

AD-A192 598

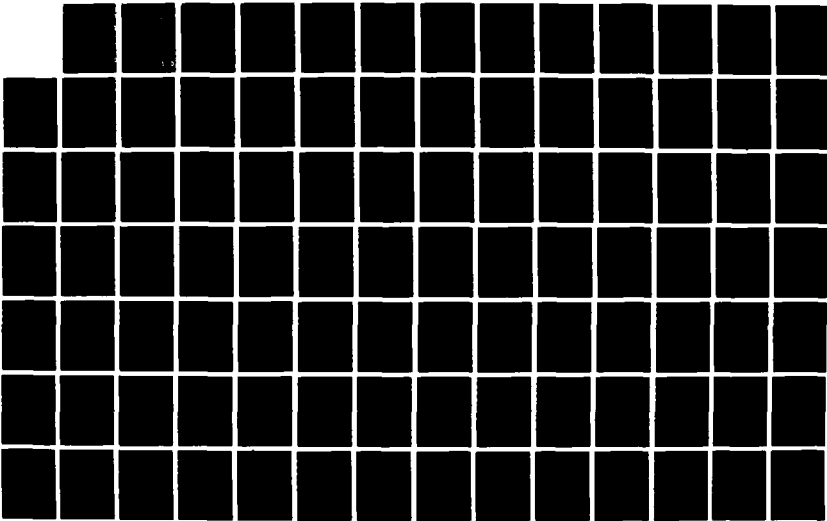
ANALYSIS TECHNIQUES FOR MICROWAVE DOSIMETRIC DATA(U)
TECHNOLOGY-USA INC FORT WASHINGTON MD J R DEMOS ET AL.
OCT 85 DAND17-79-C-9151

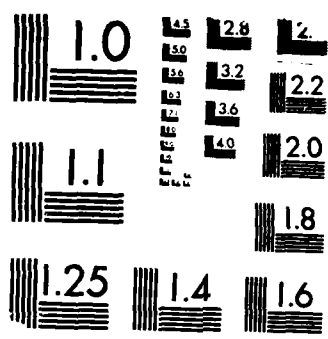
1/2

UNCLASSIFIED

F/G 14/2

NL





MICROCOPY RESOLUTION TEST CHART
NBS 1963-A

AD-A192 590

AD _____

DTIC FILE COPY

ANALYSIS TECHNIQUES FOR
MICROWAVE DOSIMETRIC DATA

ANNUAL REPORT

By
J. R. DEMOS
MICHAEL J. CAMPBELL

OCTOBER 1985

Supported By
U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND
Fort Detrick, Frederick, Maryland 21702-5012

Contract No: DAMD17-79-C-9151

Technology-USA, Inc.
P.O. Box 55333, Fort Washington, Maryland 20744-0333

Approved for public release; distribution unlimited

The view, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

DTIC
ELECTE
MAR 18 1988
S CD D
H

88 3 16 107

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Research and Analysis Techniques for Microwave Dosimetric Data		5. TYPE OF REPORT & PERIOD COVERED Annual Report November 1983 - October 1985
7. AUTHOR(s) J. R. Demos MICHAEL J. CAMPBELL		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Technology-USA, Inc. Ft. Washington, MD 20744-0333		8. CONTRACT OR GRANT NUMBER(s) DAMD17-79-C-9151
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Medical Research and Development Command Fort Detrick, Frederick, MD 21701-5012		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62777A.3E162777A878.BB.018
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE October 1985
		13. NUMBER OF PAGES 186
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release, Distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Network Analyzer; Water Loaded Microwave Scanner, G		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objective of the effort covered by this report was to provide a set of software tools which can be used for data collection and presentation. Data collection was implemented using a network analyzer and a water loaded microwave scanner. Transmission and reflection data was acquired with this system and representative data is presented in this report. The data acquisition speed of the network analyzer was improved by a factor of two by rewriting the measurement software. <i>Keywords:</i>		

Summary

The objective of the effort covered by this report was to provide a set of software tools which can be used for data collection and presentation. Data collection was implemented using a network analyzer and a water loaded microwave scanner. Transmission and reflection data was acquired with this system and representative data is presented in this report. The data acquisition speed of the network analyzer was improved by a factor of two by rewriting the measurement software.



