AD-A166 497 UE BENCH TEST PLANS AND REQUIREMENTS VOLUME 1 MAGNAVOX 1/1
UE SET(U) ESSCUBE ENGINEERING INC MARLTON NJ SEP 84
CEA/GPS-85-156-00-030-VOL-1 N62269-82-D-0059

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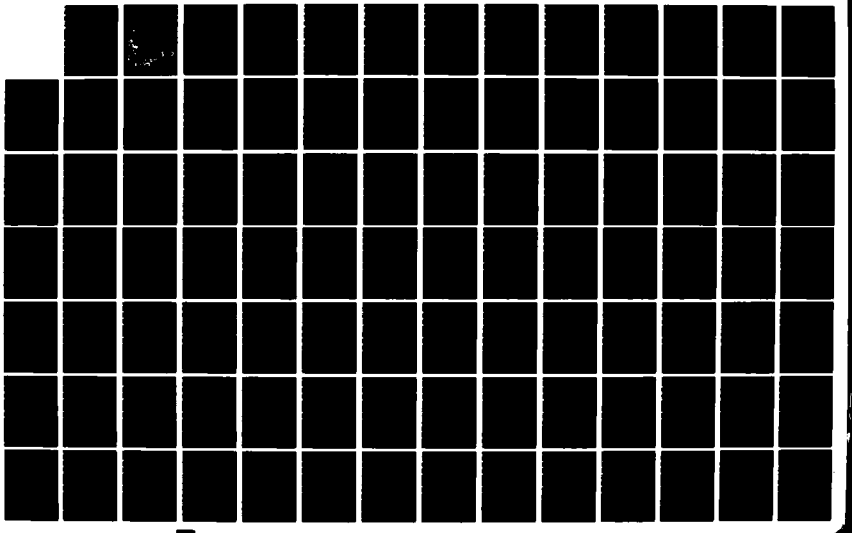

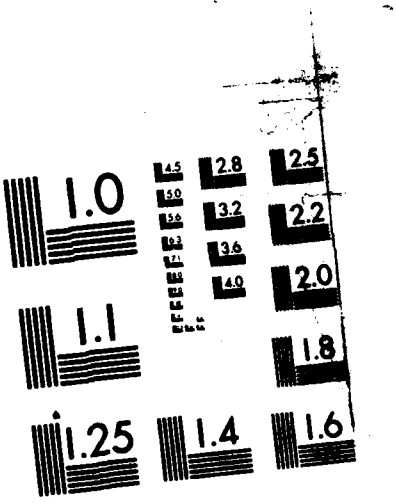

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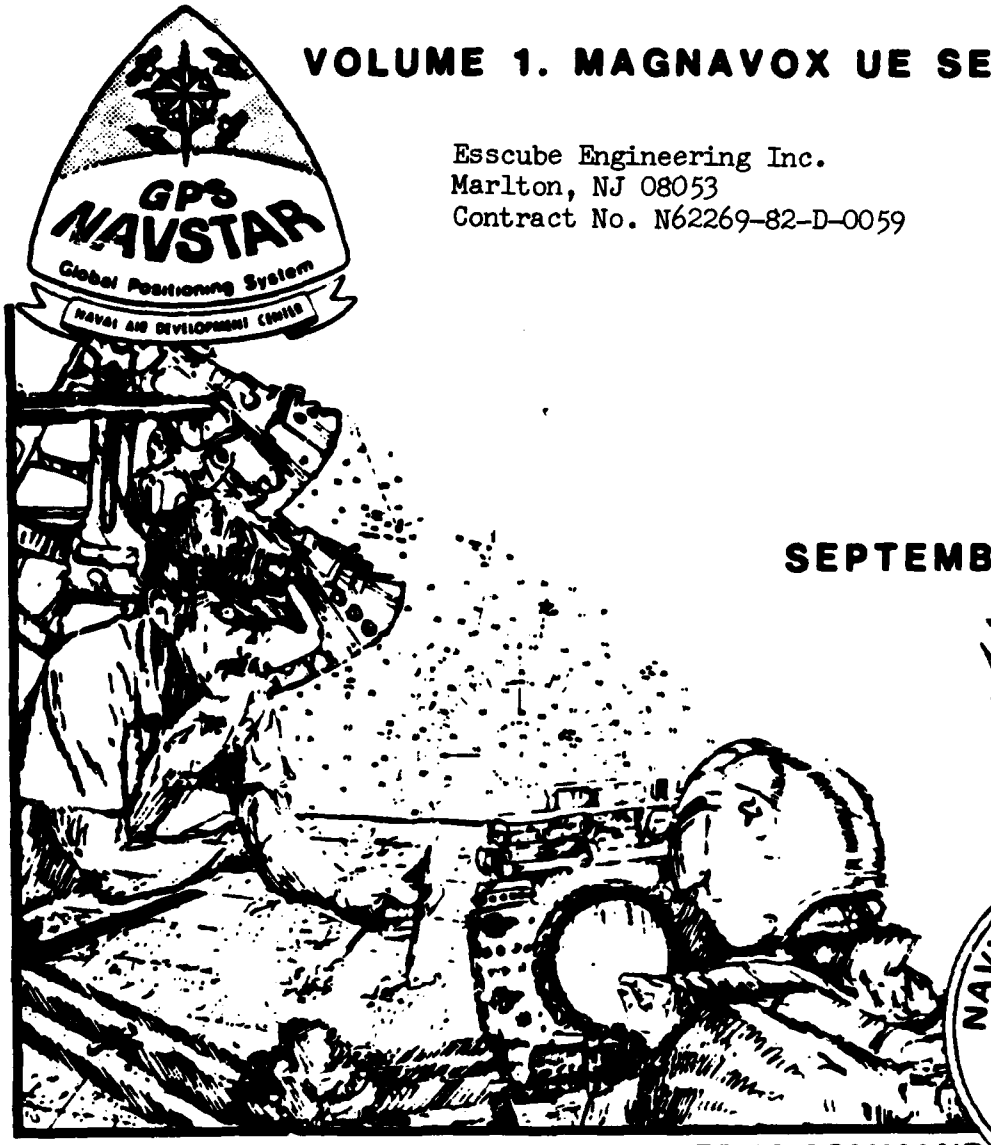
GPS-85-156-00-030

RF LABORATORY

UE BENCH TEST PLANS AND REQUIREMENTS

VOLUME 1. MAGNAVOX UE SET

Esscube Engineering Inc.
Marlton, NJ 08053
Contract No. N62269-82-D-0059



SEPTEMBER 1984

NAVY SPACE PROGRAM
PDE-106

PREPARED FOR NAVAL ELECTRONIC SYSTEMS COMMAND

UE BENCH TEST PLANS
AND REQUIREMENTS

VOLUME 1. MAGNAVOX UE SET

SEPTEMBER 1984

CEA-RFL-84-005

Prepared for:

Naval Air Development Center

Warminster, PA 18974

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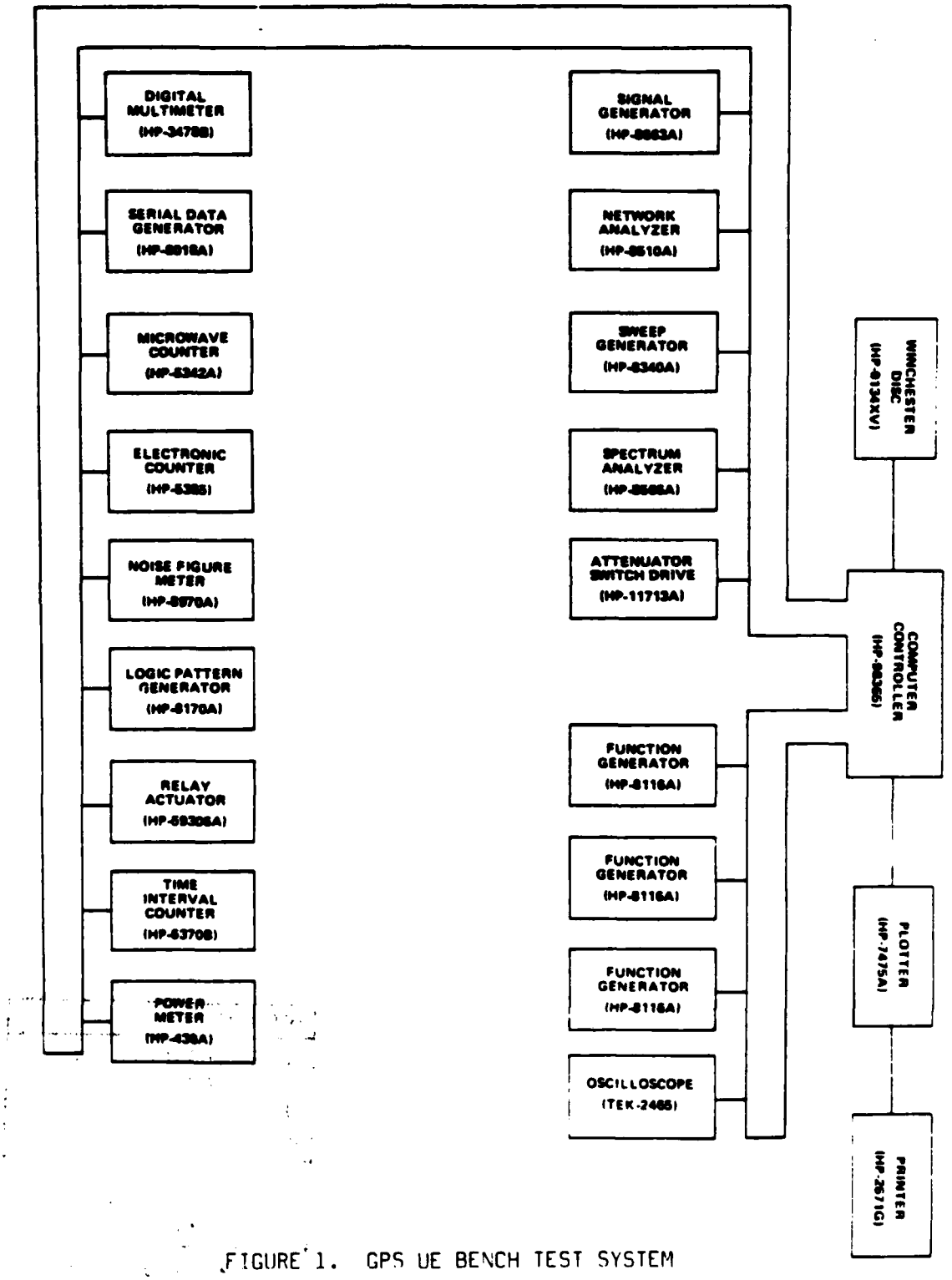


FIGURE 1. GPS UE BENCH TEST SYSTEM

BACKGROUND

When the GPS becomes operational, the RF Laboratory of the NAVAIRDEVCEN GPS Central Engineering Activity will be required to provide a capability to resolve problems which relate to the performance of the RF elements of the UE.

In order to meet these requirements, the RF Laboratory is planning to provide for:

- computer analysis of the problem using a UE RF Emulator
- RF bench test of the UE down to the component level using modern automatic testing techniques
- system level testing of the UE and antenna system using a Satellite Signal Generator and mockups of actual antenna installations

The bench tests will involve many detailed measurements to determine the effect of UE components upon the performance of the UE as a receiver and processor of the GPS signal. Special purpose software and special purpose hardware will be required to perform tests, stimulate the various function generators, pattern generators, signal generators, sweep generators, jammers and noise sources, control the meters, analyzers, counters, oscilloscopes and data recording devices and to perform some real-time data reduction for quick-look analyses.

In order to define this special software and hardware, it was necessary to devise individual tests on UE RF components using available information on both the Magnavox and the Collins Phase II UE design.

The GPS UE Bench Test System is shown in Figure 1. It uses an IEEE-488 bus to control the required stimulus, measurement and recording equipment. The computer controller will have access to all test procedures and will be able to string a group of test procedures together for different tests using the same test setup. Test data will be reduced for quick look analysis and for comparison with standard or baseline data. The system will also produce discs for offline analysis and longterm data retention. Detailed specifications for each element of the UE Bench Test System can be found in Reference 4, Volume 1.

The UE Bench Test Procedures are organized into three volumes. Volume one contains the Magnavox Bench Test Procedures and software requirements, volume two contains the Rockwell-Collins Bench Test Procedures and software requirements and volume three contains the General Receiver Tests, Antenna Test Procedures for both contractors and a section on special purpose hardware requirements.

It is intended that this document will be expanded and refined as more detailed performance information becomes available on UE RF components.

GPS UE BENCH TEST PLANS AND REQUIREMENTS

VOLUME 1

1.0 PURPOSE

The purpose of this report is to provide a basis for defining the hardware and software required to perform RF related bench tests of the Magnavox UE in the RF Laboratory of the GPS Central Engineering Activity at NAVAIRDEVCEN.

1.1 SCOPE

This report contains general test requirements for each test defining the:

level of test (UE, board, component)
test objective (parameter/function)
test inputs
test outputs
equipment required for each input/output
initial test procedure
data reduction requirements
summary list of test equipment (standard/special)
block diagram of test)

Since most of these tests will be computer controlled, special software will be required to control the conditions, parameters and data collection needs of the test.

A section on special software requirements is provided which defines the software needs of each test in terms of flowcharts.

2.0 LIST OF REFERENCE DOCUMENTS

The following documents were used as references for UE RF configuration and performance requirements:

1.	ICD-GPS-204	GPS Instrumentation and Connector Stds.	5 June 1981
2.	SS-US-200	System Segment Specification	4 Nov. 1982
3.	Magnavox	Critical Design Review	3 Sept. 1982
4.	ESSCUBE N62269-82-D-0059	Specification for a GPS UE Bench Test System	1 May 1984

3.0 TEST REQUIREMENTS

The test requirements contained herein deal with the Magnavox UE set and are written at the board level. Specific values of parameters, ranges, tolerances and granularities are provided if known. As more detailed information on the sets become available, missing values will be provided and the test requirements will be refined and expanded down to the component level.

3.1 MAGNAVOX UE TEST REQUIREMENTS

This section contains the test requirements, procedures and block diagrams for board level testing of the Magnavox UE set. Initial functional test procedures have been compiled for the following boards or units:

1. RF Synthesizer
2. Converter/Channel Switcher
3. IF/BB/Coder
4. Pre Amplifier Unit Module
5. Reference Oscillator

Although information is available for these boards, there is not enough to completely identify board input and output levels for stimulation and measurement purposes. For example, some of the boards require digital input signals as stimuli. There is not enough informaiton available to determine the required input levels for these signals or the levels for output signals. These digital signals also present a problem in that special purpose hardware may be required to interface the test equipment to the board being tested. This problem will be discussed further in Volume 3, Section 5.0 (Special Purpose Hardware Requirements).

No information has been located concerning Magnavox's Antenna Electronics or Power Suppply. Test requirements for these units will be provided as information becomes available.

3.1.1 Magnavox Test Procedures

The following sheets contain the initial test requirements and procedures as listed in section 1.1 for each of the boards identified in section 3.1. These sheets will be refined and expanded as more information becomes available. Also as more detailed data on the boards becomes available sheets will be added for testing to the component level.

3.1.1.1 RF SYNTHESIZER MODULE

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Verify GAIN AF1 operational

Inputs

	Input Name	Input Level	Equipment Used
1.	Carrier Select A	TBD	Logic Pattern Gen. (HP-8170A)
2.	BITE SW	TBD	Logic Pattern Gen. (HP-8170A)
3.	Noise On/Off	TBD	Logic Pattern Gen. (HP-8170A)
4.	2F	10.23MHz @ TBD	Sweep Gen. (HP-8340A)
5.	L1/L2	-120dBm @ L1/L2	Signal Gen. (HP-8663A)
6.	AGC S/F1	TBD	Function Gen. (HP-8116A)
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

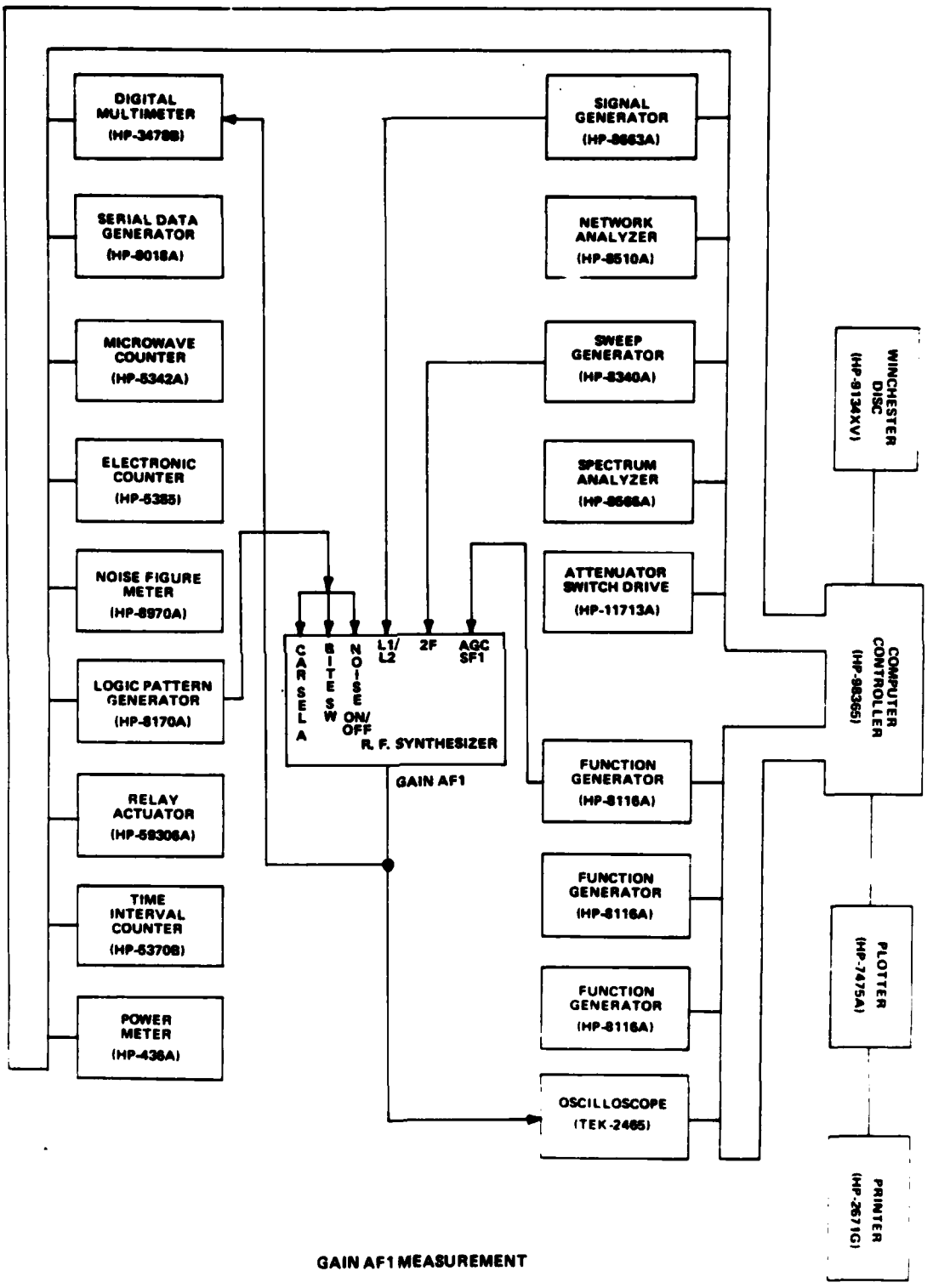
	Output Name	Output Level	Equipment Used
1.	GAIN AF 1	TBD	Digital Multi (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of RF Synthesizer. Measure GAIN AF1 with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Function Gen. (HP-8116A)	7.	Computer (HP-9836S)
2.	Sweep Gen. (HP-8340A)	5.	Digital Multi. (HP-3478B)	8.	Oscilloscope (TEK-2465)
3.	Sig. Gen. (HP-8663A)	6.	Printer (HP-2671G)	9.	Plotter (HP-7475A)



GAIN AF1 MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Verify RF GAIN AF1 operational

Inputs

	Input Name	Input Level	Equipment Used
1.	RF GAIN AF1	TBD	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

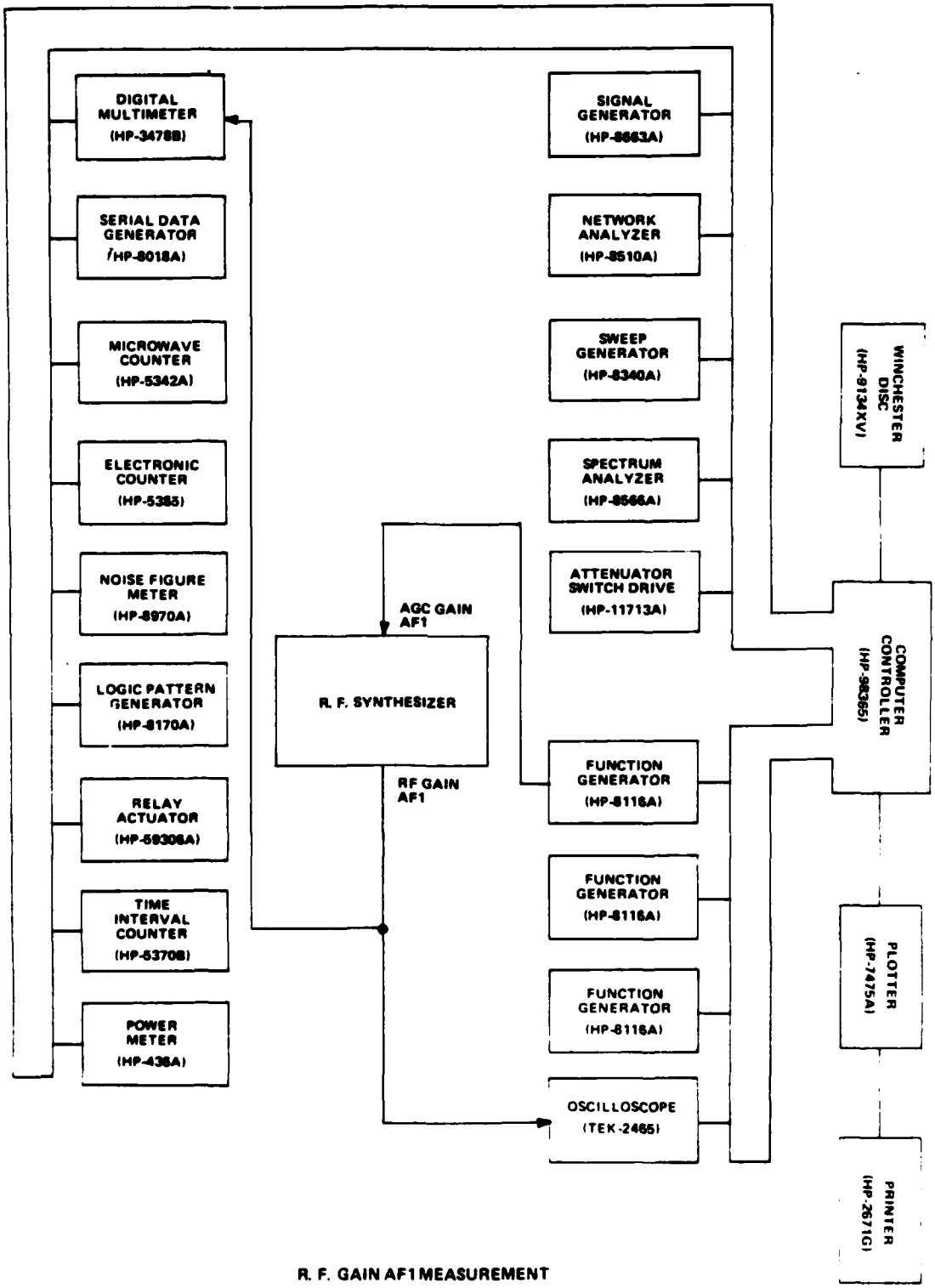
	Output Name	Output Level	Equipment Used
1.	RF GAIN AF1	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply AGC GAIN AF1 to RF Synthesizer board. Measure RF GAIN AF1 with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input level and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Function Gen. (HP-8116A)	4.	Computer (HP-9836S)	7.	
2.	Digital Multi. (HP-3478B)	5.	Oscilloscope (TEK-2465)	8.	
3.	Printer (HP-2671G)	6.	Plotter (HP-7475A)	9.	



R. F. GAIN AF1 MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure 36F(IF) output frequency and spectral content.

Inputs

	Input Name	Input Level	Equipment Used
1.	Carrier Select A	TBD	Logic Patt. Gen. (HP-8170A)
2.	BITE SW	TBD	Logic Patt. Gen. (HP-8170A)
3.	NOISE On/Off	TBD	Logic Patt. Gen. (HP-8170A)
4.	L1/L2	-120dBm @ L1/L2	Sig. Gen. (HP-8663A)
5.	2F	10.23MHz @ TBD	Sweep Gen. (HP-8340A)
6.	AGC SF1	TBD	Function Gen. (HP-8116A)
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

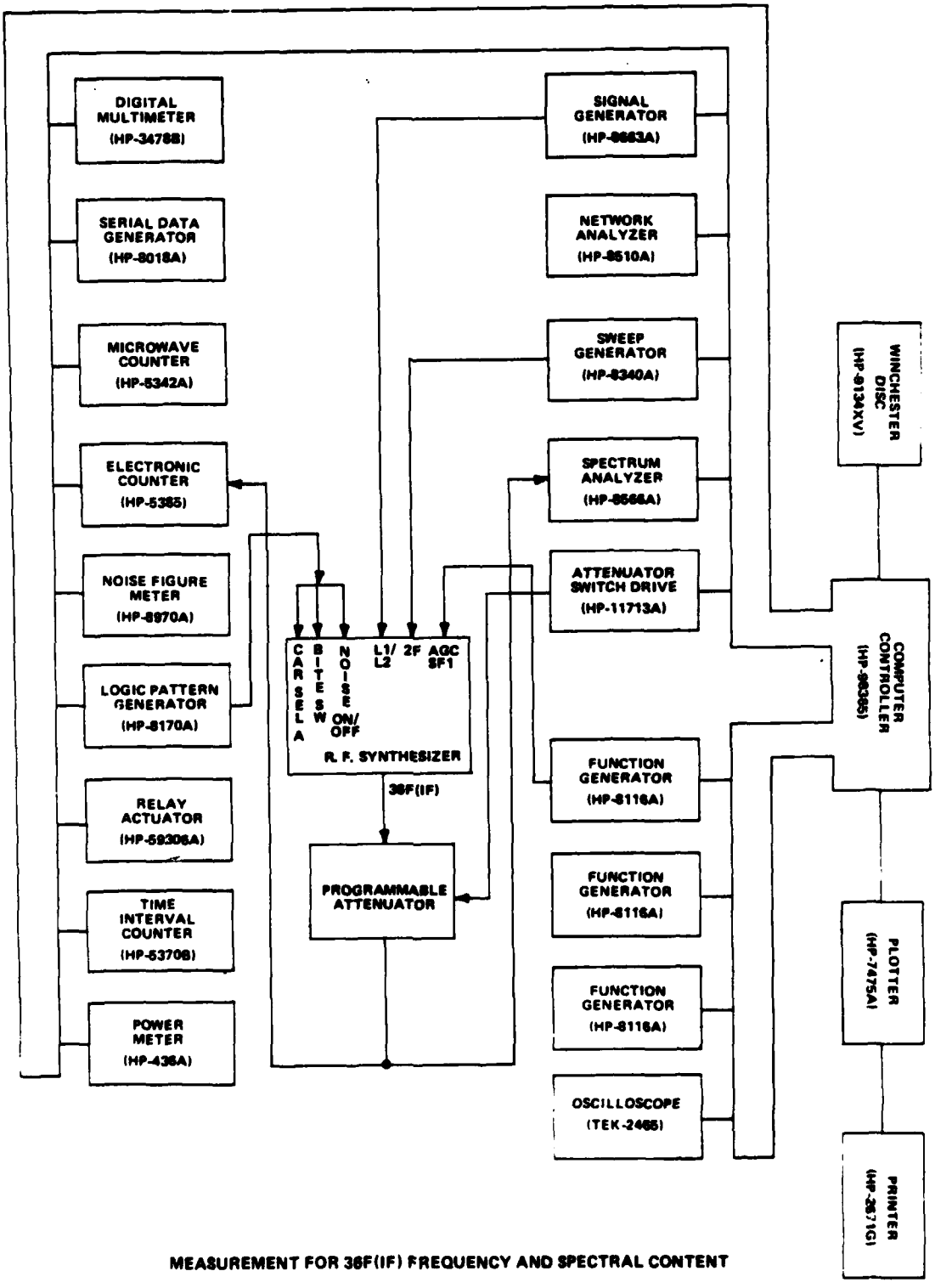
	Output Name	Output Level	Equipment Used
1.	36F(IF)	-24dBm @ 184.14MHz	Spectrum Anal. (HP-8566A)
2.			Electronic Ctr. (HP-5385)
3.			Att. Sw Drive (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of RF Synthesizer. Measure frequency of 36F(IF) output on Electronic Counter and check spectral content on Spectrum Analyzer.

Data Reduction: Send input levels and output of Electronic Counter to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Func. Gen. (HP-8116A)	7.	Att. Sw Drive (HP-11713A)
2.	Sig. Gen. (HP-8663A)	5.	Spectrum Anal. (HP-8566A)	8.	Prog. Attn. (HP-8494G)
3.	Sweep Gen. (HP-8340A)	6.	Electronic Ctr. (HP-5385)	9.	Printer (HP-2671G)
10.	Plotter (HP-7475A)	11.	Computer (HP-9836S)		



MEASUREMENT FOR 36F(IF) FREQUENCY AND SPECTRAL CONTENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Power measurement for 36F(IF)

Inputs

	Input Name	Input Level	Equipment Used
1.	Carrier Select A	TBD	Logic Patt. Gen. (HP-8170A)
2.	BITE SW	TBD	Logic Patt. Gen. (HP-8170A)
3.	Noise On/Off	TBD	Logic Patt. Gen. (HP-8170A)
4.	L1/L2	-120dBm @ L1/L2	Sig. Gen. (HP-8663A)
5.	2F	10.23MHz @ TBD	Sweep Gen. (HP-8340A)
6.	AGC SF 1	TBD	Function Gen. (HP-8116A)
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

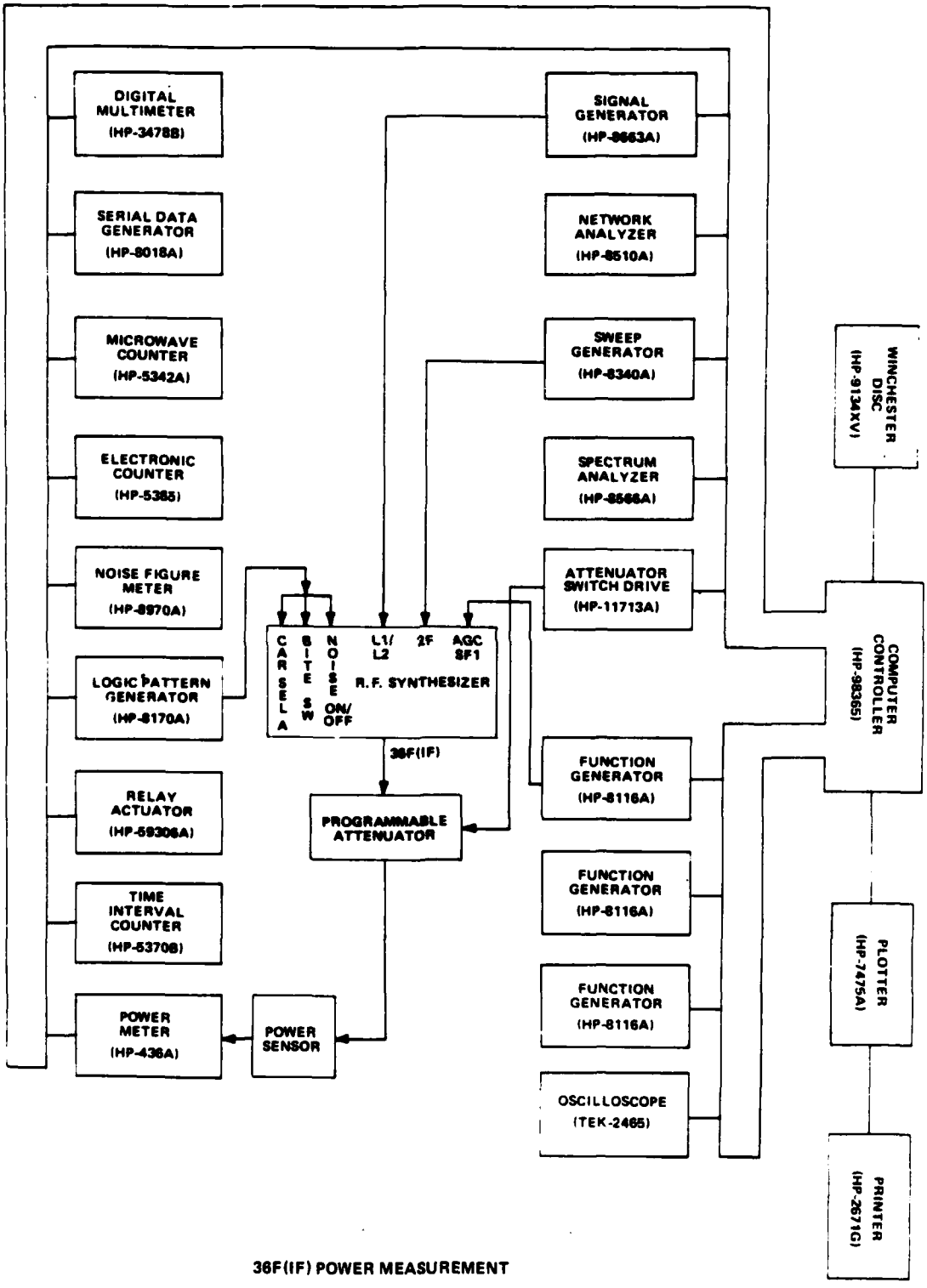
	Output Name	Output Level	Equipment Used
1.	36F(IF)	-24dBm	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Drive (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of RF Synthesizer. Measure 36F(IF) output power with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Sweep Gen. (HP-8340A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Power Meter (HP-436A)	8.	Computer (HP-9836S)
3.	Function Gen. (HP-8116A)	6.	Power Sensor (HP-8481A)	9.	Att. Switch Drive (HP-11713A)
10.	Prog. Att. (HP-8494G)				



36F(IF) POWER MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure VSWR and impedance of 36F(IF) output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par. Test Set	TBD	Sweep Gen. (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

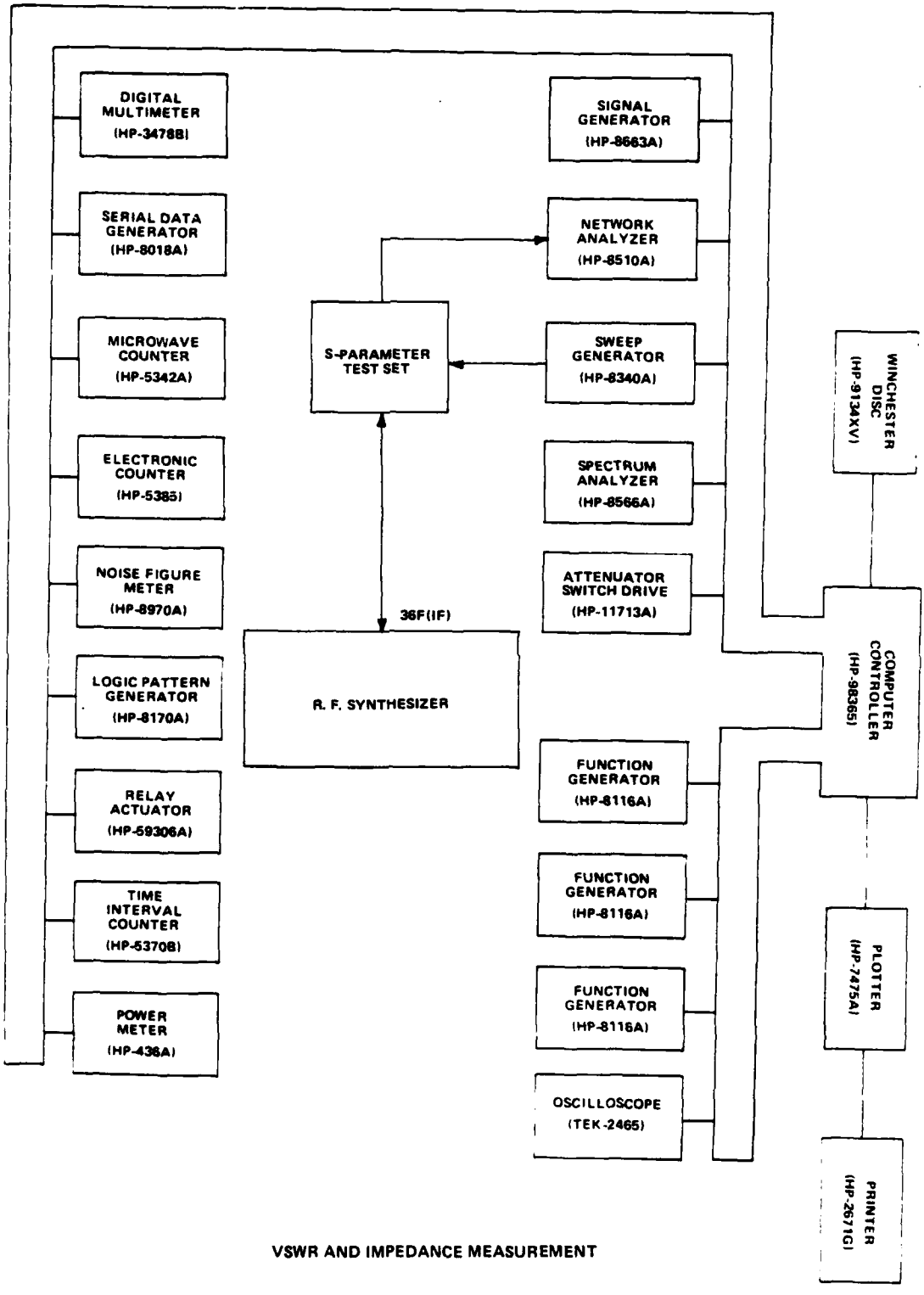
	Output Name	Output Level	Equipment Used
1.	36F(IF)	TBD	Network Anal. (HP-8510A)
2.			S-Par. Test Set (HP-8515A)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer.

