using the procedure outlined above, determine and record the -60 dB bandwidth of the 20 kHz IF. This bandwidth shall be no greater than 60.0 kHz.
5. Using the procedure outlined above, determine and record the -3 dB bandwidth of the 20 kHz IF. This bandwidth shall be no less than 20.0 kHz.
6. Using the procedure outlined above, determine and record the total of the largest positive and negative excursions of the IF output signal between the tuned frequencies of 255.5450 MHz and 255.5650 MHz. This total shall be no greater than 2.0 dB.

5.10.5 4 MHz IF Amplifier

1. Remove the 20 kHz, 100 kHz and 250 kHz IF amplifier printed circuit assemblies from the receiver and install the 1 MHz, 2 MHz and 4 MHz assemblies.
2. Set the tuned frequency of the receiver to 255.5550 MHz and set the output level of generator #1 to -8.0 dBm.

3. Select the 4 MHz BANDWIDTH.

4. Set the RF/IF GAIN control for an IF output level fo -13.0 dBm as indicated on the RF VTVM.

5. Using the procedure outlined above, determine and record the -60 dB bandwidth of the 4 MHz IF. This bandwidth shall be no greater than 12.0000 MHz.

6. Using the procedure outlined above, determine and record the -3 dB bandwidth of the 4 MHz IF. This bandwidth shall be no less than 4.0000 MHz.

7. Using the procedure outlined above, determine and record the total of the largest positive and negative excursions of the IF output signal between the tuned frequencies of 253.5550 MHz and 257.5550 MHz. This total shall be no greater than 2.0 dB.

5.10.6 2 MHz IF Amplifier

1. Set the tuned frequency of the receiver to 255.5550 MHz and set the output level of generator #1 to -11.0 dBm.

2. Select the 2 MHz BANDWIDTH.

3. Set the RF/IF GAIN control for an IF output level of -13.0 dBm as indicated on the RF VTVM.

4. Using the procedure outlined above, determine and record the -60 dB bandwidth of the 2 MHz IF. This bandwidth shall be no greater than 6.0000 MHz.

5. Using the procedure outlined above, determine and record the -3 dB bandwidth of the 2 MHz IF. This bandwidth shall be no less than 2.0000 MHz.

6. Using the procedure outlined above, determine and record the total of the largest positive and negative excursions of the IF output signal between the tuned frequencies of 254.5550 MHz and 256.5550 MHz. This total shall be no greater than 2.0 dB.

5.10.7 1 MHz IF Amplifier

1. Set the tuned frequency of the receiver to 255.5550 MHz and set the output level of generator #1 to -14.0 dBm.

2. Select the 1 MHz BANDWIDTH.

3. Set the RF/IF GAIN control for an IF output level of -13.0 dBm as indicated on the RF VTVM.

4. Using the procedure outlined above, determine and record the -60 dB bandwidth of the 1 MHz IF. This bandwidth shall be no greater than 3.0000 MHz.

5. Using the procedure outlined above, determine and record the -3 dB bandwidth of the 1 MHz IF. This bandwidth shall be no less than 1.0000 MHz.

6. Using the procedure outlined above, determine and record the total of the largest positive and negative excursions of the IF output signal between the tuned frequencies of 255.0550 MHz and 256.0550 MHz. This total shall be no greater than 2.0 dB.

5.10.8 Ultimate IF Rejection

1. Remove the 1 MHz, 2 MHz and 4 MHz IF amplifier printed circuit assemblies from the receiver and install the 20 kHz, 100 kHz and 250 kHz assemblies.
2. Set the step attenuator to 90 dB insertion loss.
3. Set the tuned frequency of the receiver to 255.5550 MHz and set the output level of generator #1 to +7.0 dBm.
4. Select the 250 kHz BANDWIDTH.
5. Set the RF/IF GAIN control for an IF output level of -13.0 dBm as indicated on the RF VTVM.
6. Increase the tuned frequency of the receiver to 256.0550 MHz.
7. Decrease the insertion loss of the step attenuator until the RF VTVM again indicates -13.0 dBm.
8. Record the required decrease in insertion loss of the attenuator. This decrease shall be no less than 80 dB.

70 dB for f_o < 10X IF BW
80 dB for f_o > 10X IF BW

5.11 AGC Operation

5.11.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, select the 20 kHz BANDWIDTH. Use RF Input Configuration A (Figure 2).
2. Set the output level of generator #1 to -96 dBm and increase its modulation level to 50%. ADJUST LEVEL TO POINT WHERE AUDIO OUTPUT LEVEL DOES NOT INCREASE IN AMPLITUDE. THIS IS AGC THRESHOLD POINT.
3. Connect the RF VTVM to J1 on the receiver.

5.11.2 Slope

1. Note the audio output amplitude as read from the distortion analyzer meter and note the IF output amplitude as read from the RF VTVM.
2. Set the output level of generator #1 to +1 dBm.
3. Calculate and record the change in audio output amplitude from that noted in step 5.11.2.1. This change shall be no greater than 6 dB.
4. Calculate and record the change in IF output amplitude from that noted in step 5.11.1. This change shall be no greater than 6 dB.

5.11.3 Time Constants

1. Set the output level of generator #1 to -66 dBm and set the step attenuator to 23 dB insertion loss.
2. Set the time base of the oscilloscope to 50 ms/div and adjust its trigger controls so that a single sweep begins when the step attenuator is switched between 23 dB and 3 dB insertion loss.
3. Note the audio output level as displayed on the oscilloscope and, while observing the display, switch the attenuator from 23 dB to 3 dB insertion loss. Determine and record the time required for the audio output level to reach its new amplitude after switching the attenuator. This time shall be no greater than 200 ms.
4. Readjust the oscilloscope trigger controls so that a single sweep begins when the step attenuator is switched between 3 dB and 23 dB insertion loss.
5. Note the audio output level as displayed on the oscilloscope and, while observing the display, switch the attenuator from 3 dB to 23 dB insertion loss. Determine and record the time required for the audio output level to reach its new amplitude after switching the attenuator. This time shall be no less than 200 ms.
6. Select the PULSE DETECT MODE on the receiver and move the oscilloscope input cable from J3 to J4.
7. Remove the 250 kHz IF amplifier printed circuit assembly from the receiver and install the 2 MHz assembly.

8. Select the 2 MHz BANDWIDTH.

9. Change the RF Input Configuration from A to F (Figure 8).

10. Select PULSE modulation on generator #1 and set the controls of the pulse generator to produce a 10μs pulse with a repetition rate of 1 kHz and an output level of 1 Vp-p.

11. Set the output level of generator #1 to -76 dBm and set the step attenuator to 3 dB insertion loss.

12. Note the amplitude of the video output pulse as displayed on the oscilloscope.

13. Set the output level of generator #1 to +1 dBm.

14. Calculate and record the change in video output amplitude from that noted in step 5.11.2.12. This change shall be no greater than 6 dB.

15. Set the output level of generator #1 to -66 dBm.

16. Set the controls of the pulse generator to produce a 2 μs pulse with a repetition rate of 100 Hz.

17. Note the amplitude of the video output pulse as displayed on the oscilloscope.

18. Increase the width of the pulse to 5 ms.

19. Calculate and record the change in the video output amplitude from that noted in step 5.11.2.17. This change shall be no greater than 6 dB.

20. Repeat steps 5.11.2.16 and 5.11.2.17.

21. Increase the pulse repetition rate to 250 kHz.

22. Calculate and record the change in the video output amplitude from that noted in step 5.11.2.20. This change shall be no greater than 6 dB.

5.12 Audio Outputs

5.12.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).

5.12.2 Line Audio

1. Operate the LINE ADJ control on the rear panel to the point just before clipping of the audio signal peaks is evident on the oscilloscope display.
2. Read and record the audio output amplitude as indicated on the meter of the distortion analyzer. This amplitude shall be no less than ~~7.75~~ 2.45 Vrms.
3. Set the output level of generator #1 to -55 dBm and set the LINE ADJ control for ~~7.75~~ 2.45 Vrms as indicated by the distortion analyzer voltmeter.
4. Measure and record the distortion present on the line audio output signal. This distortion shall be no greater than 5%.
5. Set the controls of generator #1 for variable internal AM modualtion. Adjust the generator for 30% modulation at a 1.0 kHz rate.
6. Set the LINE ADJ control for a reference on the dB scale of the distortion analyzer meter at or near the ~~7.75~~ 2.45 Vrms point.
7. Vary the modulation frequency of the generator over the range of 50 Hz to 15 kHz noting the greatest excursions from the reference.
8. Measure and record the greatest positive excursion from the reference. This excursion shall be no greater than 1.0 dB.
9. Measure and record the greatest negative excursion from the reference. This excursion shall be no greater than 1.0 dB.

5.12.3 Headphone Audio

1. Reset the controls of generator #1 as specified in the Standard Test Set-up of paragraph 5.2; except, set the output level to -75 dBm.
2. Connect the oscilloscope to view the headphone audio output.
3. Operate the AUDIO GAIN control to the point just before clipping of the audio signal peaks is evident on the oscilloscope display.
4. Read and record the audio output amplitude as indicated on AC VTVM #1. This amplitude shall be no less than 2.45 Vrms.
5. Operate the AUDIO GAIN control from its maximum CCW to maximum CW direction while observing the line audio output level as indicated on the distortion analyzer meter. Note that the line audio output level is not affected by the position of the AUDIO GAIN control. Indicate acceptable operation by a check mark on the data sheet.

5.13 FM Demodulator Performance

5.13.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Select the 100 kHz BANDWIDTH and the FM DETECT MODE.
3. Set the output level of generator #1 to -59 dBm. FM modulate the output signal with 45 kHz deviation at a 400 Hz rate.
4. Disconnect AC VTVM #2 from J2 and move the distortion analyzer input cable from J3 to J2.

5.13.2 Distortion

1. Measure and record the distortion present on the FM audio output signal. This distortion shall be no greater than ~~2~~ 5%.

5.13.3 Output Level

1. Move the spectrum analyzer input cable back to J3 and reconnect AC VTVM #2 to J2.
2. Decrease the output level of generator #1 to -89 dBm, change the deviation rate to 1 kHz and decrease the deviation to 30 kHz.
3. Ensure that the line audio output level is capable of being adjusted to a minimum of ~~7.75~~ 2.45 Vrms. Indicate acceptable performance by a check mark on the data sheet.