Accession For	
NTIS GRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

FOREWORD

Citations of commercial organizations and trade names in this report do not constitute an official Department of the Army endorsement or approval of the products or services of these organizations.

Table of Contents

<u>Section</u>	<u>Page</u>
I. Introduction.....	4
II. Data Collection Capabilities	
A. Line Scan.....	5
B. Raster Scan.....	14
C. Rotation and Translation.....	22
D. Antenna Subarray Verification.....	23
E. Improvements in Data Acquisition Speed.....	53
III. Data Collection Software	
A. Antenna Position/Control.....	58
B. Line Scan.....	63
C. Measurement of S11.....	77
D. Measurement of S21.....	80
E. Error Message Subroutine.....	83
F. Translate and Rotate.....	90
G. Process Data from Disc File.....	119
H. Raster Scan.....	132
I. Raster Scan.....	163
J. Raster Scan with Processing.....	175

SECTION I

Introduction

The developments described in this Annual Report cover software programs and system modifications which were developed to provide various options for scanning an object with the water loaded microwave scanner. All the programs were designed to be used in an interactive mode. The user is presented with a menu or quired for the parameters necessary to make the desired measurements. This report presents a brief overview of the system capabilities and provides samples of the results obtained with the system. Complete operational procedures along with a detailed description of the various programs can be found in the System Users Manual. As can be seen from the presented data, the microwave scanner system is operational at the present time.

SECTION II

DATA COLLECTION CAPABILITIES

A. LINE SCANS

The basic capability needed to obtain a picture of a sample is to be able to scan along the sample in a straight line. The system provides this capability by having the sample remain fixed while the two antennae (transmitting on one side of the sample and receiving on the other side) are moved together along a straight line. Figure 1 shows a plot of a simple line scan taken of a hollow epoxy-nylon tube of 8 mm outside diameter and 6 mm inside diameter. The antennae were about 2 mm to either side of the tube.

The frequency was 2.6 Giga-hertz. The frequency of a scan can be set anywhere from 2.5 Giga-hertz to 3.5 Giga-hertz. The electronics can actually range from 100 Mega-hertz to 12.4 Giga-hertz but the antennae are very inefficient beyond the range of 2.5 to 3.5 Giga-hertz.

The user has the capability of scanning over many frequencies during a line scan. Figure 2 shows the same sample as figure 1 with the frequency varying from 2.5 Giga-hertz to 3.5 Giga-hertz in steps of .1 Giga-hertz. Each line has its own marker with the first 1 to 9 frequencies marked with "1" to "9" respectively. The tenth frequency is marked with "." and the eleventh with "+". Both figure 1 and figure 2 are copies of what appears on the CRT during a scan and are provided to give the user a compact representation of the data. From figure 2 one can see that each of the frequencies gives approximately the same shape of line scan but the overall attenuation varies greatly with 2.5 Giga-hertz having the most and 2.9 Giga-hertz having the least attenuation. If the user later decides he wants to look more closely at a graph of one frequency, he can go back to the data and have a single frequency plotted. Figures 3 to 13 show a scan similar to that shown in figure 2, but each frequency is plotted separately.

One usually takes transmission data to get a representation of the inside of a sample as was done to make figures 1 to 13. However, one can obtain other useful information by measuring the attenuation of the reflected wave. The user has the capability of taking reflection scans in the same manner as transmission scans are taken. The graphs are similar to the transmission graphs except that the attenuation is much greater.

The user also has the capability of repeating the measurement several times at each data point for statistical averaging. If a frequency scan is done, the frequency is scanned before any measurements are repeated instead of repeating the measurements at each frequency of a frequency scan. It is done this way to have the greatest time between different measurements of the same frequency.

The position accuracy of a linear scan was measured by measuring the difference between the desired position and the achieved position. Ten measurements were taken for each of three days. The root mean square difference between the desired and achieved position is .002 mm. The time required to run a scan can be quite long since a typical scan usually has several thousand data points. If we take a linear scan with only one attenuation measurement per position, the time for each position was found to be 2.3 seconds. This time was measured with a stop watch by measuring the time it takes to run a scan over 32 positions at one frequency and with no statistical averaging. From previous measurements, the time to move the position 1 mm was found to be 1.3 seconds. Therefore the other second can be assumed to be used to take the attenuation measurement. Thus the time per scan can be given by the formula:

for step sizes up to 2.9 mm

$$T = N_p[1.3\sqrt{d}] + N_a$$

for 1 mm step size, this reduces to

$$T = 1.3 N_p + N_a$$

for step sizes greater than 2.9 mm

$$T = N_p[2.2 + 0.06(d-2.9)] + N_a$$

Where

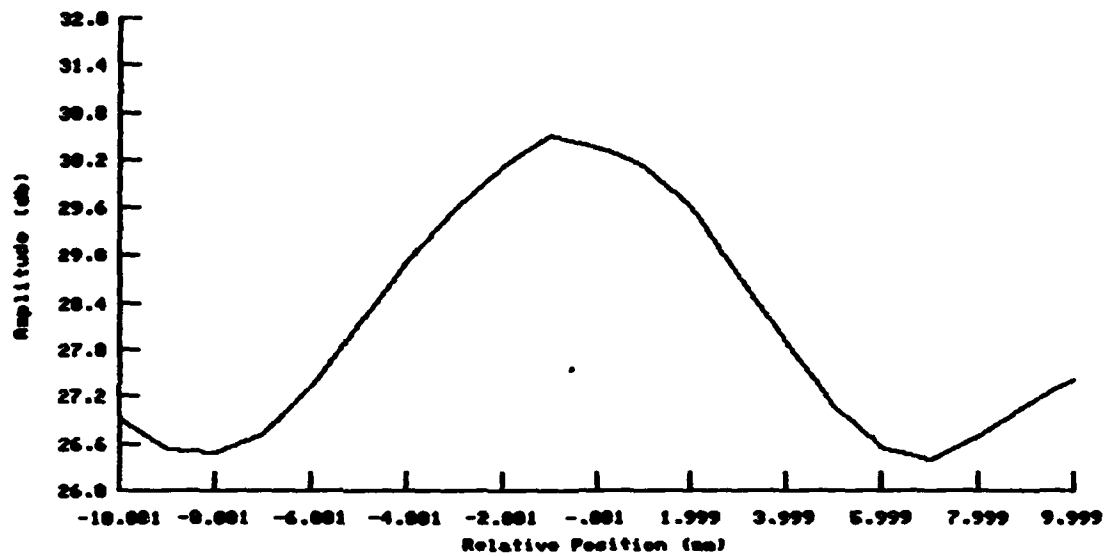
T = time in seconds for the scan

N_a = number of measurements

N_p = number of positions

d = distance between measurement points in millimeters

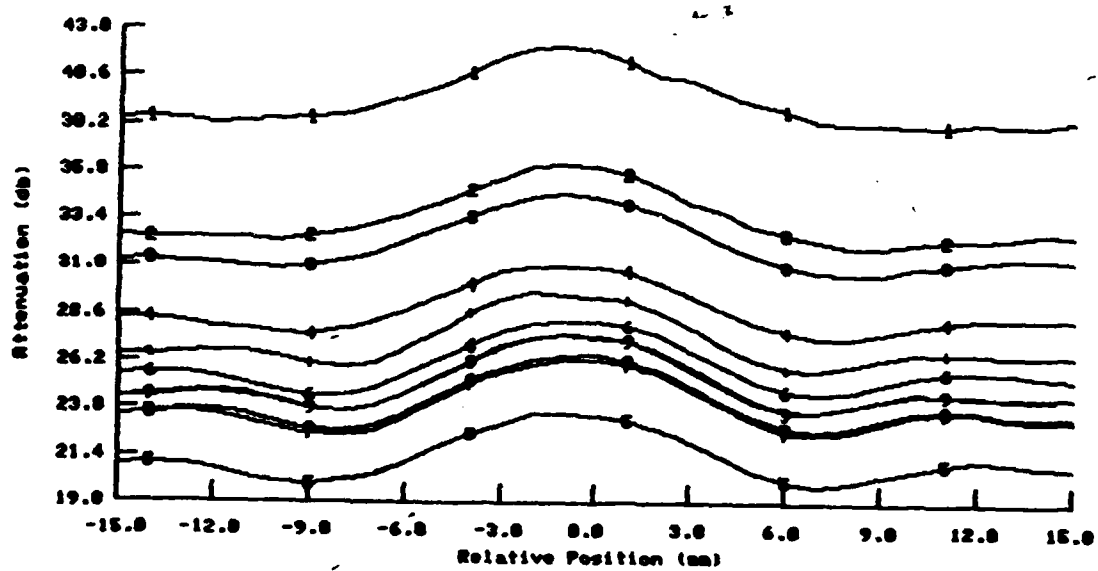
Figure 1