Data Reduction: Send input levels to printer. Output of Network Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Ana. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Gen. (HP-8340A)	9.	



VSWR AND IMPEDANCE MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure noise figure of 36F(IF) output.

Inputs

	Input Name	Input Level	Equipment Used
1.	Carrier Select A	TBD	Logic Patt. Gen. (HP-8170A)
2.	BITE SW	TBD	Logic Patt. Gen. (HP-8170A)
3.	Noise On/Off	TBD	Logic Patt. Gen. (HP-8170A)
4.	Noise Source	TBD	Noise Source (HP-346B)
5.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
6.	AGC SF 1	TBD	Func. Gen. (HP-8116A)
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

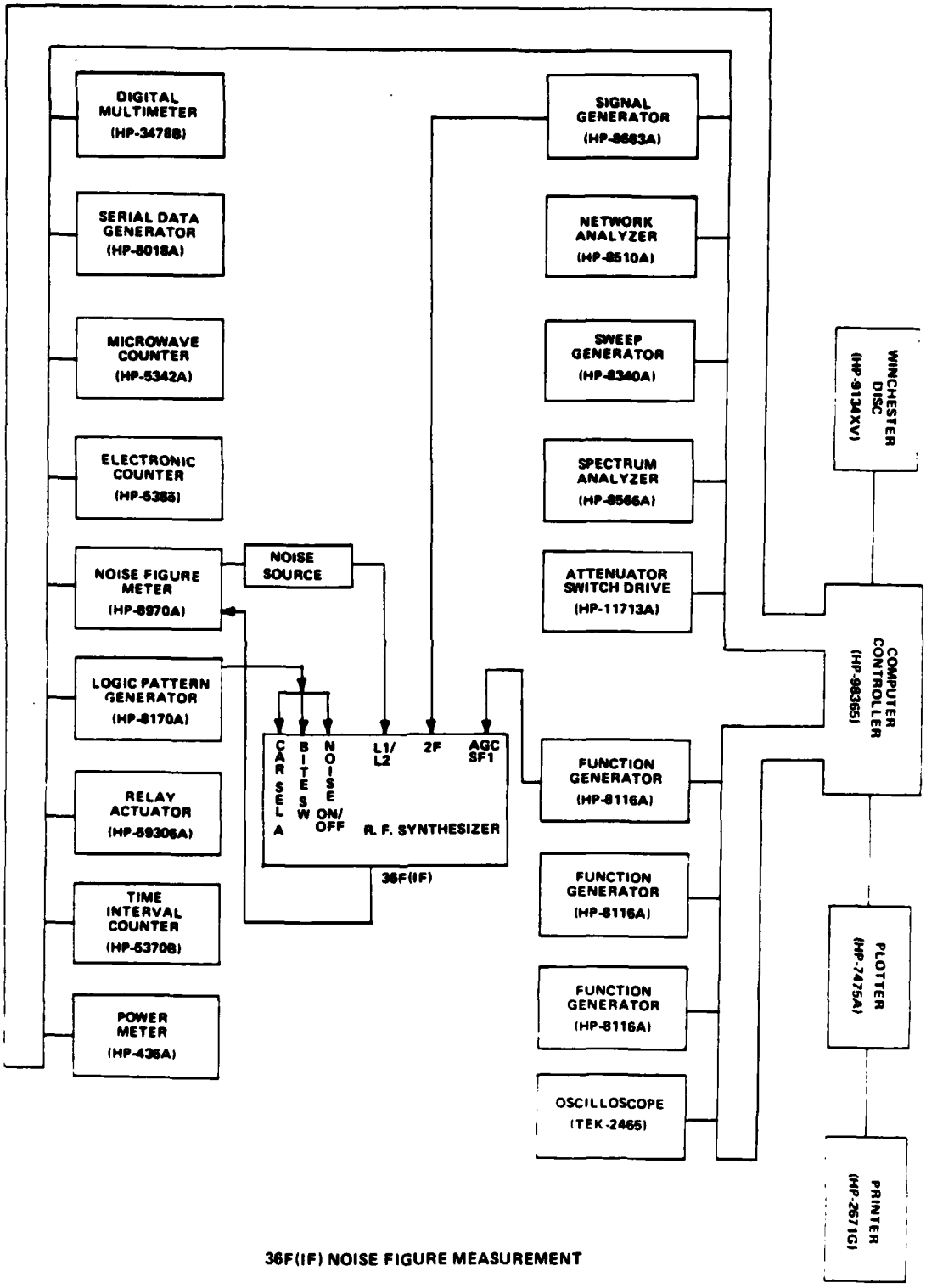
	Output Name	Output Level	Equipment Used
1.	36F(IF)	TBD	Noise Figure Meter (HP-8970A)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of RF Synthesizer, including Noise Source. Measure noise figure of 36F(IF) output with Noise Figure Meter.

Data Reduction: Send input levels and output of Noise Figure Meter to printer.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Noise Source (HP-346B)	7.	Computer (HP-9836S)
2.	Signal Gen. (HP-8663A)	5.	N.F. Meter (HP-8970A)	8.	
3.	Function Gen. (HP-8116A)	6.	Printer (HP-2671G)	9.	



36F(IF) NOISE FIGURE MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure frequency of 68F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

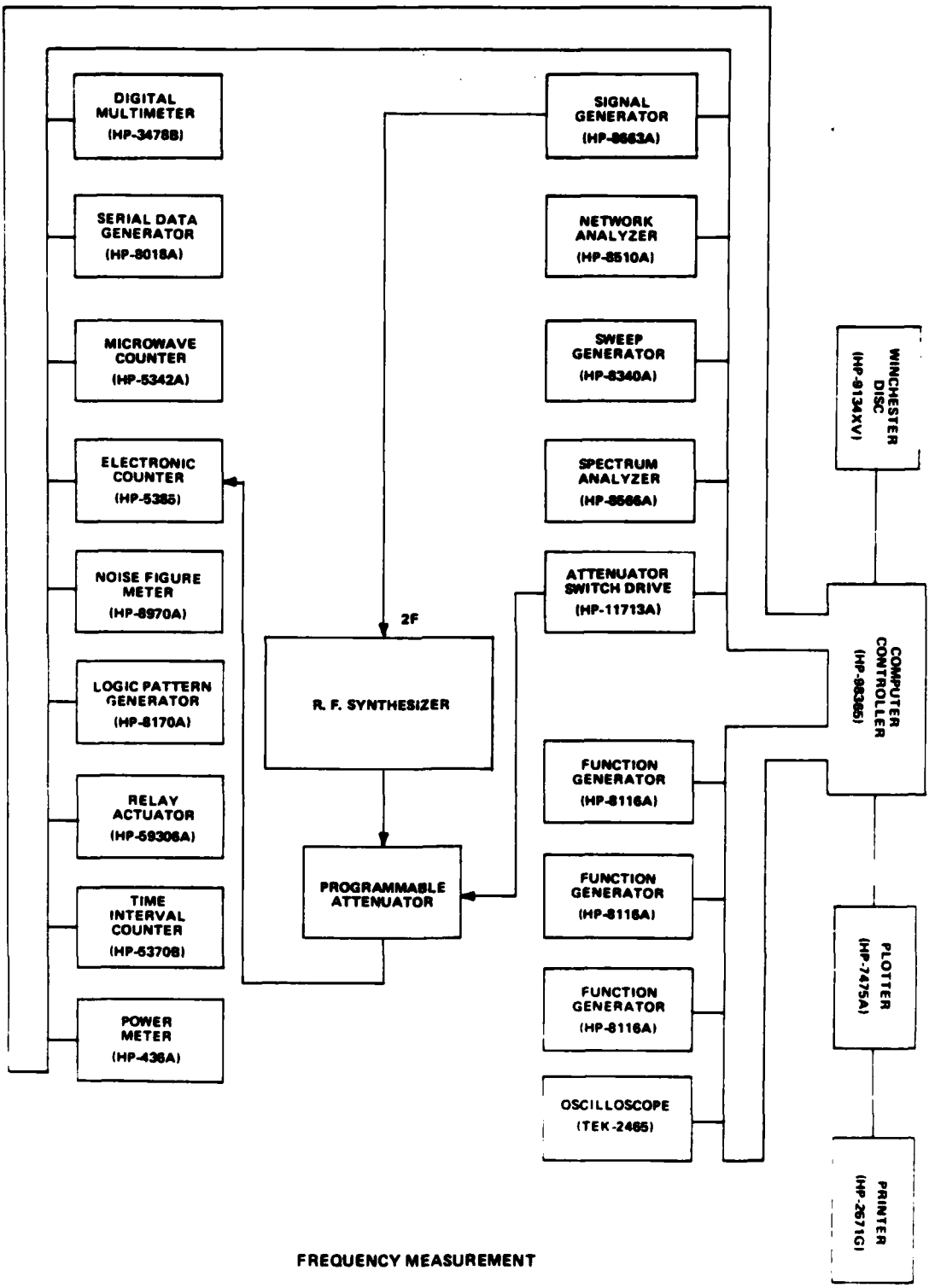
	Output Name	Output Level	Equipment Used
1.	68F	347.82MHz	Electronic Ctr. (HP-5385)
2.			Att. Switch Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F frequency to RF Synthesizer reference oscillator input. Measure output frequency at 68F output with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Electronic Ctr. (HP-5385)	7.	
2.	Att. Sw Dr. (HP-11713A)	5.	Printer (HP-2671G)	8.	
3.	Prog. Att. (HP-8494G)	6.	Computer (HP-9836S)	9.	



FREQUENCY MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output power of 68F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

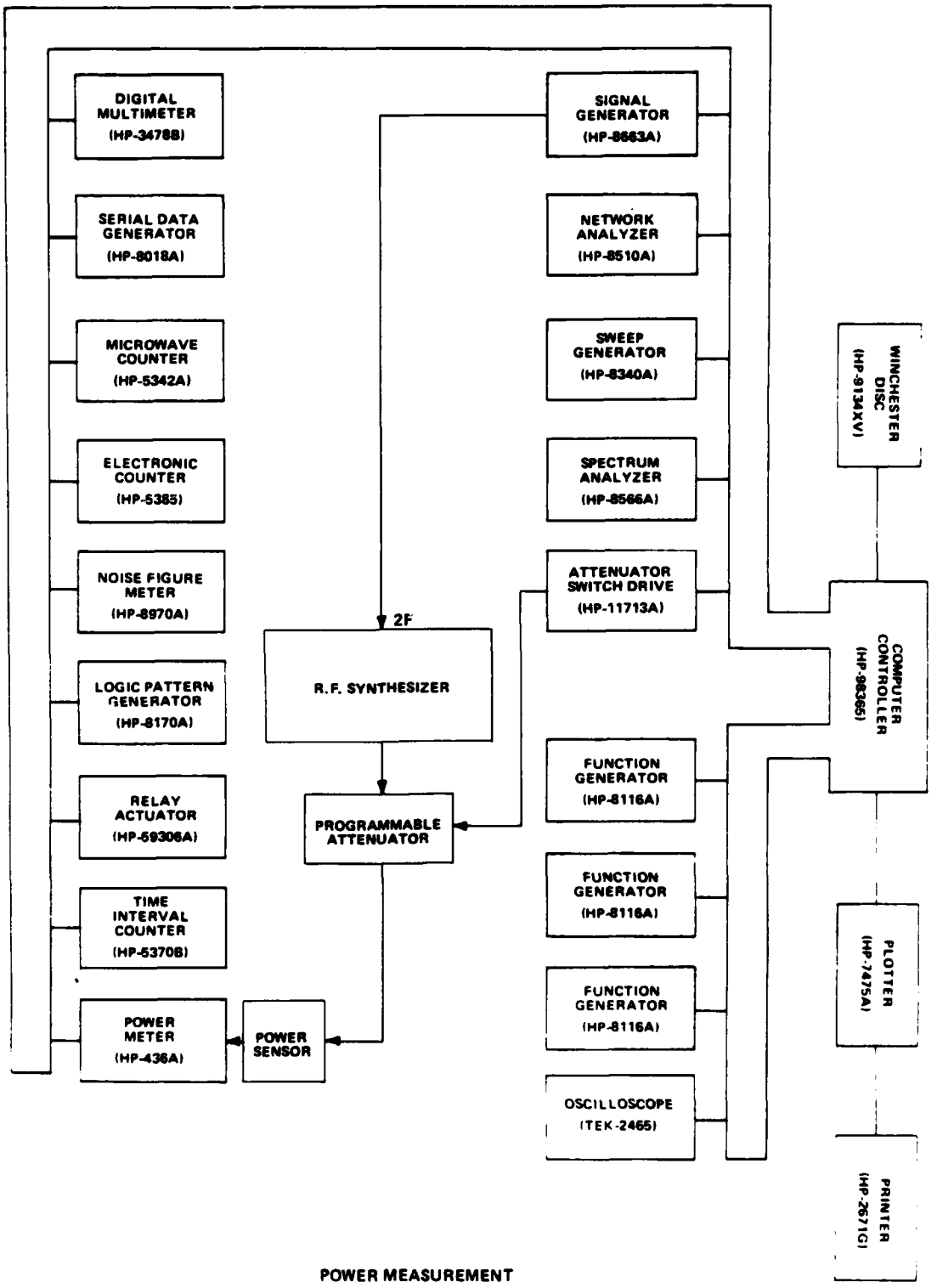
	Output Name	Output Level	Equipment Used
1.	68F	-10dBm	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Drive (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output power at 68F output with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Att. Sw Dr. (HP-11713A)	7.	Computer (HP-9836S)
2.	Power Meter (HP-436A)	5.	Prog. Att. (HP-8494G)	8.	
3.	Power Sensor (HP-8481A)	6.	Printer (HP-2671G)	9.	



POWER MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Check 68F output for spectral content.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Sig. Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

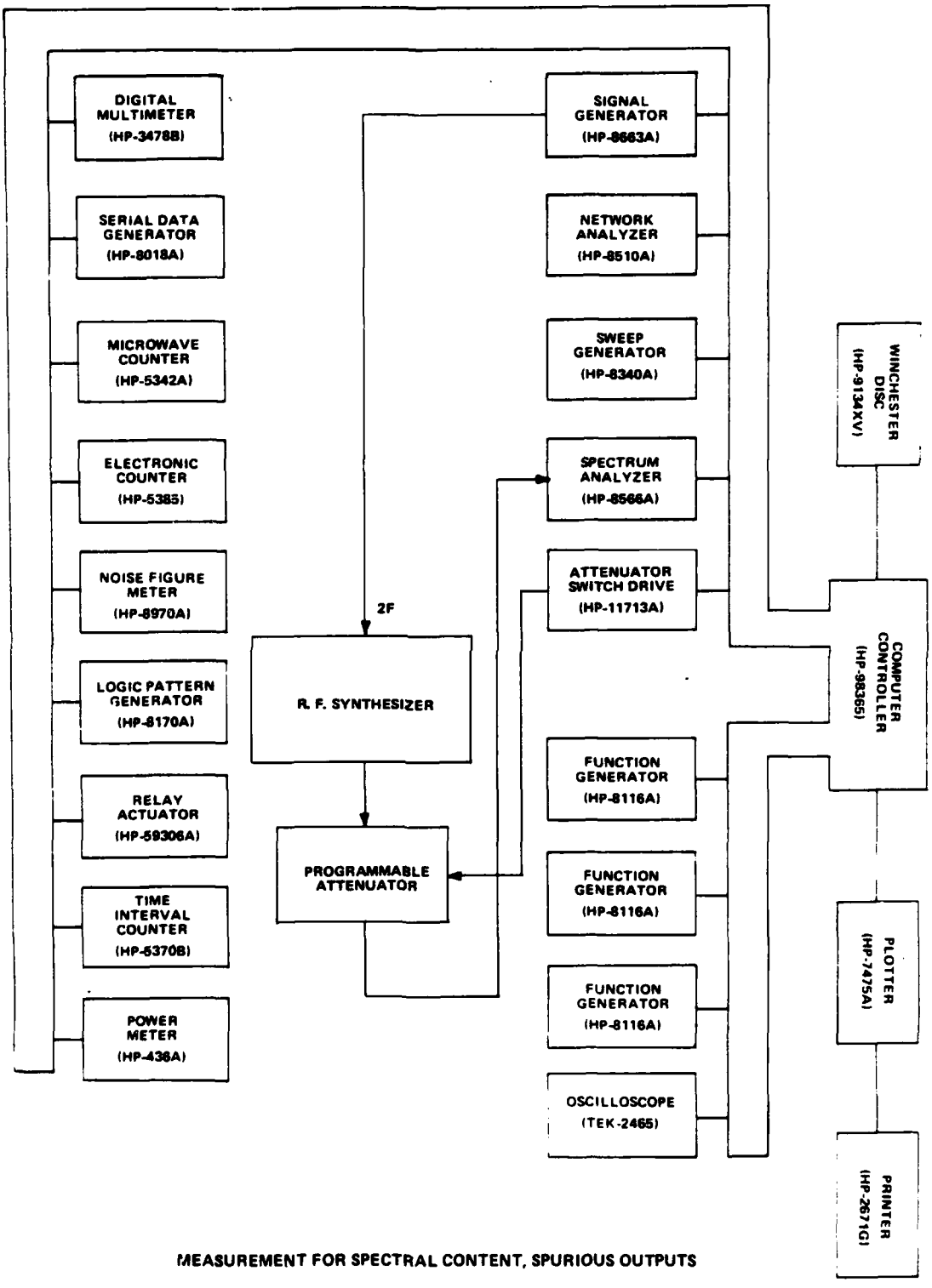
	Output Name	Output Level	Equipment Used
1.	68F	-10dBm @ 347.82MHz	Spectrum Anal. (HP-8566A)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure the spectral content of the 68F output with Spectrum Analyzer.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Prog. Att. (HP-8494G)	7.	Printer (HP-2671G)
2.	Spectrum Anal. (HP-8566A)	5.	Plotter (HP-7475A)	8.	
3.	Att. Sw Dr. (HP-11713A)	6.	Computer (HP-9836S)	9.	



MEASUREMENT FOR SPECTRAL CONTENT, SPURIOUS OUTPUTS

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure impedance and VSWR of 68F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	TBD	Sweep Gen. (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

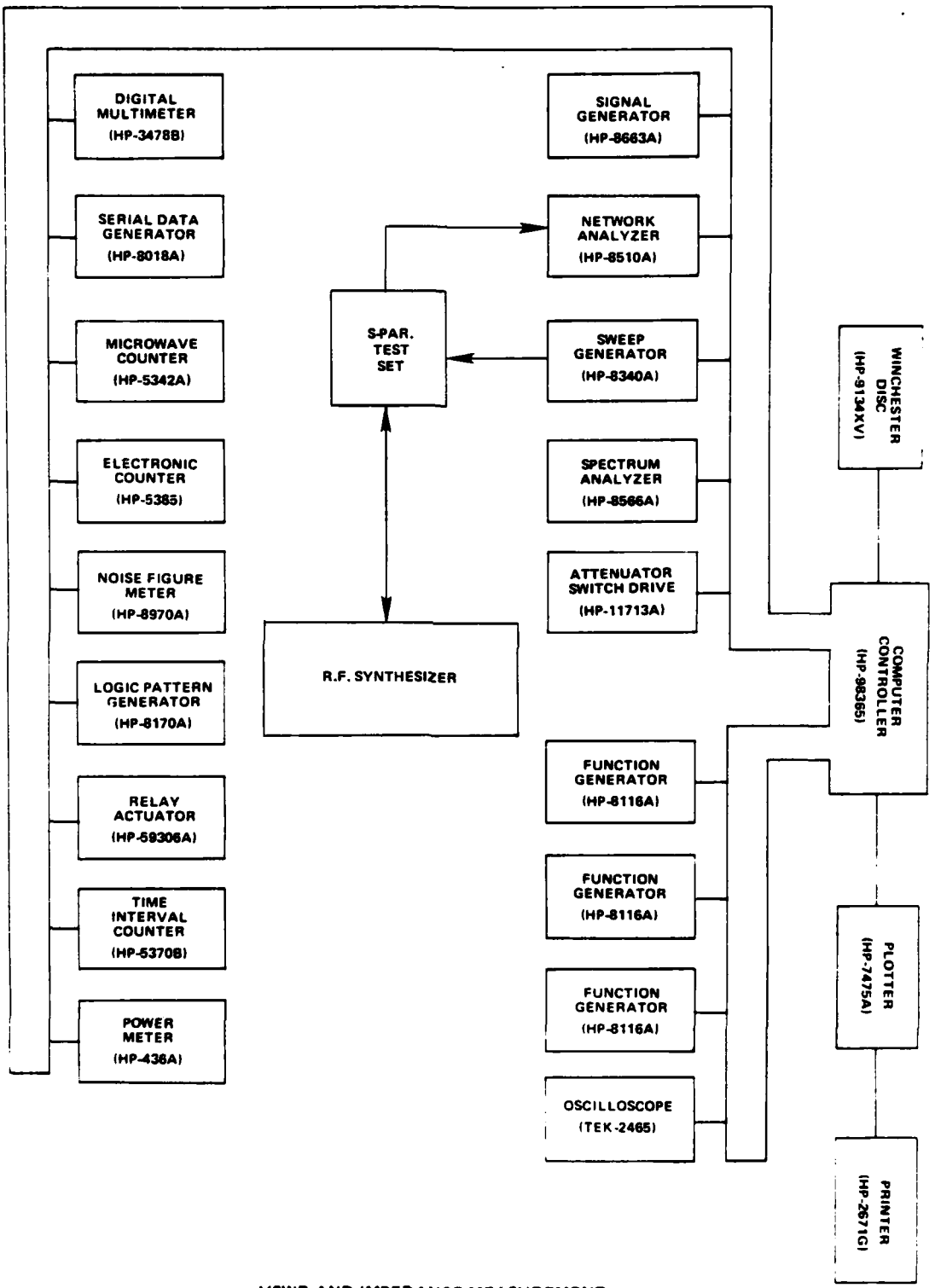
	Output Name	Output Level	Equipment Used
1.	68F	TBD	Network Anal. (HP-8510A)
2.			S-Par Test Set (HP-8515A)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer.

Data Reduction: Send input levels to printer. Output of Network Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Gen. (HP-8340A)	9.	



VSWR AND IMPEDANCE MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output frequency of 29 7/8F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	29 7/8F	152.81MHz	Electronic Ctr (HP-5385)
2.			Att. Sw Dr. (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output frequency at 29 7/8F output with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Att. Sw Dr. (HP -11713A)	7.	
2.	Sig. Gen. (HP-8663A)	5.	Prog. Att. (HP-8494G)	8.	
3.	Electronic Ctr (HP-5385)	6.	Printer (HP-2671G)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output power at 29/8F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	$29\frac{7}{8}$F	-10dBm	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Dr. (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output power at $29\frac{7}{8}$F output with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Power Sensor (HP-8481A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Att. Sw Dr. (HP-11713A)	8.	
3.	Power Meter (HP-436A)	6.	Prog. Att. (HP-8494G)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure spectral content of 29/8F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	29/8F	-10dBm @ 152.81MHz	Spectrum Anal. (HP-8566A)
2.			Prog. Att. (HP-8494G)
3.			Att. Sw Dr. (HP-11713A)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure spectral content of 29/8F output on Spectrum Analyzer.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Att. Sw Dr. (HP-11713A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Prog. Att. (HP-8494G)	8.	
3.	Spectrum Anal. (HP-8566A)	6.	Plotter (HP-7475A)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output impedance and VSWR of 2978F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	TBD	Sweep Gen. (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	29/8F	TBD	Network Analyzer (HP-8510A)
2.			S-Par Test Set (HP-8515A)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer.

Data Reduction: Send input levels to printer. Output of Network Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Gen. (HP-8340A)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Verify AF1 LOCK operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

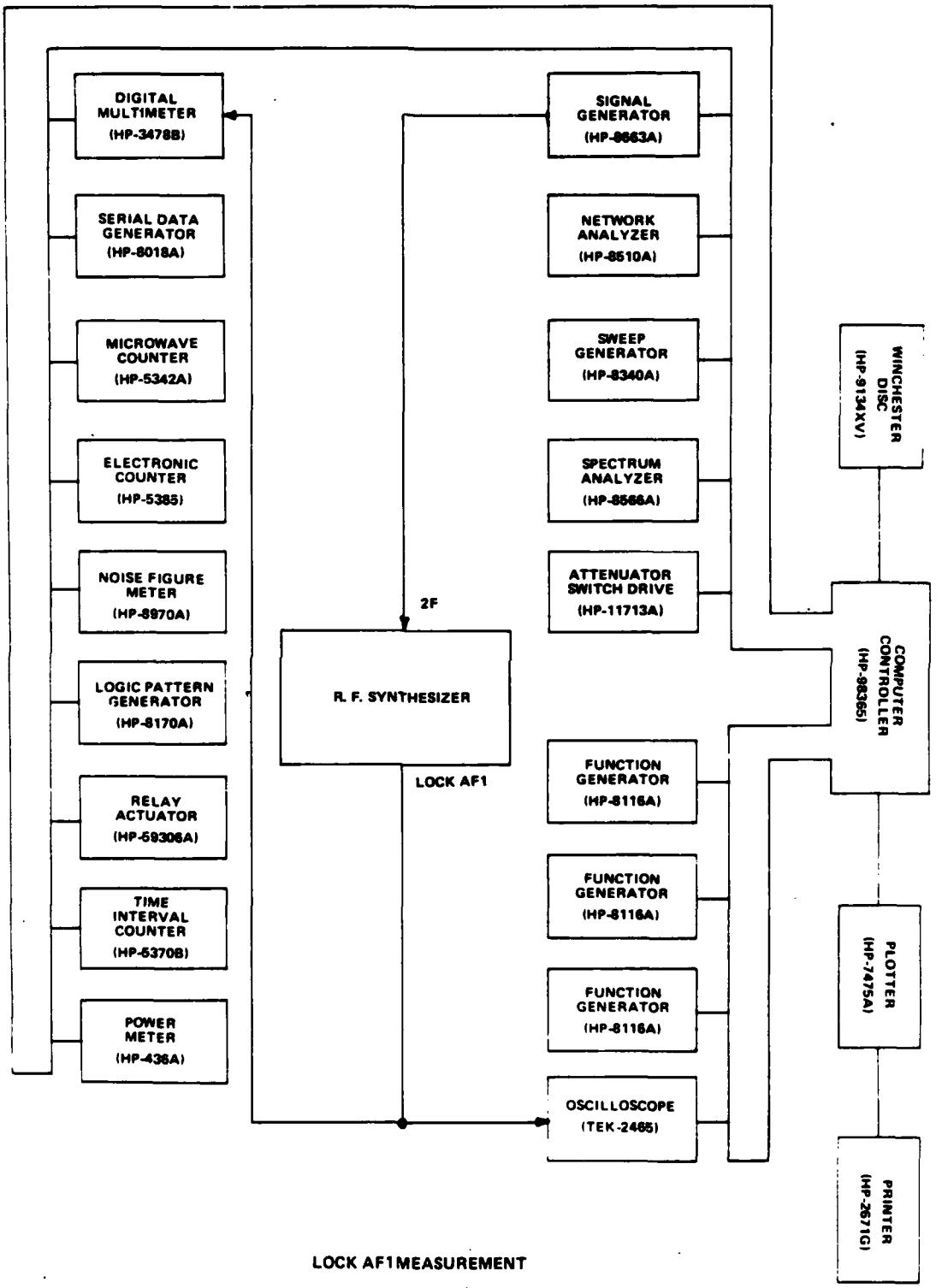
	Output Name	Output Level	Equipment Used
1.	LOCK AF1	TBD	Digital Multi. (HP-3478)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure AF1 LOCK with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Printer (HP-2671G)	7.	
2.	Sig. Gen. (HP-8663A)	5.	Oscilloscope (TEK-2465)	8.	
3.	Digital Multi. (HP-3478B)	6.	Plotter (HP-7475A)	9.	



LOCK AF1 MEASUREMENT

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output frequency at 6F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	6F	30.69MHz	Electronic Ctr (HP-5385)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output frequency at 6F output with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Att. Sw Dr. (HP-11713A)	7.	
2.	Sig. Gen. (HP-8663A)	5.	Prog. Att. (HP-8494G)	8.	
3.	Elec. Ctr. (HP-5385)	6.	Printer (HP-2671G)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output power at 6F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	6F	-30dBm	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Dr. (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output power at 6F output with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Power Sensor (HP-8481A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Att. Sw Dr. (HP-11713A)	8.	
3.	Power Meter (HP-436A)	6.	Prog. Att. (HP-8494G)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure spectral content of 6F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	6F	-30dBm @ 30.69MHz	Spectrum Anal. (HP-8566A)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure spectral content of 6F output on Spectrum analyzer.

Data Reduction: Signal input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Att. Sw Dr. (HP-11713A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Prog. Att. (HP-8494G)	8.	
3.	Spectrum Anal. (HP-8566A)	6.	Plotter (HP-7475A)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output frequency at 2F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	2F	10.23MHz	Electronic Ctr (HP-5385)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output frequency at 2F output with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Att. Sw Dr. (HP-11713A)	7.	
2.	Signal Gen. (HP-8663A)	5.	Prog. Att. (HP-8494)	8.	
3.	Electronic Ctr (HP-5385)	6.	Printer (HP-2671G)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure output power at 2F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	2F	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Dr. (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure output power at 2F output with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Power Sensor (HP-8481A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Att. Sw Dr. (HP-11713A)	8.	
3.	Power Meter (HP-436A)	6.	Prog. Att. (HP-8494G)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Measure spectral content of 2F output.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	2F	30.69MHz @ TBD	Spectrum Anal. (HP-8566A)
2.			Prog. Att. (HP-8494G)
3.			Att. Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a 2F signal to the RF Synthesizer's reference oscillator input. Measure spectral content at 2F output with Spectrum Analyzer.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Att. Sw Dr. (HP-11713A)	7.	Printer (HP-2671G)
2.	Sig. Gen. (HP-8663A)	5.	Prog. Att. (HP-8494G)	8.	
3.	Spectrum Anal. (HP-8566A)	6.	Plotter (HP-7475A)	9.	

Contractor: Magnavox

Board Tested: RF Synthesizer

Test Objective: Verify 2F -F/154, 120 is operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	2F	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	F/154, F/120	TBD	Function Gen. (HP-8116A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

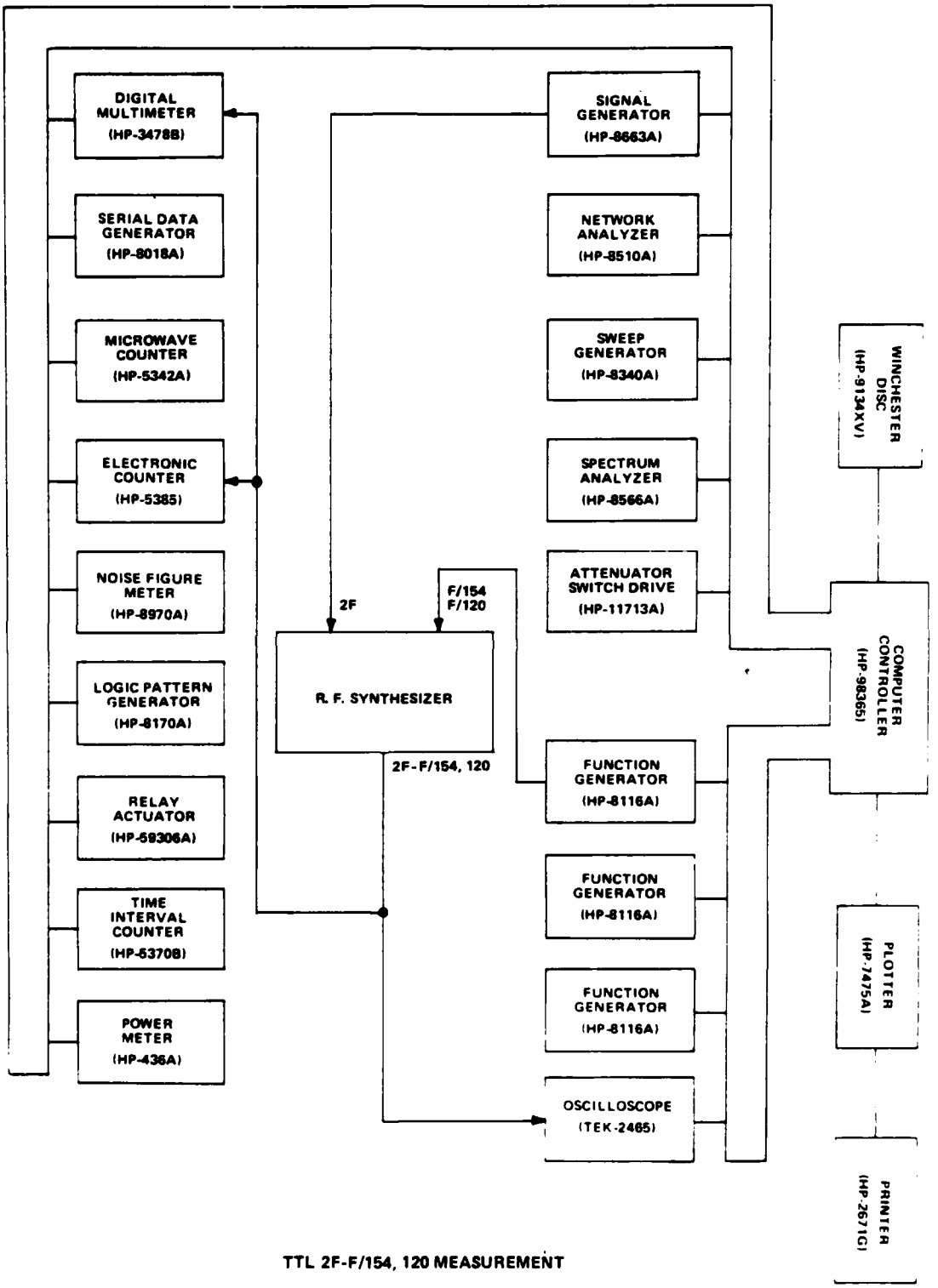
	Output Name	Output Level	Equipment Used
1.	2F -F/154, 120	TBD	Digital Multi. (HP-3478B)
2.			Electronic Ctr (HP-5385)
3.			Oscilloscope (TEK-2465)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure output frequency at 2F -F/154, 120 output with Electronic Counter. Measure signal strength with Digital Multimeter and an Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and outputs of Electronic Counter and Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Electronic Ctr (HP-5385)	7.	Computer (HP-9836S)
2.	Func. Gen. (HP-8116A)	5.	Printer (HP-2671G)	8.	Plotter (HP-7475A)
3.	Digital Multi. (HP-3478B)	6.	Oscilloscope (TEK-2465)	9.	