5.14 Cross Modulation

5.14.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Select the 20 kHz IF BANDWIDTH and the AGC OFF GAIN MODE.
3. Set the output level of generator #1 to ~~-78~~ -87 dBm, AM MODULATED 30% AT 1-kHz RATE
4. By observing the oscilloscope, determine that the receiver is not in an overload condition. If the receiver is overloaded, carefully adjust the RF/IF GAIN control in a CCW direction until the audio output waveform appears normal on the oscilloscope display.

5.14.2 Cross Modulation

1. ~~Using the LINE ADJ control, set a reference on the distortion analyzer meter.~~ MONITOR AUDIO OUT WITH SPECTRUM ANALYZER. SET A REF ON THE 1 kHz AUDIO OUTPUT LEVEL.
2. Set generator #1 for a CW output signal.
3. Set the output frequency of generator #2 to 255.6550 MHz at a level of ~~-18~~ -27 dBm. Modulate the output signal 30% at a 1 kHz rate.
4. Read and record the decrease in the ~~distortion~~ SPECTRUM analyzer meter reading. This decrease shall be no less than 20 dB.

IT SHALL BE ATLEAST 20 dB BELOW THE REF OUTPUT LEVEL MEASURED IN 5.14.2.1.

5.15 Intermodulation Intercept Points

5.15.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the spectrum analyzer to the NB IF OUTPUT (J1) in place of the RF VTVM. Use RF Input Configuration A (Figure 2).
2. Select the AGC OFF GAIN MODE.
3. Set generator #1 for a CW output.

5.15.2 Second Order In-band Intercept Point

1. Set the spectrum analyzer controls for a reasonable presentation of the IF signal. This presentation is the output reference.
2. Set the step attenuator to its maximum insertion loss.
3. Set the output frequency of generator #1 to ~~511.0100~~ 100.0000 MHz at a level of -5 dBm, CW.
4. Set the output frequency of generator #2 to ~~255.4550~~ 155.5550 MHz at a level of -5 dBm, CW.
5. Decrease the insertion loss of the step attenuator until the response on the spectrum analyzer is the same as that established in step 5.15.2.1.
6. Calculate the intercept point as follows:

$$IP = P_{IN} + \frac{(P_{IN} - P_{REF})}{2}$$

where IP = intercept point (in dBm)
P_{IN} = ~~-5~~ -8 -(insertion loss of step attenuator) dBm
P_{REF} = -91 dBm
Record the result. This result shall be no less than 0 dBm.

5.15.3 Third Order In-band Intercept Point

1. Set the step attenuator to its maximum insertion loss.
2. Set the output frequency of generator #1 to ~~255.5050~~ 256.8050 MHz at a level of -5 dBm, CW.
3. Set the output frequency of generator #2 to ~~255.4550~~ 258.0550 MHz at a level of -5 dBm, CW.
4. Decrease the insertion loss of the step attenuator until the response on the spectrum analyzer is the same as that established in step 5.15.2.1.
5. Calculate the intercept point as ~~in step 5.15.2.6.~~ FOLLOWS Record the result. This re sult shall be no less than -8 dBm.

$IP = P_{IN} + \left(\frac{P_{IN} - P_{REF}}{2}\right)$

$P_{IN} = -8$ dBm (INSERTION LOSS OF STEP ATTEN)

$P_{REF} = -91$ dBm

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5.16 Image Rejection

5.16.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Set the output frequency of generator #1 to 20.0000 MHz and tune the receiver to 20.0000 MHz.
3. Select the 100 kHz BANDWIDTH and the AGC OFF GAIN MODE.
4. Set generator #1 for a CW output at a level of -89 dBm.

5.16.2 Rejection, IMAGE FREQ 1

1. Set the signal monitor controls for a convenient reference on the display.
2. Substitute the UHF signal generator for generator #1. Set its output frequency to 1124.0000 MHz at a level of -89 dBm, CW. If required, use the counter to set the output frequency.
3. Increase the UHF signal generator output level until the reference noted in step 5.16.2.1 is again attained.
4. Calculate and record the required increase in generator output level. This increase shall be no less than 90 dB.

5.16.3 IMAGE FREQ 2

1. SET GEN TO 499 MHz. TUNE RCVR TO 499 MHz
2. SELECT 100 kHz IF BW WITH AGC OFF.
3. SET GEN FOR CW OUTPUT AT LEVEL OF -89 dBm.
4. SET SIG MONITOR FOR CONVENIENT REF ON DISPLAY.
5. SET GEN FREQ TO 509.2 MHz
6. INCREASE GEN OUTPUT LEVEL UNTIL THE REF NOTED IN STEP 5.16.3.4 IS AGAIN ATTAINED.
7. CALCULATE AND RECORD THE REQUIRED INCREASE IN GEN OUTPUT LEVEL. THIS SHALL BE NO LESS THAN 90 dB.

5.17 IF Rejection

5.17.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Select the 100 kHz BANDWIDTH and the AGC OFF GAIN MODE.
3. Set generator #1 for a CW output at a level of -89 dBm.

5.17.2 Rejection

1. Set the signal monitor controls for a convenient reference on the display.
2. Set the output frequency of generator #1 to 551.4450 MHz.
3. Increase the generator output level until the reference noted in step 5.17.2.1 is again attained.
4. Calculate and record the required increase in generator output level. This increase shall be no less than 90 dB.

5. REPEAT STEPS 2 THROUGH 4 WITH GEN FREQUENCY SET TO 21.4000 MHz

5.18 Desensitization

5.18.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2). USE SPECTRUM ANALYZER RATHER THAN RF VTVM
2. Select the 20 kHz BANDWIDTH and the AGC OFF GAIN MODE.
3. Set the output level of generator #1 to -94 dBm and remove the modulation from its output signal.
4. Set the output frequency of generator #2 to 255.6550 MHz. Do not modulate the output signal.
5. Note the IF output level as indicated by the ~~RF VTVM~~ SPECTRUM ANALYZER.

5.18.2 Desensitization

1. Increase the output level of generator #2 to -34 dBm.
2. Read and record the change in IF output level as indicated by the ~~RF VTVM~~ SPECTRUM ANAL. This change shall be no greater than ± 0 dB.

5.19 Recovery Time

5.19.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Select the AGC OFF GAIN MODE.
3. Set the step attenuator for 86 dB insertion loss.
4. Set the output level of generator #1 to +1 dBm.
5. Set the RF GAIN control for a reference at or near the 7.75 Vrms point on the distortion analyzer meter.
6. Set the time base of the oscilloscope to 0.5 ms/div and adjust its trigger control so that a single sweep begins when the step attenuator is switched between 3 and 86 dB insertion loss.

5.19.2 Time

1. Set the step attenuator to 3 dB insertion loss for a period not less than 100 ms.
2. Note the audio output level as displayed on the oscilloscope and, while observing the display, switch the attenuator from 3 dB to 73 dB insertion loss. Determine and record the time required for the audio output level to return to the reference amplitude set in step 5.19.1.5 after switching the attenuator. This time shall be no greater than 2 ms.

5.20 IF Outputs

5.20.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Select the AGC OFF GAIN MODE ~~and connect the counter input to the IF output J1.~~ ADJUST INPUT LEVEL OF GEN #1 TO -73 dBm.

5.20.2 WB IF Output Level and Bandwidth

1. Read and record the IF output level as indicated by the RF VTVM. This level shall be no less than -30 dBm, (J20).
2. Set the RF/IF GAIN control for an IF output level of -30 dBm as indicated by the RF VTVM.
3. Increase the tuned frequency of the receiver until the IF output level drops to -33 dBm. Record the output frequency as indicated by the counter.
4. Decrease the tuned frequency of the receiver, past 255.5550 MHz, until the IF output level again drops to -33 dBm. Record the output frequency as indicated by the counter.
5. Calculate and record the IF output bandwidth by subtracting the frequency recorded in step 5.20.2.4 from that recorded in step 5.20.2.3. This bandwidth shall be no less than 4.0 MHz.
6. Calculate and record the IF output center frequency by adding one-half of the IF output bandwidth (step 5.20.2.5) to the frequency recorded in step 5.20.2.4. This center frequency shall be 21.400 $\pm$ 0.200 MHz.

5.20.3 Switched IF Output Level

1. Set the ~~RF/IF GAIN control to its maximum CW position.~~ FOR AGC MODE
2. Connect the RF VTVM to J1 on the receiver.
3. Reset the output frequency of generator #1 to 255.5550 MHz. AT OUTPUT LEVEL EQUIVALENT TO AGC THRESHOLD
4. Read and record the IF output level as indicated by the RF VTVM. This level shall be no less than -13 dBm.

5.21 Internally Generated Spurious Response Level

5.21.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the spectrum analyzer to the IF OUTPUT (J1) in place of the RF VTVM. Use RF Input Configuration A (Figure 2).
2. Set the output level of generator #1 to -115 dBm. Do not modulate the output signal.
3. Select the 20 kHz BANDWIDTH and the AGC OFF GAIN MODE.
4. Set the controls of the spectrum analyzer so as to view a display of the IF output signal.
5. Note the level of the signal as displayed on the spectrum analyzer.
6. Disconnect RF Input Configuration A and connect RF Input Configuration E (Figure 6).
7. Tune the receiver to 20.0000 MHz.

5.21.2 Spurious Response Level

1. While observing the spectrum analyzer display, slowly tune the receiver up in frequency. As each spurious response is encountered, ensure that its amplitude is no greater than the reference level noted in step 5.21.1.5. Indicate acceptable operation by a check mark on the data sheet.

DO SEPERATELY NO AUTO TEST

5.22 Manual Tuning Operation

MANUAL TEST

5.22.1 Equipment Set-up

1. Use the Standard Test Set-up of paragrpah 5.2. Use RF Input Configuration A (Figure 2).

5.22.2 Frequency Tuning Speed

1. Using the sweep-second hand of a wrist watch, determine the time required to tune the receiver as quickly as possible from 255.5550 MHz up to 1099.9999 MHz. Employ the tuning switches as desired. The required time shall be no greater than 5 s. Indicate acceptable operation by a check mark on the data sheet.