2.6 Giga-hertz

8mm O. D. tube

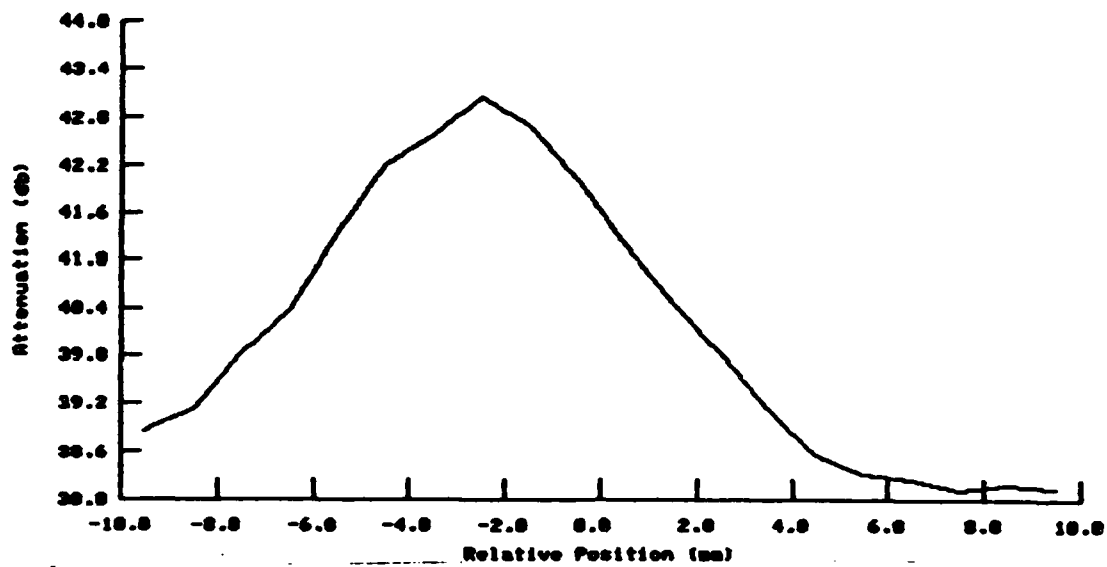
Figure 2



2.5 - 3.5 Giga-hertz

8mm O. D. tube

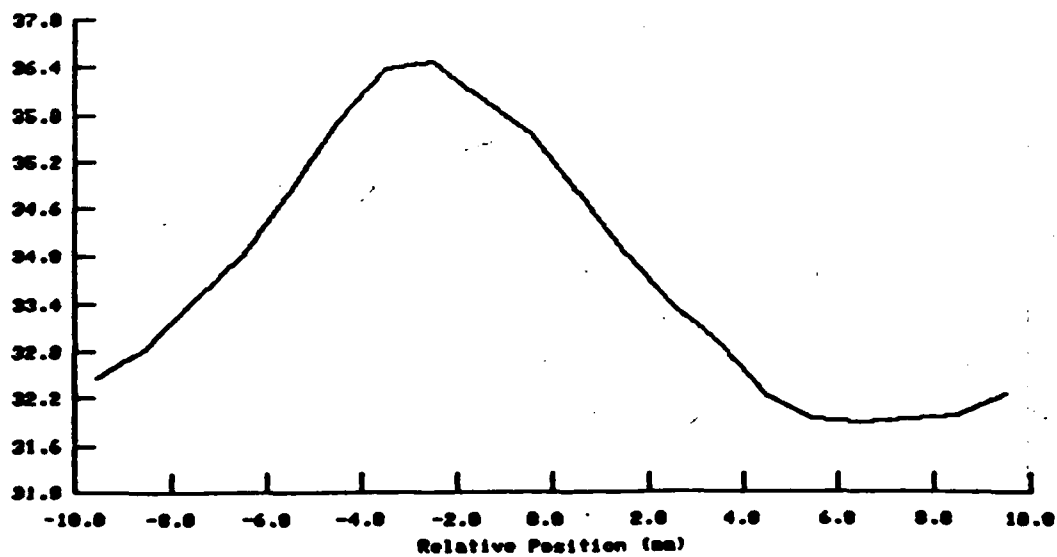
Figure 3



2.5 Giga-hertz

8mm O. D. tube