TTL 2F-F/154, 120 MEASUREMENT

3.1.1.2 CONVERTER/CHANNEL SELECTOR MODULE

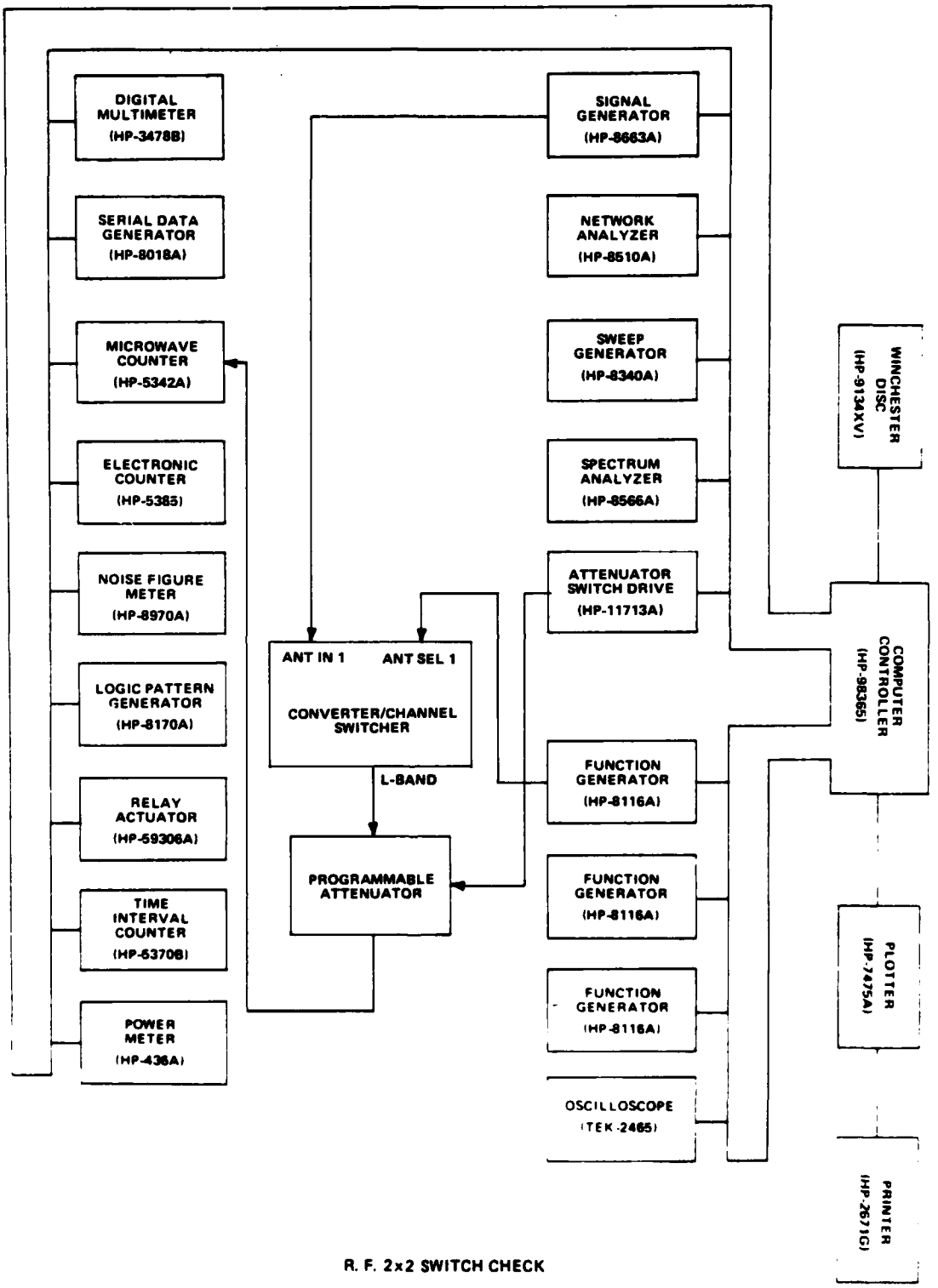
Contractor: Magnavox

Board Tested: Converter/Channel Switch

Test Objective: Verify RF 2 x 2 switch operation.

Inputs

	Input Name	Input Level	Equipment Used
1.	Antenna Select 1	TBD	Function Gen. (HP-8116A)
2.	Antenna IN 1	-120dBm @ L1/L2	Signal Gen. (HP-8663A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			



R. F. 2x2 SWITCH CHECK

Contractor: Magnavox

Board Tested: Converter/Channel Switch

Test Objective: To verify AGC GAIN AF1 is operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	Antenna Select 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Antenna Select 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	20 MUT	TBD	Logic Patt. Gen. (HP-8170A)
4.	1 UT	TBD	Logic Patt. Gen. (HP-8170A)
5.	BITE SW, A, B, C	TBD	Logic Patt. Gen. (HP-8170A)
6.	Carrier Select B	TBD	Logic Patt. Gen. (HP-8170A)
7.	L1/L2	-120dBm @ L1/L2	Signal Generator (HP-8663A)
8.	68F	347.82MHz @ -10dBm	Sweep Generator (HP-8340A)
9.	AGC S/F 2	TBD	Function Gen. (HP-8116A)
10.			
11.			
12.			

Outputs

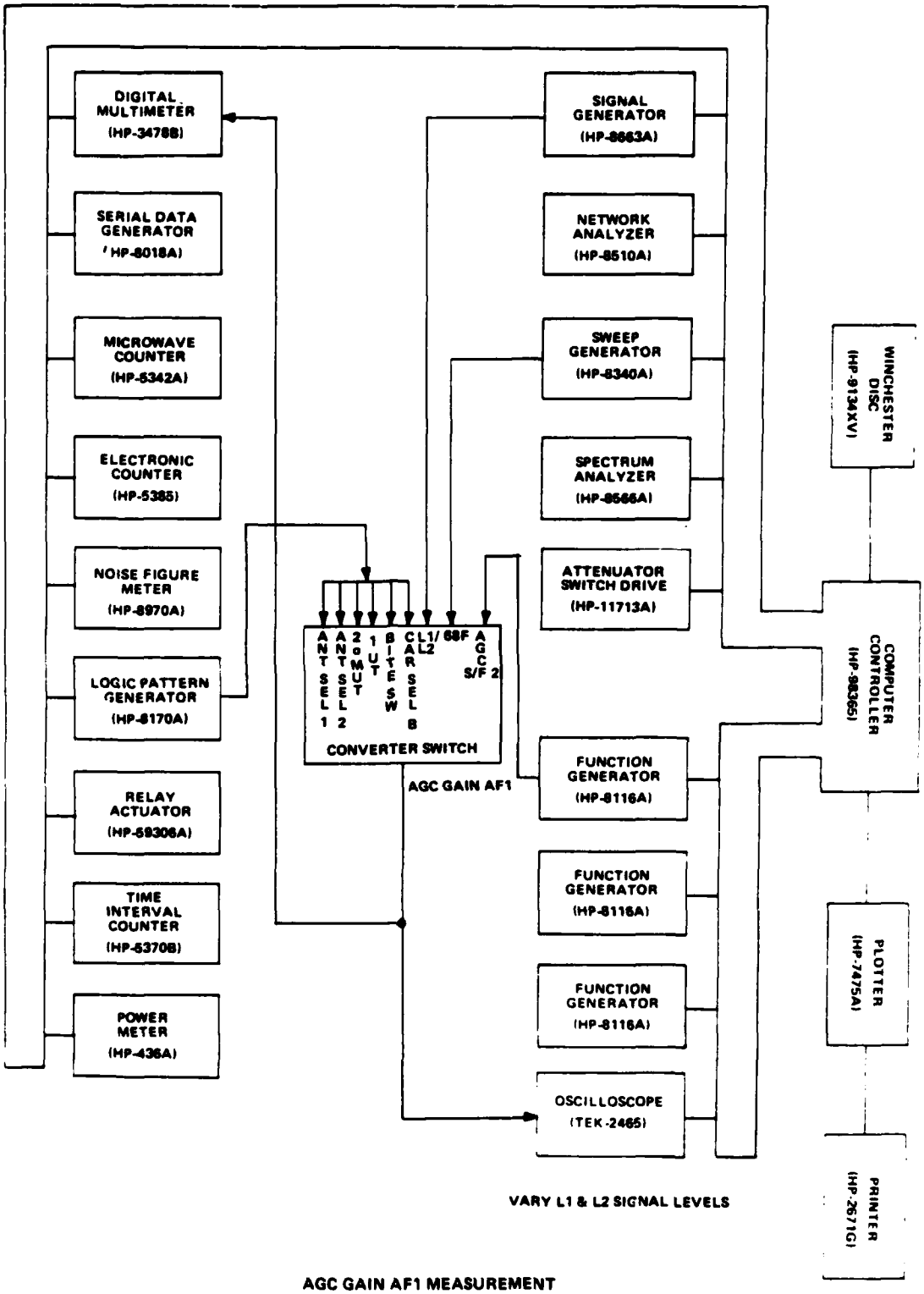
	Output Name	Output Level	Equipment Used
1.	AGC GAIN AF1	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signals to all inputs. Measure AGC GAIN AF1 output with Digital Multimeter to verify operation. An Oscilloscope will also be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Sweep Gen. (HP-8340A)	7.	Computer (HP-9836S)
2.	Func. Gen. (HP-8116A)	5.	Digital Multi. (HP-3478B)	8.	Oscilloscope (TEK-2465)
3.	Signal Gen. (HP-8663A)	6.	Printer (HP-2671G)	9.	Plotter (HP-7475A)



AGC GAIN AF1 MEASUREMENT

Contractor: Magnavox

Board Tested: Converter/Channel Switch

Test Objective: Verify 36F(IF) switch operation.

Inputs

	Input Name	Input Level	Equipment Used
1.	Antenna Select 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Antenna Select 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	20 MUT	TBD	Logic Patt. Gen. (HP-8170A)
4.	1 UT	TBD	Logic Patt. Gen. (HP-8170A)
5.	BITE SW A, B, C	TBD	Logic Patt. Gen. (HP-8170A)
6.	Carrier Select B	TBD	Logic Patt. Gen. (HP-8170A)
7.	RF Select Ø	TBD	Logic Patt. Gen. (HP-8170A)
8.	L1/L2	-120dBm @ L1/L2	Signal Generator (HP-8663A)
9.	68F	-10dBm @ 347.82MHz	Sweep Generator (HP-8340A)
10.	36F	-24dBm @ 184.14MHz	External Oscillator
11.	AGC S/F 2	TBD	Function Gen. (HP-8116A)
12.			

Outputs

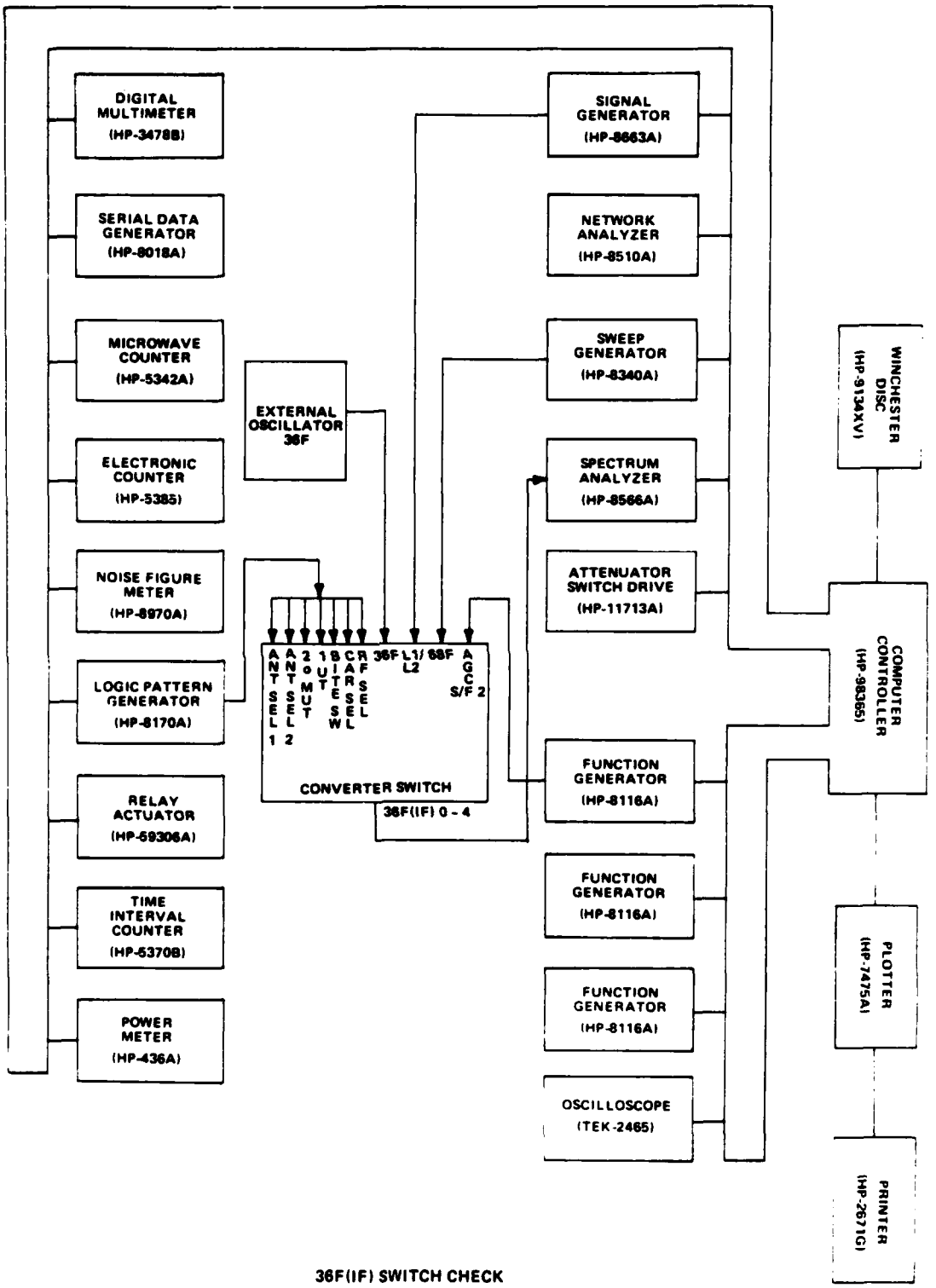
	Output Name	Output Level	Equipment Used
1.	36F(IF) Output	-24dBm @ 184.14MHz	Spectrum Anal. (HP-8556A)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signals to all inputs. Measure output frequency and power on Spectrum Analyzer to verify switch operation. (Repeat for all 5 channels by changing RF Select Input)

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Func. Gen. (HP-8116A)	7.	Computer (HP-9836S)
2.	Signal Gen. (HP-8663A)	5.	Spectrum Anal. (HP-8566A)	8.	External Oscillator
3.	Sweep Gen. (HP-8340A)	6.	Plotter (HP-7475A)	9.	Printer (HP-2671G)



36F(IF) SWITCH CHECK

Contractor: Magnavox

Board Tested: Converter/Channel Switch

Test Objective: Verify operation of Carrier Select outputs.

Inputs

	Input Name	Input Level	Equipment Used
1.	RF Select Ø	TBD	Logic Patt. Gen. (HP-8170A)
2.	RF Select 1	TBD	Logic Patt. Gen. (HP-8170A)
3.	RF Select 2	TBD	Logic Patt. Gen. (HP-8170A)
4.	RF Select 3	TBD	Logic Patt. Gen. (HP-8170A)
5.	RF Select 4	TBD	Logic Patt. Gen. (HP-8170A)
6.	Carrier Select A	TBD	Logic Patt. Gen. (HP-8170A)
7.	Carrier Select B	TBD	Logic Patt. Gen. (HP-8170A)
8.			
9.			
10.			
11.			
12.			

Outputs

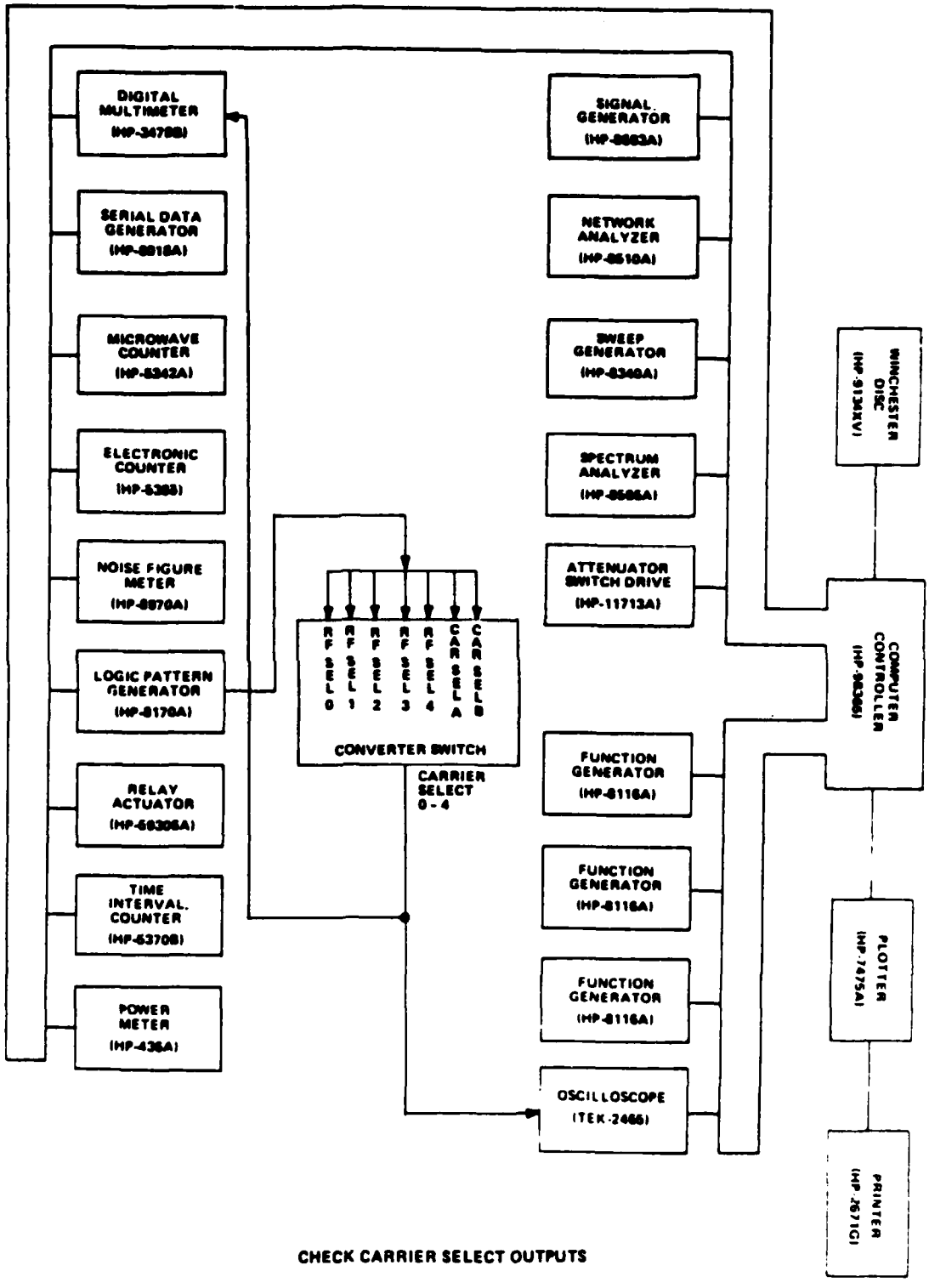
	Output Name	Output Level	Equipment Used
1.	Carrrier Select Ø-4	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs. Measure Carrier Select output with Digital Multimeter. An Oscilloscope will be used to display waveform. (Repeat for all Carrier Select outputs)

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Computer (HP-9836S)	7.	
2.	Digital Multi. (HP-3478B)	5.	Oscilloscope (TEK-2465)	8.	
3.	Printer (HP-2671G)	6.	Plotter (HP-7475A)	9.	



CHECK CARRIER SELECT OUTPUTS

Contractor: Magnavox

Board Tested: Converter/Channel Switch

Test Objective: Verify Delta Diff outputs operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	RF Select Ø	TBD	Logic Patt. Gen. (HP-8170A)
2.	RF Select 1	TBD	Logic Patt. Gen. (HP-8170A)
3.	RF Select 2	TBD	Logic Patt. Gen. (HP-8170A)
4.	RF Select 3	TBD	Logic Patt. Gen. (HP-8170A)
5.	RF Select 4	TBD	Logic Patt. Gen. (HP-8170A)
6.	2F	10.23MHz @ TBD	Signal Generator (HP-8663A)
7.	F/120 UT	42625kHz @ TBD	Func. Generator (HP-8116A)
8.	F/154 UT	33214.3kHz @ TBD	Func. Generator (HP-8116A)
9.	2F - F/120, 154	10.23MHz - 42625kHz/ 33214.3kHz @ TBD	Func. Generator (HP-8116A)
10.			
11.			
12.			

Outputs

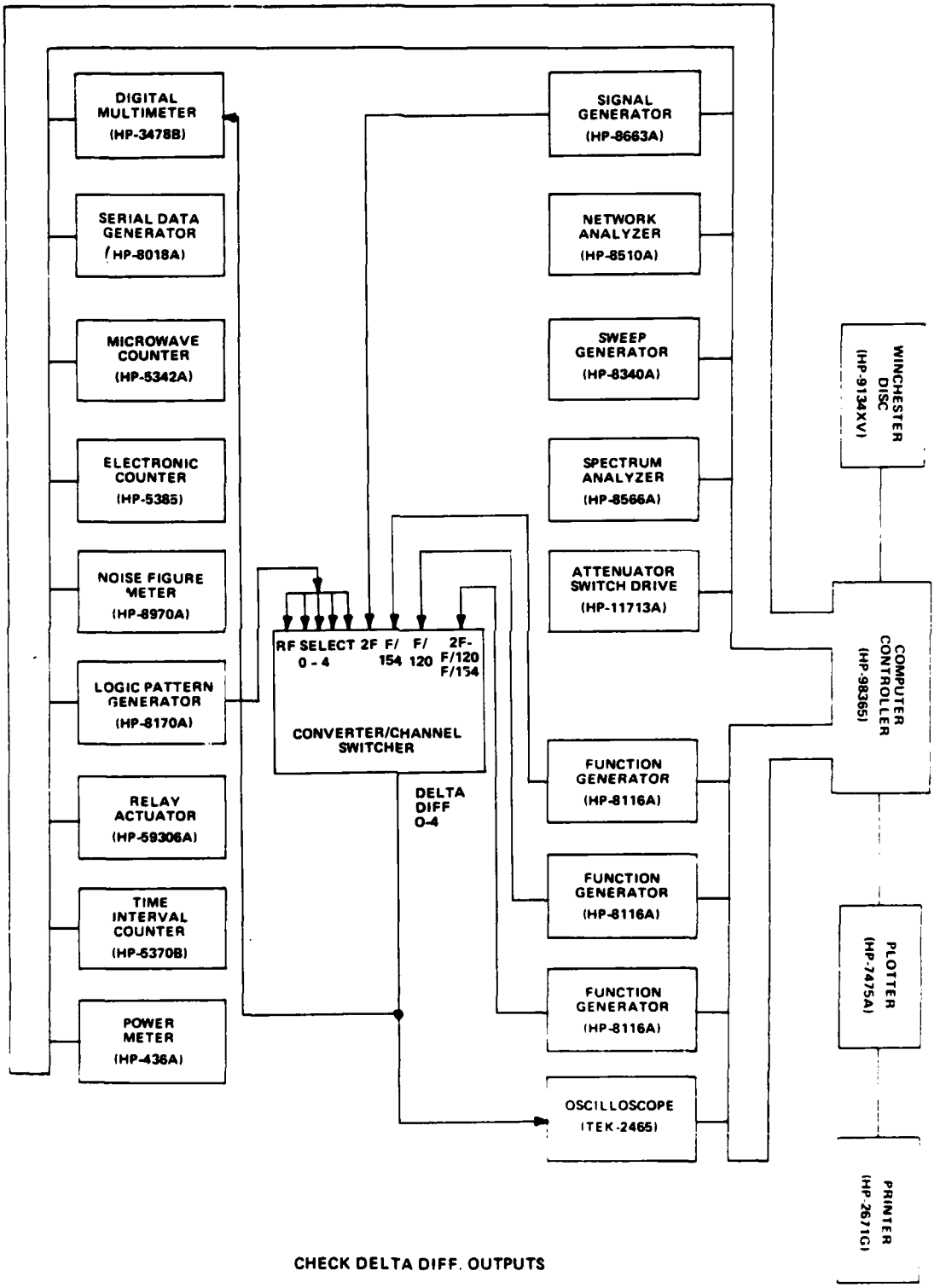
	Output Name	Output Level	Equipment Used
1.	Delta Diff Ø-4	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs. Measure Delta Diff output with Digital Multimeter. An Oscilloscope will be used to display waveform. (Repeat for all Delta Diff outputs).

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Logic Patt. Gen. (HP-8170A)	4.	Digital Multi (HP-3478B)	7.	Oscilloscope (TEK-2465)
2.	3-Func. Gens. (HP-8116A)	5.	Printer (HP-2671G)	8.	Plotter (HP-7475A)
3.	Signal Gen. (HP-8663A)	6.	Computer (HP-9836S)	9.	



CHECK DELTA DIFF. OUTPUTS

3.1.1.3 IF/BB/CODER MODULE

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper operation of SLEW DNE Signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29 7/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for theses inputs.

Outputs

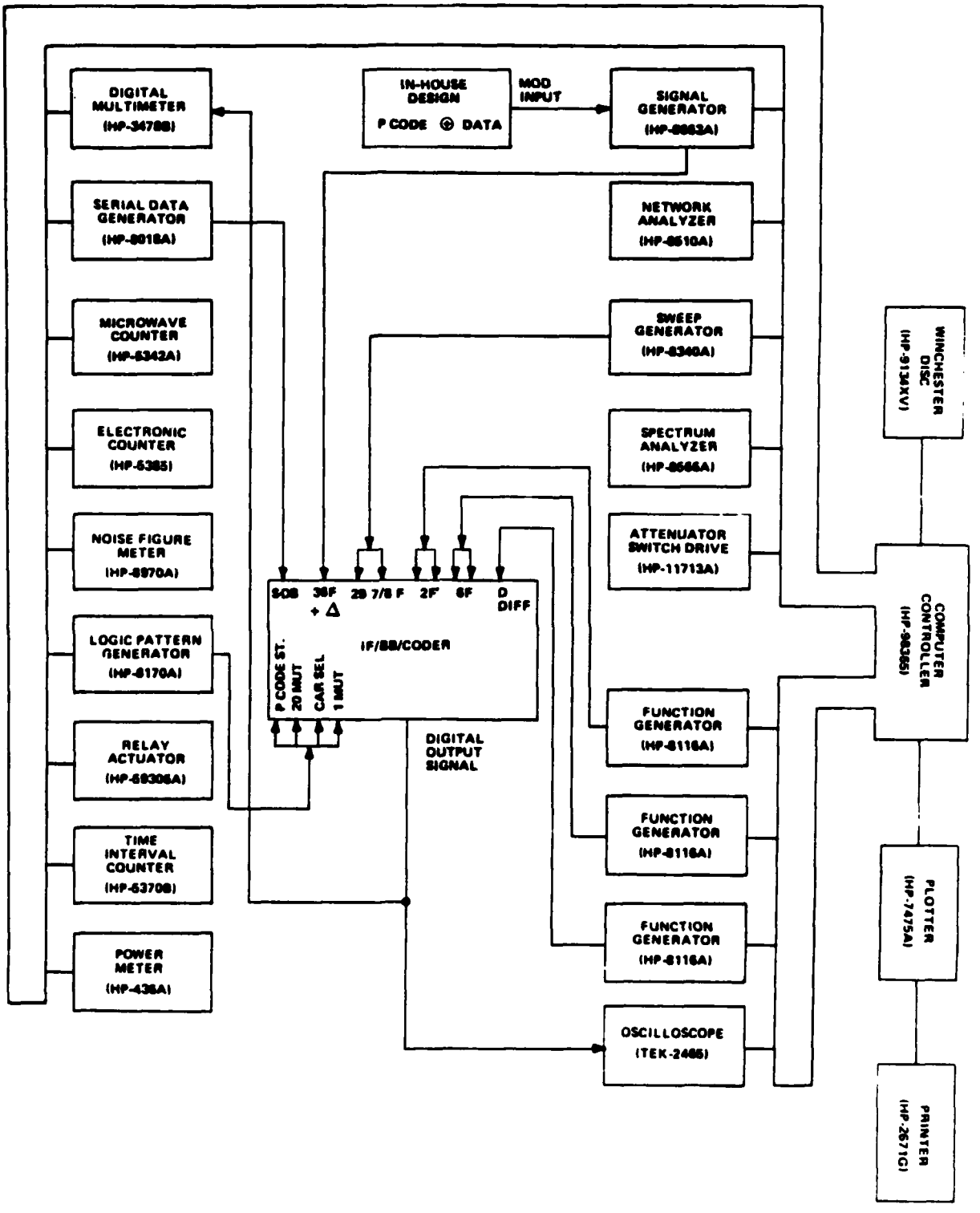
	Output Name	Output Level	Equipment Used
1.	SLEW DNE	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/ Coder module. Measure output of SLEW DNE Signal with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Sig. Gen. (HP-8663A)	5.	Log. Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)


DIGITAL MULTIMETER (HP-3478B)
IN-HOUSE DESIGN
P CODE ⊕ DATA
MOD INPUT
SIGNAL GENERATOR (HP-8663A)
SERIAL DATA GENERATOR (HP-8018A)
NETWORK ANALYZER (HP-8510A)
MICROWAVE COUNTER (HP-5342A)
SWEEP GENERATOR (HP-8340A)
WINCHESTER DISC (HP-9134XV)
ELECTRONIC COUNTER (HP-5385)
SPECTRUM ANALYZER (HP-8566A)
NOISE FIGURE METER (HP-8970A)
ATTENUATOR SWITCH DRIVE (HP-11713A)
SOB
38F + Δ
2B 7/8 F
2F
8F
D DIFF
IF/BB/CODER
P CODE ST.
20 MUT
CAR SEL
1 MUT
COMPUTER CONTROLLER (HP-9836S)
LOGIC PATTERN GENERATOR (HP-8170A)
FUNCTION GENERATOR (HP-8116A)
RELAY ACTUATOR (HP-59306A)
DIGITAL OUTPUT SIGNAL
FUNCTION GENERATOR (HP-8116A)
TIME INTERVAL COUNTER (HP-5370B)
PLOTTER (HP-7475A)
FUNCTION GENERATOR (HP-8116A)
POWER METER (HP-436A)
OSCILLOSCOPE (TEK-2465)
PRINTER (HP-2671G)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper level of Course Range Epoch (CRE) output signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	CRE	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/Coder Module. Measure output of CRE with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)(3)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper level of Fine Range Epoch (FRE) output signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29 7/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	FRE	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/ Coder module. Measure output of FRE with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper operation of AGC SF/1 signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29⅞F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data bus (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	AGC SF/1	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/ Coder module. Measure output level of AGC SF/1 signal with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Sig. Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper operation of CARR SEL A signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data Bus (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	CARR SEL A	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/Coder module. Measure output level of CARR SEL A signal with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper operation of CANCEL A Signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29 7/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	CANCEL A	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/ Coder module. Measure output level of CANCEL A signal with DMM. Observe signal presence and level on scope.

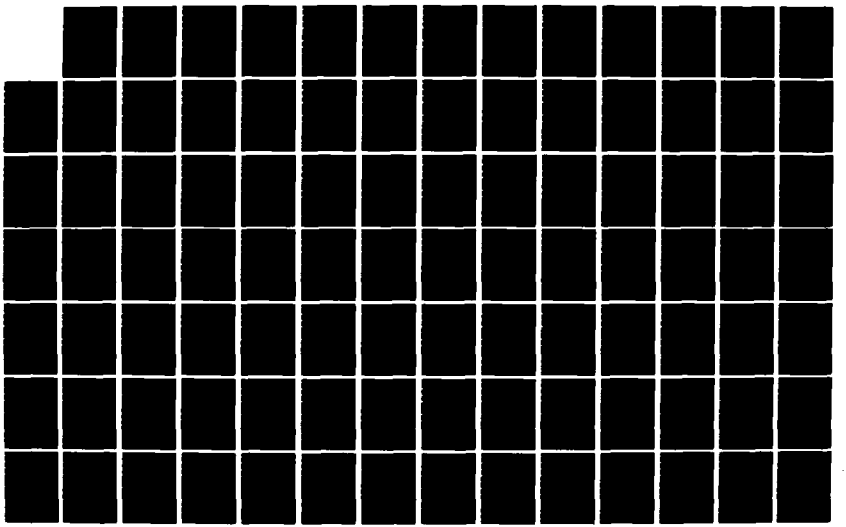
Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

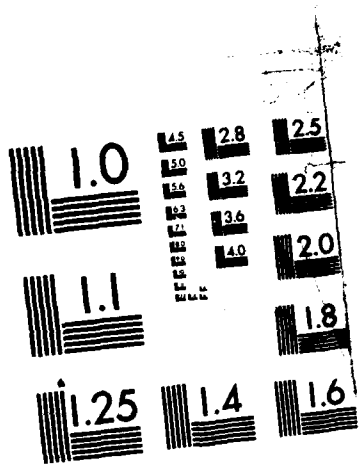
Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

AD-A166 497 UE BENCH TEST PLANS AND REQUIREMENTS VOLUME 1 MAGNAVOX 2/2
UE SET(U) ESSCUBE ENGINEERING INC MARLTON NJ SEP 84
CEA/GPS-85-156-00-030-VOL-1 N62269-82-D-0059

UNCLASSIFIED F/G 14/2 NL





Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper operation of RF SEL signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Func. Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Ser. Data Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	RF SEL	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/ Coder module. Measure output level of RF SEL with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Sig. Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper operation of Noise On/Off Signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29 7/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Ser. Data Gen. (HP-8116A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated and spread by in house designed P or C/A Code and data generator.

** Power splitters needed for these 6 inputs.

X Some sort of breakout board needed to provide different levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	Noise On/Off	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/Coder module. Measure output level of Noise On/Off signal with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See first page notes)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper level of ANT SEL signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29 7/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Serial Data Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	ANT SEL	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/ Coder module. Measure output of ANT SEL with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A) (3)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (HP-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

Contractor: Magnavox

Board Tested: IF/BB/Coder

Test Objective: Verify presence and proper level of Bite SW output signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	Δ Difference	TBD	Function Gen. (HP-8116A)
2.	* 36F + Δ	-24dBm	Signal Gen. (HP-8663A)
3.	** 29 7/8F (2 inputs)	-10dBm	Sweep Gen. (HP-8340A)
4.	** 2F (2 inputs)	TBD	Function Gen. (HP-8116A)
5.	** 6F (2 inputs)	-30dBm	Function Gen. (HP-8116A)
6.	Serial Data Bus	TBD	Log Patt. Gen. (HP-8018A)
7.	X P Code St	TBD	Log Patt. Gen. (HP-8170A)
8.	X 20 MUT	TBD	Log Patt. Gen. (HP-8170A)
9.	X CARR SEL	TBD	Log Patt. Gen. (HP-8170A)
10.	X 1 MUT	TBD	Log Patt. Gen. (HP-8170A)
11.			
12.			

* Signal Generator output must be modulated by an in house designed Code and data generator.

** Power splitters needed for these six inputs.

X Breakout board needed to provide various levels for these inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	Bite SW	TBD	DMM (HP-3478B)
2.			Scope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs of IF/BB/Coder module. Measure output of Bite SW with DMM. Observe signal presence and level on scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)(3)	4.	Ser. Data Gen. (HP-8018A)	7.	Oscilloscope (TEK-2465)
2.	Signal Gen. (HP-8663A)	5.	Log Patt. Gen. (HP-8170A)	8.	Special In house designed equipment (See notes on previous page)
3.	Sweep Gen. (HP-8340A)	6.	DMM (HP-3478B)	9.	
10.	Computer (HP-9836S)	11.	Printer (HP-2671G)	12.	Plotter (HP-7475A)

3.1.1.4 PRE AMPLIFIER UNIT MODULE

Contractor: Magnavox

Board Tested: Pre Amp Unit

Test Objective: Measure PAU noise figure

Inputs

	Input Name	Input Level	Equipment Used
1.	Noise Input	TBD	Noise Source (HP-346B)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

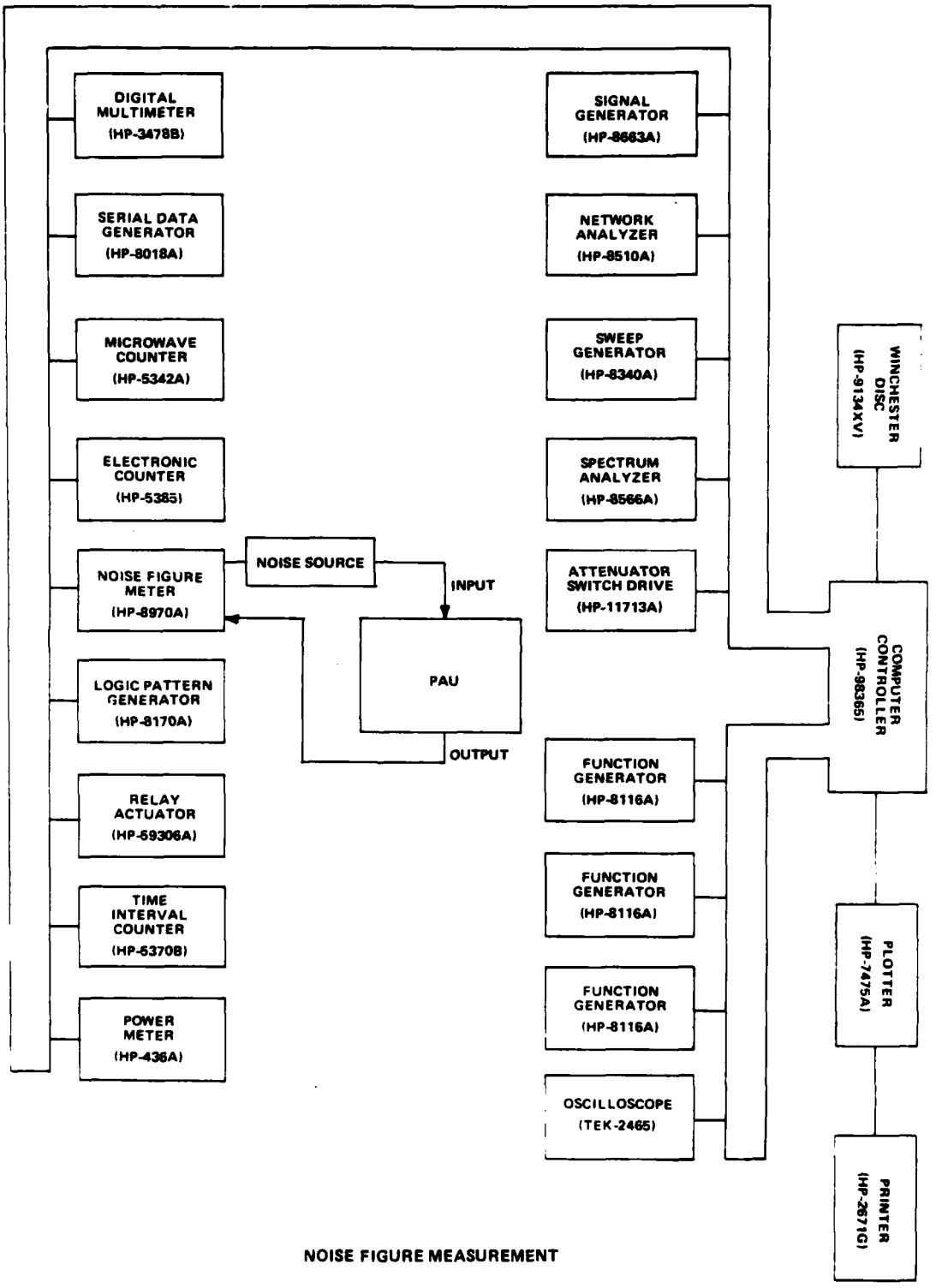
	Output Name	Output Level	Equipment Used
1.	NF	5dB Max	Noise Meter (HP-8970A)
2.			
3.			
4.			
5.			