2. Use the procedure outlined above to determine the time required for the following tuning steps:

From	TO
1099.9999 MHz	33.6731 MHz
33.6731 MHz	255.5550 MHz

In each case the required time shall be no greater than 5 s. In each case indicate acceptable operation by a check mark on the data sheet.

5.22.3 Tuning Disable Operation

1. Depress the TUNING SPEED-LOCK switch on the receiver.

2. Attempt to tune the receiver by means of the tuning control. Observe that the tuned frequency of the receiver will not change until one of the tuning speed switches is depressed. Indicate acceptable operation by a check mark on the data sheet.

3. Depress the TUNING SPEED-FAST switch and observe that the receiver tunes only in 1 MHz increments. Indicate acceptable operation by a check mark on the data sheet.

4. Depress the TUNING SPEED-MED switch and observe that the receiver tunes only in 10 kHz increments. Indicate acceptable operation by a check mark on the data sheet.

5. Depress the TUNING SPEED-SLOW switch and observe that the receiver tunes only in 100 Hz increments. Indicate acceptable operation by a check mark on the data sheet.

5.22.4 Frequency Storage

1. With the receiver tuned to 255.5550 MHz, remove power to the receiver by disconnecting it from the power source.

2. After a 1 hour period, reconnect the receiver to the power source. Observe that the receiver is still tuned to 255.5550 MHz. Indicate acceptable operation by a check mark on the data sheet.

5.23 Tuning Noise

5.23.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the oscilloscope to the IF OUTPUT (J1) in place of the RF VTVM. Use RF Input Configuration E (Figure 6).
2. Select the 20 kHz BANDWIDTH and tune the receiver to 30.0000 MHz.
3. Adjust the trigger controls on the oscilloscope so that a single sweep is initiated as the receiver tuned frequency is changed up and down between 30.0000 MHz and 29.9999 MHz.

5.23.2 Noise Level and Duration

1. Measure the peak-to-peak amplitude of the IF output noise as displayed on the oscilloscope.
2. Change the receiver tuned frequency up and down between 30.0000 MHz and 29.9999 MHz as often as required to determine the peak-to-peak amplitude of the noise bursts occuring at the beginning of each oscilloscope sweep.
3. The peak-to-peak amplitude of the noise bursts shall be no more than seven times the peak-to-peak amplitude of the IF output noise as measured in step 5.23.2.1. Inidcate acceptable performance by a check mark on the data sheet.
4. Repeat the procedure outlined above at the following sets of tuned frequencies. In each case indicate acceptable performance by a check mark on the data sheet.

46.9999 - 47.0000 MHz	381.9999 - 382.0000 MHz
74.9999 - 75.0000 MHz	499.9999 - 500.0000 MHz
119.9999 - 120.0000 MHz	599.9999 - 600.0000 MHz
186.9999 - 187.0000 MHz	699.9999 - 700.0000 MHz
291.9999 - 292.0000 MHz	899.9999 - 900.0000 MHz

1099.9999 - 20.0000 MHz

5..24 Synthesizer Settling Time

5.24.1 Equipment Set-up

1. Connect the equipment as shown in Figure 7.
2. Set the output frequency of the generator to 98.7654 MHz with an output level of -92 dBm. AM modulate the output 50% at a 1 kHz rate.
3. Set the controls on the test set as follows:

F_A	98.7654 MHz
F_B	98.7653 MHz
MODE	MAN
FREQUENCY	F_A

4. Set the receiver controls as specified in paragraph 5.2, except, select the 20 kHz BANDWIDTH and the AGC OFF GAIN MODE.
5. Set the storage oscilloscope to its internal trigger mode and, with the vertical amplifier DC coupled, set a reference level at midscale of the display.
6. Increase the generator output frequency to 98.7655 MHz and note the discriminator DC output level displayed on the storage oscilloscope.
7. Decrease the generator output frequency to 98.7653 MHz and note the discriminator DC output level displayed on the storage oscilloscope.
8. Reset the generator output frequency to 98.7654 MHz.
9. Set the storage oscilloscope to its external triggered mode and, while moving the FREQUENCY switch on the test set between F_A and F_B, adjust the trigger controls so that a single sweep begins each time the FREQUENCY switch is changed.
10. Reset the FREQUENCY switch to F_A.
11. Set the oscilloscope to its internal triggered mode and adjust the vertical sensitivity controls for a 4 div p-p presentation of the IF output signal on the oscilloscope display.
12. Set the oscilloscope to its external triggered mode and, while moving the FREQUENCY switch on the test set between F_A and F_B adjust the trigger controls so that a single sweep begins each time the FREQUENCY switch is changed.

5.24.2 Settling Time; Adjacent Steps

1. Set the MODE switch on the test set to STEP F_A - F_B.
2. Using the storage oscilloscope, measure and record the time required, as the receiver steps from F_B to F_A, for the discriminator output voltage to stabilize within the + and - 100 Hz boundaries noted in steps 5.24.1.6 and 5.24.1.7. This time shall be no greater than 5 ms.

3. Using the oscilloscope, measure and record the time required, as the receiver steps from F_B to F_A, for the IF output signal to stabilize within $\pm$ 3 dB of the level set in step 5.24.1.11. ($\pm$3 dB = 2.8 to 5.6 div p-p) This time shall be no greater than 5 ms.

5.24.3 Settling Time; Non-adjacent Steps

1. Set F_B on the test set to 200.8273 MHz.
2. Repeat step 5.24.2.2 and record the result. This result shall be no greater than 10 ms.
3. Repeat step 5.24.2.3 and record the result. This result shall be no greater than 10 ms.

5.25 Externally Generated Spurious Response Level

5.25.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the spectrum analyzer to the IF OUTPUT (J1) in place of the RF VTVM. Use RF Input Configuration A (Figure 2).
2. Set the output level of generator #1 to -95 dBm. Do not modulate the output signal.
3. Select the 20 kHz BANDWIDTH and the AGC OFF GAIN MODE.
4. Set the controls of the spectrum analyzer so as to view a display of the IF output signal.
5. Note the level of the signal as displayed on the spectrum analyzer.
6. Set the output frequency of generator #1 to 20.0000 MHz at a level of -35 dBm, CW.

5.25.2 Spurious Response Level

1. While observing the spectrum analyzer display, slowly increase the output frequency of generator #1 to 255.4550 MHz. As each spurious response is encountered, ensure that its amplitude is no greater than the reference level noted in step 5.25.1.5. Indicate acceptable operation by a check mark on the data sheet.

   NOTE: Apparent spurious responses may be observed at sub-multiples of the receiver tuned frequency due to harmonic outputs of the generator tuned frequency. If there is any doubt as to the origin of these responses, suitable filters may be inserted between the generator output and the receiver input.

2. Set the output frequency of generator #1 to 255.6550 MHz.
3. While observing the spectrum analyzer display, slowly increase the output frequency of generator #1 to 1099.9999 MHz. As each spurious response is encountered, ensure that its amplitude is no greater than the reference level noted in step 5.25.1.5. Indicate acceptable operation by a check mark on the data sheet.

5.26 Spurious Free Dynamic Range

5.26.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the spectrum analyzer to the IF OUTPUT (J1) in place of the RF VTVM. Use RF Input Configuration A (Figure 2).
2. Set the output level of generator #1 to -73 dBm. Do not modulate the output signal.
3. Remove the 250 kHz IF amplifier printed circuit assembly from the receiver and install the 4 MHz assembly.
4. Select the 4 MHz BANDWIDTH and the AGC OFF GAIN MODE.
5. Set the controls of the spectrum analyzer so as to view a display of the IF output signal.
6. Note the level of the signal as displayed on the spectrum analyzer.
7. Set the output frequency of generator #1 to 20.0000 MHz at a level of -13 dBm, CW.

5.26.2 Spurious Response Level

1. While observing the spectrum analyzer display, slowly increase the output frequency of generator #1 to 249.5550 MHz. As each spurious response is encountered, ensure that its amplitude is no greater than the reference level noted in step 5.26.1.6. Indicate acceptable operation by a check mark on the data sheet.

   NOTE: Apparent spurious responses may be observed at sub-multiples of the receiver tuned frequency due to harmonic outputs of the generator tuned frequency. If there is any doubt as to the origin of these responses, suitable filters may be inserted between the generator output and the receiver input.

2. Set the output frequency of generator #1 to 261.5550 MHz.
3. While observing the spectrum analyzer display, slowly increase the output frequency of generator #1 to 1099.9999 MHz. As each spurious response is encountered, ensure that its amplitude is no greater than the reference level noted in step 5.26.1.6. Indicate acceptable operation by a check mark on the data sheet.

5.27 RF Input Dynamic Range

5.27.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Set the output level of generator #1 to ~~-73 dBm~~ TO AGC THRESHOLD and increase its modulation level to 50%.
3. Connect the RF VTVM to J1 on the receiver.
4. Remove the 250 kHz IF amplifier printed circuit assembly from the receiver and install the 4 MHz assembly.
5. Select the 4 MHz BANDWIDTH.

5.27.2 Dynamic Range

1. Note the audio output amplitude as read from the distortion analyzer meter and note the IF output amplitude as read from the RF VTVM.
2. Set the output level of generator #1 to +1 dBm.
3. Calculate and record the change in audio output amplitude from that noted in step 5.27.2.1. This change shall be no greater than 6 dB.
4. Calculate and record the change in IF output amplitude from that noted in step 5.27.2.1. This change shall be no greater than 6 dB.

5.28 Local Oscillator Noise

5.28.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the spectrum analyzer to the IF output (J1) in place of the RF VTVM. Use RF Input Configuration A (Figure 2). SET RCVR TO AGC MODE.
2. Set the output level of generator #1 to ~~+1~~ -20 dBm. Do not modulate the output signal.
3. Select the 100 kHz BANDWIDTH.
4. Set the spectrum analyzer controls to display a full scale presentation of the IF output signal using the 10 dB log display. Use a scan width of 2 kHz/div and a bandwidth of 100 Hz. Set the scan time/div as required to maintain a calibrated display.