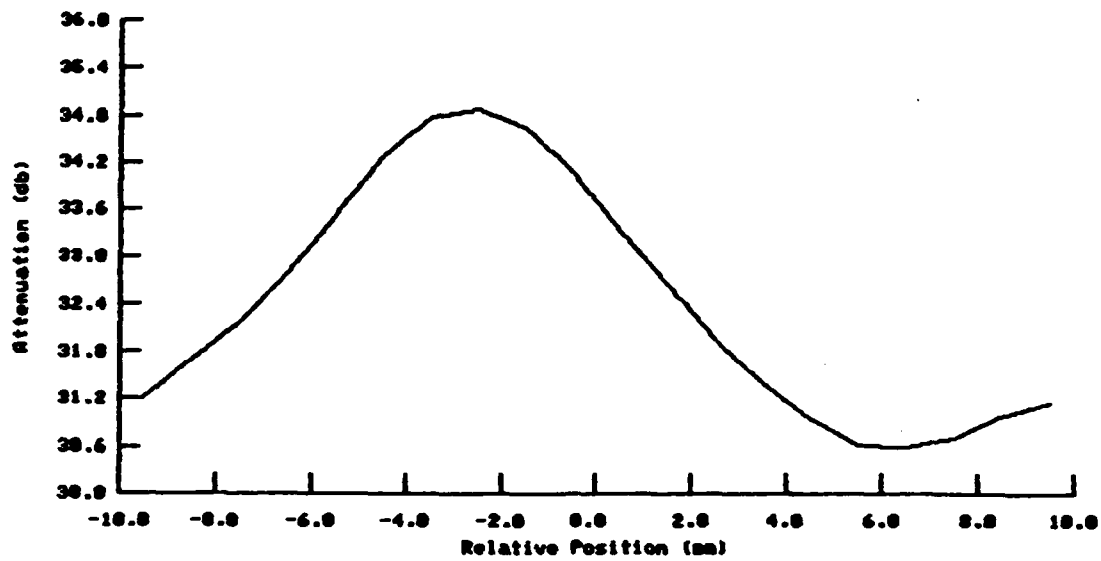
Figure 4



2.6 Giga-hertz

8mm O. D. tube

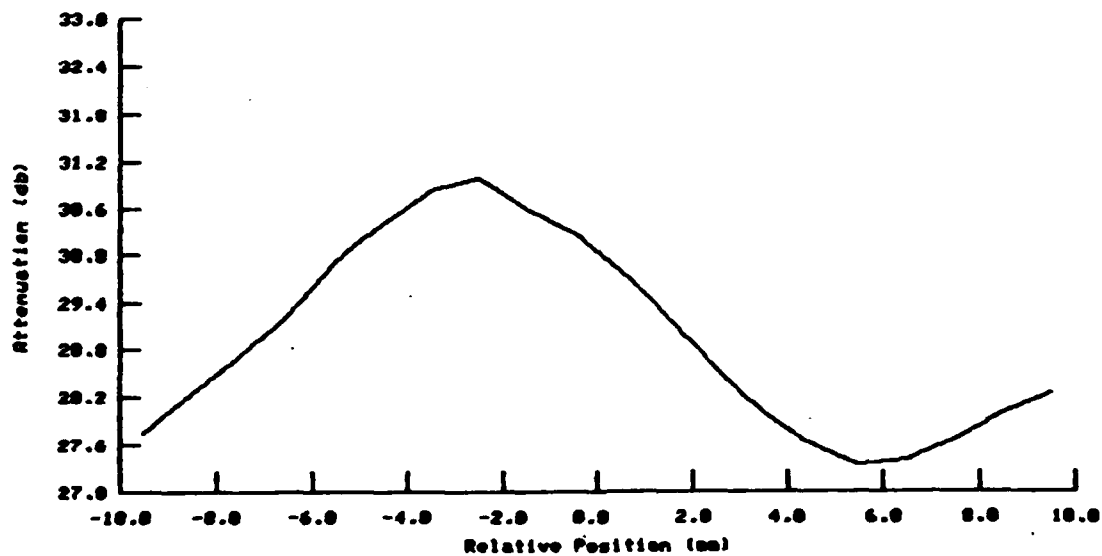
Figure 5



2.7 Giga-hertz

8mm O. D. tube

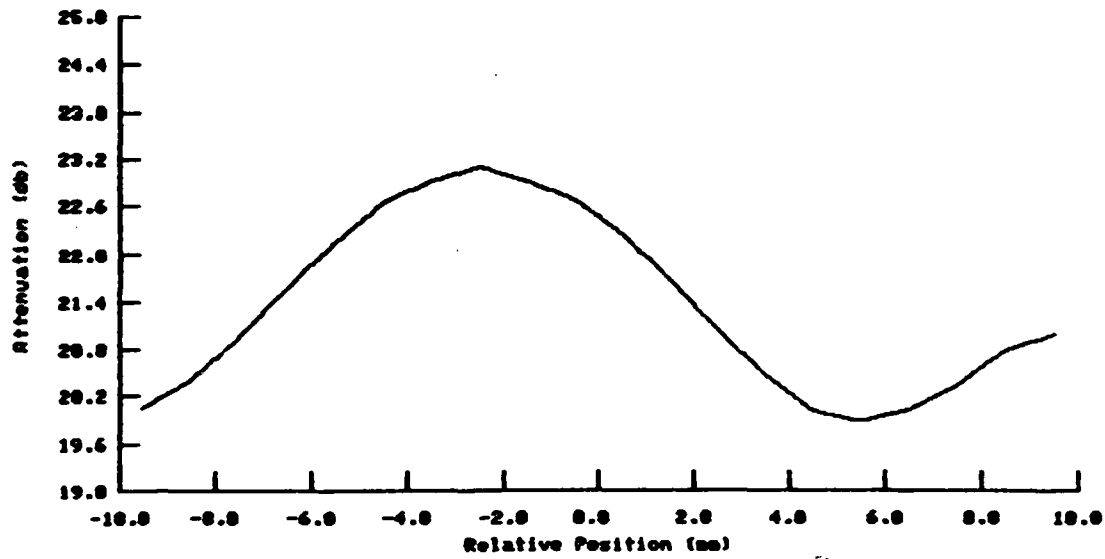
Figure 6



2.8 Giga-hertz