Test Procedure: Hook up unit under test as shown in diagram. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper input level to PAU. Measure NF with meter.

Data Reduction: Record Noise Figure on printer.

Equipment List:

1.	Noise Source (HP-346B)	4.	Printer (HP-2671G)	7.	
2.	NF Meter (HP-8970A)	5.		8.	
3.	Computer (HP-9836S)	6.		9.	



NOISE FIGURE MEASUREMENT

Contractor: Magnavox

Board Tested: PAU

Test Objective: Verify proper frequency output from Preamp unit

Inputs

	Input Name	Input Level	Equipment Used
1.	L1/L2	1227.60/1575.42MHz	Signal Generator (HP-8663A)
2.			Attenuator
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

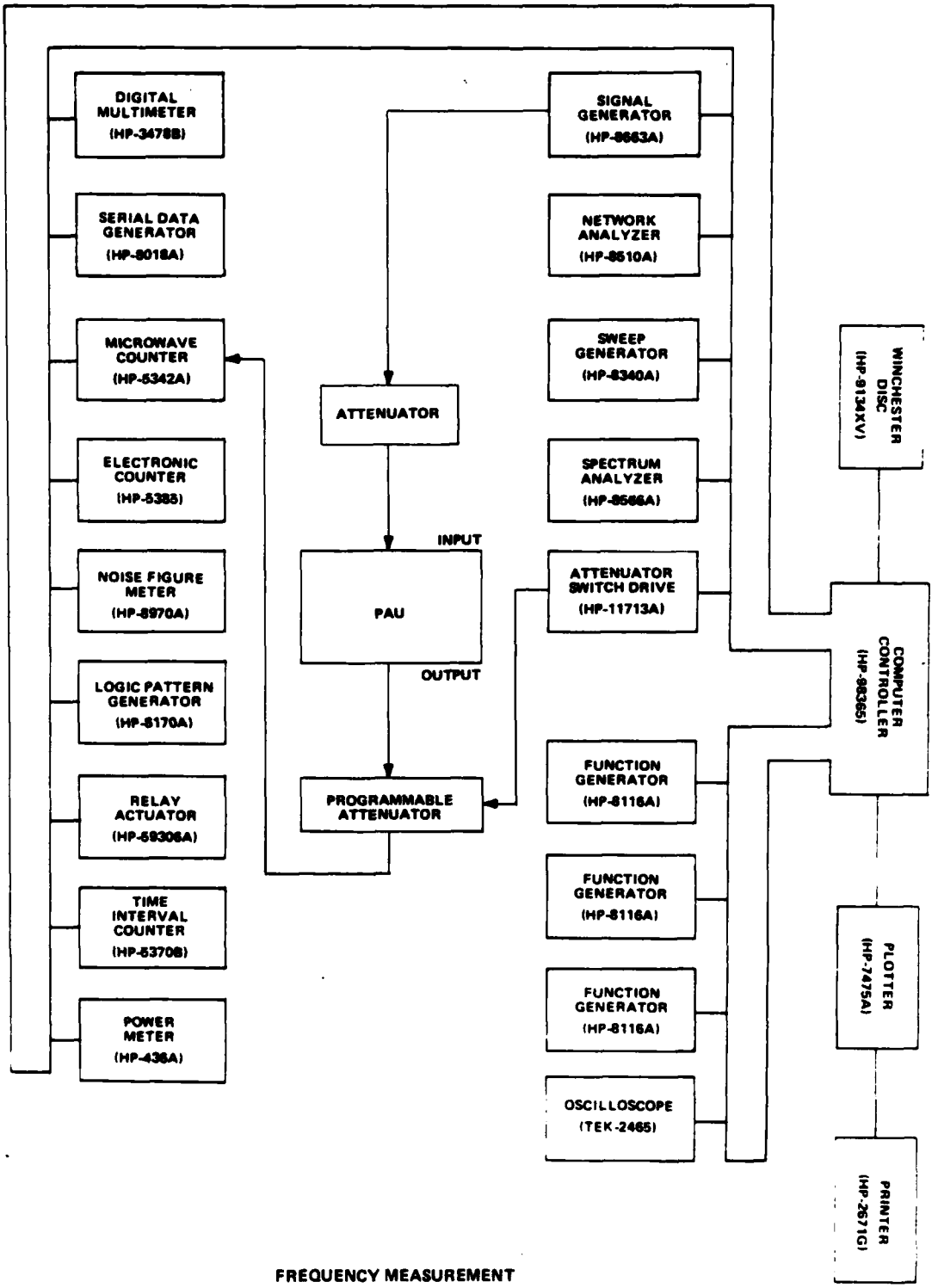
	Output Name	Output Level	Equipment Used
1.	L1/L2	1227.60/1575.42MHz	Micro Ctr (HP-5342A)
2.			Prog Atten (HP-84946)
3.			Atten Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in diagram. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper input levels to PAU. Measure PAU output frequency with Micro Counter.

Data Reduction: Send input levels and output of Microwave Counter to printer.

Equipment List:

1.	Signal Gen (HP-8663A)	4.	Printer (HP-2671G)	7.	Att. Sw Drive (HP-11713A)
2.	Attenuator	5.	Micro Ctr (HP-5342A)	8.	
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	



FREQUENCY MEASUREMENT

Contractor: Magnavox

Board Tested: Pre-Amp Unit

Test Objective: Verify proper power output and gain for PAU

Inputs

	Input Name	Input Level	Equipment Used
1.	L1/L2	-163dbW	Signal Generator (HP-8663A)
2.			Attenuator
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

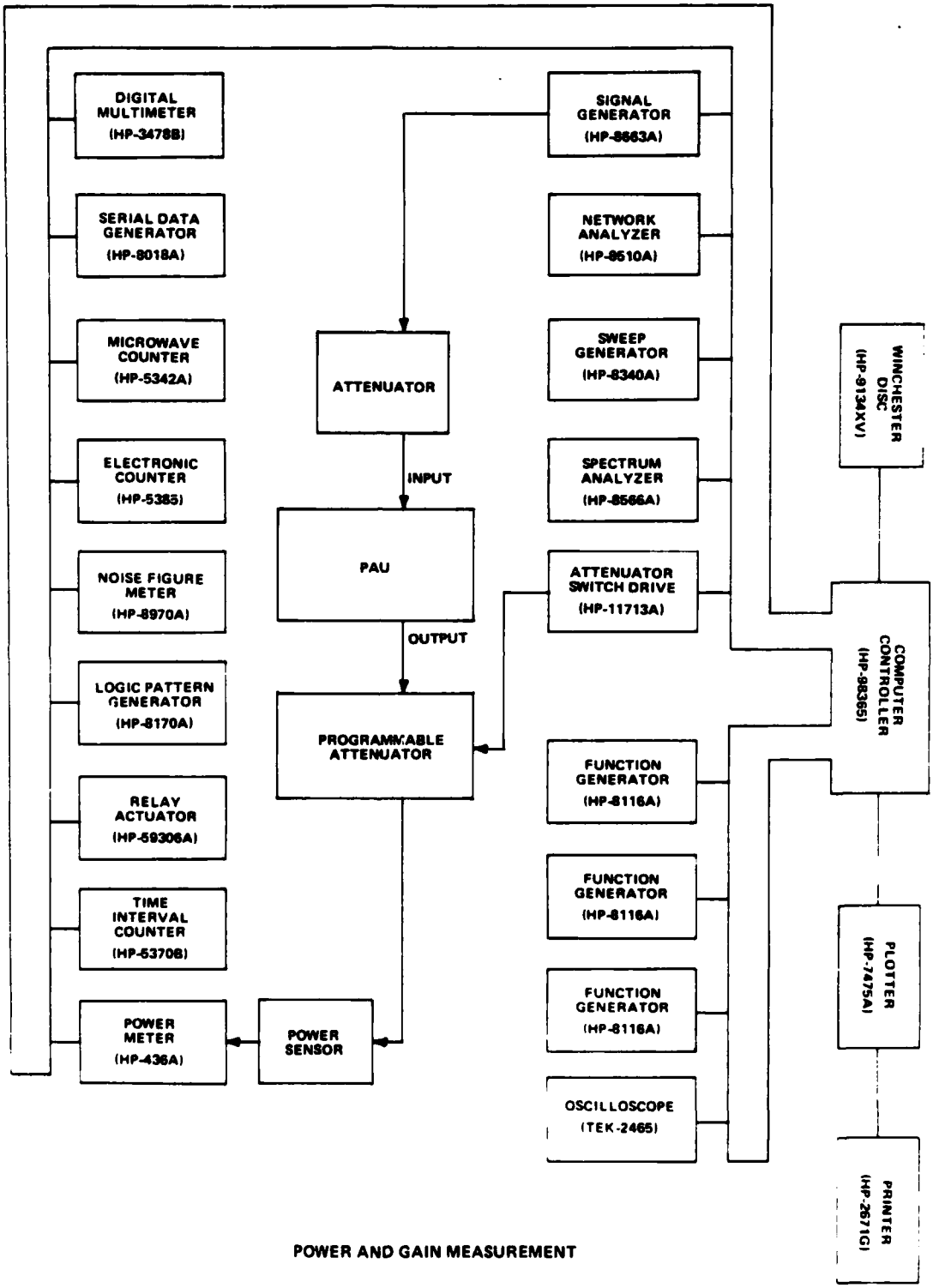
	Output Name	Output Level	Equipment Used
1.	L1/L2	-120dbW	Power Meter (HP-436A)
2.	GAIN	43db	Power Sensor (HP-8481A)
3.			Prog Atten (HP-8494G)
4.			Att Sw Drive (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in diagram. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper input level to PAU. Measure PAU output power with Power Meter.

Data Reduction: Record input levels and output power measurement on printer. GAIN can be computed.

Equipment List:

1.	Sig Gen (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Attenuator	5.	Power Meter (HP-436A)	8.	Att. Sw Drive (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	



POWER AND GAIN MEASUREMENT

Contractor: Magnavox

Board Tested: Pre-Amp Unit

Test Objective: Measure input/output VSWR

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	(1565.42 to 1585.42MHz) @ TBD	Sweep Gen. (HP-8340A)
2.	S-Par Test Set	(1217.6 to 1237.6MHz) @ TBD	Sweep Gen. (HP-8340A)
3.	S-Par Test Set	(1565.42 to 1585.42MHz) @ TBD	Sweep Gen. (HP-8340A)
4.	S-Par Test Set	(1217.6 to 1237.5MHz) @ TBD	Sweep Gen. (HP-8340A)
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

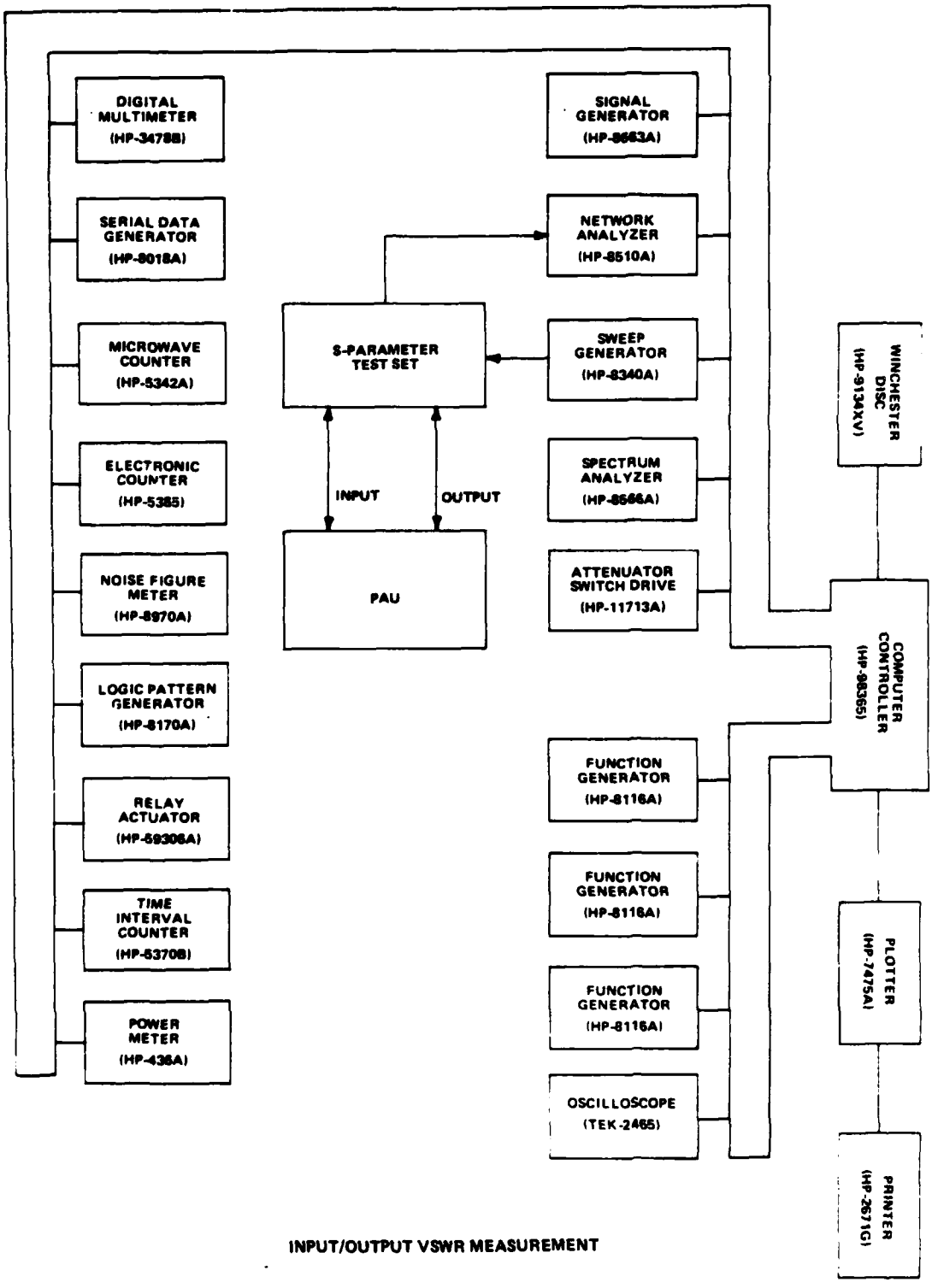
	Output Name	Output Level	Equipment Used
1.	L1	1.5:1 (max)	S-Par Test Set (HP-8515A
2.	L2	1.5:1 (max)	Network Anal. (HP-8510A)
3.	RF Out	1.5:1 (max)	
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Connect the input of the PAU to one port of the S-parameter test set and the output of the PAU to the other test port. Set Sweep Generator to sweep through L1 and measure S11 (input reflection coefficient) and L1 S22 (output reflection coefficient). Set Sweep Generator to sweep through L2 and repeat measurements.

Data Reduction: Output data from Network Analyzer to plotter and send input levels to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Sweep Gen. (HP-8340A)	6.	Plotter (HP-7475A)	9.	



INPUT/OUTPUT VSWR MEASUREMENT

Contractor: Magnavox

Board Tested: Pre-Amp Unit

Test Objective: Check spectral content, and selectivity (3db and 60dB Bandwidth) of PAU output

Inputs

	Input Name	Input Level	Equipment Used
1.	L1/L2	1227.6/1575.42MHz	Sig. Gen. (HP-8663A)
2.		@ -163dbW	Attenuator
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

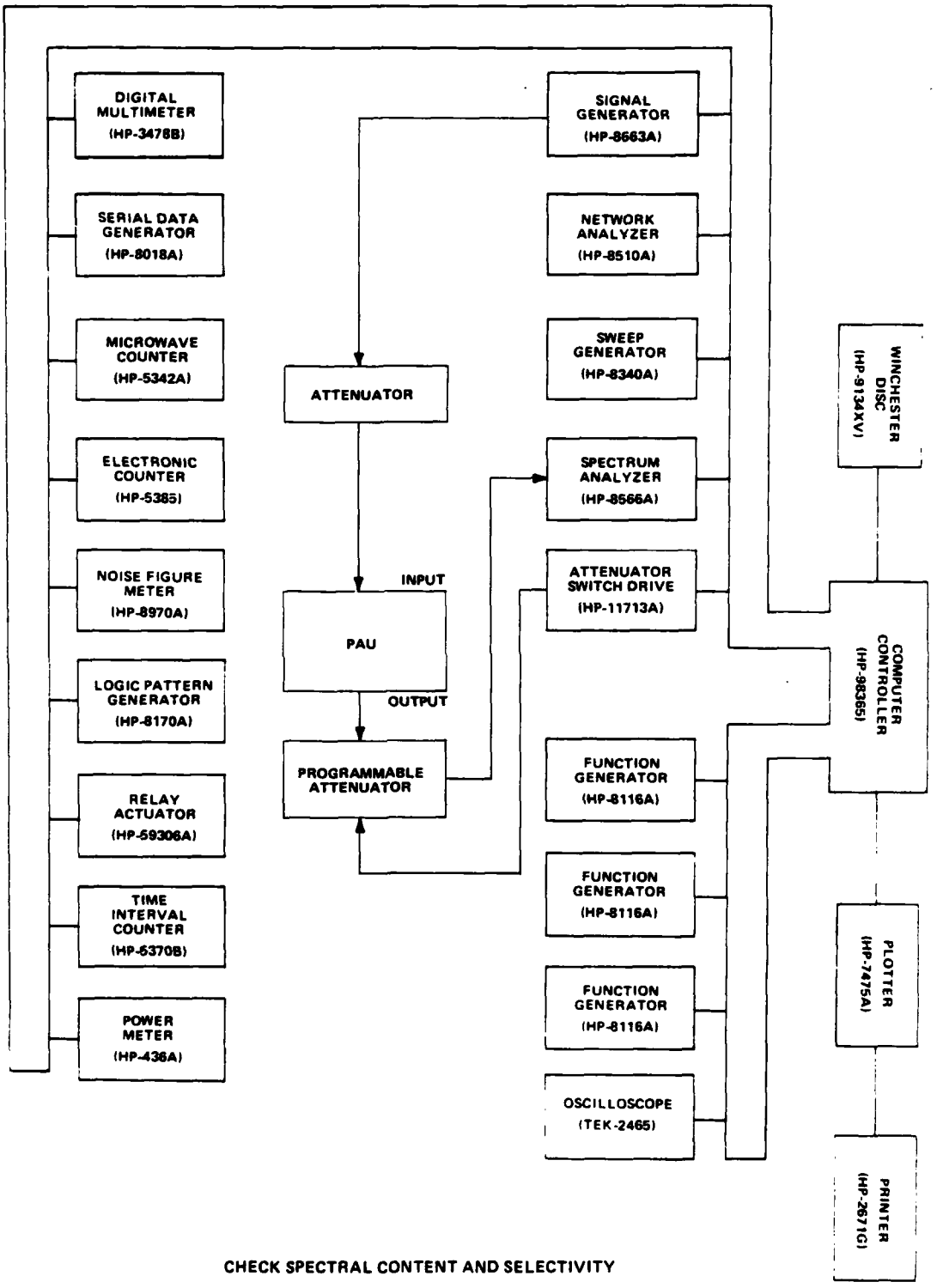
	Output Name	Output Level	Equipment Used
1.	L1/L2	1227.6/1575.42 @ -120dBW	Spec Analyzer (HP-8566A)
2.	3dB BW	14MHz	Prog Atten (HP-8494G)
3.	60dB BW	200MHz	Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in diagram. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper input level to PAU. Measure output quantities using Spectrum Analyzer.

Data Reduction: Record input levels with printer. Output Spectrum Analyzer data to plotter.

Equipment List:

1.	Sig Gen (HP-8663A)	4.	Spec Anal (HP-8566A)	7.	Printer (HP-2671G)
2.	Attenuator	5.	Prog Atten (HP-8494G)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Att SW Drive (HP-11713A)	9.	



CHECK SPECTRAL CONTENT AND SELECTIVITY

Contractor: Magnavox

Board Tested: Pre-Amp Unit

Test Objective: Verify burnout protection level

Inputs

	Input Name	Input Level	Equipment Used
1.	In Band Signal	up to +30dbm	Sig Gen. (HP-8663A)
2.			Amplifier
3.			Prog. Atten. (HP-8494G)
4.			Att Sw Drive (HP-11713A)
5.			Power Sensor (HP-8481A)
6.			Power Meter (HP-436A)
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

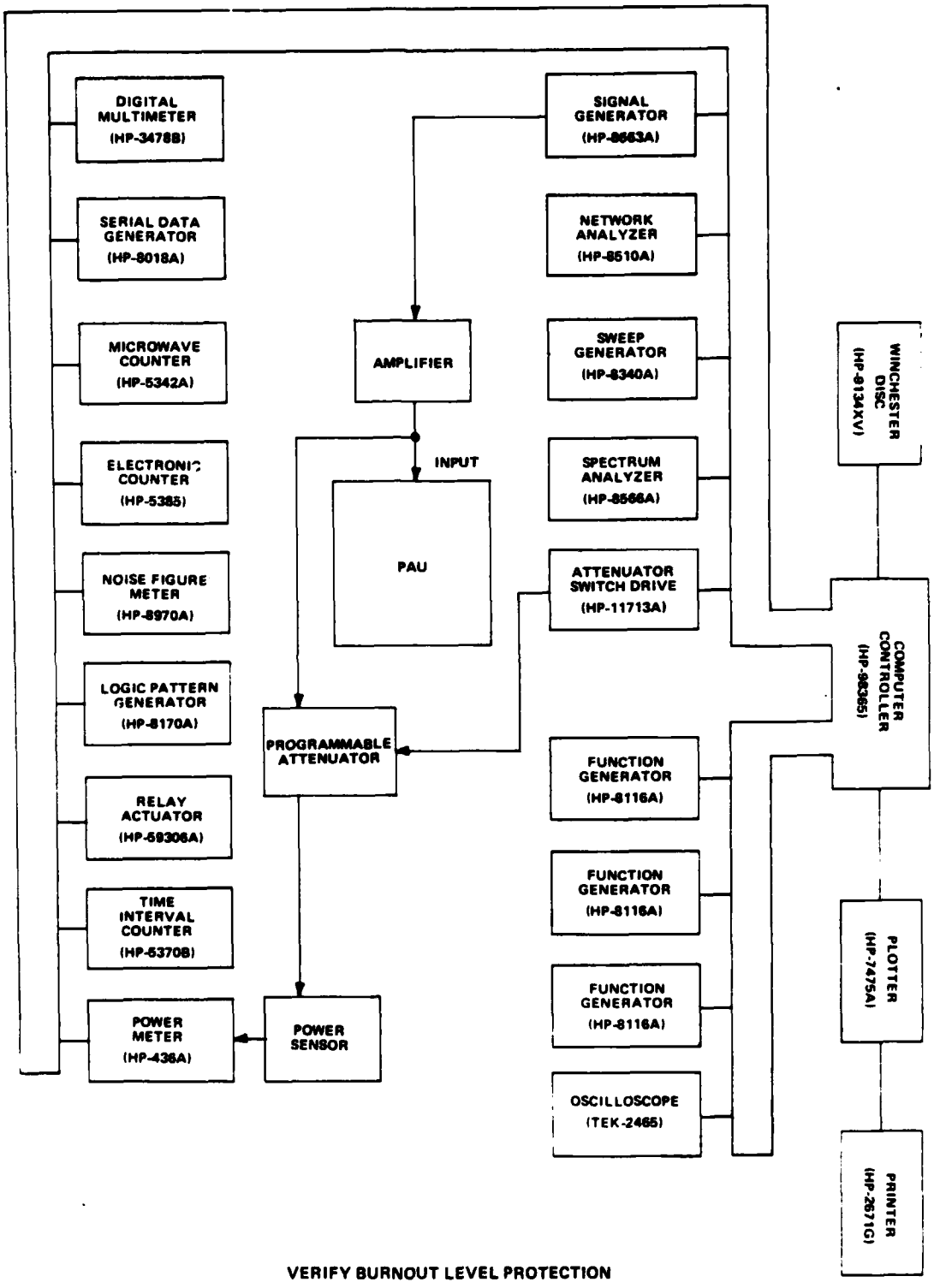
	Output Name	Output Level	Equipment Used
1.			
2.			
3.			
4.			
5.			

Test Procedure: Hook up unit under test as shown in diagram. Turn on test equipment. Set measurement equipment to proper ranges. Apply input to PAU increasing to max of +30dbm. Repeat Gain and Noise Figure Tests to insure no permanent damage to PAU.

Data Reduction: Record input levels with printer.

Equipment List:

1.	Sig Gen (HP-8663A)	4.	Power Meter (HP-436A)	7.	Program Atten. (HP-8494G)
2.	Computer (HP-9836S)	5.	Power Sensor (HP-8481A)	8.	Amplifier
3.	Printer (HP-2671G)	6.	Att. Sw Dr. (HP-11713A)	9.	



VERIFY BURNOUT LEVEL PROTECTION

Contractor: Magnavox

Board Tested: Pre-Amp Unit

Test Objective: Measure group delay

Inputs

	Input Name	Input Level	Equipment Used
1.	L1	1575.42MHz @ TBD	Signal Gen. (HP-8663A)
2.	L2	1227.6MHz @ TBD	Signal Gen. (HP-8663A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

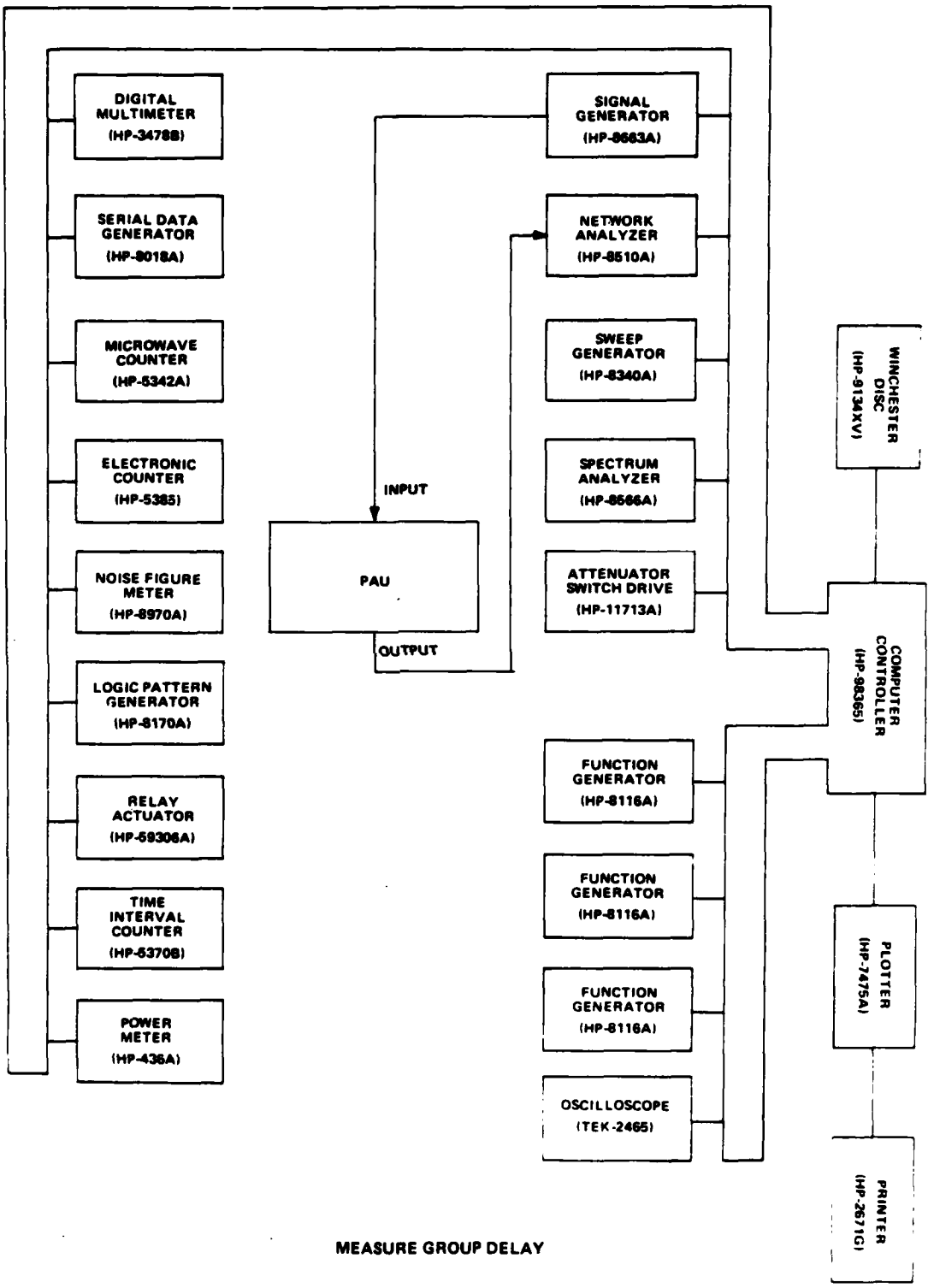
	Output Name	Output Level	Equipment Used
1.	RF Out	TBD	Network Anal. (HP-8510A)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply L1 and L2 to PAU measure group delay with Network Analyzer.

Data Reduction: Output data from Network Analyzer to plotter and send inputs to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Network Anal. (HP-8510A)	7.	
2.	Printer (HP-2671G)	5.	Plotter (HP-7475A)	8.	
3.	Signal Gen. (HP-8663A)	6.		9.	



MEASURE GROUP DELAY

3.1.1.5 REFERENCE OSCILLATOR MODULE

Contractor: Magnavox

Board Tested: Reference Oscillator

Test Objective: Verify proper frequency output.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Voltage	TBD	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

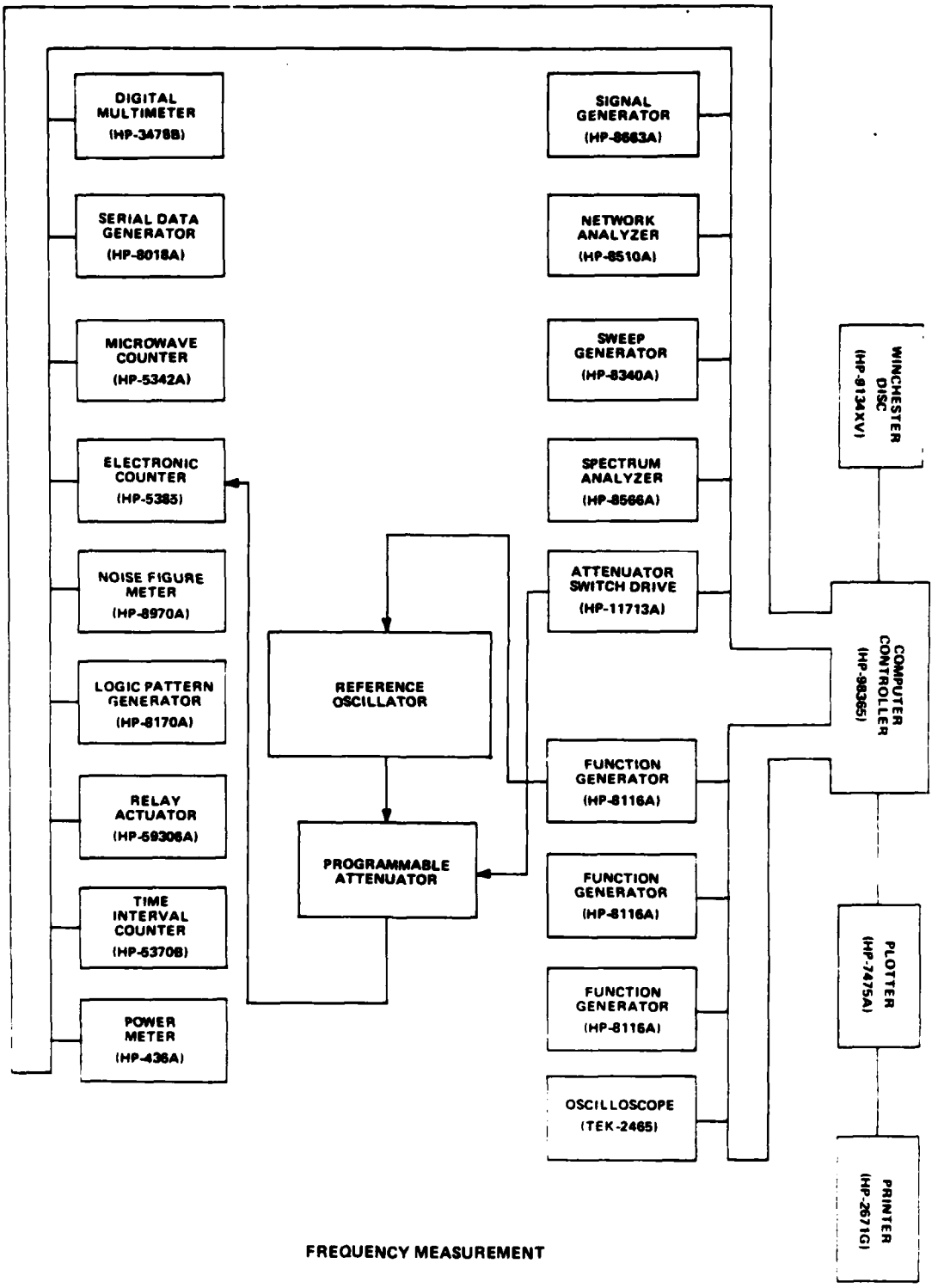
	Output Name	Output Level	Equipment Used
1.	Oscillator Output	10.23MHz	Electronic Counter (HP-5385)
2.			Atten. Switch Drive (HP-11713A)
3.			Prog. Atten. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply DC power to oscillator board. Measure output frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Prog. Atten. (HP-8494G)	7.	
2.	Elec Ctr (HP-5385)	5.	Printer (HP-2671G)	8.	
3.	Atten. Sw Dr. (HP-11713A)	6.	Computer (HP-9836S)	9.	



FREQUENCY MEASUREMENT

Contractor: Magnavox

Board Tested: Reference Oscillator

Test Objective: Verify proper oscillator output power level.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Voltage	TBD	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

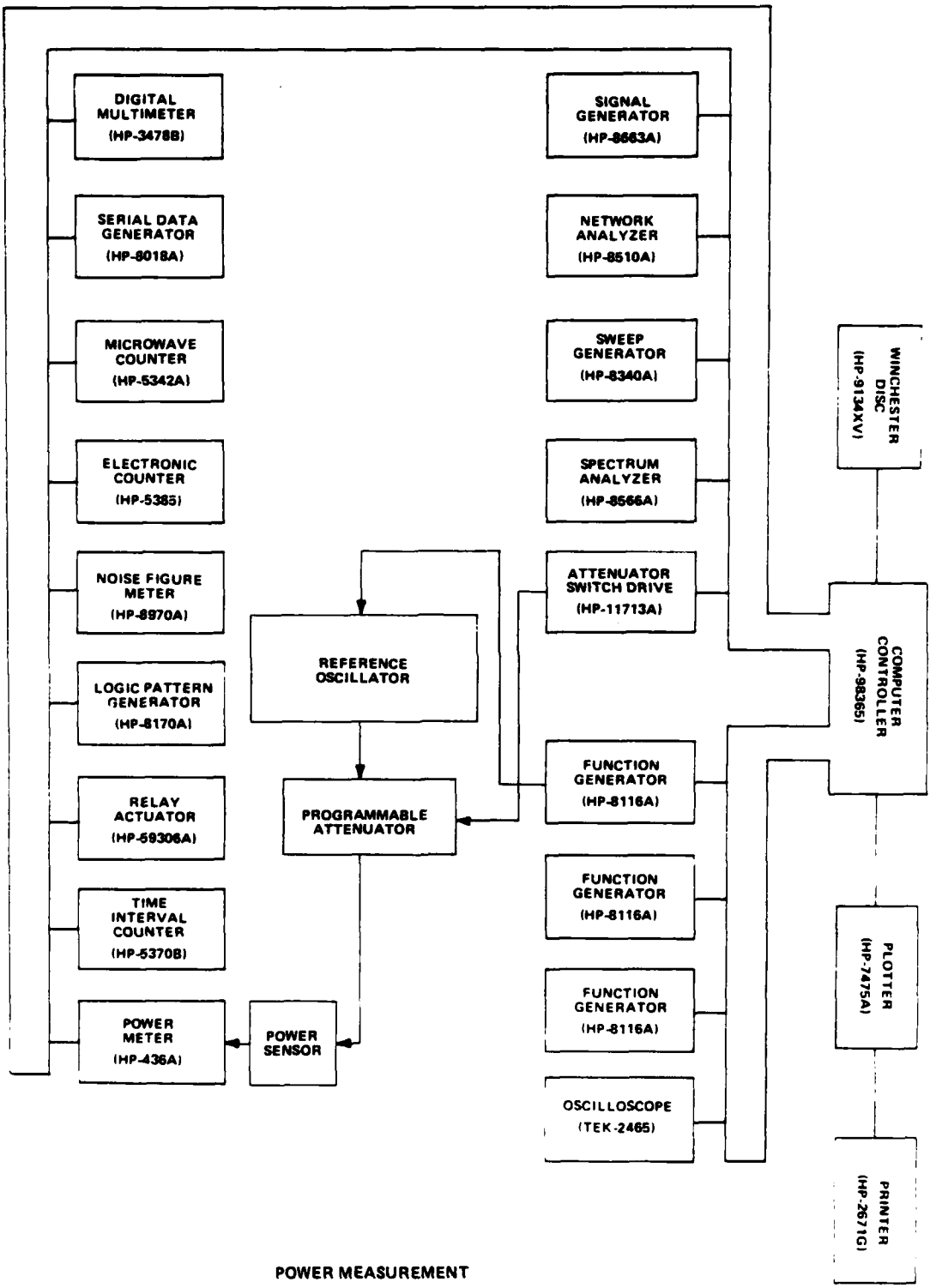
	Output Name	Output Level	Equipment Used
1.	Oscillator Output	+7dBm ±1dB	Power Sensor (HP-8481A)
2.			Power Meter (HP-436A)
3.			Prog Atten. (HP-8494G)
4.			Atten. Sw Drive (HP-11713A)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply DC power to oscillator board. Measure output power level with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Atten. Sw Dr. (HP-11713A)	7.	Computer (HP-9836S)
2.	Power Sensor (HP-8481A)	5.	Prog. Atten. (HP-8494G)	8.	
3.	Power Meter (HP-436A)	6.	Printer (HP-2671G)	9.	