5.28.2 Noise

1. With the peak of the IF output signal set at the 0 dB reference on the display, measure and record the amplitude of the display at the point 10 kHz removed from the peak. This amplitude shall be no less than ~~85~~ 60 dB below the peak (~~-85~~ -60 dBc).

5.29 Scan Function Operation

5.29.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the spectrum analyzer to the IF output (J1) in place of the RF VTVM. Use RF Input Configuration A (Figure 2).
2. Set signal generator #1 to produce a CW output.
3. Select the AGC OFF GAIN MODE & AND 20 kHz IF BW.
4. Set the spectrum analyzer controls to display a full scale presentation of the IF output signal using the linear display.
5. On the receiver, set a scan START frequency at 245.5550 MHz and a scan STOP frequency at 265.5550 MHz.

5.29.2 Detected Carrier Degradation

1. Place the receiver in the SCAN mode.
2. Increase the output level of generator #1 to return the amplitude of the IF output signal display to full scale as set in step 5.29.1.4.
3. Record the required increase in the output level of generator #1. This increase shall be no greater than 1 dB.

5.29.3 Scan Output

1. Connect the oscilloscope and the counter to the SCAN OUT connector (J5).
2. Set the DWELL control maximum CW.
3. On the receiver, set a scan START frequency at 20.0000 MHz and a scan STOP frequency at 1099.9999 MHz.
4. Place the receiver in the SCAN mode.
5. Observe that the scan output is a 1 Vp-p sine wave which varies in frequency from 200 Hz to 11 kHz as the receiver scans from 20.0000 MHz to 1099.9999 MHz. Indicate acceptable operation by a check mark on the data sheet.

5.30 External Frequency Standard Operation

5.30.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2.
2. Connect the counter to J1 on the receiver.
3. Set the output frequency of generator #1 to 1.00000 MHz at a level of +13 dBm, CW.
4. Connect the output of generator #1 to A8J1 and to the 1 MHz REF connector (J8) on the receiver.
5. Set the REF SEL switch (S2) on the receiver to EXT.
6. Tune the receiver to 20.0000 MHz.

5.30.2 Operation

1. Read and record the IF output frequency of the receiver. This frequency shall be 21.400000 $\pm$ 0.000050 MHz.

5.31 Internal Memory Operation

5.31.1 Equipment Set-up

1. Store the following sets of conditions in memory channels 1 through 5:

Memory Channel	1	2	3	4	5
Tuned Frequency	33.3333	101.5000	978.6543	255.5550	255.5550
Detect Mode	AM	FM	PULSE	AM	AM
Bandwidth	20	100	20	250	250
Antenna Select	2	1	2	1	2

2. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).

5.31.2 Operation

1. Recall and execute memory channels 1 through 5. Ensure that the receiver returns to the conditions which were stored above. Ensure that an audio output (other than noise) is present when memory channel 4 is executed. Indicate acceptable operation by a check mark on the data sheet.
2. Clear memory channel 2 and store in it the set of conditions specified above for memory channel 4.
3. Set the DWELL control maximum CW.
4. Step through memory channels 1 through 5. Ensure that an audio output (other than noise) is present when memory channels 2 and 4 are activated. Indicate acceptable operation by a check mark on the data sheet.

5.32 Group Delay

5.32.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2, except, connect the equipment as shown in Figure 9.

2. Set the synthesizer to step up in frequency from 253.0550 MHz to 258.0550 MHz in 0.050 MHz steps. Set the output level of the synthesizer to -40 dBm.

3. Set the network analyzer for a 0.050 MHz output at a level such that the A channel and B channel input levels at the network analyzer are approximately equal and that the RF output of the synthesizer is AM modulated at approximately 50 %.

4. Calibrate the X channel of the recorder for a full scale deflection as the synthesizer steps from 253.0550 MHz to 258.0550 MHz.

5. Calibrate the Y channel of the recorder for a full scale deflection of 100 ns.

5.32.2 Differential Group Delay

1. Run a plot of group delay vs frequency.

2. Calculate and record the maximum variation in group delay between the frequency limits of 253.7550 MHz and 257.3550 MHz. This variation shall be no greater than 50 ns.

5.33 Digital Remote Control Operation

5.33.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2).
2. Connect the REMOTE CONTROL connector (J) on the receiver to the H-P 9825A controller via the H-P 98034A interface. Ensure that the H-P 98210A and 98213A ROMs are installed in the controller.
3. Set the receiver to its remote mode.

5.33.2 Operation

1. Using the controller, perform the following remote operations. After each operation check the receiver front panel and/or the controller printout for the proper result.

   a. Select the AM detection mode.
   b. Set the AGC to ON.
   c. Select the 250 kHz BANDWIDTH.
   d. Tune the receiver to 255.5550 MHz.
   e. Set the AFC to OFF.
   f. Set the RF/IF gain to maximum gain.
   g. Select memory channel 00.
   h. Set the COR level to 00.
   i. Select antenna input 1.
   j. Interrogate the receiver as to its condition.
   k. Tune the receiver to 400.0000 MHz.
   l. Interrogate the receiver as to its condition (signal strength and COR outputs should have changed).
   m. Select the FM detection mode.
   n. Select the PULSE detection mode.
   o. Set the AGC to OFF.
   p. Set the AFC to ON.
   q. Set the AFC to OFF.
   r. Select the AM detection mode.
   s. Tune the receiver to 255.5550 MHz.
   t. Decrease the RF/IF gain (signal strength should decrease)
   u. Set a scan start frequency at 200.0000 MHz and a scan stop frequency at 300.0000 MHz.
   v. Set the RF/IF gain to maximum gain.
   w. Set the dwell time for maximum.
   x. Put the receiver in SCAN mode (signal strength and COR outputs should change at 255.5550 MHz)
   y. Tune the receiver to 255.5550 MHz.
   z. Change the COR level until the indicator extinguishes.

aa. Select antenna input 2.
bb. Select the 20 kHz BANDWIDTH.
cc. Select the 100 kHz BANDWIDTH.
dd. Perform the Internal Memory Operation test of paragraph 5.31.

Indicate acceptable operation by a check mark on the data sheet.

5.34 Spectrum Monitor Operation

5.34.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2). Do not modulate the output signal.

5.34.2 Sweep Width

1. Set generator #1 output frequency so that the pip is aligned behind the extreme right mark on the spectrum monitor graticule. Record the generator output frequency.
2. Set generator #1 output frequency so that the pip is aligned behind the extreme left mark on the spectrum monitor graticule. Record the generator output frequency.
3. Calculate and record the sweepwidth by subtracting the frequencies recorded in steps 5.34.2.1 and 5.34.2.2. The result shall be 4.00 $\pm$ 0.20 MHz.
4. Repeat steps 5.34.2.1 through 5.34.2.3 with the SWEEP WIDTH control set maximum CCW. The sweep width shall be no greater than 20 kHz.

5.34.3 Sweep Linearity

1. Reset generator #1 output frequency to 255.5550 MHz.
2. Reset the SWEEP WIDTH control maximum CW.
3. Set the CENTER FREQUENCY control on the spectrum monitor so the input from generator #1 will fall at the center of the display.
4. Change generator #1 output frequency in ~~400~~ 600 kHz increments, observing the position of the pip. Verify the pip falls behind each vertical graticule mark $\pm$ 200 kHz.
5. Indicate acceptable operation by a check mark on the data sheet.

5.34.4 Center Frequency Control Range

1. Reset generator #1 output frequency to 255.5550 MHz.
2. Set the SWEEP WIDTH control to approximately midrange.
3. Set the CENTER FREQUENCY control maximum CW.
4. Using generator #1 verify that the marker moves to the right no less than 100 kHz from the center of the display.
5. Set the CENTER FREQUENCY control maximum CCW.
6. Verify that the marker moves to the left no less than 100 kHz from the center of the display.
7. Calculate and record the total change. It shall be no less than 200 kHz.

5.34.5 Marker Accuracy

1. Reset generator #1 output frequency to 255.5550 MHz.
2. Adjust the SWEEP WIDTH and CENTER FREQUENCY controls to display only the marker.
3. Using generator #1 insert a signal which zero beats with the marker.
4. Record generator #1 output frequency. It shall be 255.5550 MHz $\pm$ 3 kHz.
5. Verify that the marker amplitude is full scale. Indicate acceptable operation by a check mark on the data sheet.

5.34.6 Resolution

1. Set the SWEEP WIDTH control for approximately 50 kHz sweep width.
2. Adjust the CENTER FREQUENCY control to display the marker just to the left of the center of the display.
3. Set generator #1 output frequency to the marker frequency (as recorded in step 3.34.5.4) plus 25 kHz at the same amplitude as the marker.
4. Verify that the displayed peak to valley ratio is no less than 6 dB. Indicate acceptable operation by a check mark on the data sheet.

5.34.7 Frequency Response

1. Reset the output level of generator #1 to -85 dBm.
2. Reset the SWEEP WIDTH control maximum CW.
3. Vary the signal generator from 254.0550 MHz to 257.0550 MHz and determine the points of minimum and maximum amplitude of the display.
4. Measure and record the difference between the minimum and maximum amplitude points. This difference shall be no greater than 3 dB.
5. Set the LIN-LOG switch to LOG.
6. Set generator #1 output frequency to 254.0550 MHz and adjust its output level so that the pip is at the top line of the graticule.
7. Decrease the generator output level so that the pip is at the next lowest division of the graticule. The decrease in output level shall be 10 $\pm$ 4 dB.
8. Repeat step 3.34.7.7 for each division of the graticule. The second division shall be 20 $\pm$ 4 dB. The third division shall be 30 $\pm$ 4 dB. The fourth division shall be 40 $\pm$ 4 dB.
9. Repeat steps 3.34.7.6 through 3.34.7.8 at 255.5550 MHz and 257.0550 MHz.
10. Indicate that LOG operation is acceptable by a check mark on the data sheet.