8mm O. D. tube

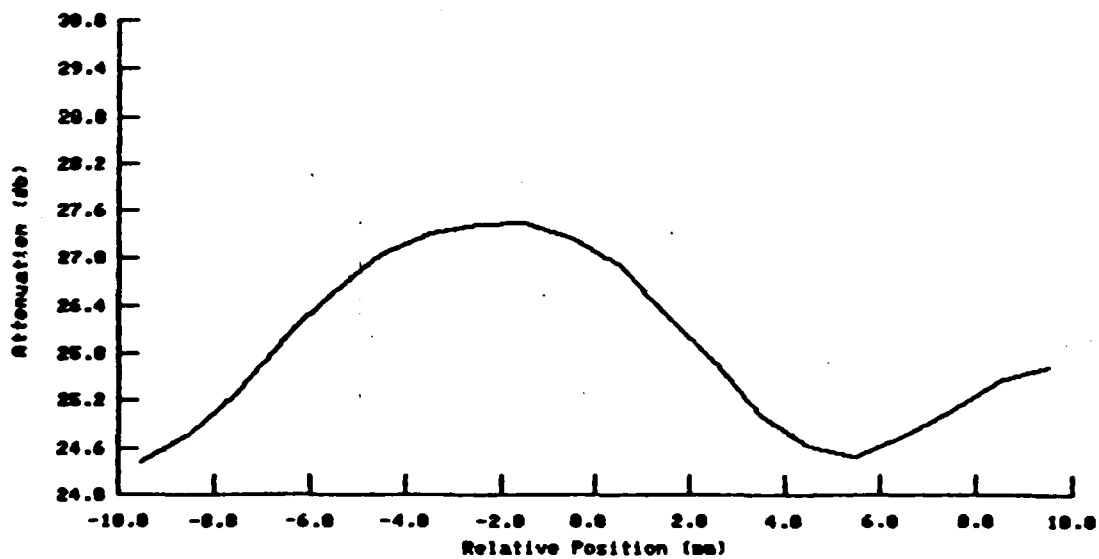
Figure 7



2.9 Giga-hertz

8mm O. D. tube

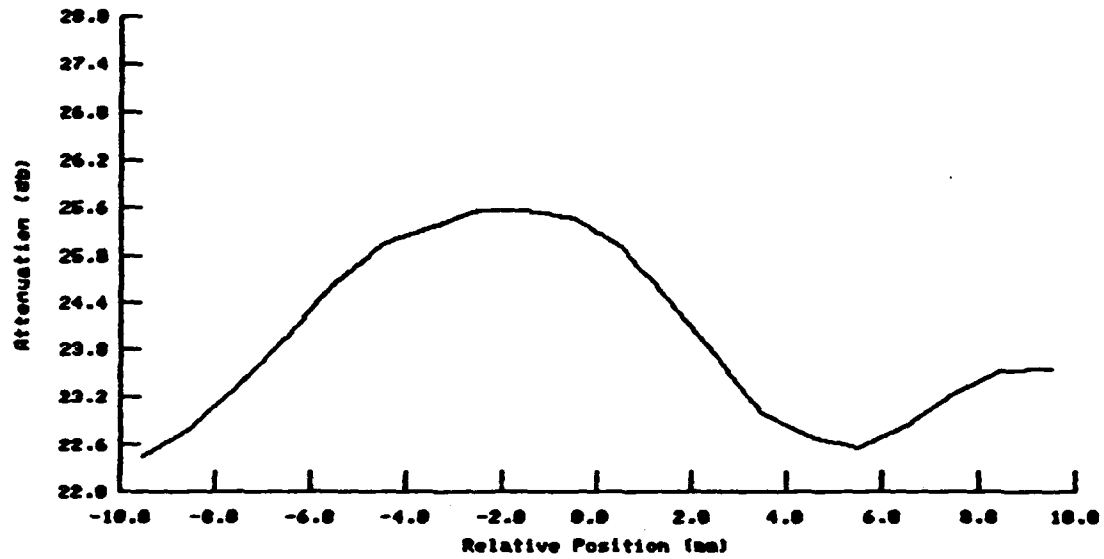
Figure 8



3.0 Giga-hertz

8mm O. D tube

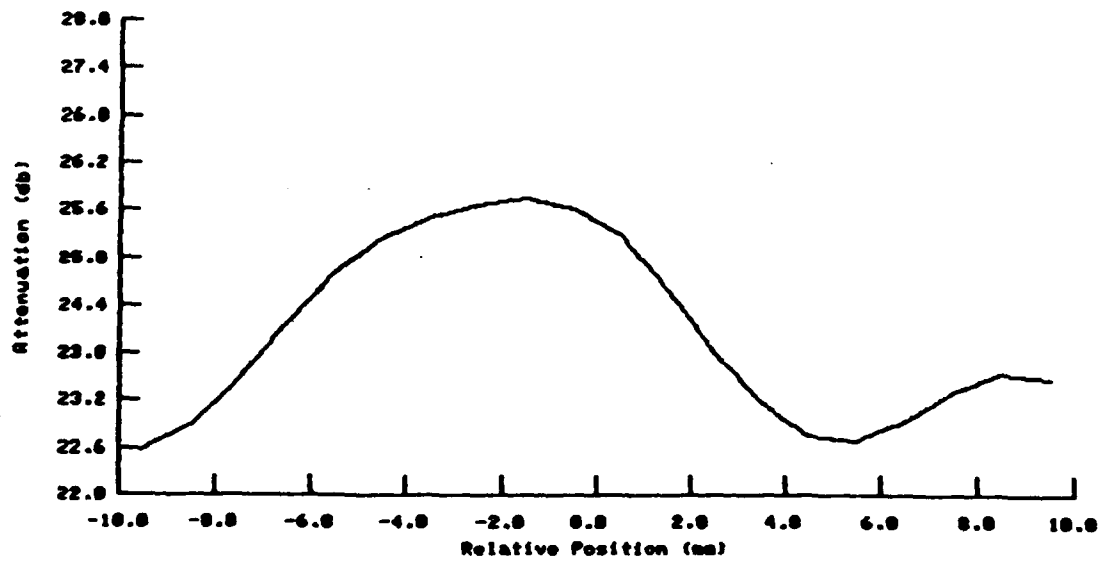