POWER MEASUREMENT

Contractor: Magnavox

Board Tested: Reference Oscillator

Test Objective: Check oscillator output for spectral content.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Voltage	TBD	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

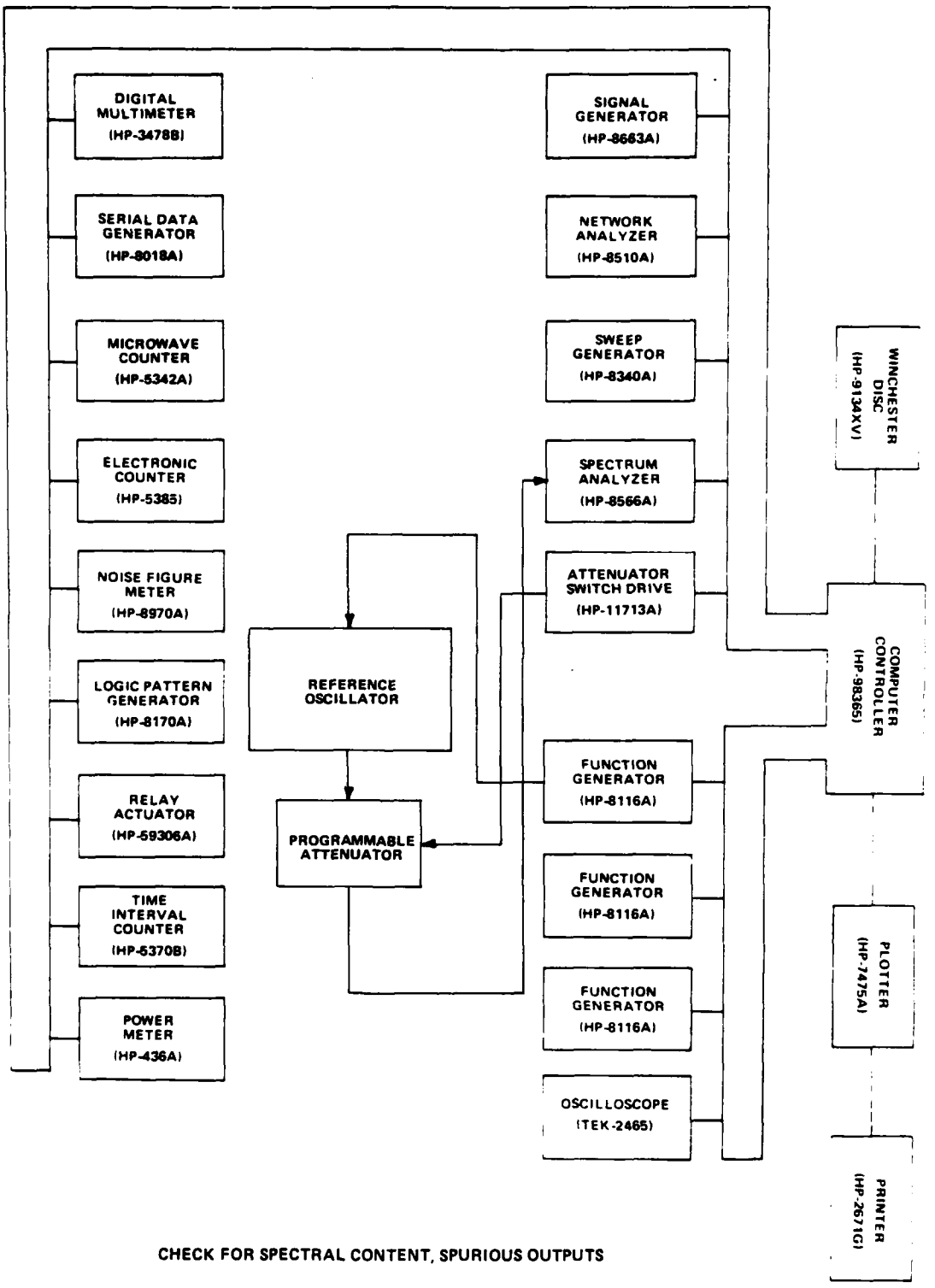
	Output Name	Output Level	Equipment Used
1.	Oscillator output	+7dBm at 10.23MHz	Spect. Analyzer (HP-8566A)
2.			Atten. Sw Dr. (HP-11713A)
3.			Prog. Atten. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply DC power to oscillator board. Check spectral content of oscillator output for spurious outputs, harmonic levels etc.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Prog. Atten. (HP-8[illegible])
2.	Spect. Analyzer (HP-8566A)	5.	Plotter (HP-7[illegible])
3.	Att. Sw Dr. (HP-11713A)	6.	Computer (HP-9836[illegible])



CHECK FOR SPECTRAL CONTENT, SPURIOUS OUTPUTS

Contractor: Magnavox

Board Tested: Reference Oscillator

Test Objective: Check oscillator output for stability, residual FM, noise sidebands, and phase noise.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Voltage	TBD	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

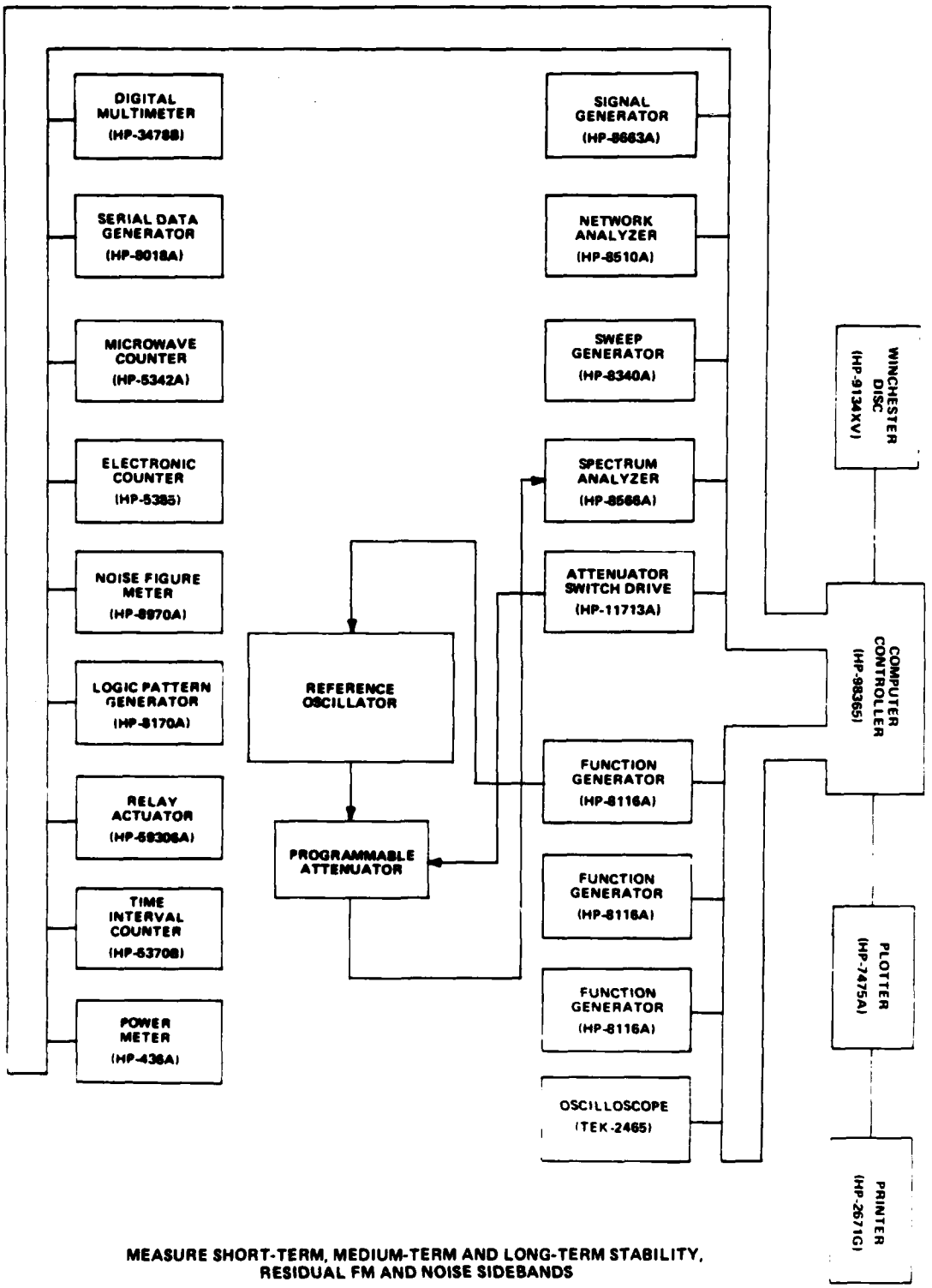
	Output Name	Output Level	Equipment Used
1.	Oscillator Output	Short term Stab. 1×10^{-12} (1-100 sec)	Spect. Analyzer (HP-8566A)
2.		1×10^{-11} (.1-1000 sec)	Prog. Atten. (HP-8494G)
3.		Phase Noise -115dBc (2Hz)	Atten. Sw Drive (HP-11713A)
4.		Long term Stab. - TBD	
5.		Noise Sidebands - TBD Residual FM - TBD	

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply DC power to oscillator board. Measure short and long term stability, phase noise, noise sidebands, and residual FM of oscillator output.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Prog. Atten. (HP-8494G)	7.	Printer (HP-2671G)
2.	Spect. Analyzer (HP-8566A)	5.	Plotter (HP-7475A)	8.	
3.	Atten. Sw Dr. (HP-11713A)	6.	Computer (HP-9836S)	9.	



MEASURE SHORT-TERM, MEDIUM-TERM AND LONG-TERM STABILITY, RESIDUAL FM AND NOISE SIDEBANDS

Contractor: Magnavox

Board Tested: Reference Oscillator

Test Objective: Verify within specification operation of oscillator after 5 minute warm up.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Voltage	TBD	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

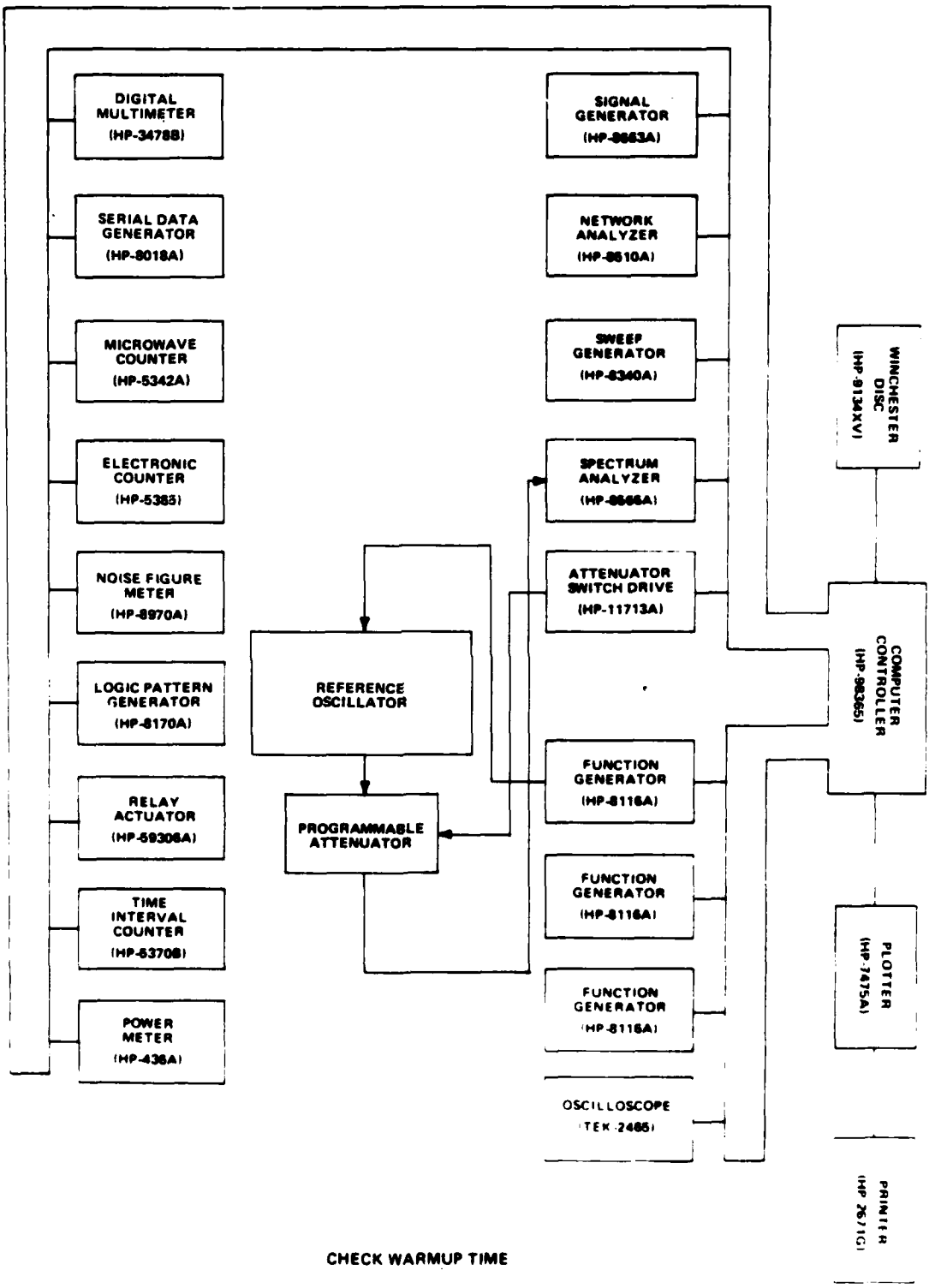
	Output Name	Output Level	Equipment Used
1.	Oscillator Output	---	Spect. Analyzer (HP-8566A)
2.			Atten. Sw Dr. (HP-11713A)
3.			Prog. Atten. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply DC power to oscillator board. After 5 minute specificaiton period take stability reading with Spectrum Analyzer to verify proper operation after the warm up period.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Func. Gen. (HP-8116A)	4.	Prog. Atten. (HP-8494G)	7.	Printer (HP-2671G)
2.	Spect. Anal. (HP-8566A)	5.	Plotter (HP-7475A)	8.	
3.	Atten. Sw Dr. (HP-11713A)	6.	Computer (HP-9836S)	9.	



CHECK WARMUP TIME

4.0 SOFTWARE REQUIREMENTS

This section contains the software requirements for the bench test procedures defined in Section 3. These software requirements are defined in terms of flowcharts.

The software requirements contained herein are written at the functional level. There is a flowchart for each test procedure that illustrates the sequence of events that will be required in order to perform these tests by computer. In addition to these requirements, all tests will include the following capabilities:

- menu driven testing will prompt operator through:
    1. test set-ups
    2. testing
    3. data reduction/storage/hardcopy
- Each test will have a program module number and will be contained in a testing menu. All tests with the same set-ups can be grouped together to be run one after the other.
- Each test will incorporate a full error-checking capability during operator inputs so that no manual error can be entered into the system.
- Data reduction based on baseline data and/or range limits. The specified range values and/or tolerances will be stored and compared to the results obtained from the actual test. The values will be displayed and any differences can quickly be seen.
- There will be real-time monitoring for any bus available information during testing.
- There will be off-line storage or transfer of data for interfacing with the DPSSF/NSL system capabilities. This capability will be used for any information that is needed for the DPSSF, NSL or for RFL data reduction requirements.

- All software will be stored including back-up disks and hardcopy listings in a library which will contain as a minimum the following information in its catalog:
    - program module name and number (disk #)
    - back-up copy # (disk #)
    - date written, by whom
    - date last revised, by whom

There are two floppy disk drives which have a memory of 170k each built into the computer. All information will be stored on either of these floppy disks. There is also a Winchester hard disk provided. This can be used as a temporary storage for data and information obtained while testing, if needed. For example, if a series of tests are being run and many data points are needed to be stored and all of the memory is being used in the computer, this information is stored temporarily on the Winchester disk until processing is complete and then archived onto the floppy disks.

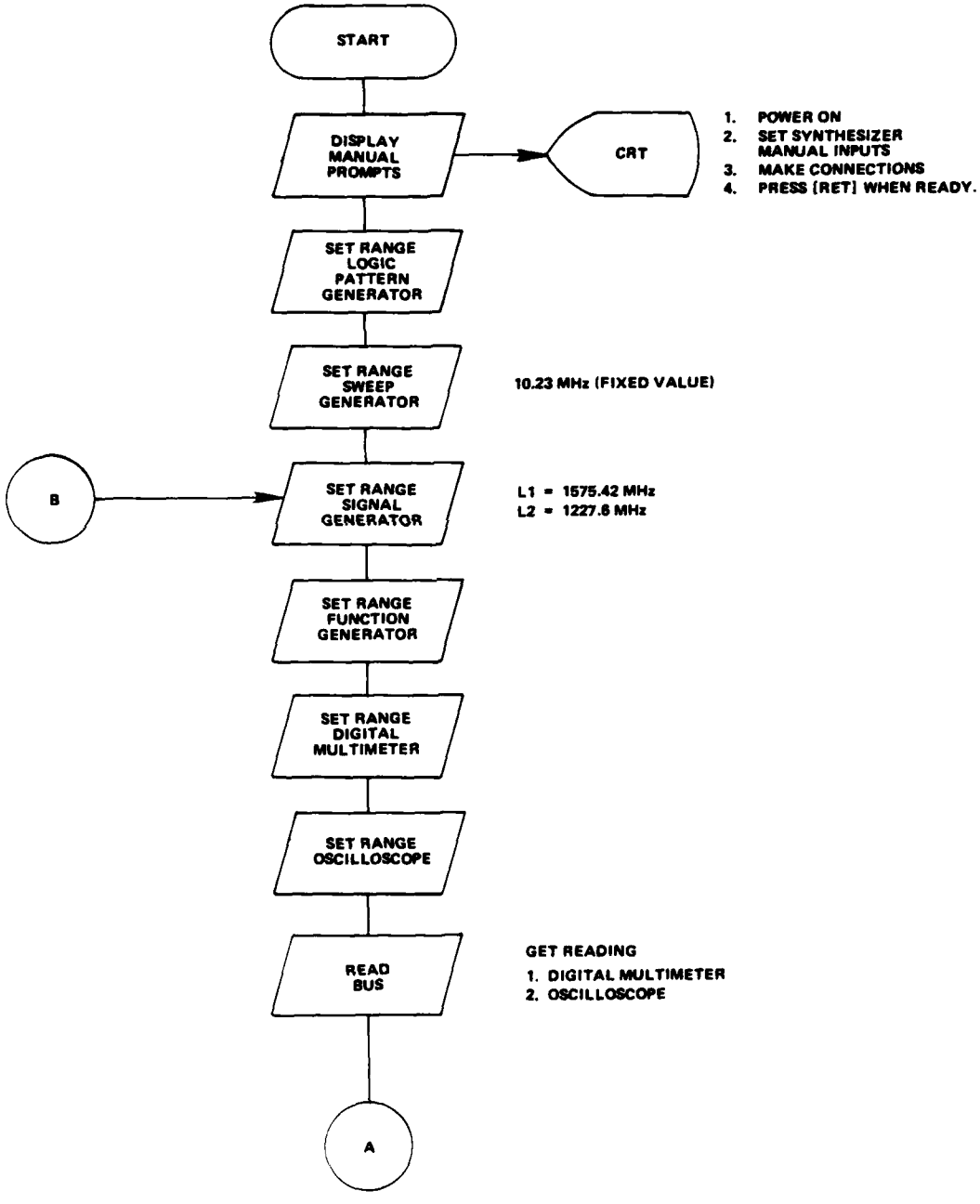
4.1 MAGNAVOX SOFTWARE REQUIREMENTS

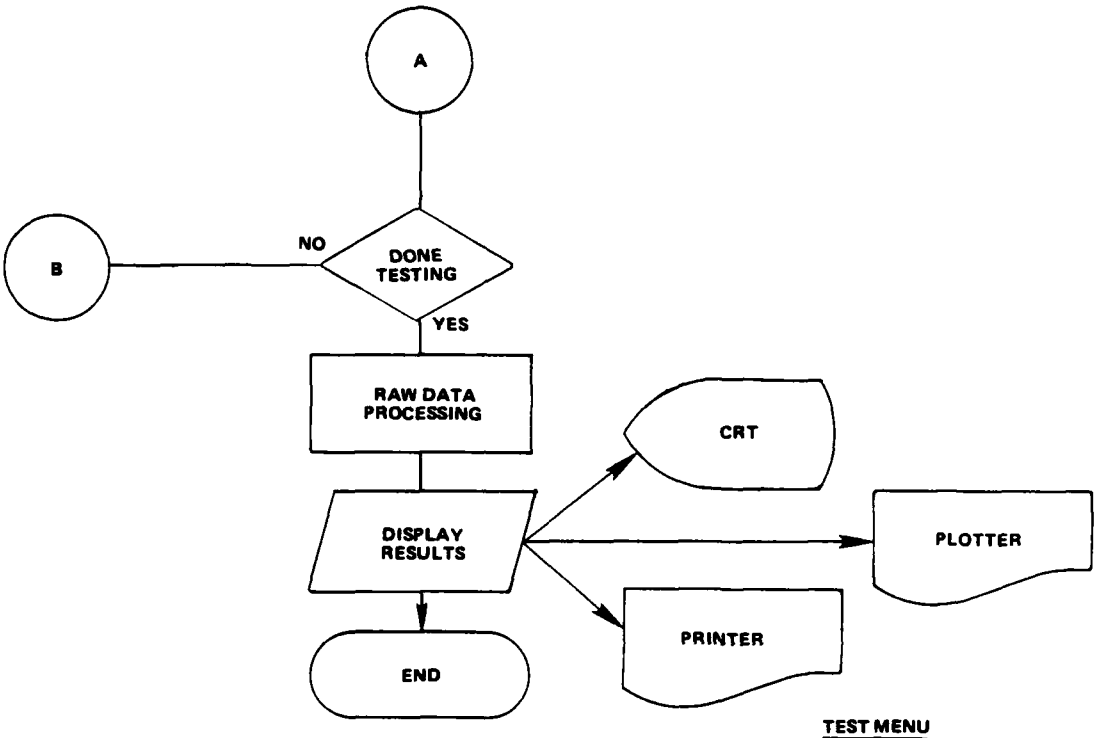
The following sheets contain the software requirements for the Bench test procedures for each of the boards identified in Section 3.1. The software requirements will also be refined and expanded as more detailed information becomes available for the bench tests.