5.34.8 Gain Control Range

1. Set the LIN-LOG switch to LIN.
2. Reset generator #1 output frequency to 550.5550 MHz and output level to -85 dBm.
3. Set the MARKER switch to OFF.
4. Set a reference at mid-scale of the display with generator #1 output attenuator.
5. Set the GAIN control to its maximum CCW position.
6. Increase generator #1 output level to obtain the original reference.
7. Calculate and record the required change in generator #1 output level. This change shall be no less than 60 dB.

5.34.9 SM Display Controls

1. Set the MARKER switch to ON.
2. Verify that the following controls are operational:

   FOCUS - can obtain sharply defined pip (minimal blurring at maximum intensity is acceptable)
   INTENSITY - CW rotation provides maximum intensity.

3. Indicate acceptable operation by a check mark on the test data sheet.

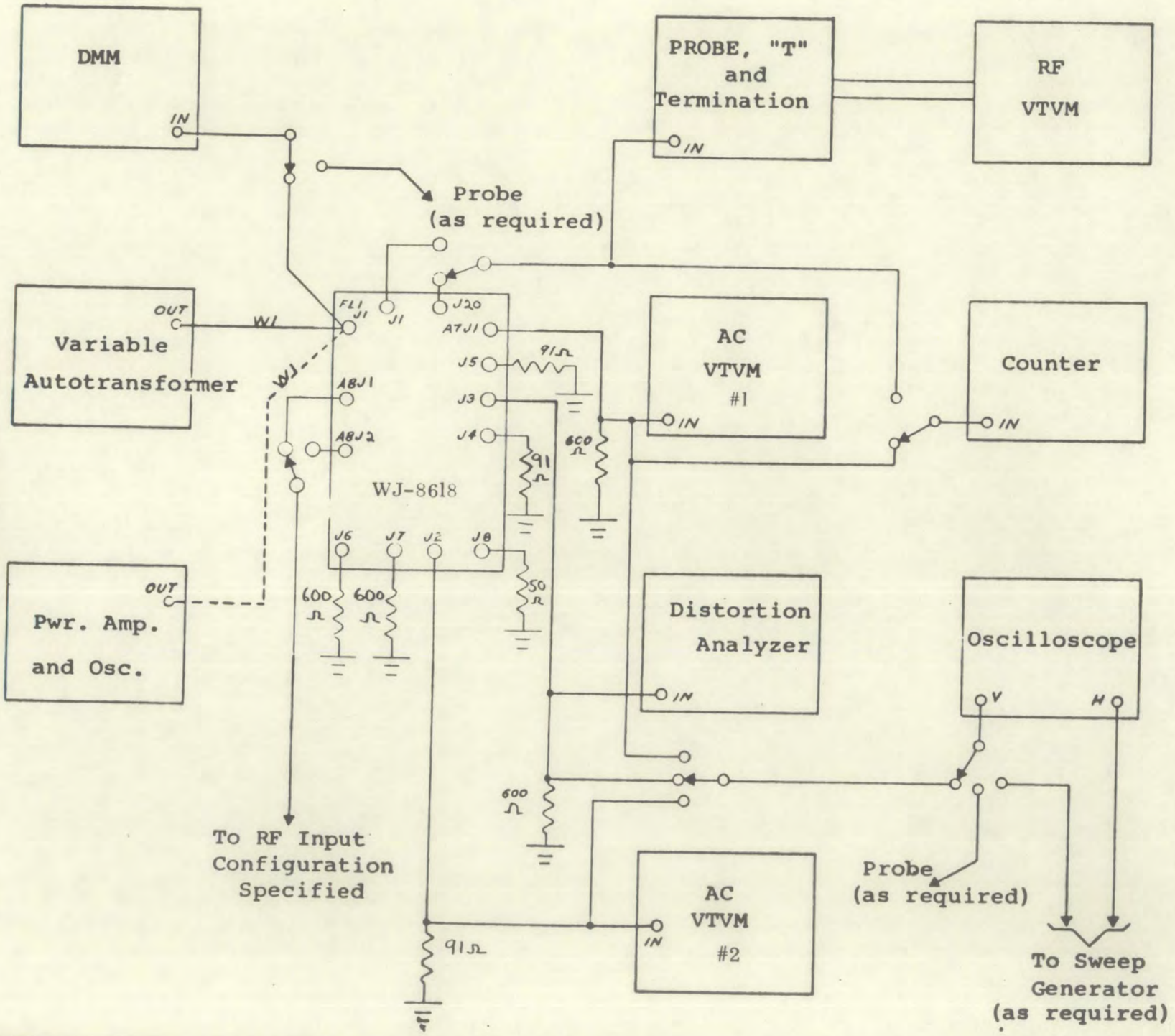
5.35 COR Operation

5.35.1 Equipment Set-up

1. Use the Standard Test Set-up of paragraph 5.2. Use RF Input Configuration A (Figure 2). Do not modulate the output of generator #1.

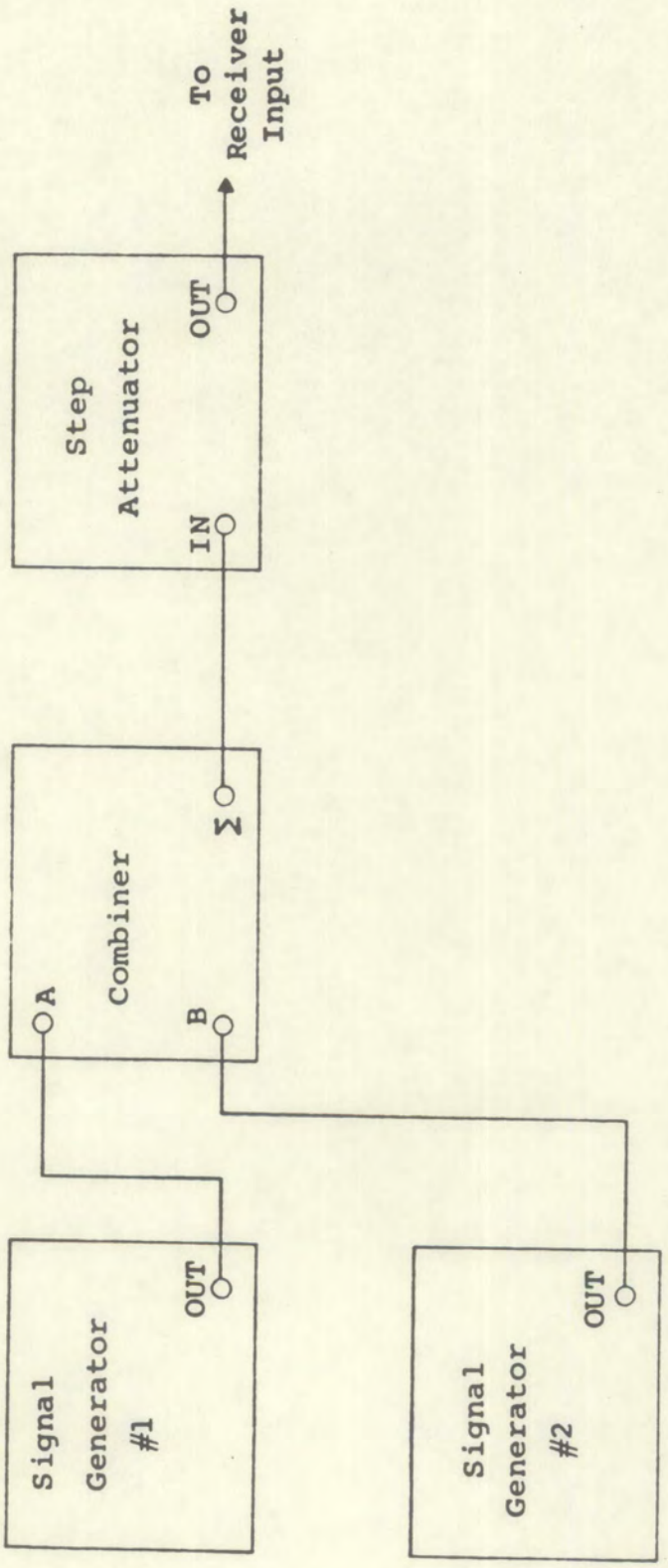
5.35.2 Operation

1. Disconnect generator #1 from the RF input of the receiver.
2. Set the COR LEVEL to its most sensitive position and observe that the COR is ON and that the output voltage at J21 is approximately 0 Vdc. Indicate acceptable operation by a check mark onthe data sheet.
3. Adjust the COR LEVEL until the COR just switches to OFF. Observe that the output voltage at J21is approximately 24 Vdc. Indicate acceptable operation by a check mark on the data sheet.
4. Connect generator #1 to the RF input of the receiver.
5. Set the COR LEVEL to its least sensitive position and observe that the COR is OFF.
6. Increase the output level of generator #1 until the COR just switches to ON. Note the output level of generator #1. This level shall be no less than -61 dBm. Indicate acceptable operation by a check mark on the data sheet.