4.1.1 RF SYNTHESIZER MODULE

GAIN AF1 MEASUREMENT

PROGRAM MODULE NAME: _____



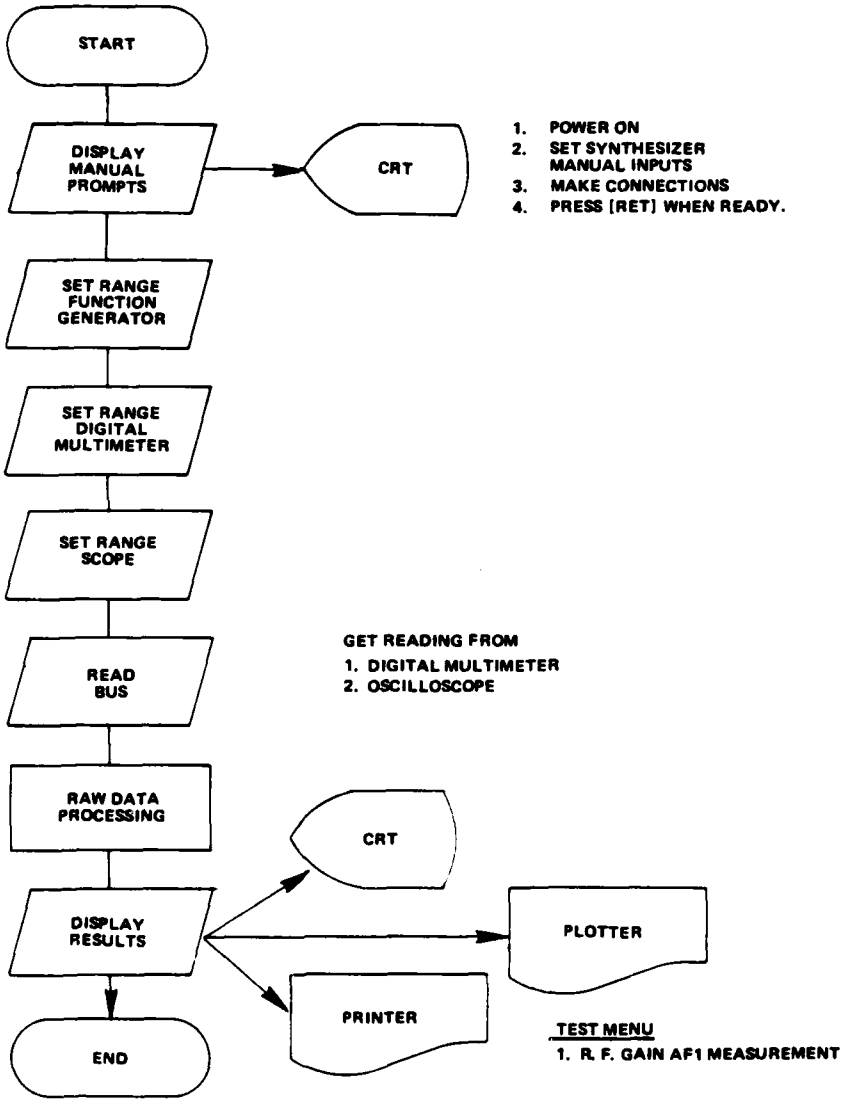


TEST MENU

1. GAIN AF1 MEASUREMENT

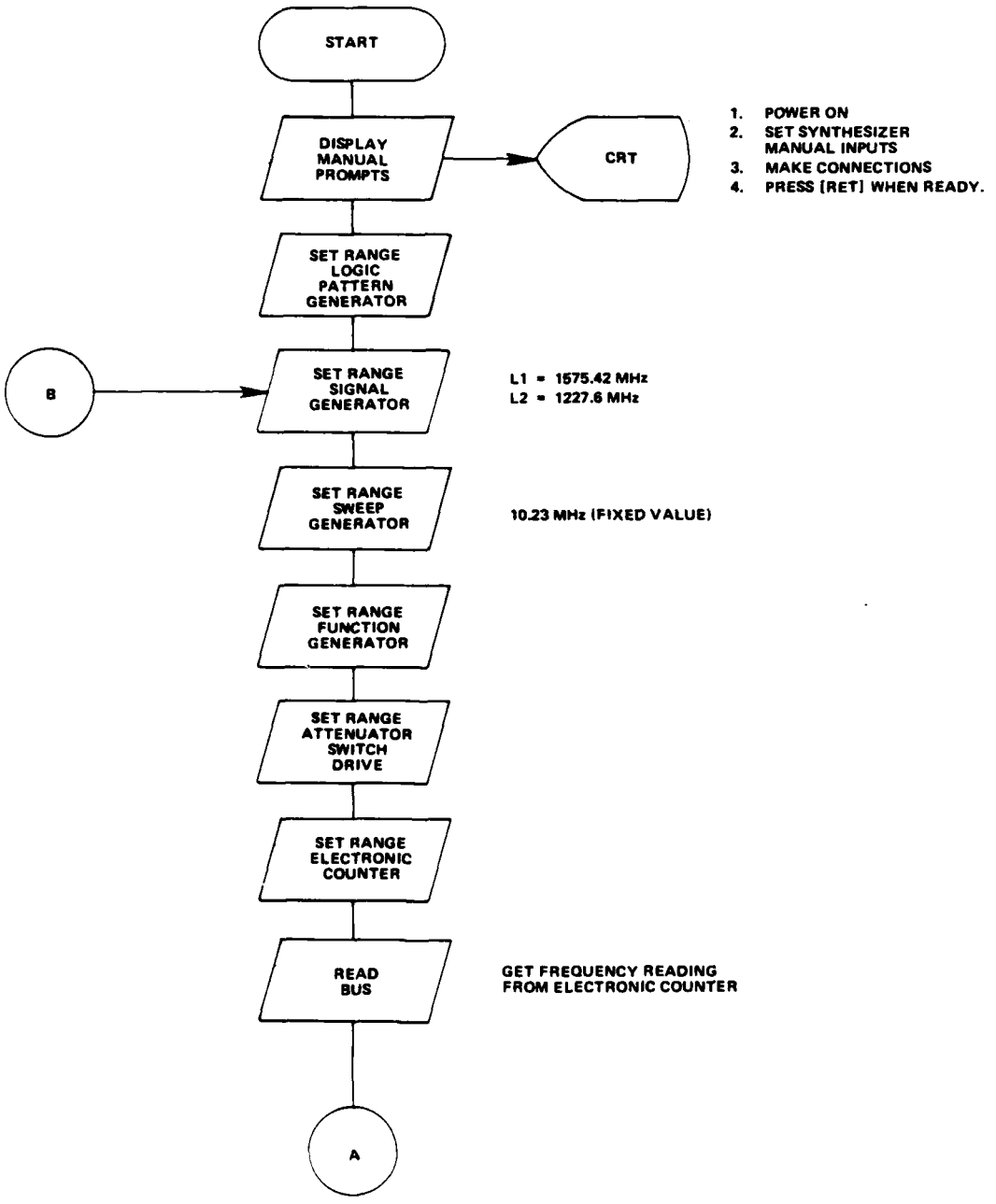
R. F. GAIN AF1 MEASUREMENT

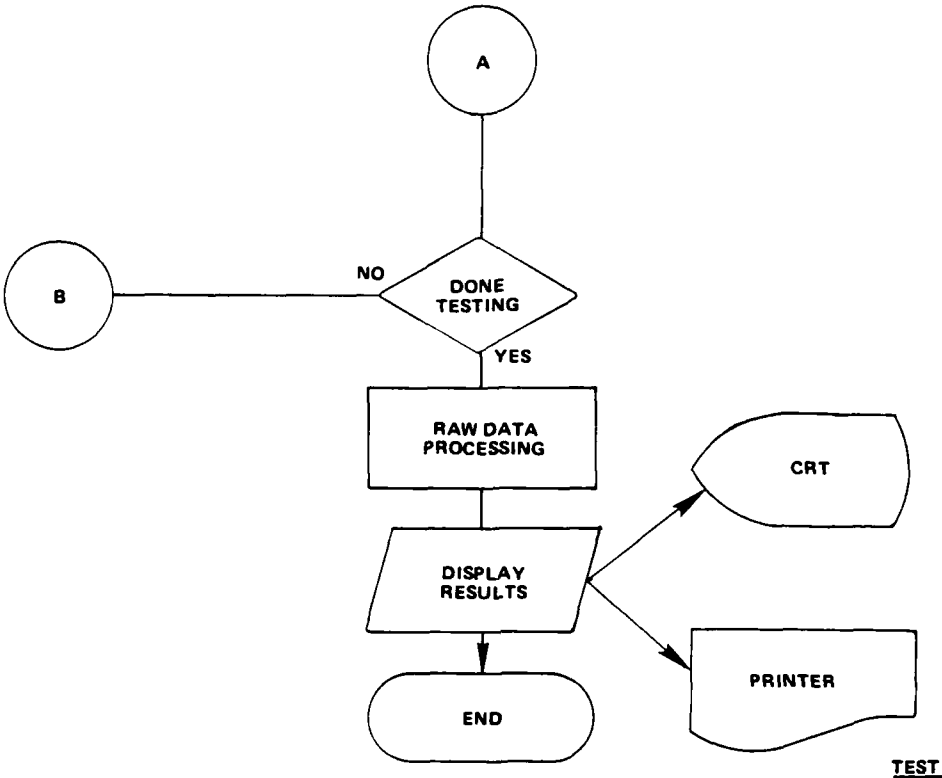
PROGRAM MODULE NAME: _____



36F(IF) OUTPUT FREQUENCY

PROGRAM MODULE NAME: _____



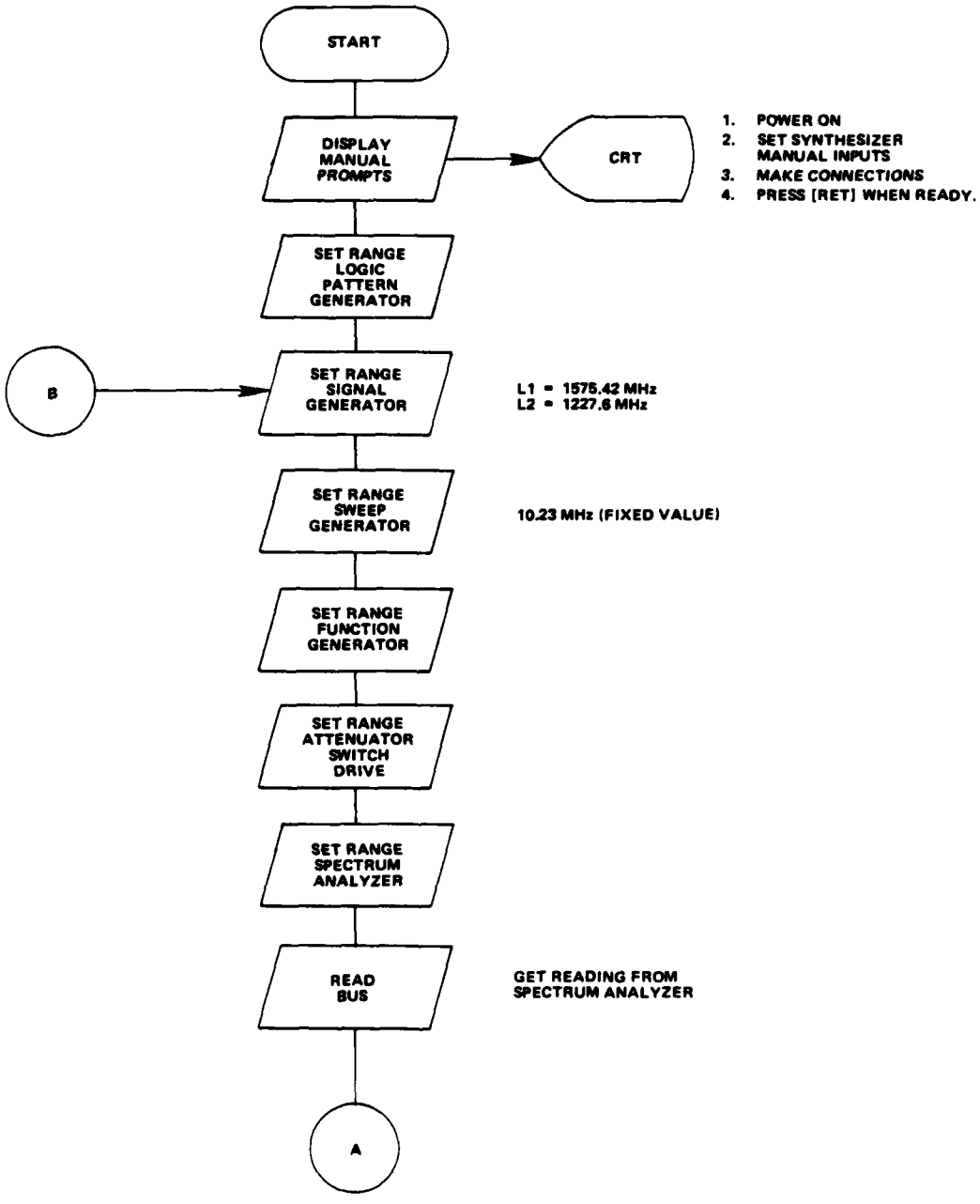


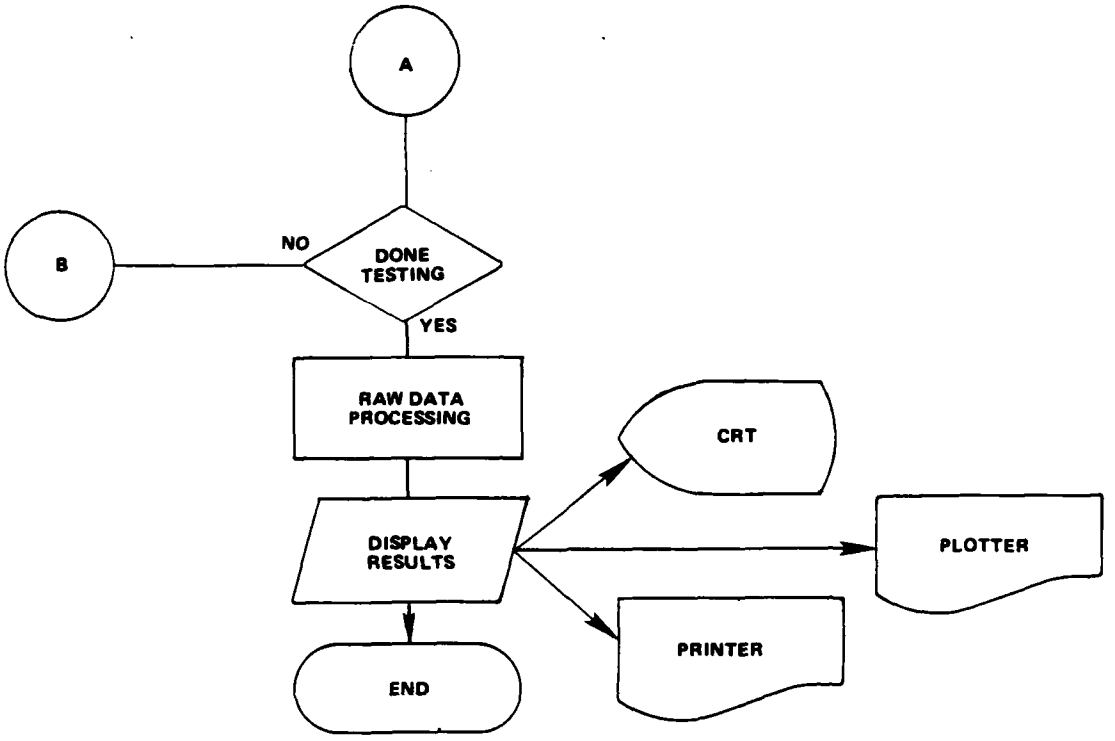
TEST MENU

1. 36F(IF) OUTPUT FREQUENCY

36F(IF) SPECTRAL CONTENT

PROGRAM MODULE NAME: _____



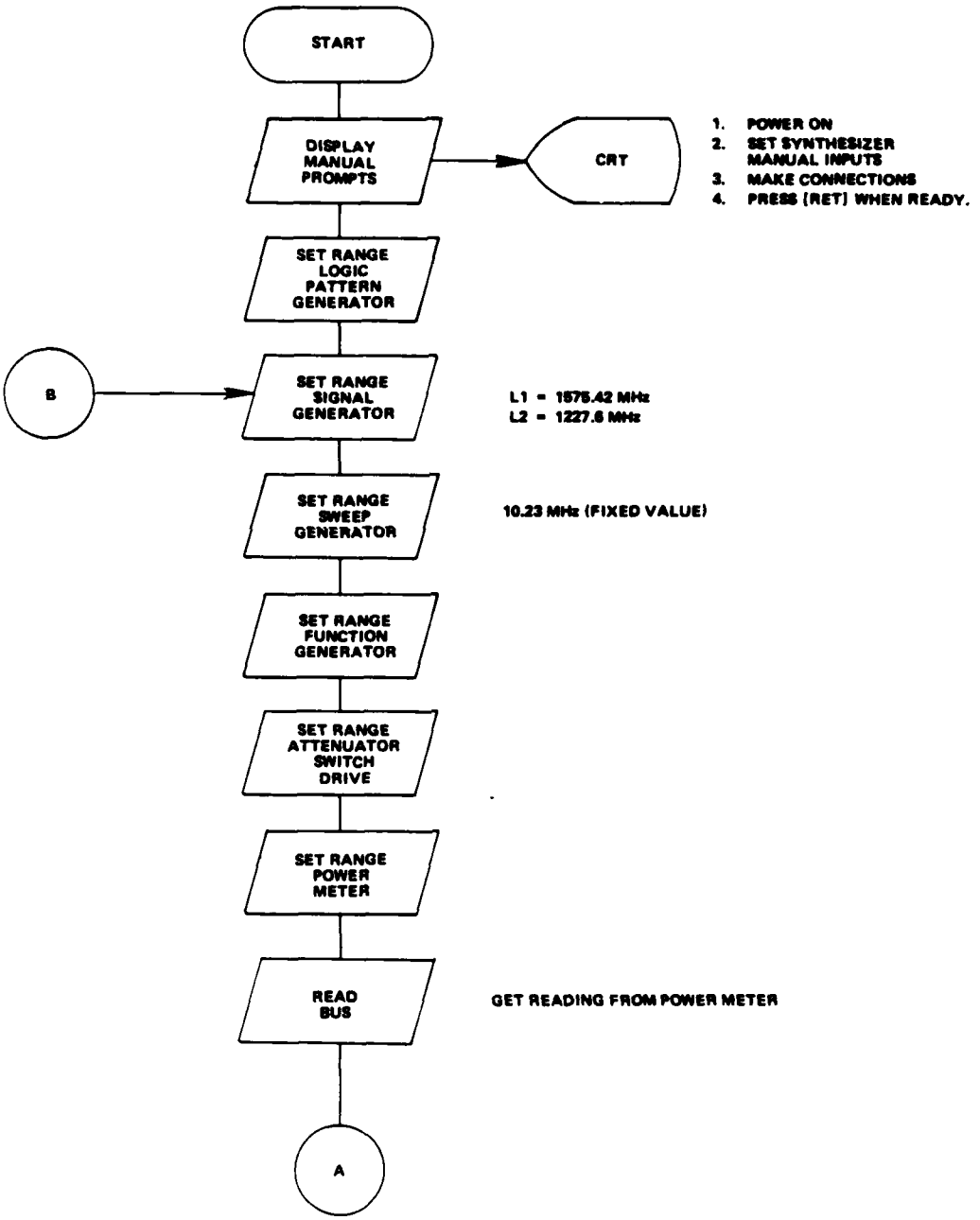


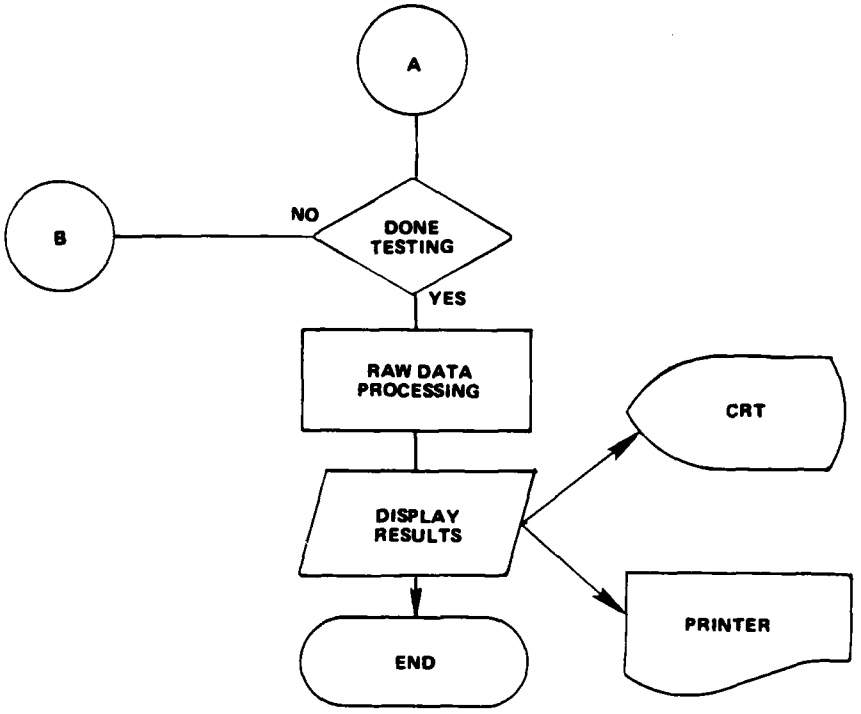
TEST MENU

1. 36F(IF) SPECTRAL CONTENT

36F(IF) OUTPUT POWER MEASUREMENT

PROGRAM MODULE NAME: _____



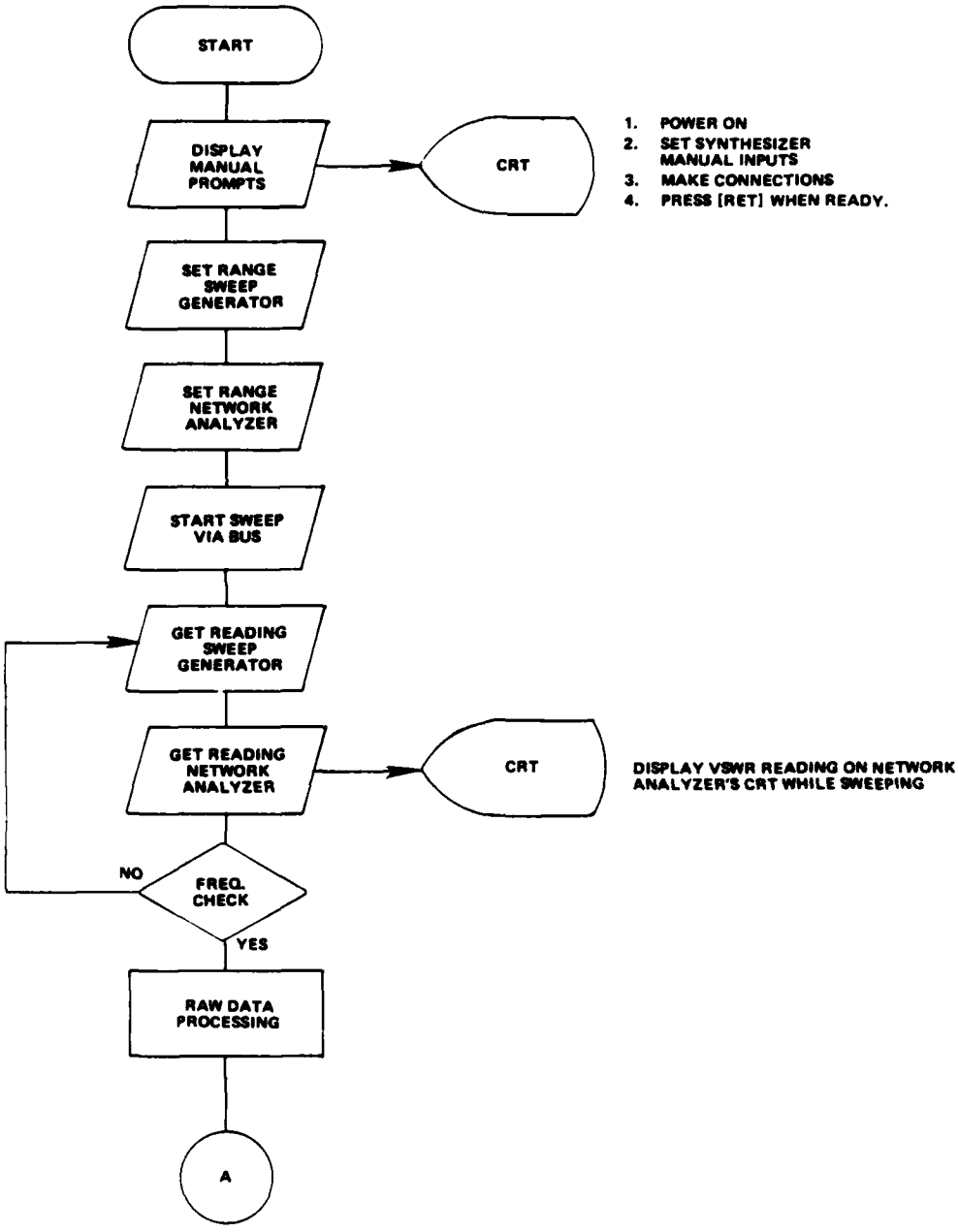


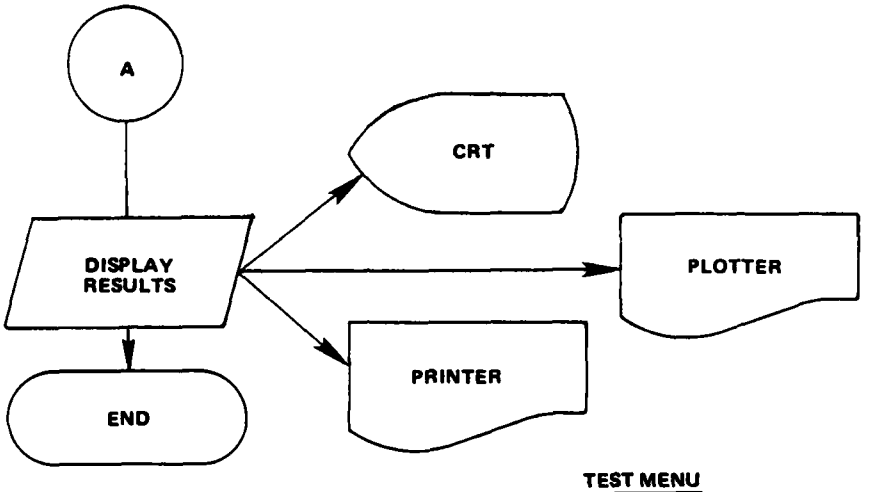
TEST MENU

1. 36F(IF) OUTPUT POWER MEASUREMENT

36F(IF) VSWR AND IMPEDANCE MEASUREMENT

PROGRAM MODULE NAME: _____



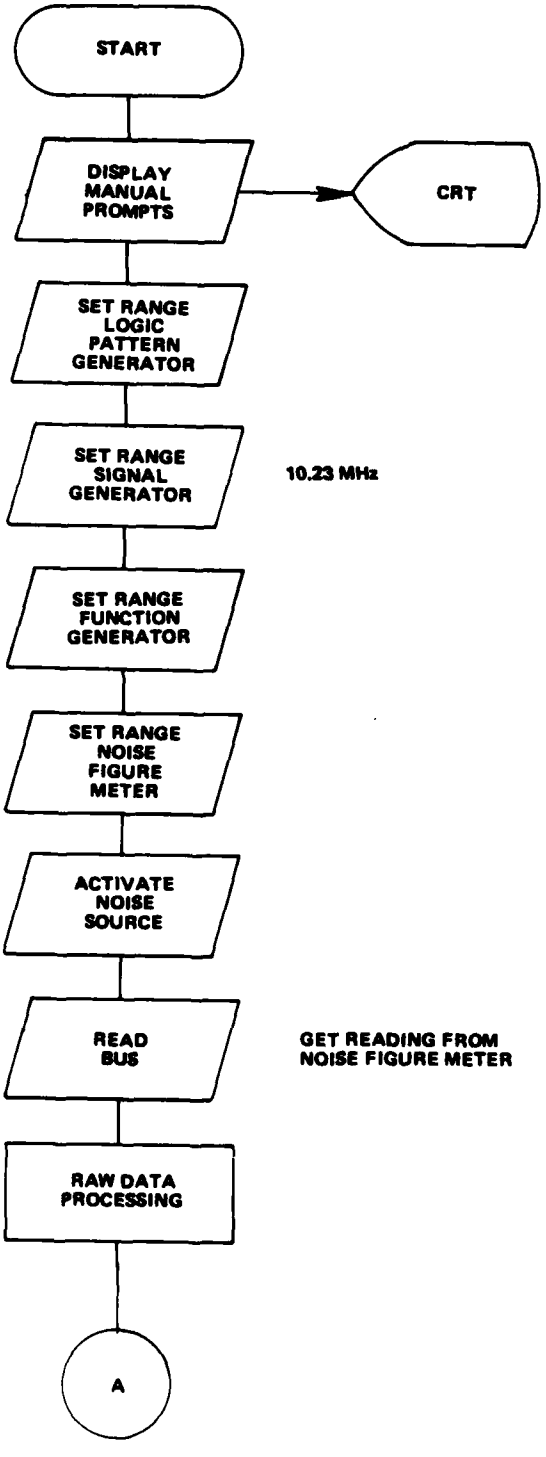


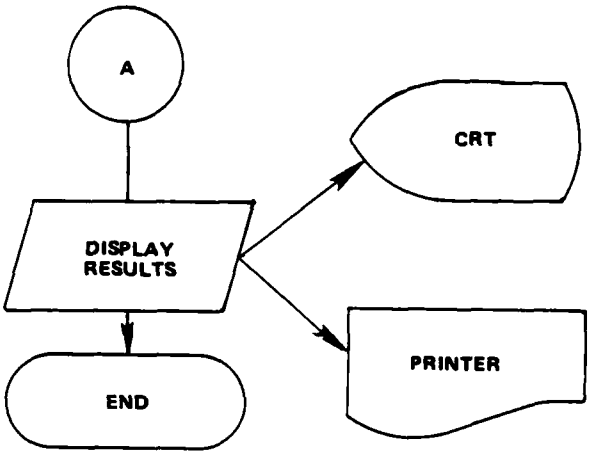
TEST MENU

1. 36F(IF) VSWR AND
   IMPEDANCE MEASUREMENT

36F(IF) NOISE FIGURE MEASUREMENT

PROGRAM MODULE NAME: _____



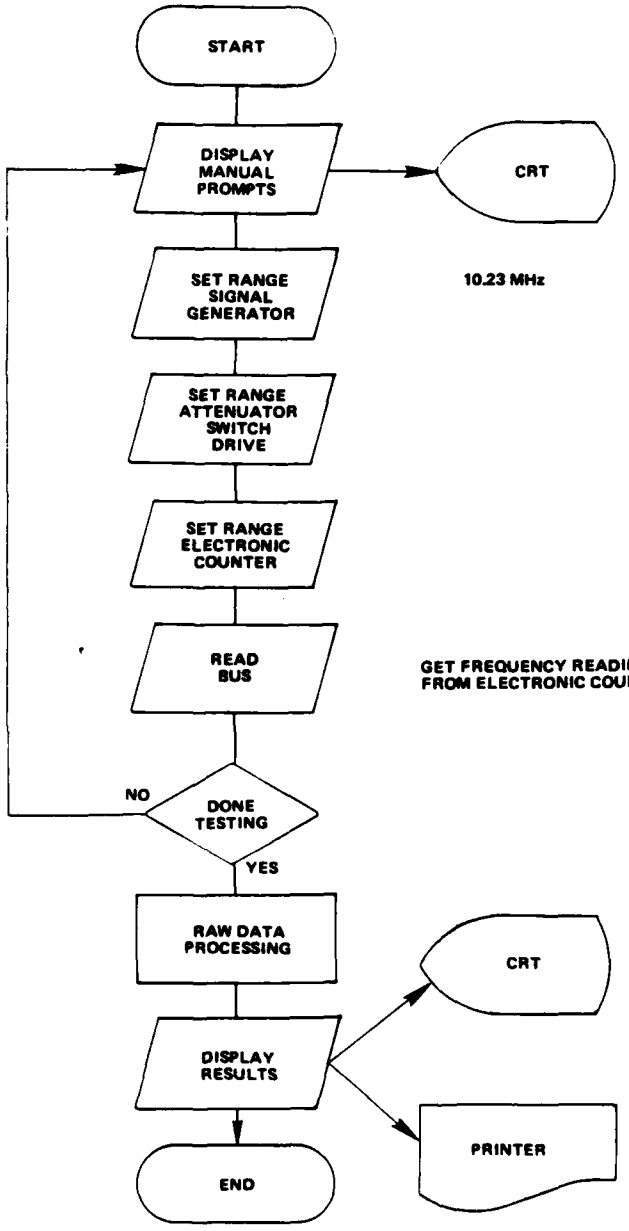


TEST MENU

1. 36F(IF) NOISE FIGURE MEASUREMENT

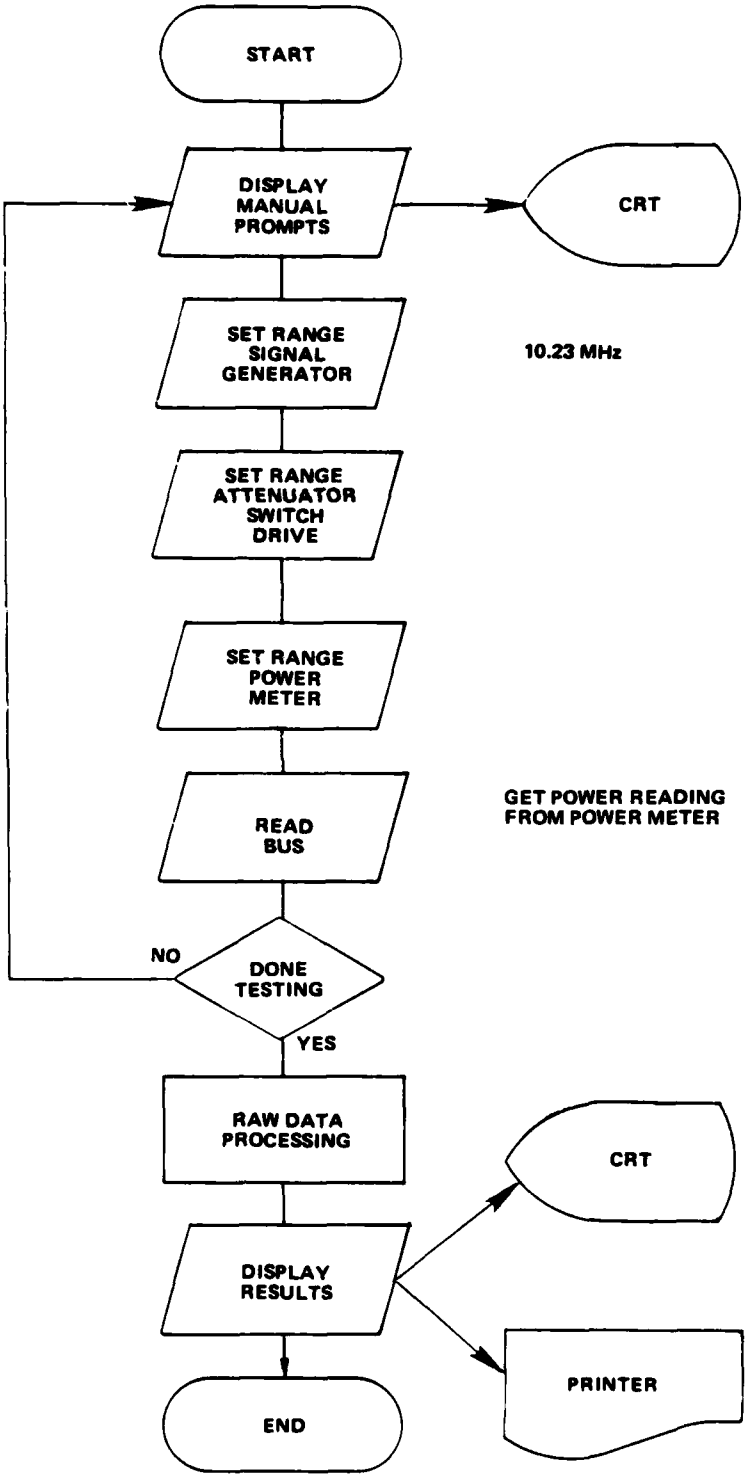
OUTPUT FREQUENCY MEASUREMENTS

PROGRAM MODULE NAME: _____



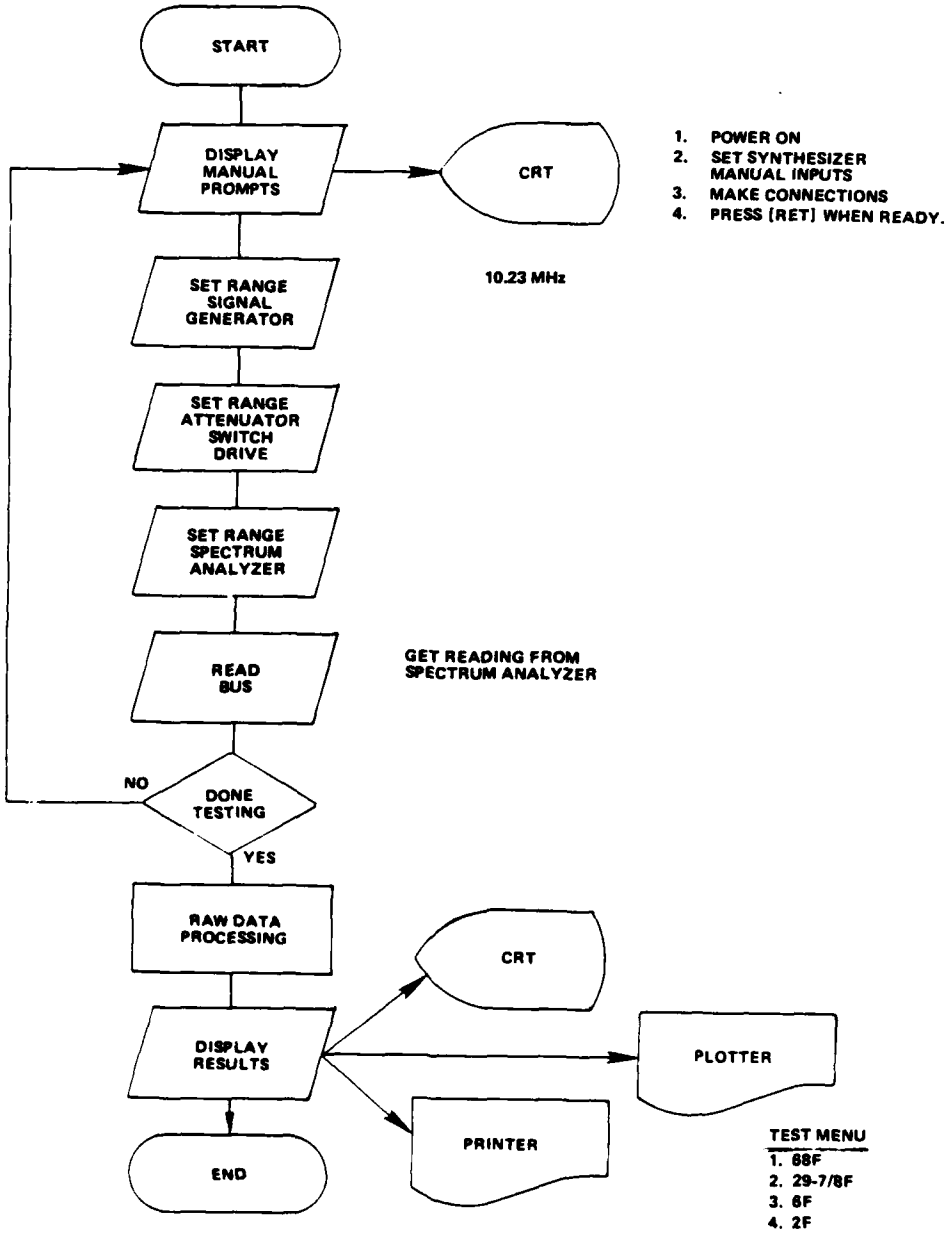
OUTPUT POWER MEASUREMENT

PROGRAM MODULE NAME: _____



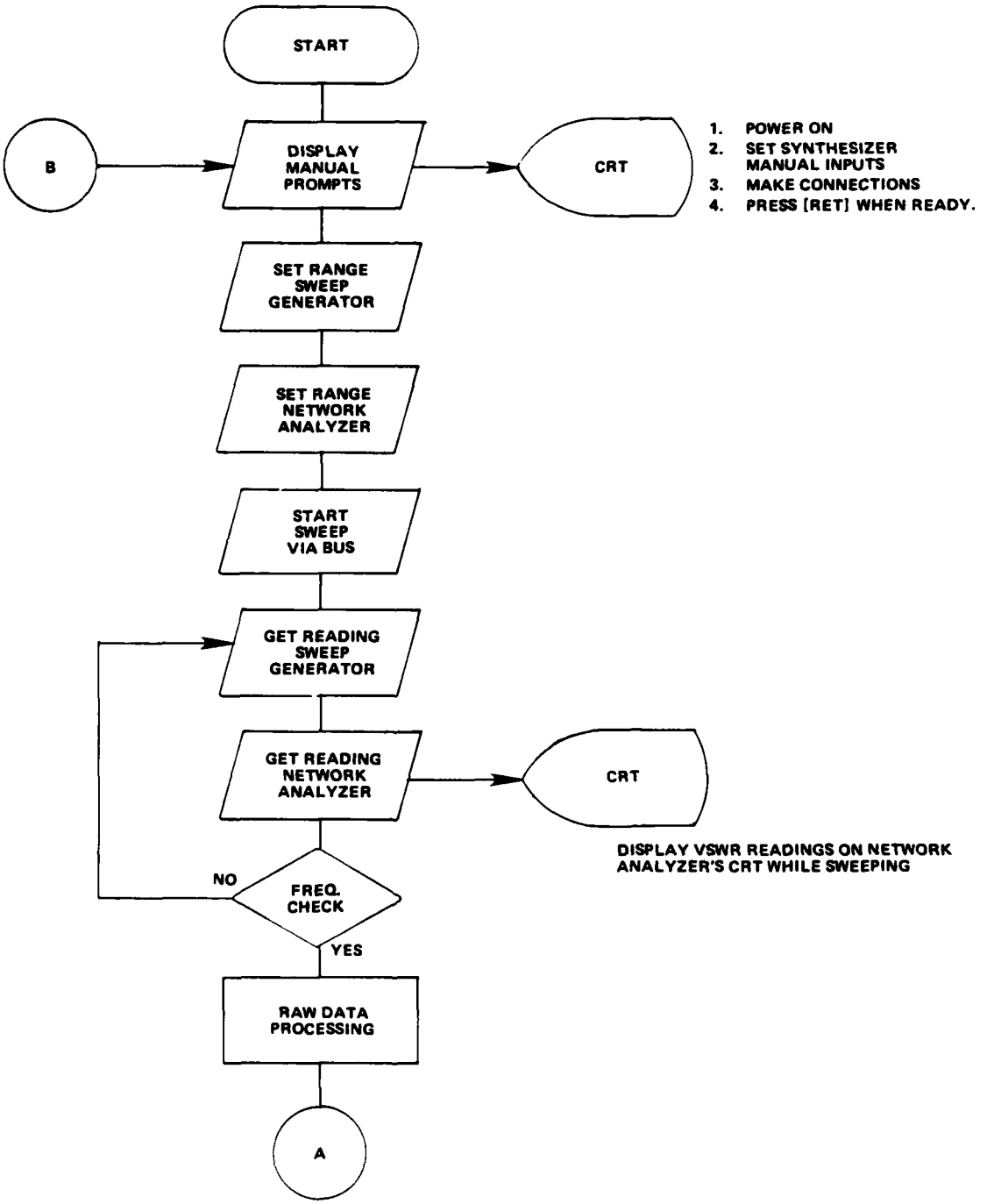
MEASURE SPECTRAL CONTENT

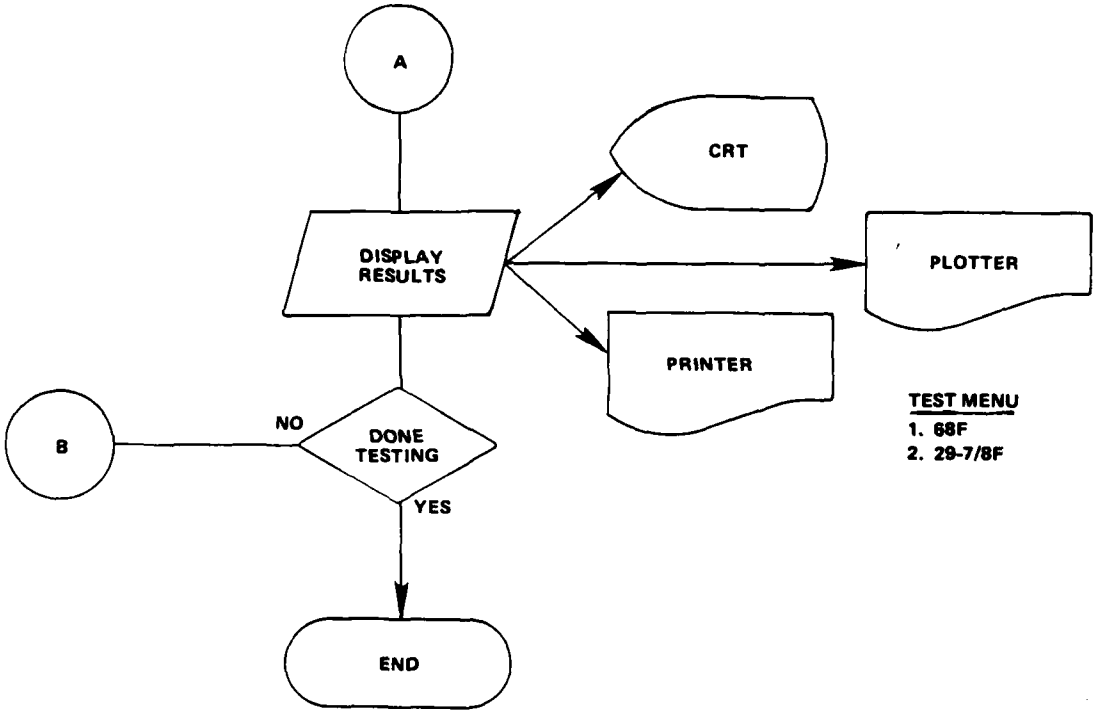
PROGRAM MODULE NAME: _____



VSWR AND IMPEDANCE MEASUREMENT

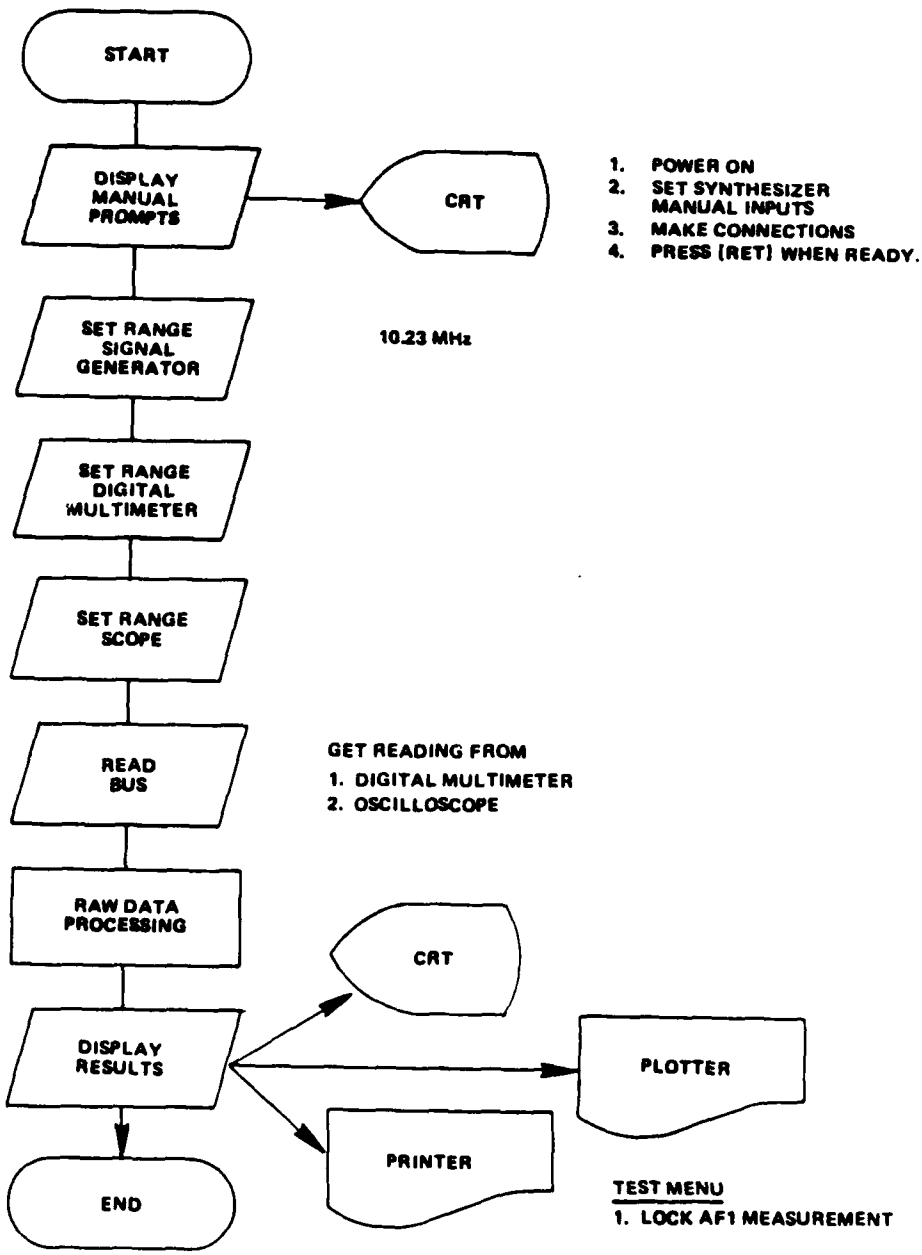
PROGRAM MODULE NAME: _____




A
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
TEST MENU
1. 68F
2. 29-7/8F
B
NO
DONE TESTING
YES
END