Standard Test Set-up
Figure 1

SIZE	CODE IDENT NO.	DRAWING NO.
A	14632	STP-15003

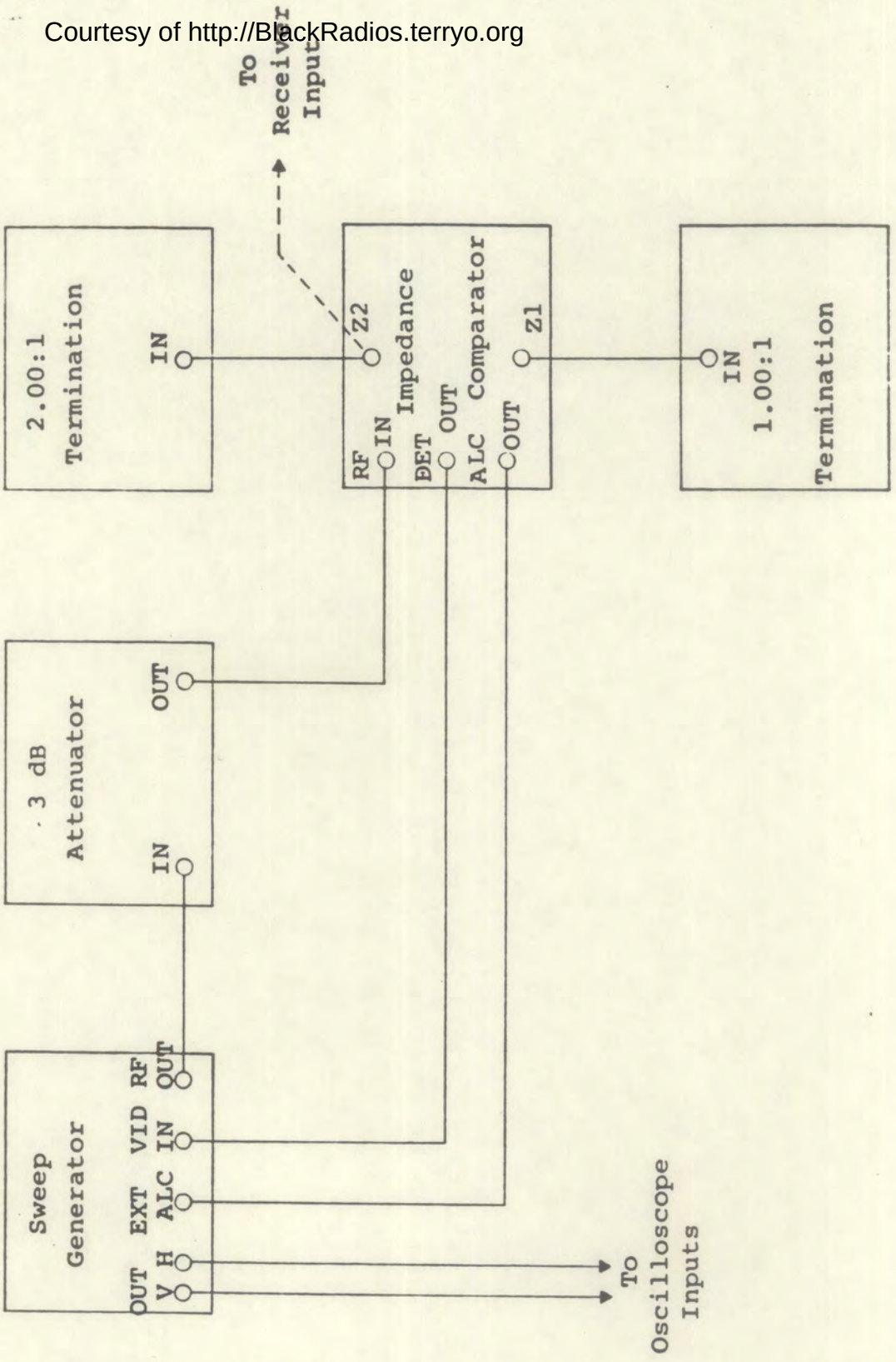


RF Input Configuration A

Figure 2

SIZE	CODE IDENT NO.	DRAWING NO.
A	14632	STP-15003

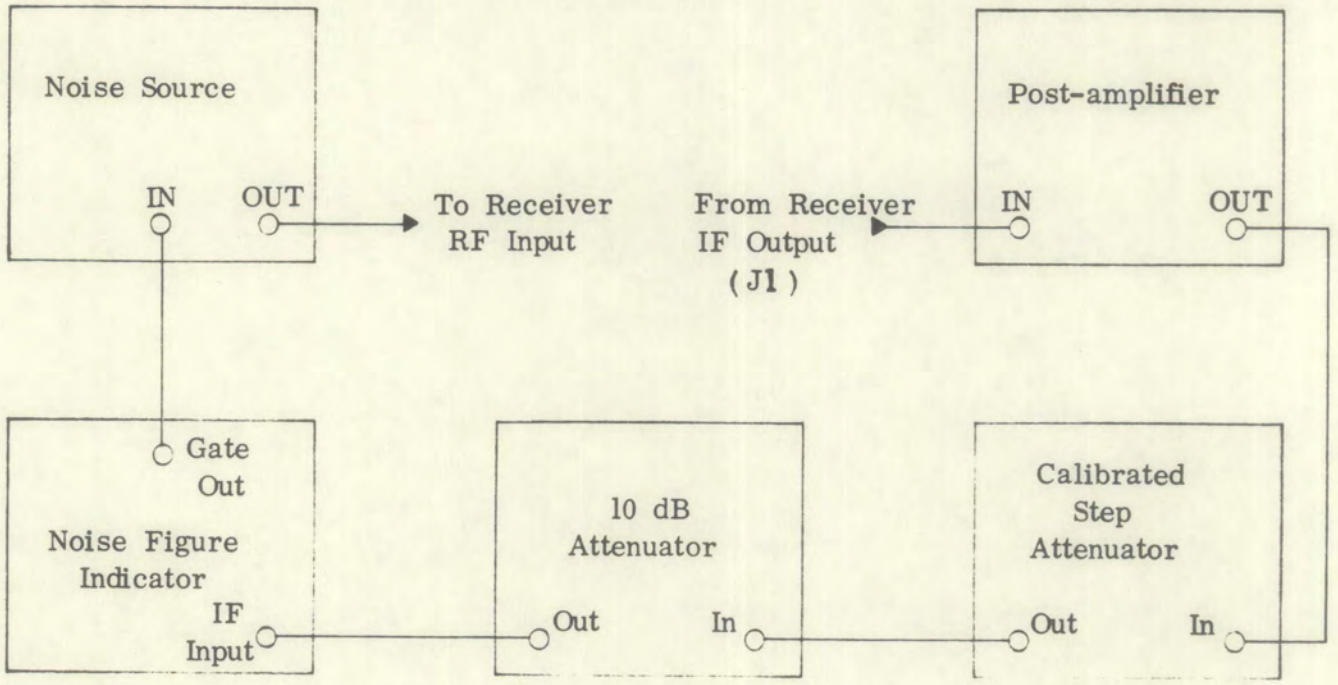
SHEET 55 OF 60



RF Input Configuration B

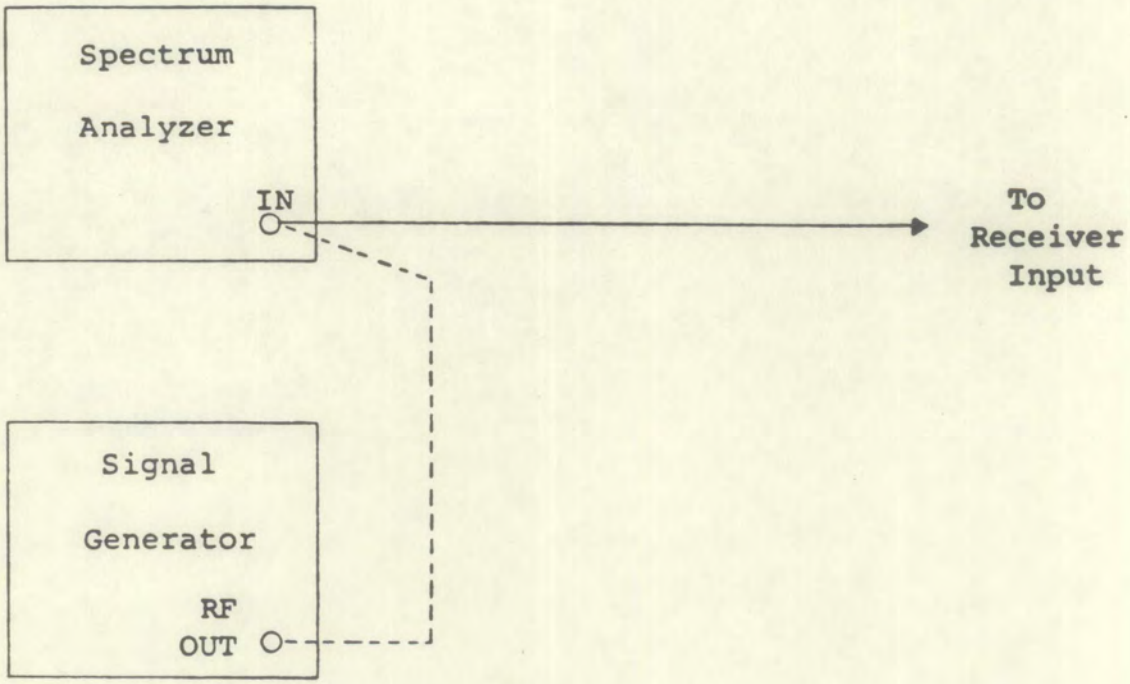
Figure 3

SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 56 OF 60



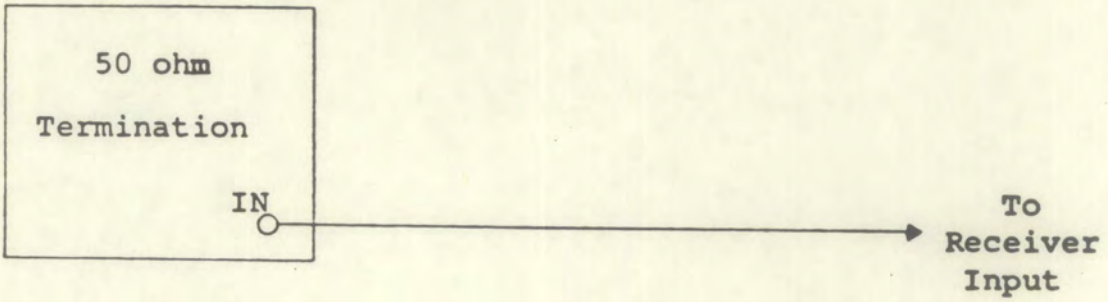
RF Input Configuration C
Figure 4

SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 57 OF 60



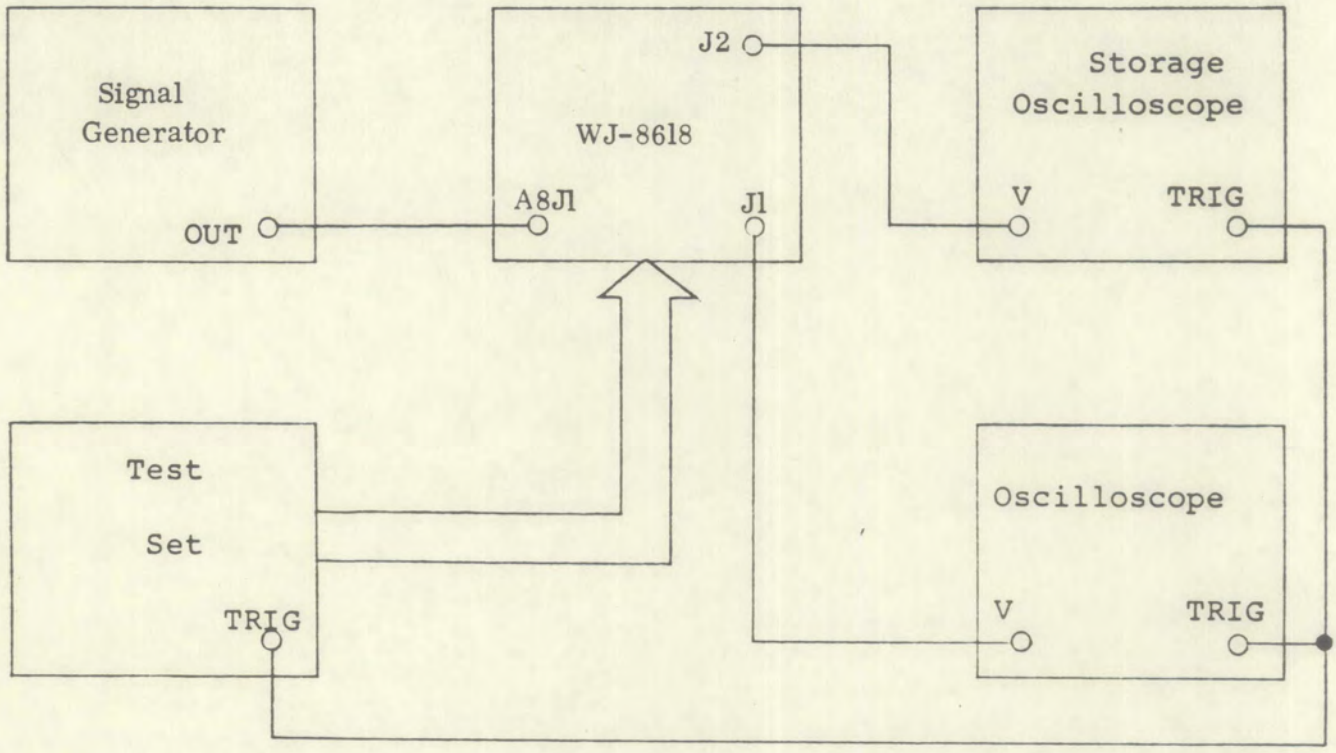
RF Input Configuration D

Figure 5



RF Input Configuration E

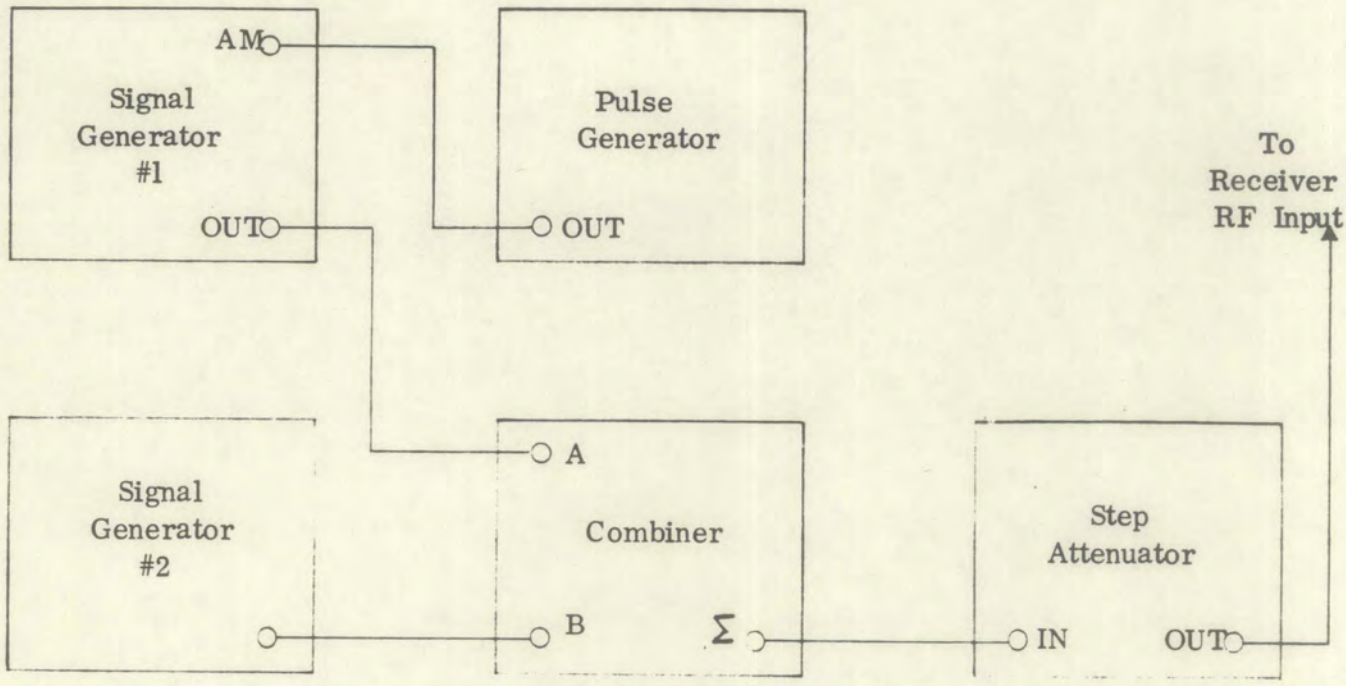
Figure 6



Synthesizer Settling Time
Test Set-up

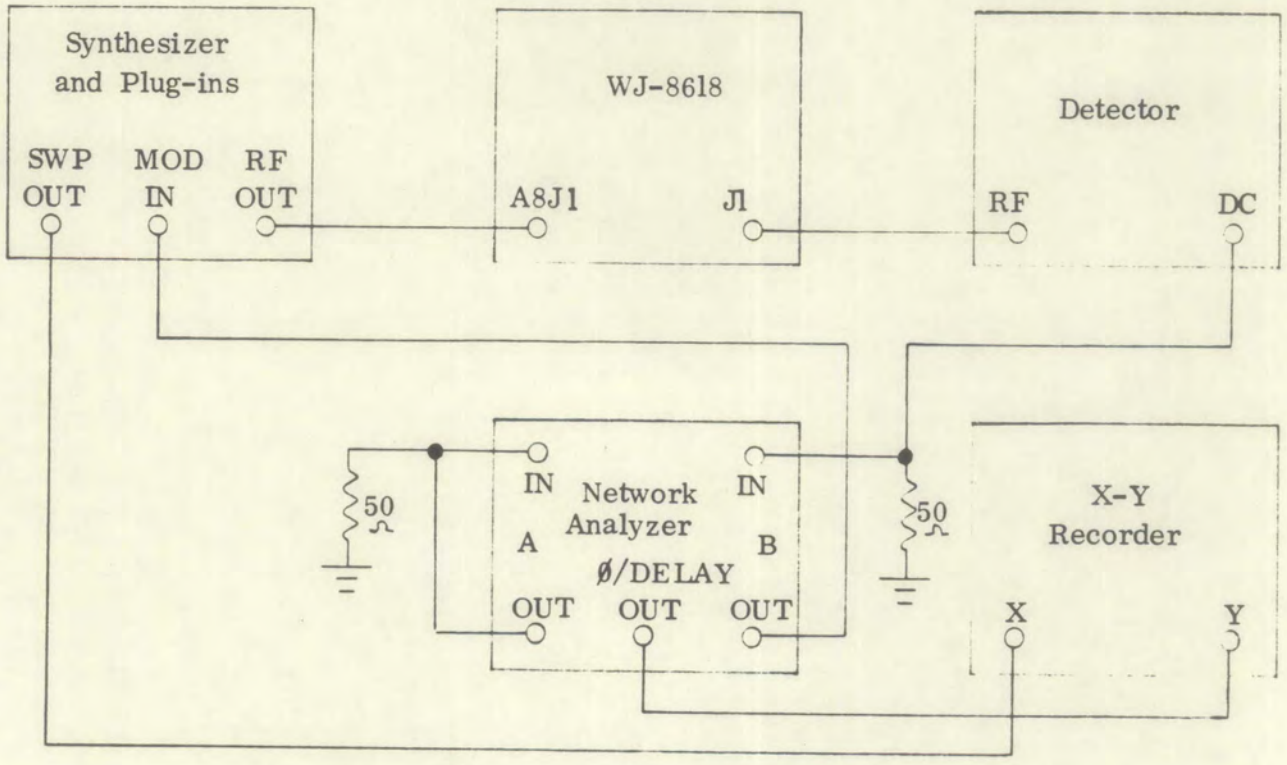
Figure 7

SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 59 OF 60



RF Input Configuration F

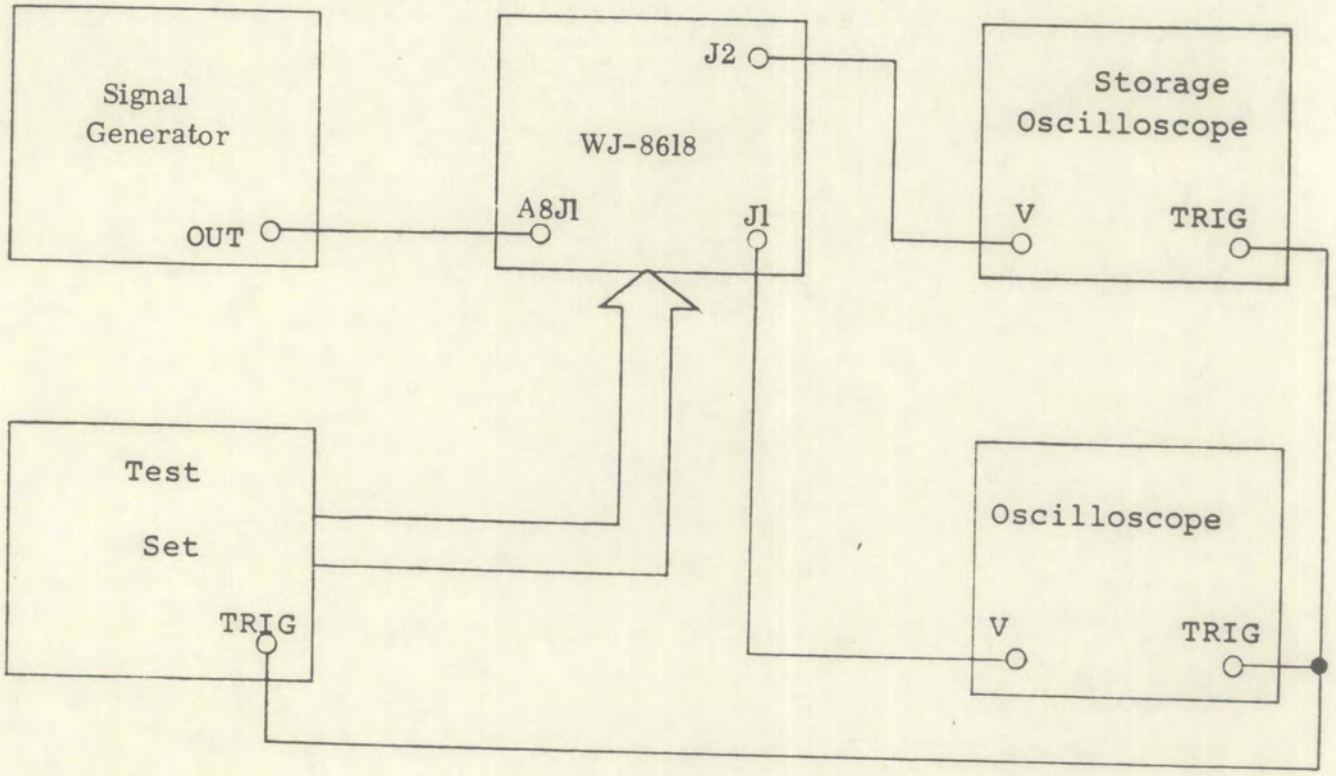
Figure 8



Group Delay Test Set-up

Figure 9

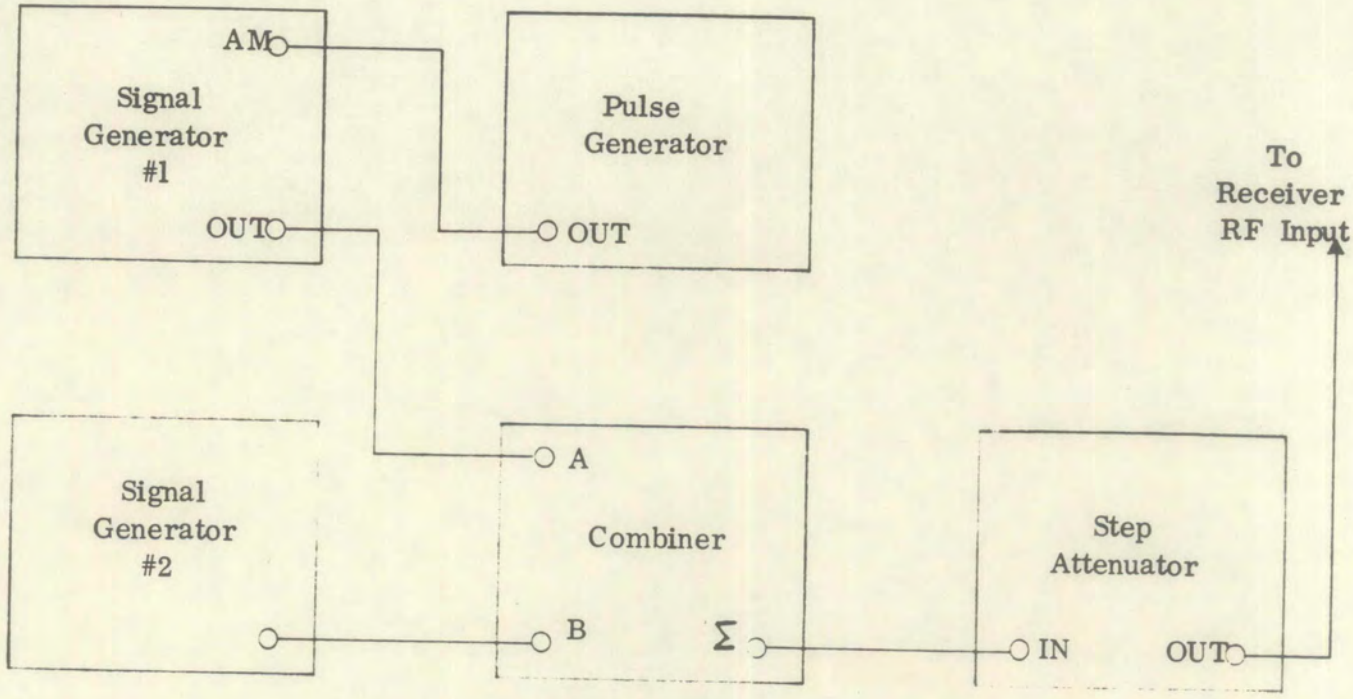
SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 60 OF 60



Synthesizer Settling Time
Test Set-up

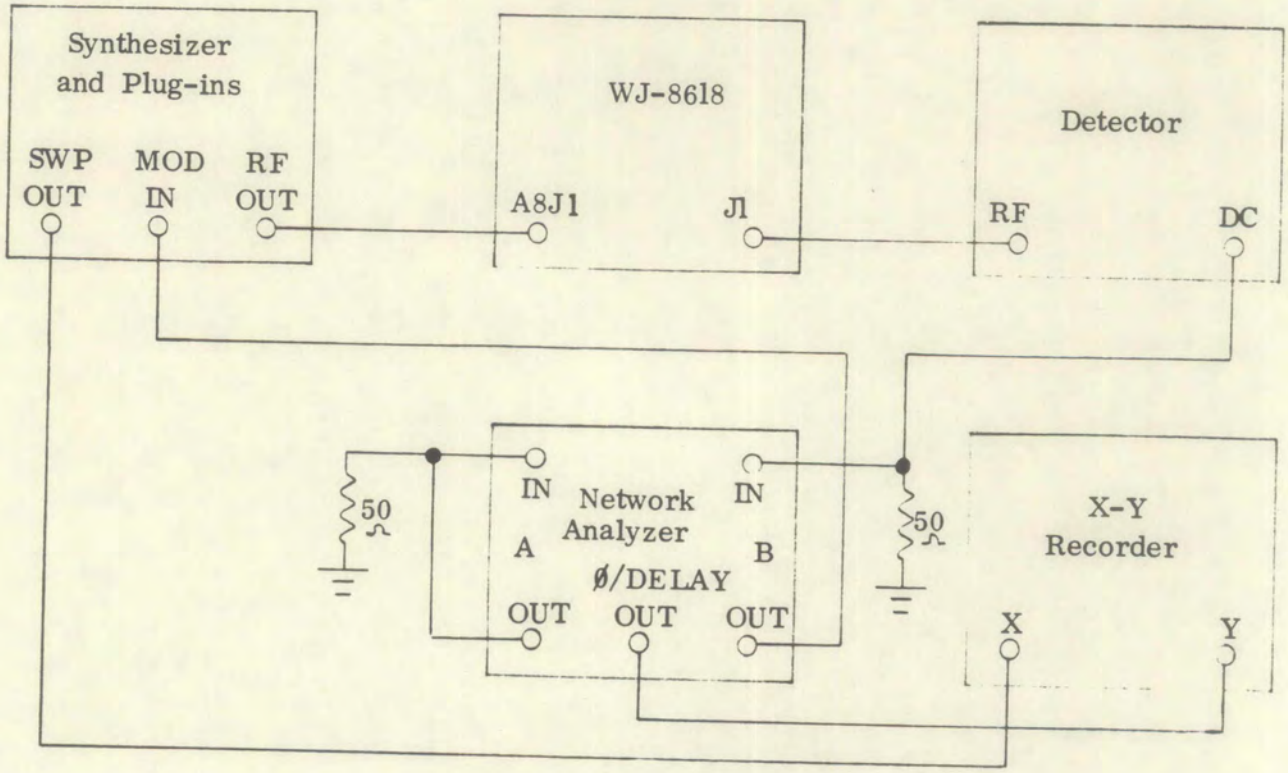
Figure 7

SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 59 OF 60



RF Input Configuration F

Figure 8



Group Delay Test Set-up

Figure 9

SIZE	CODE IDENT NO.	DRAWING NO. STP-15003
A	14632	SHEET 60 OF 60

5.36 AM SENSITIVITY

1. Use the standard test set ups of paragraph 5.2 except select the AGC off mode and select ~~the desired IF~~ IF #1.
2. Set the ~~signal~~ output level of signal generator #1 to the level in table 1 for the IF BW being tested.
3. Modulate the signal generator 50% AM at a 1KHz rate.
~~4. Adjust the Volts~~
4. Adjust the audio gain of the reciver for 2.45 VRMS as indicated on the ACVTVM with the rear panel line adjust control.
5. Remove the modulation from ~~the~~ signal generator #1.
6. Record the decrease in the reading on the ACVTVM. This is the AM (S+N)/N and shall be no less than 10db.
7. Repeat steps 2 through 6 for the remaining three IF BW's.

5.37. FM SENSITIVITY

1. Use the standard test set up of paragraph 5.2 except select the FM mode and select IF BW #1.
2. Set the level of signal generator #1 to the level specified in table 2 for the IF BW being tested
3. Modulate the signal generator at a 1KHZ rate with a deviation as specified in table 2 for the IF BW being tested.

5.37.2

4. Adjust the audio gain of the receiver for 2.45 VRMS as indicated on the AC VTVM with the rear panel line adjust control.
5. Remove the modulation from ~~the~~ signal generator #1.
6. Record the decrease in the reading on the AC VTVM. This is the FM (S+N)/N and shall be no less than 17db.
7. Repeat steps 2 through 6 for the remaining three IF BWs.