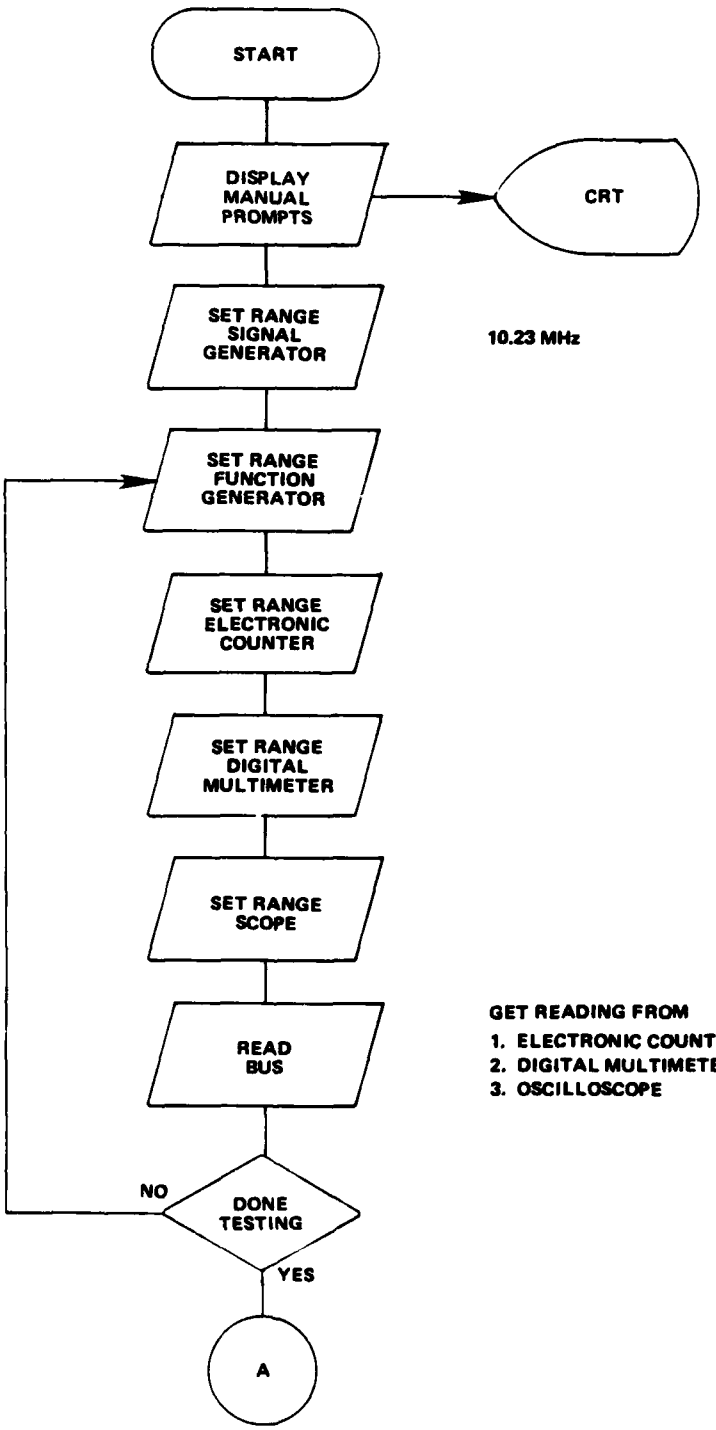
MEASURE LOCK AF1

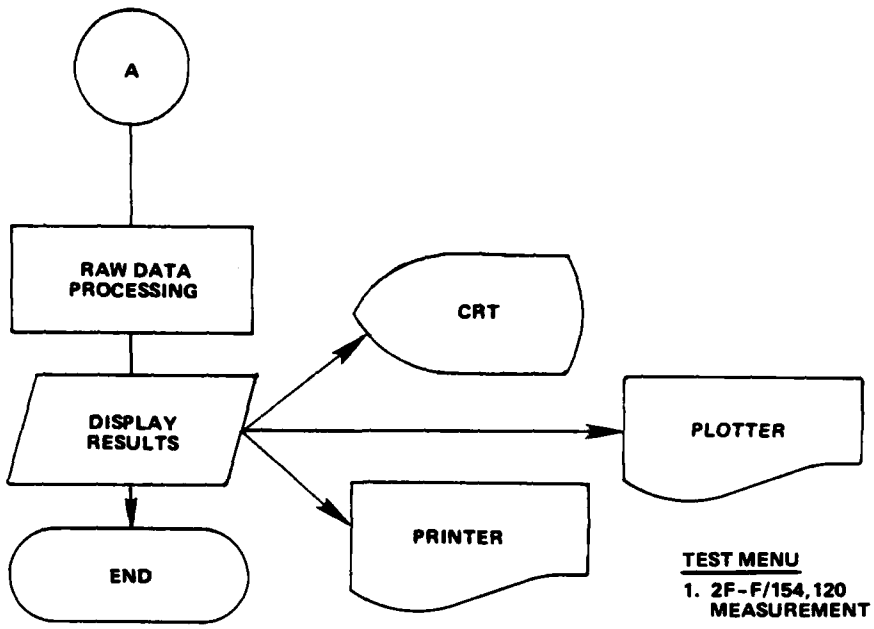
PROGRAM MODULE NAME: _____



MEASURE 2F - F/154, 120

PROGRAM MODULE NAME: _____

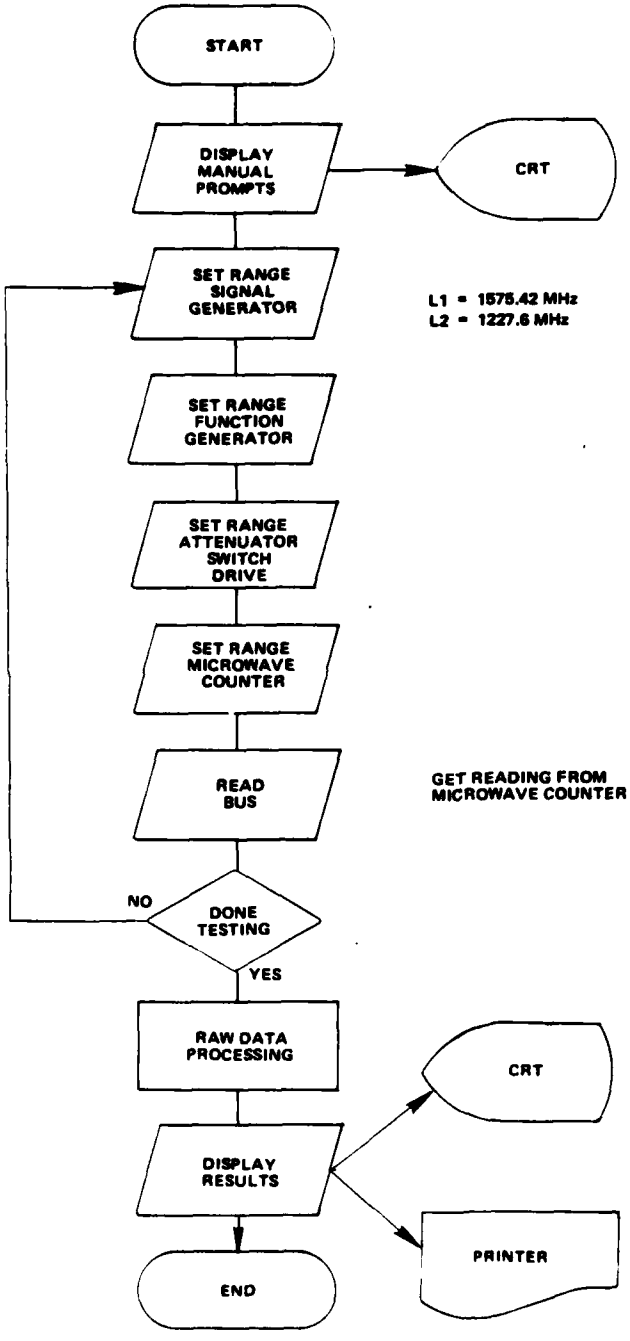



A
RAW DATA PROCESSING
DISPLAY RESULTS
END
CRT
PLOTTER
PRINTER
TEST MENU
1. 2F-F/154,120 MEASUREMENT

4.1.2 CONVERTER/CHANNEL SWITCHER MODULE

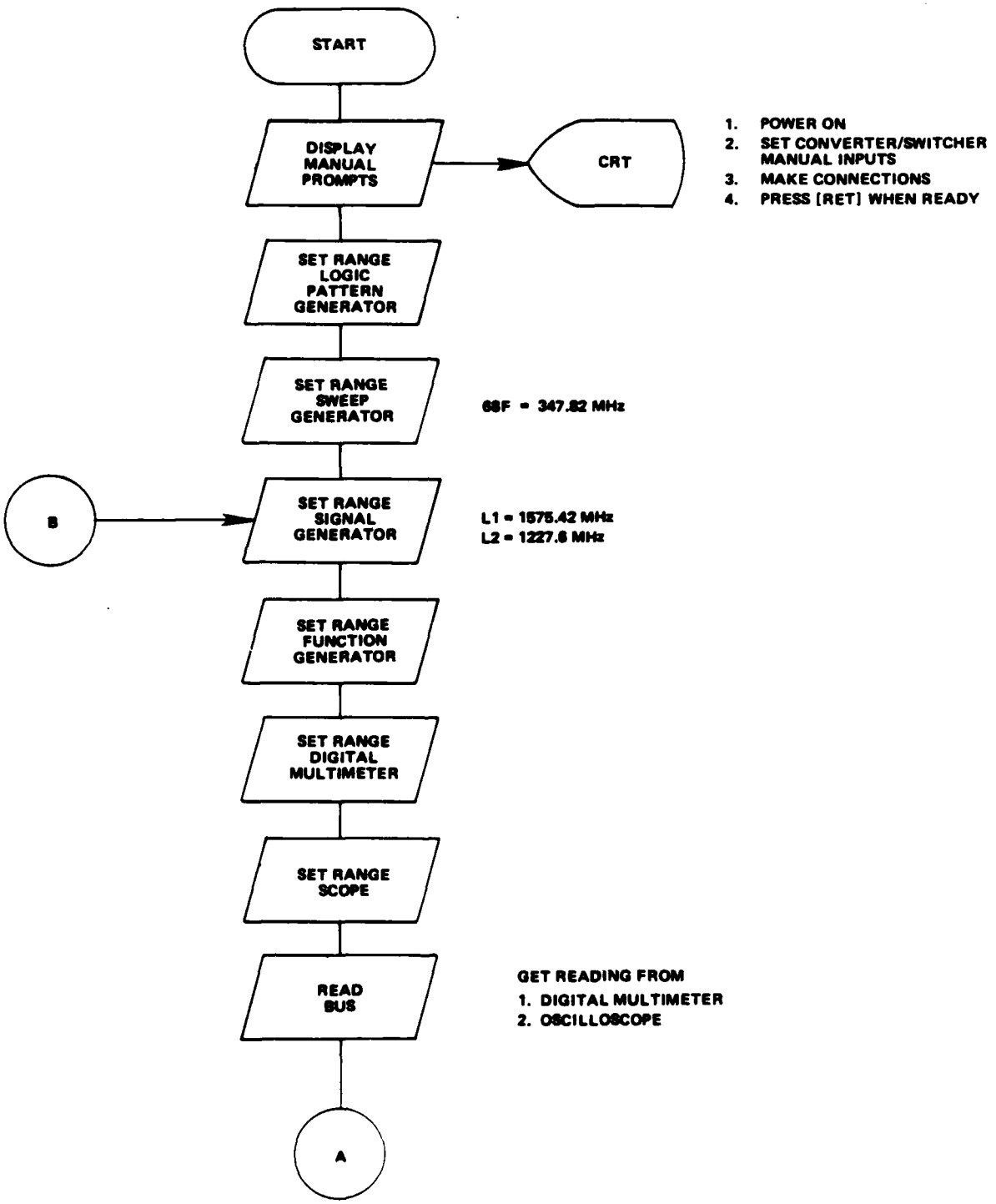
R. F. 2x2 SWITCH CHECK

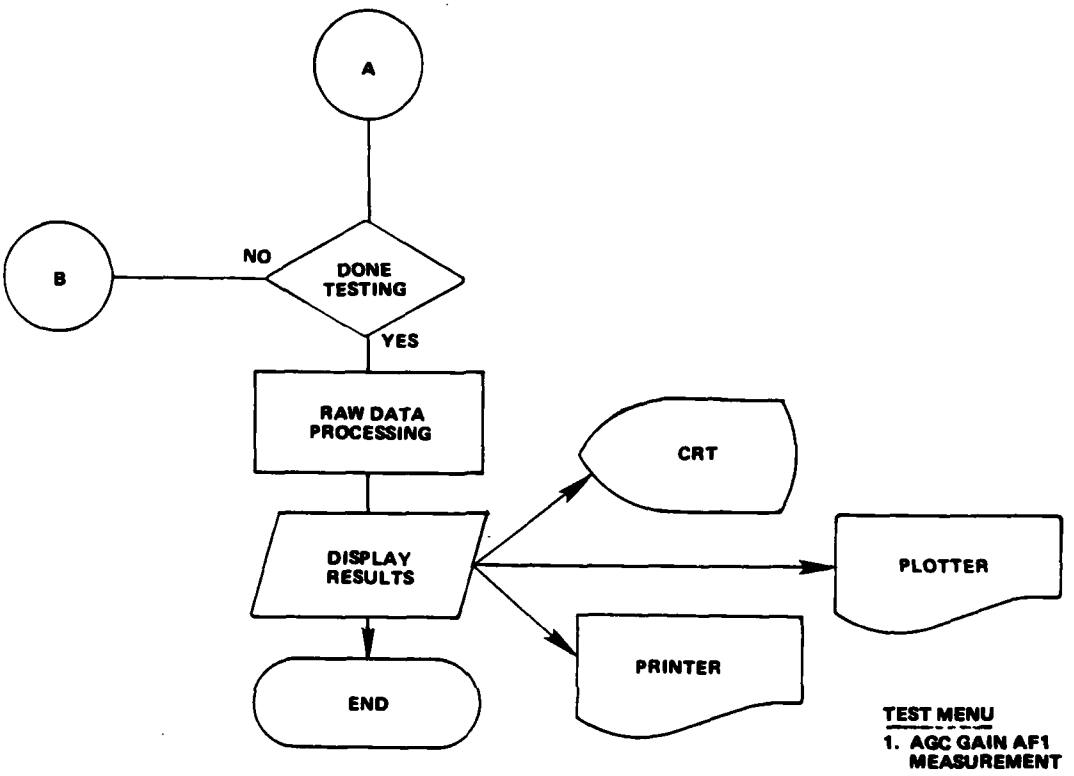
PROGRAM MODULE NAME: _____



MEASURE AGC GAIN AF1

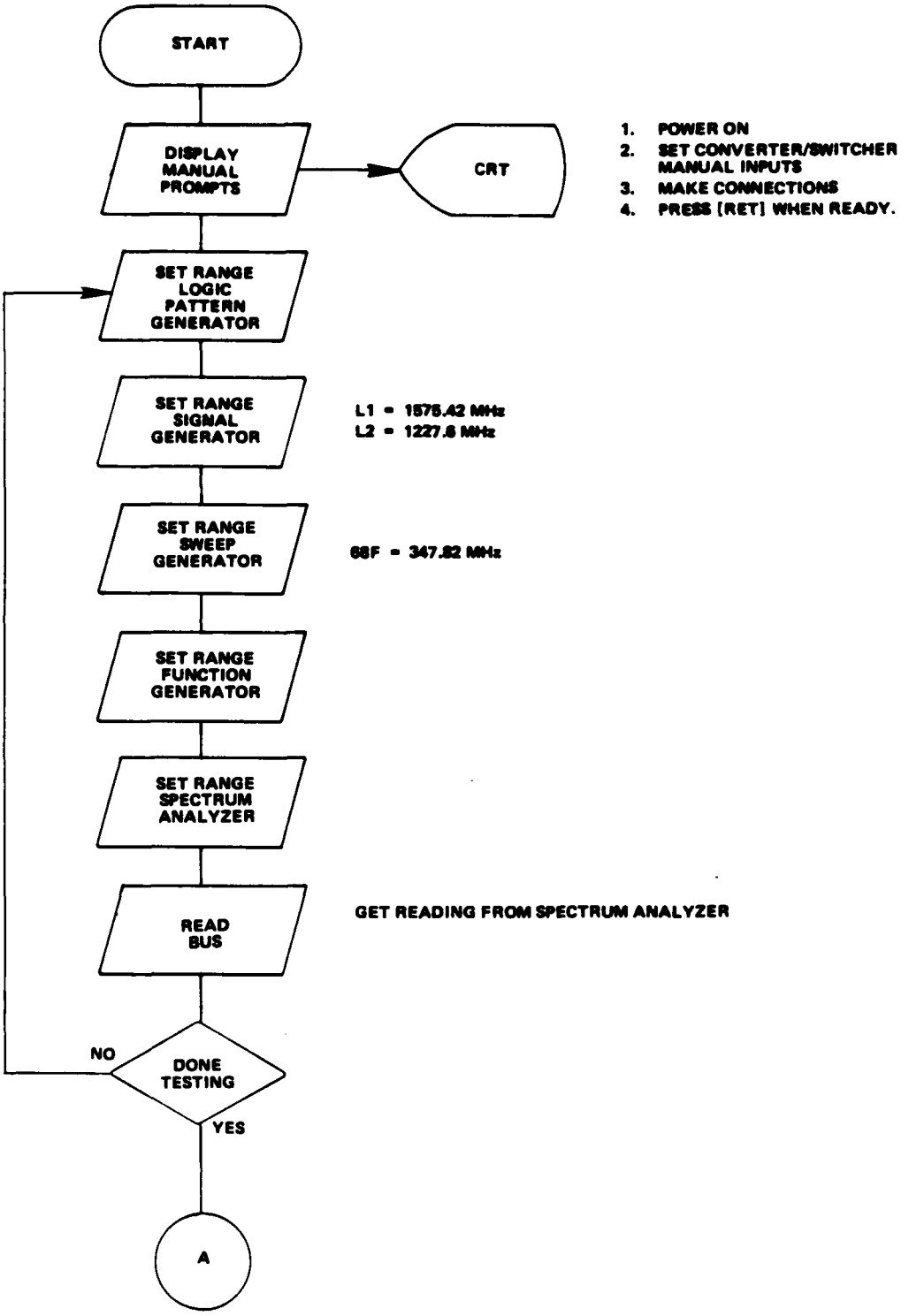
PROGRAM MODULE NAME: _____

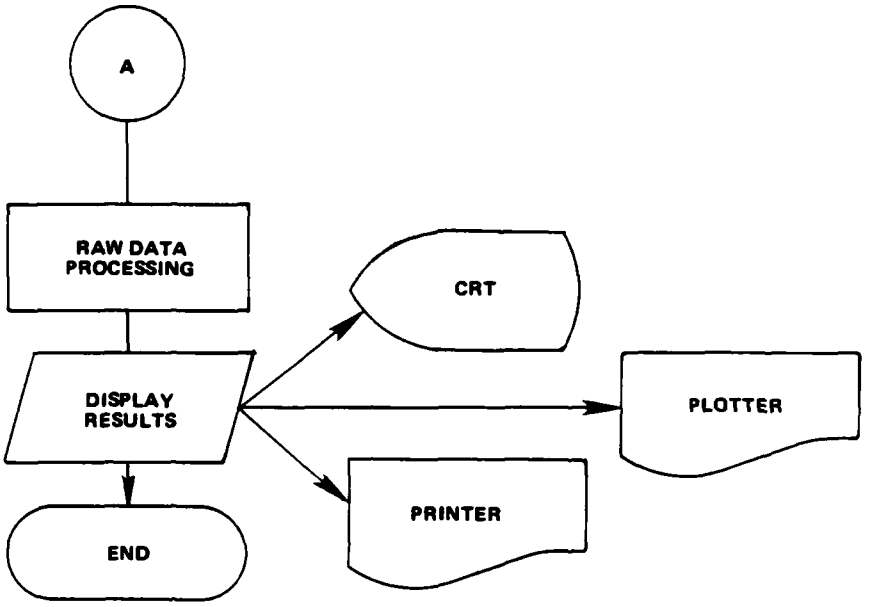



A
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
END
TEST MENU
1. AGC GAIN AF1 MEASUREMENT

38F(IF) SWITCH OPERATION

PROGRAM MODULE NAME: _____



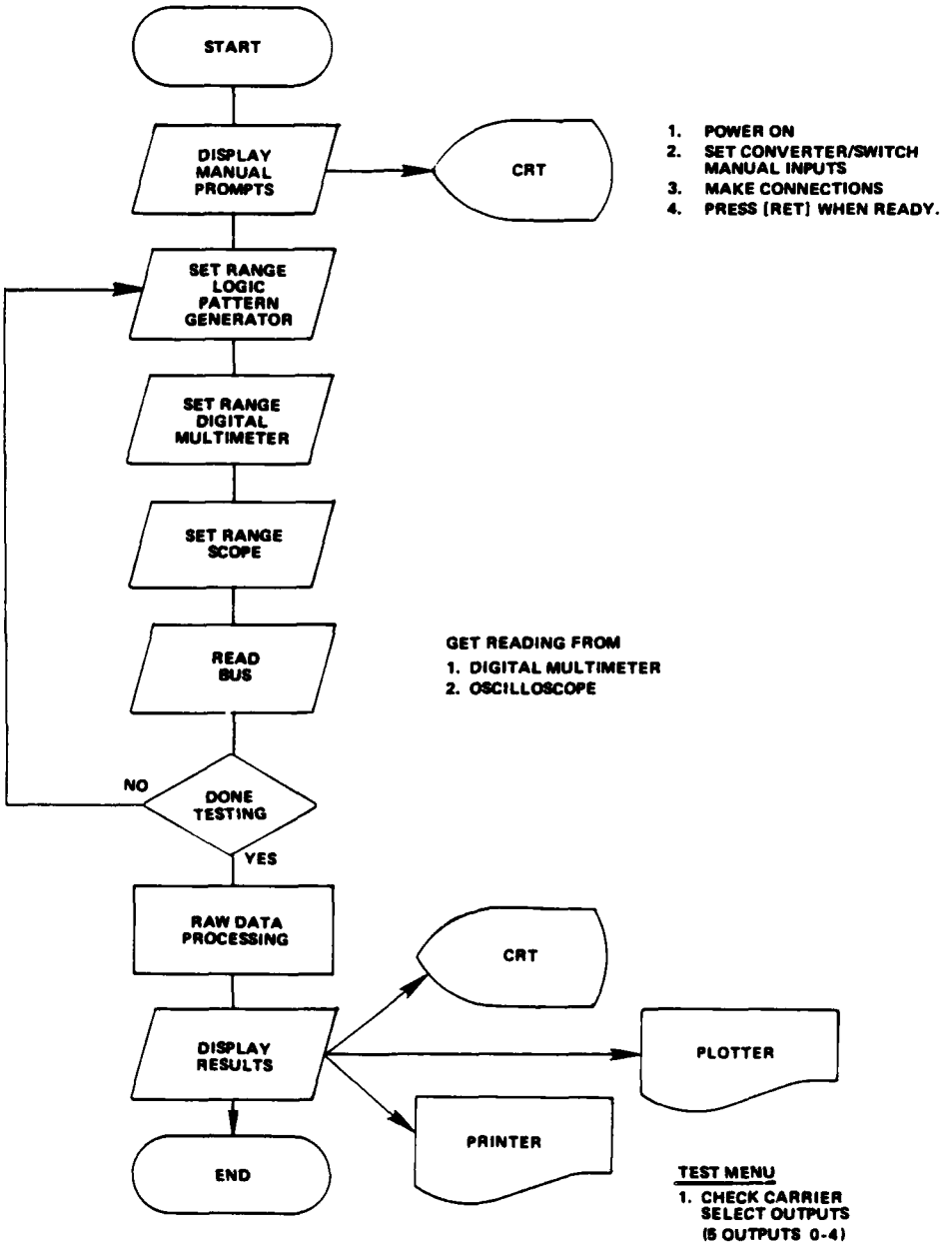


TEST MENU

1. 36F(IF) SWITCH OPERATION
   5-CHANNEL (0 - 4)

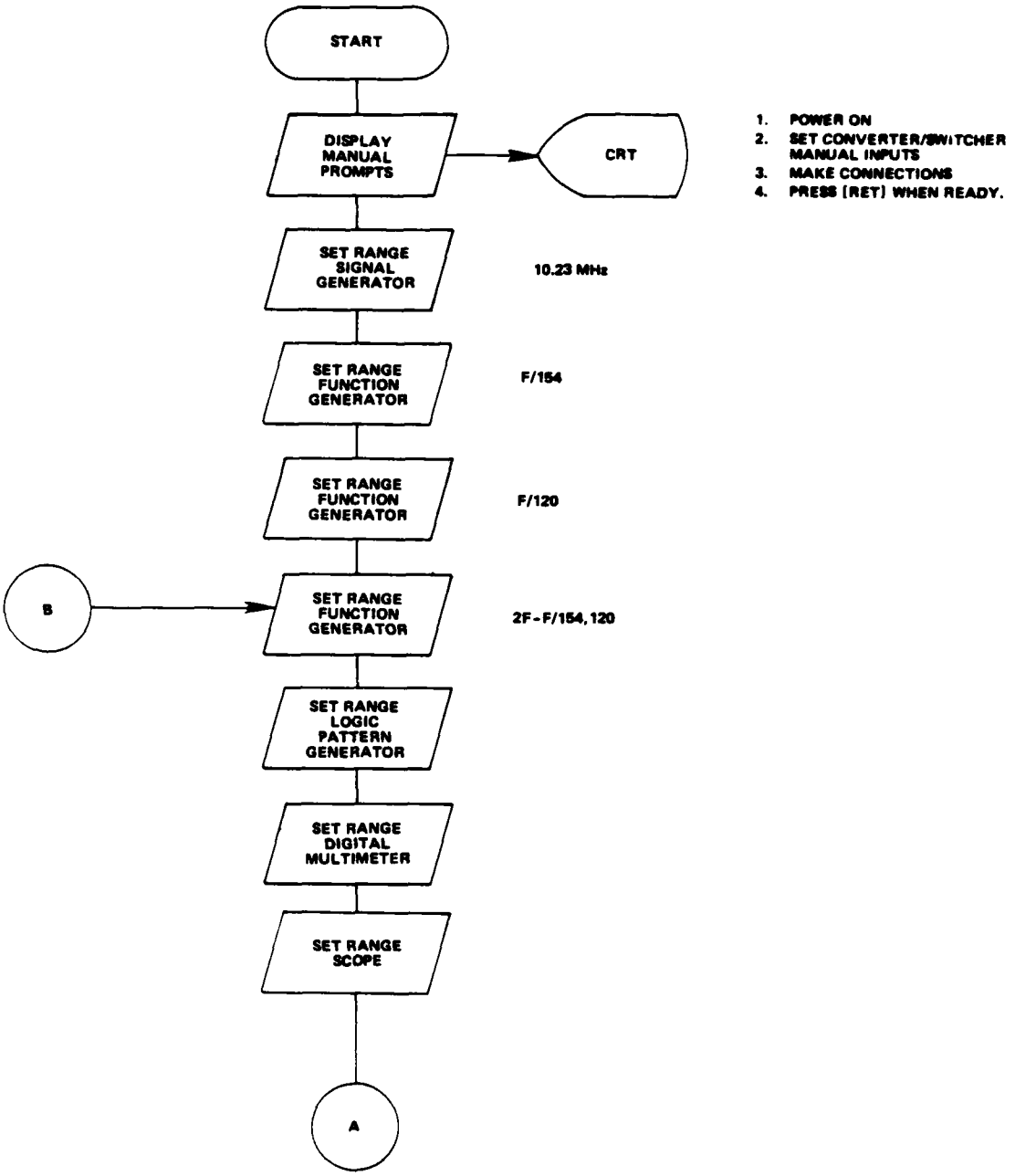
CHECK CARRIER SELECT OUTPUTS

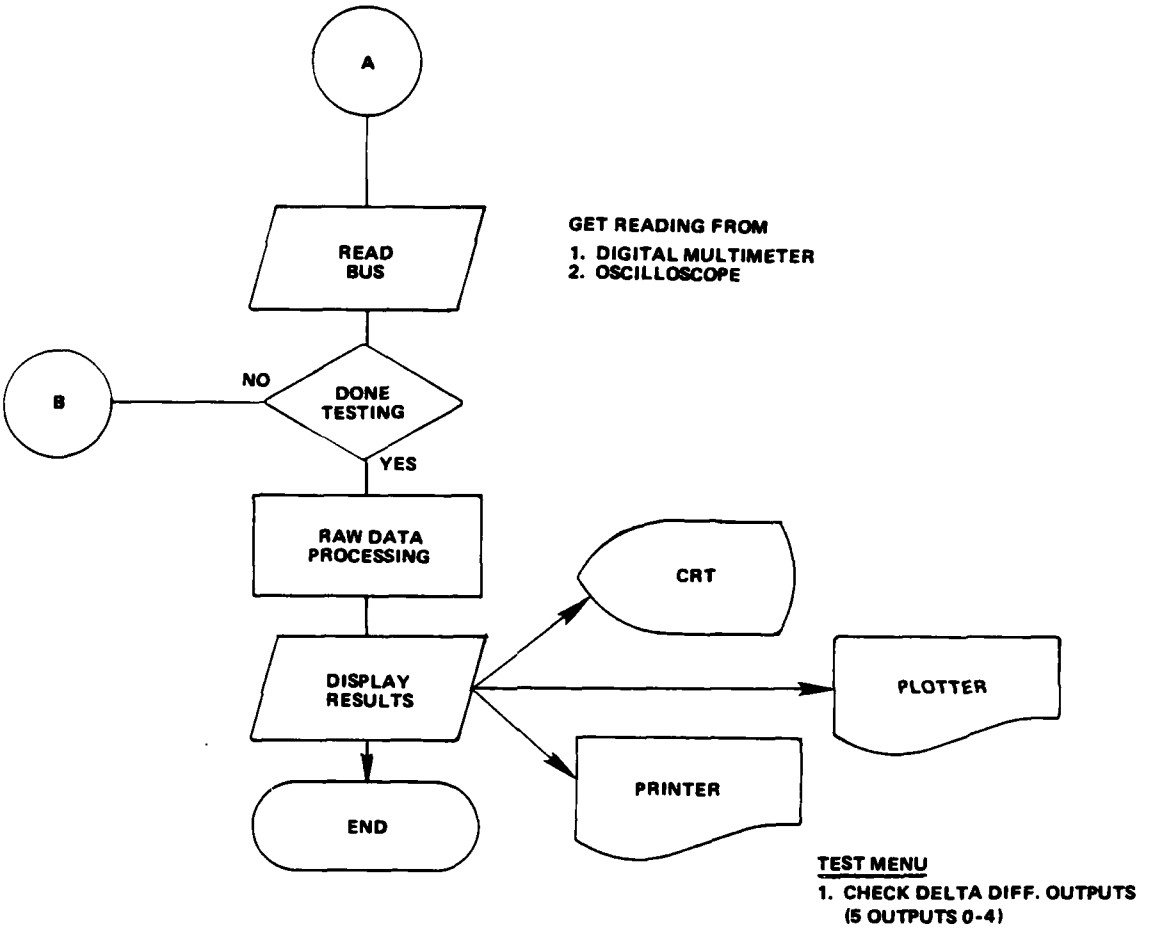
PROGRAM MODULE NAME: _____



CHECK DELTA DIFF. OUTPUTS

PROGRAM MODULE NAME: _____

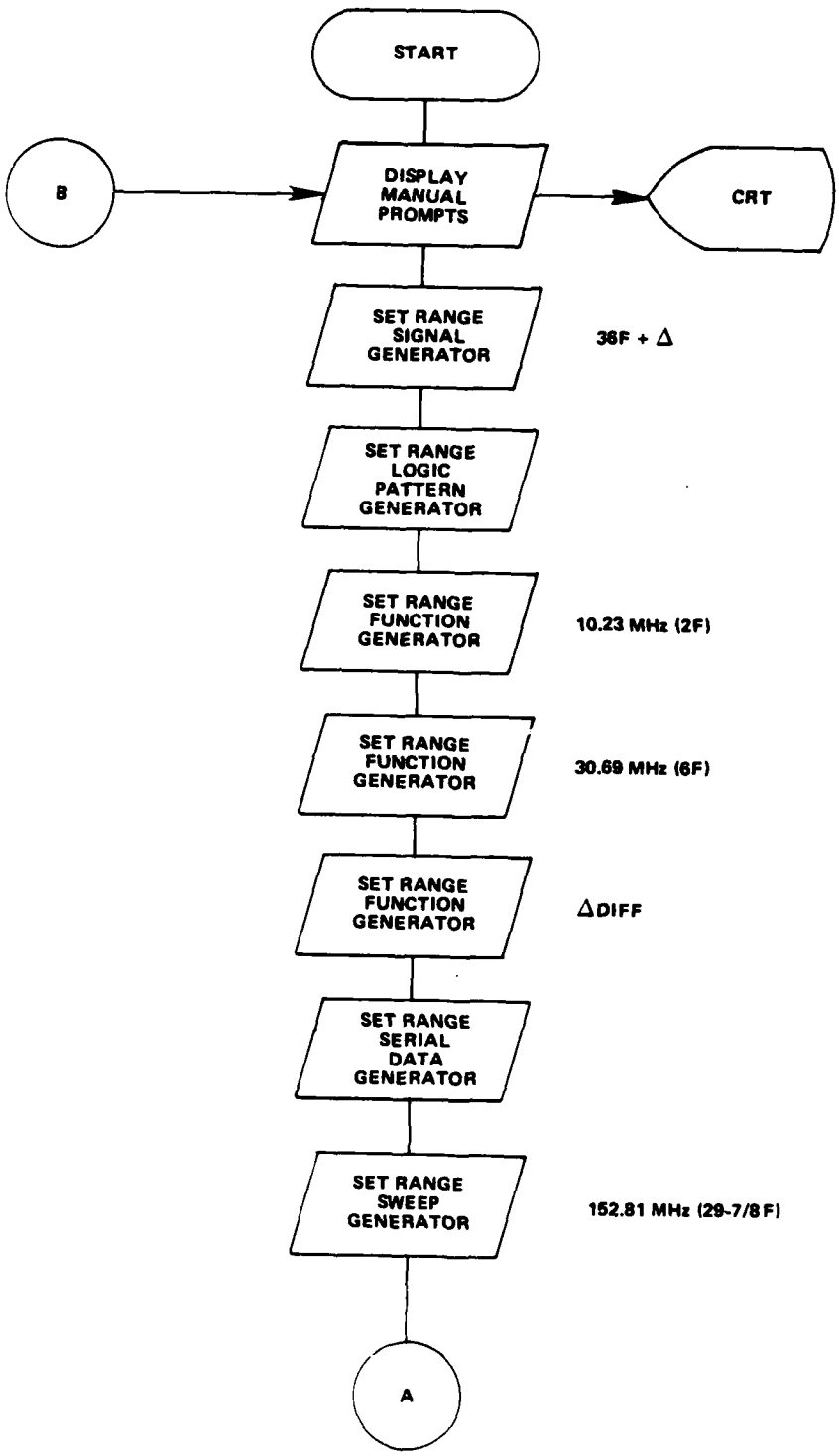



A
READ BUS
GET READING FROM
1. DIGITAL MULTIMETER
2. OSCILLOSCOPE
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
END
TEST MENU
1. CHECK DELTA DIFF. OUTPUTS
(5 OUTPUTS 0-4)

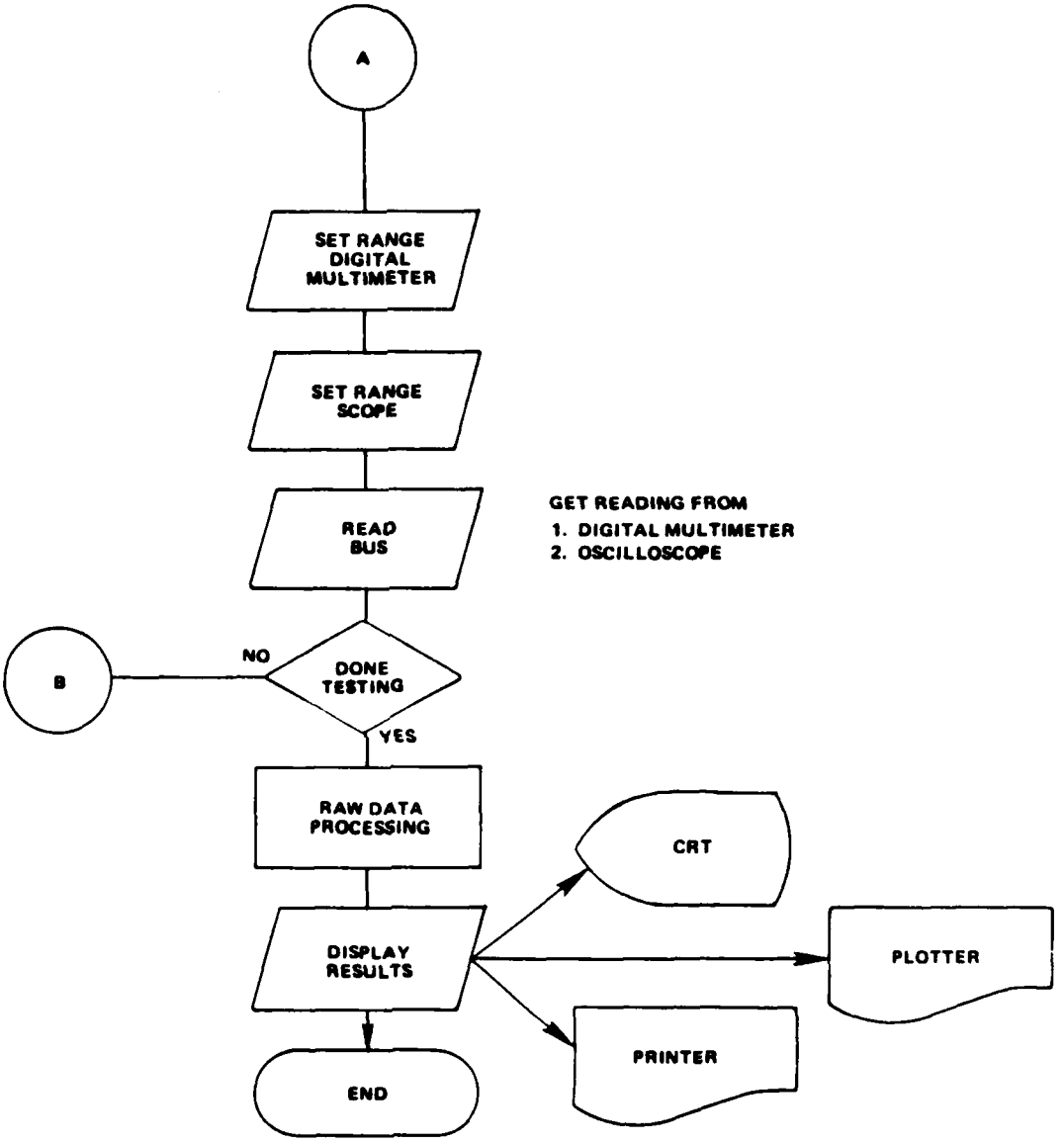
4.1.3 IF/BB/CODER MODULE

MEASURE DIGITAL OUTPUT SIGNALS

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET IF/BB/CODER MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY



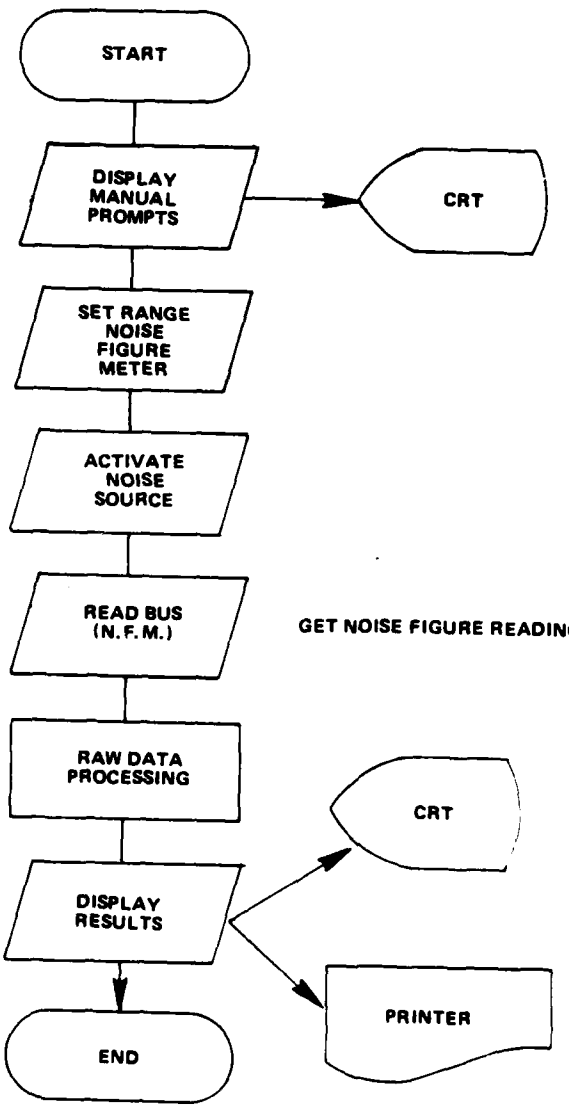
TEST MENU

1. MEASURE SLEW DNE SIGNAL
2. COARSE RANGE EPOCH (CRE)
3. FINE RANGE EPOCH (FRE)
4. AGC S/F1 SIGNAL
5. CARRIER SELECT A SIGNAL
6. CANCEL A SIGNAL
7. R. F. SELECT SIGNAL
8. NOISE ON/OFF SIGNAL
9. ANTENNA SELECT SIGNAL
10. BITE SW SIGNAL

4.1.4 PREAMPLIFIER UNIT MODULE

NOISE FIGURE

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET PAU MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

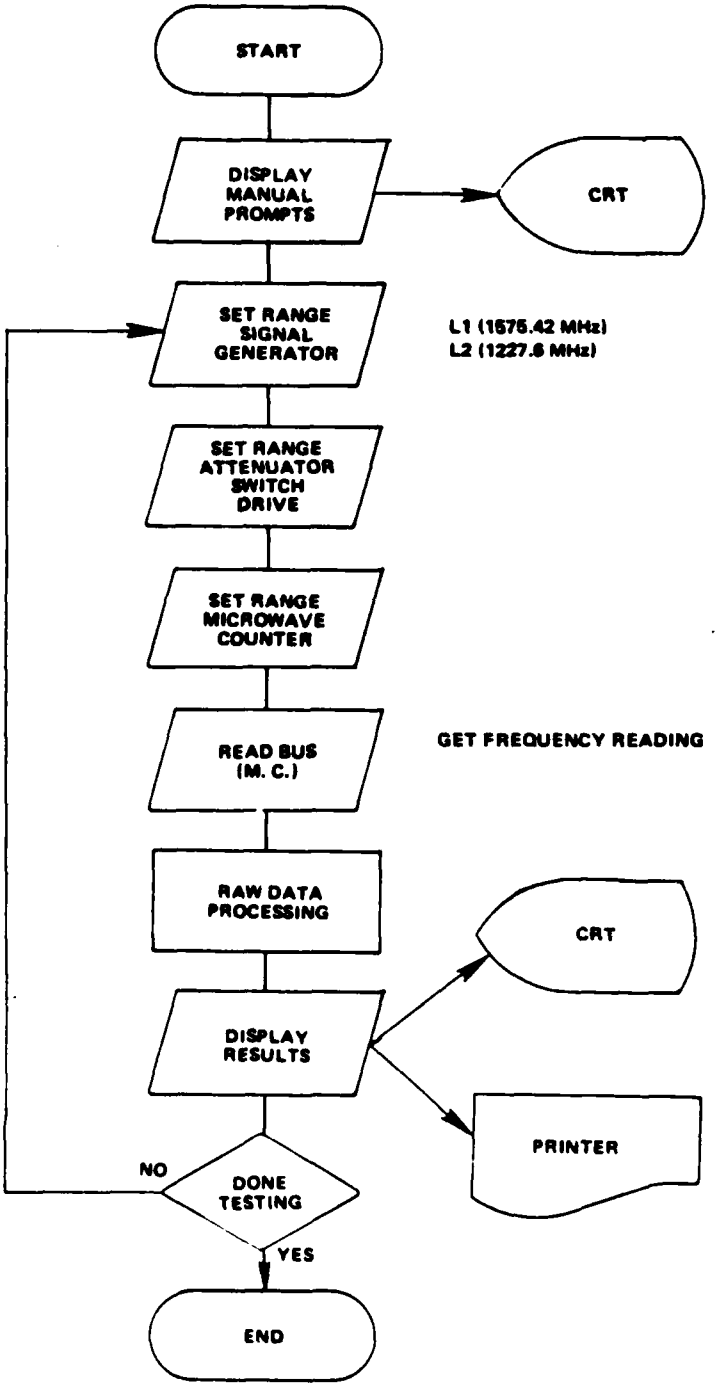
GET NOISE FIGURE READING

TEST MENU

1. NOISE FIGURE

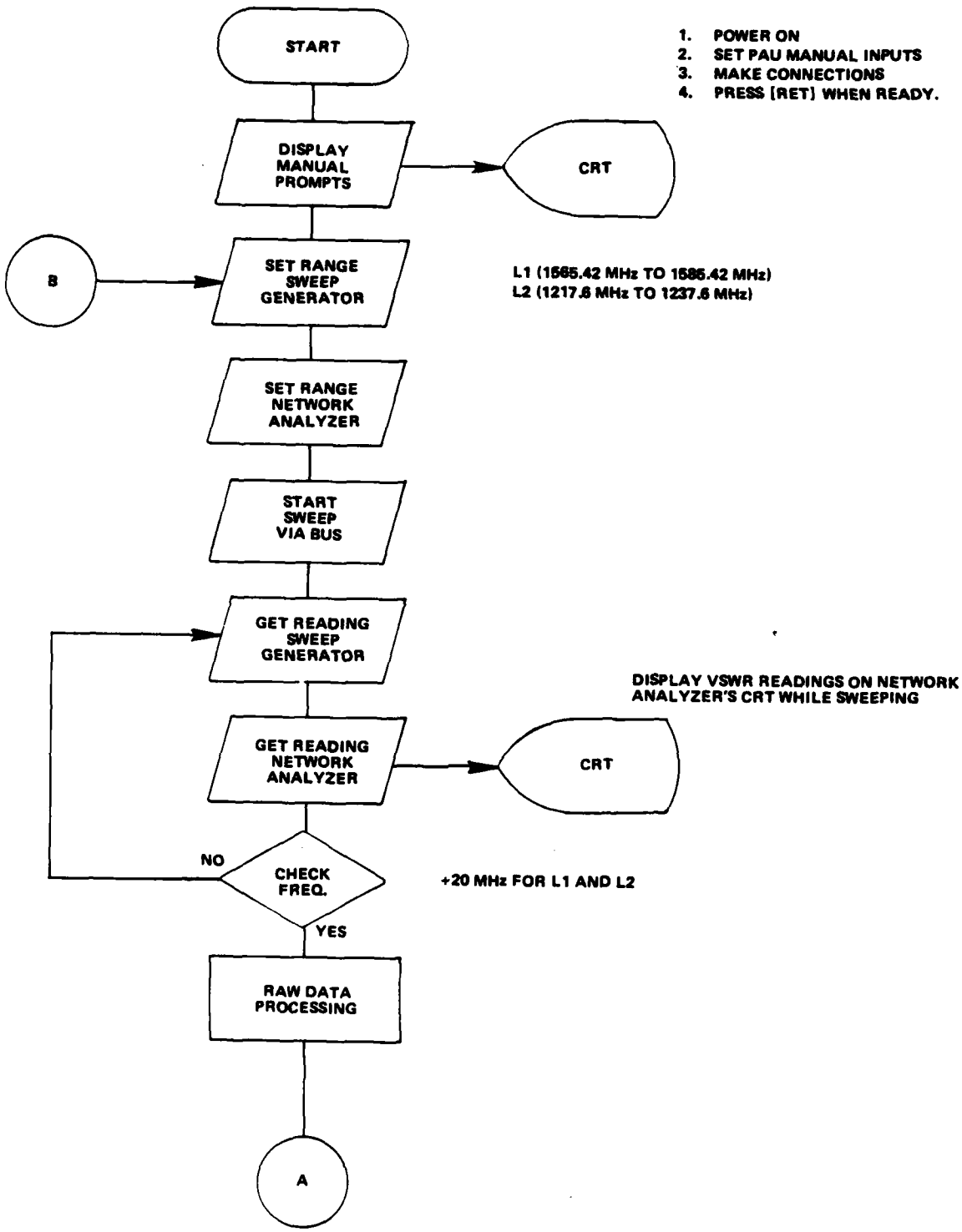
FREQUENCY MEASUREMENT

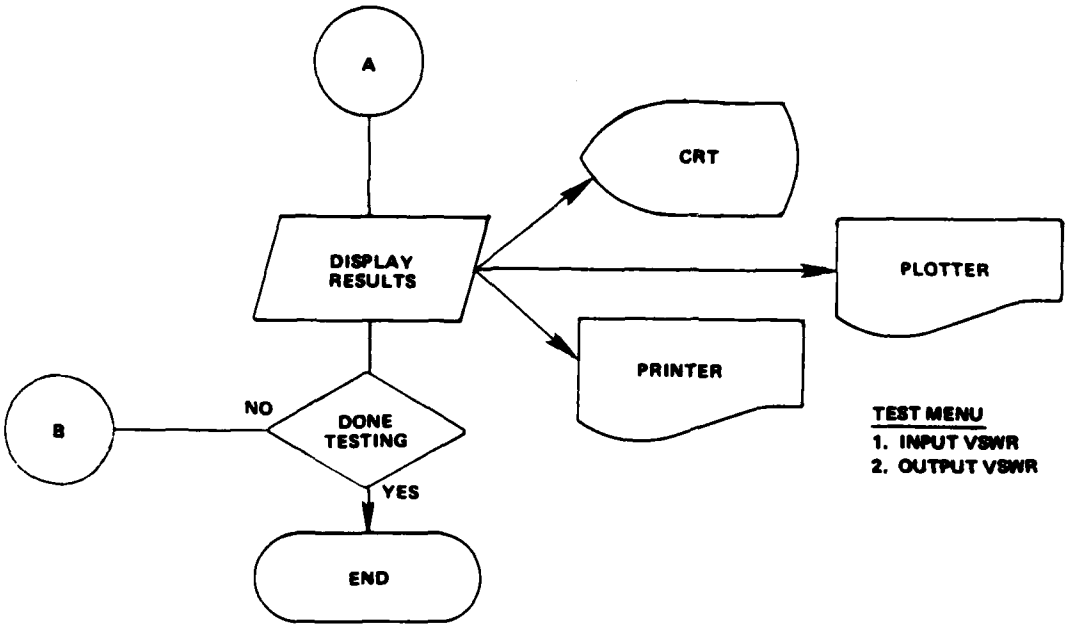
PROGRAM MODULE NAME: _____



INPUT/OUTPUT VSWR

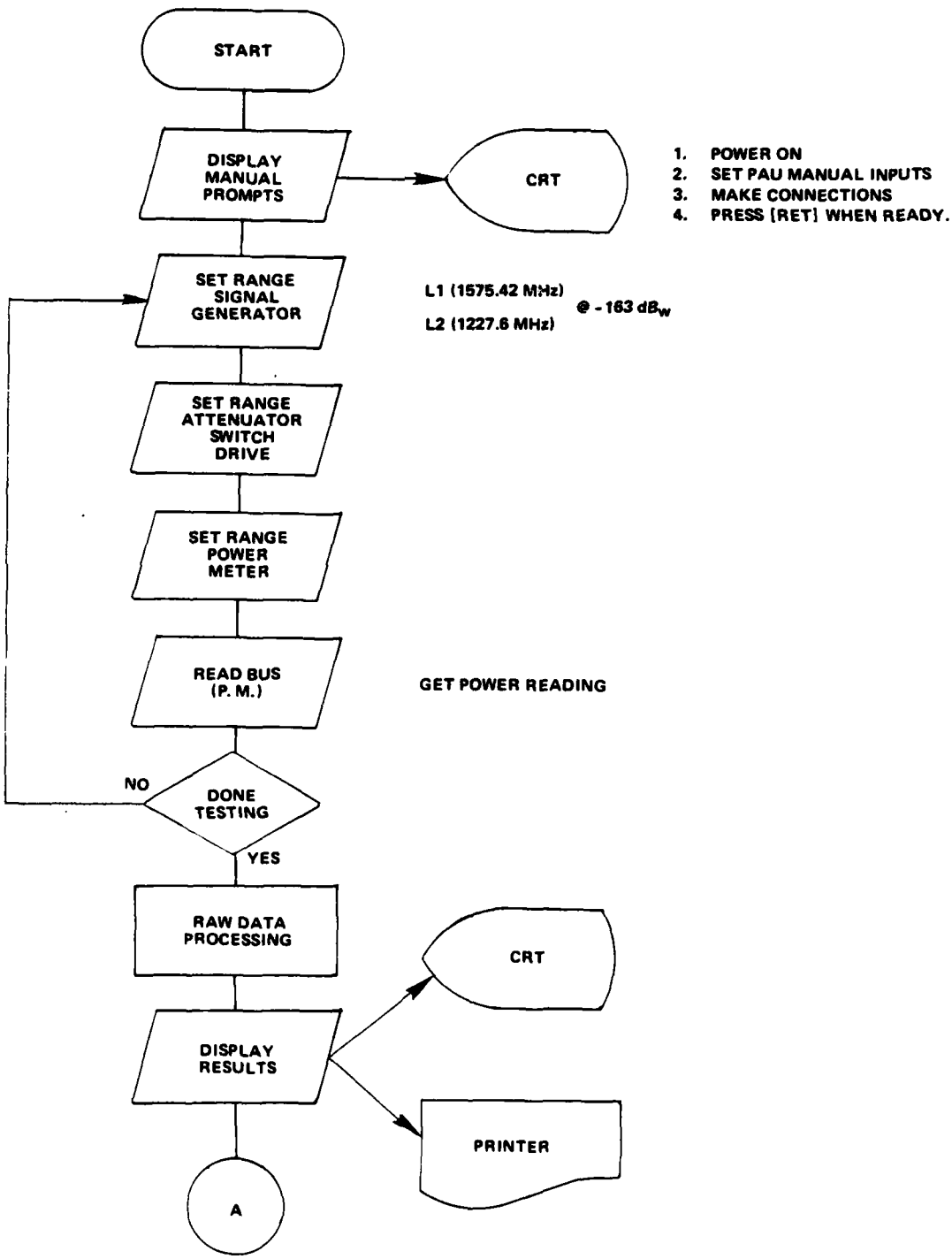
PROGRAM MODULE NAME: _____

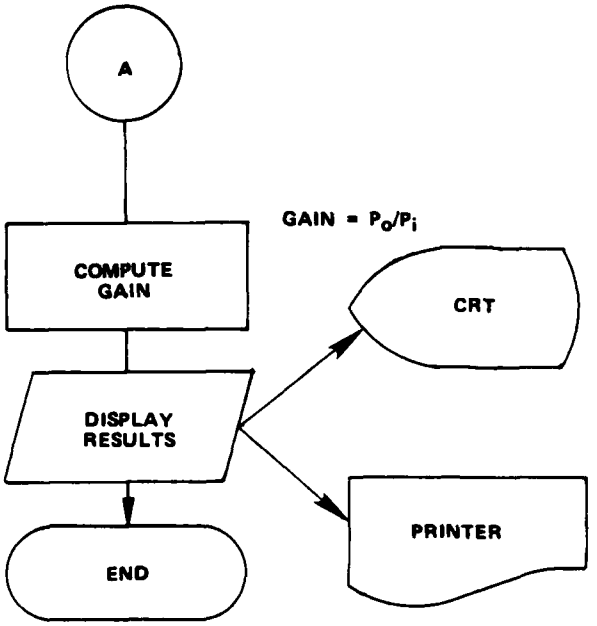



A
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
B
NO
DONE TESTING
YES
END
TEST MENU
1. INPUT VSWR
2. OUTPUT VSWR

GAIN AND POWER MEASUREMENT

PROGRAM MODULE NAME: _____



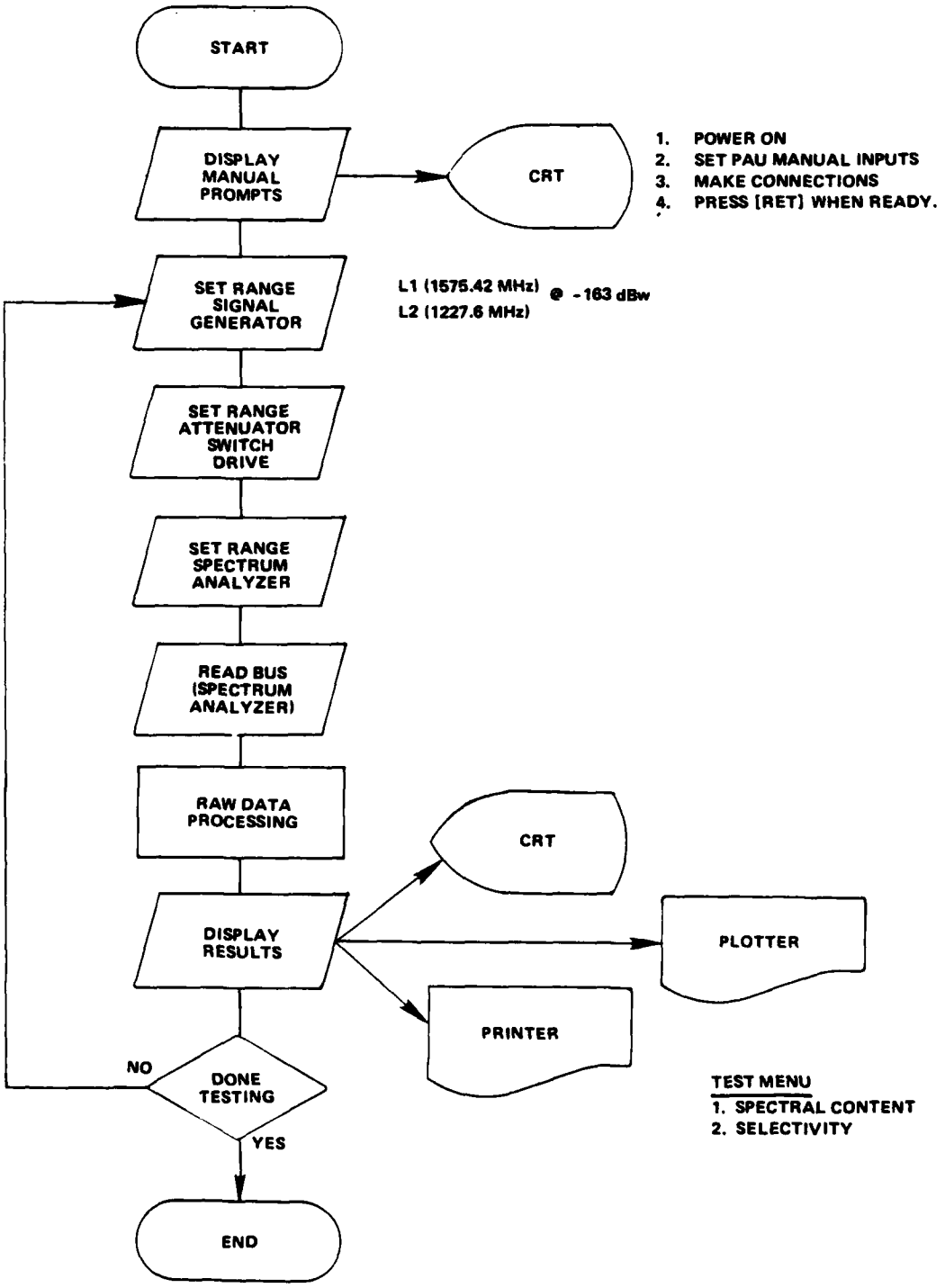


TEST MENU

1. POWER AND GAIN MEASUREMENT

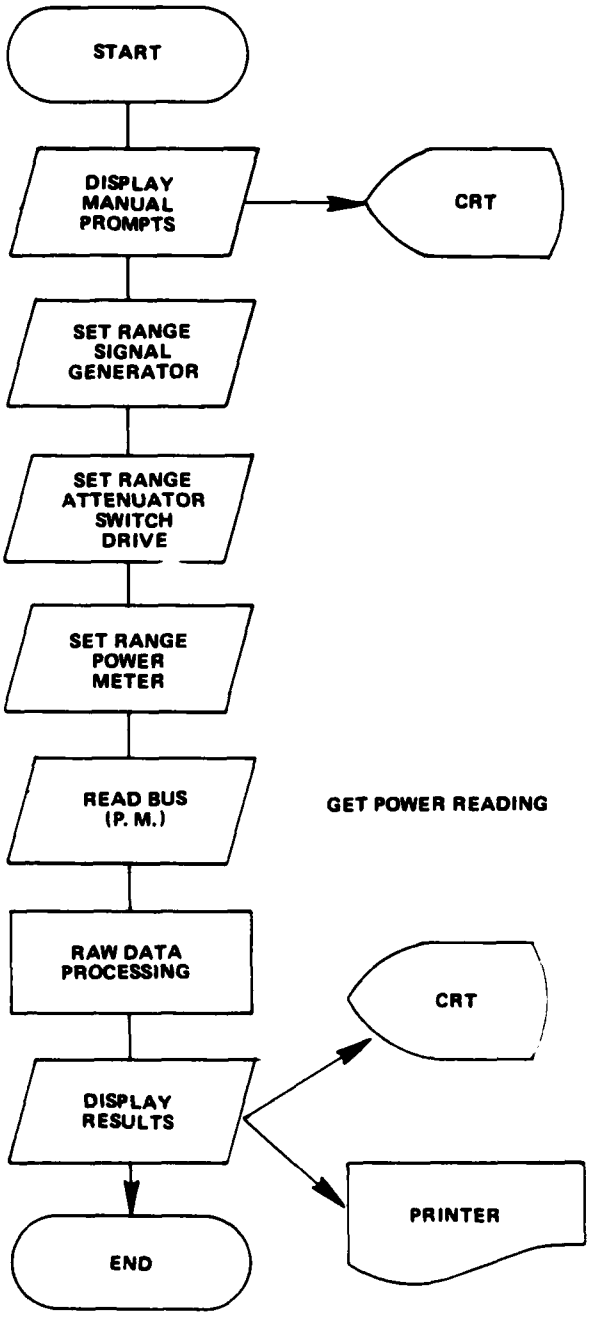
SPECTRAL CONTENT AND SELECTIVITY MEASUREMENT

PROGRAM MODULE NUMBER: _____



VERIFY BURNOUT PROTECTION

PROGRAM MODULE NAME: _____



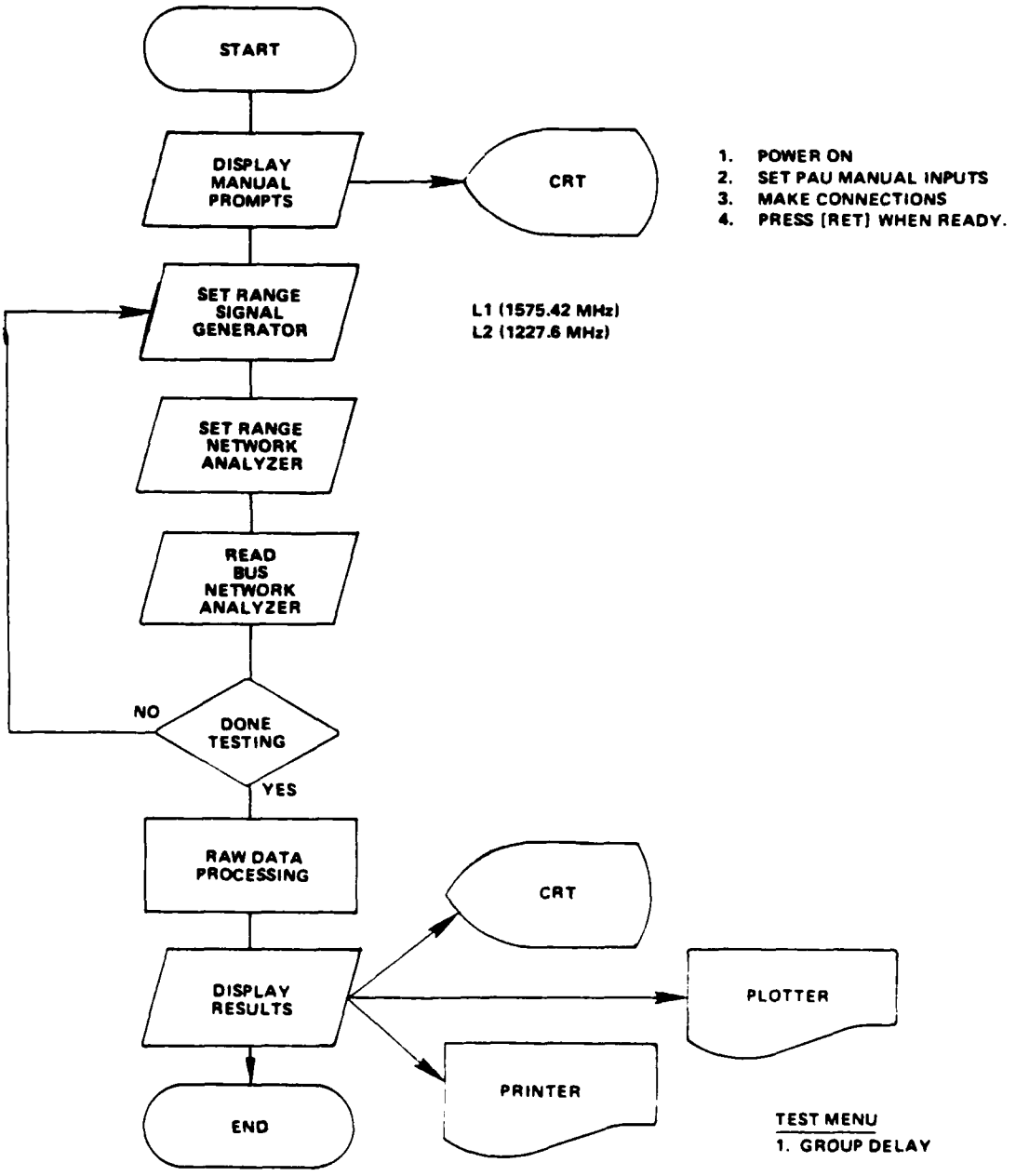
1. POWER ON
2. SET PAU MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

GET POWER READING

TEST MENU
1. BURNOUT PROTECTION

GROUP DELAY

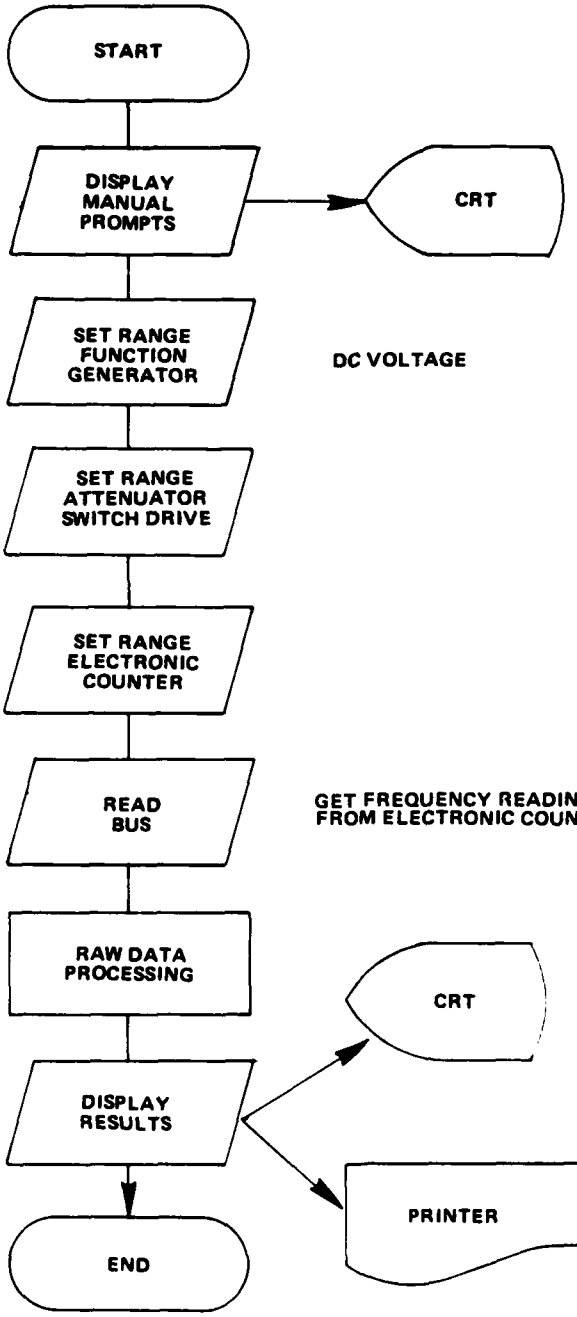
PROGRAM MODULE NAME: _____



4.1.5 REFERENCE OSCILLATOR MODULE

FREQUENCY MEASUREMENT

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET OSCILLATOR MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

DC VOLTAGE

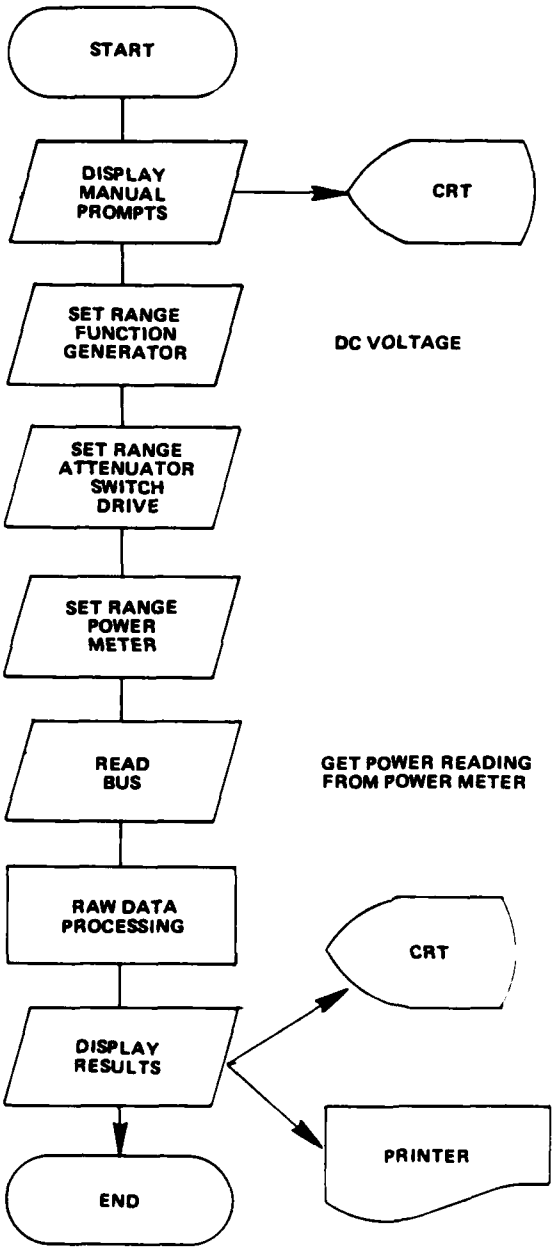
GET FREQUENCY READING FROM ELECTRONIC COUNTER

TEST MENU

1. FREQUENCY MEASUREMENT

POWER MEASUREMENT

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET OSCILLATOR MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

DC VOLTAGE

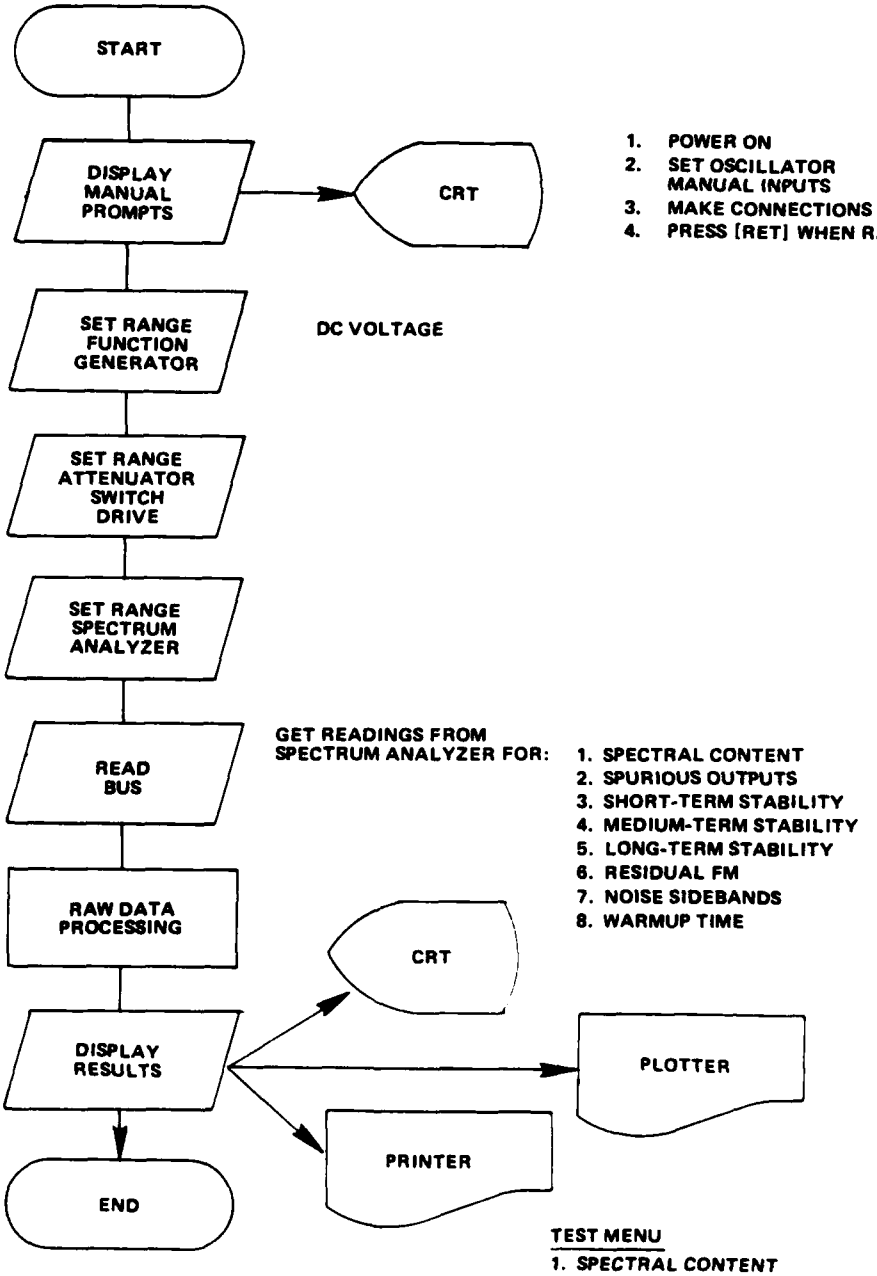
GET POWER READING FROM POWER METER

TEST MENU

1. POWER MEASUREMENT

CHECK SPECTRAL CONTENT

PROGRAM MODULE NAME: _____



END