Figure 9



3.1 Giga-hertz

8mm O. D. tube

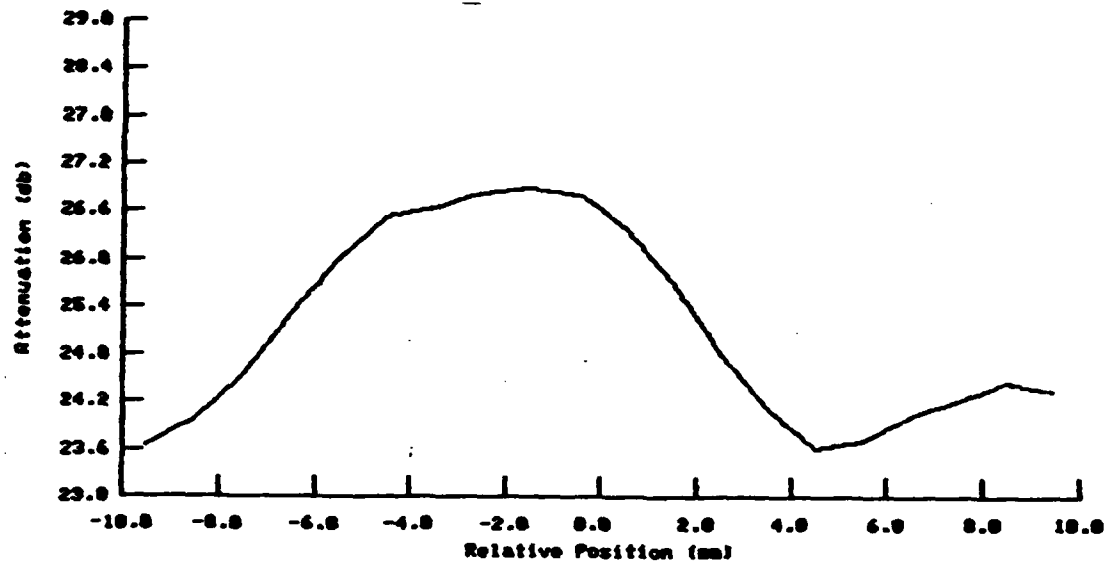
Figure 10



3.2 Giga-hertz

8mm O. D. tube

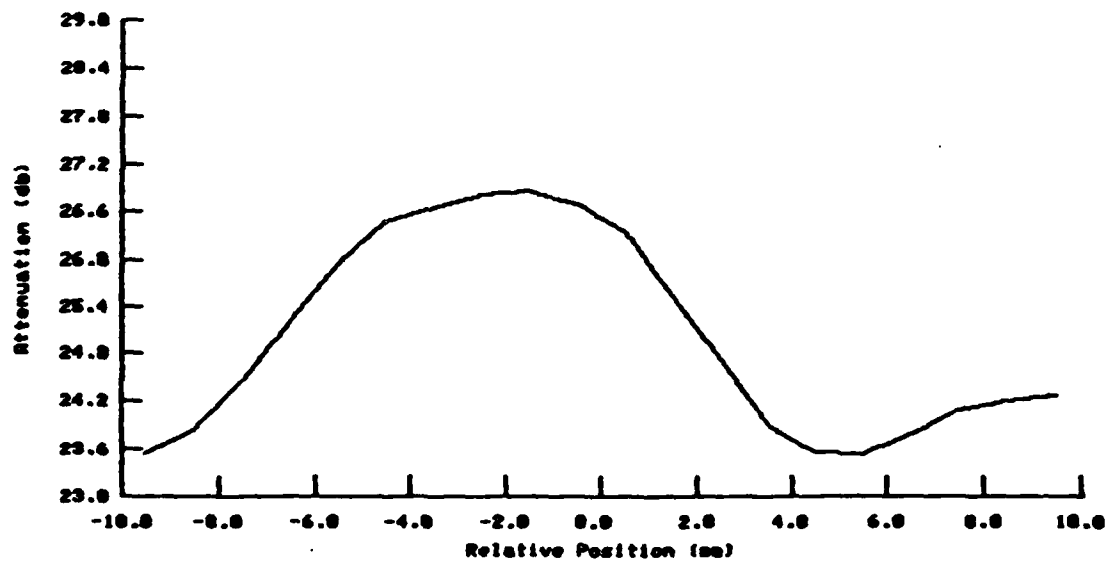
Figure 11



3.3 Giga-hertz

O. D. tube

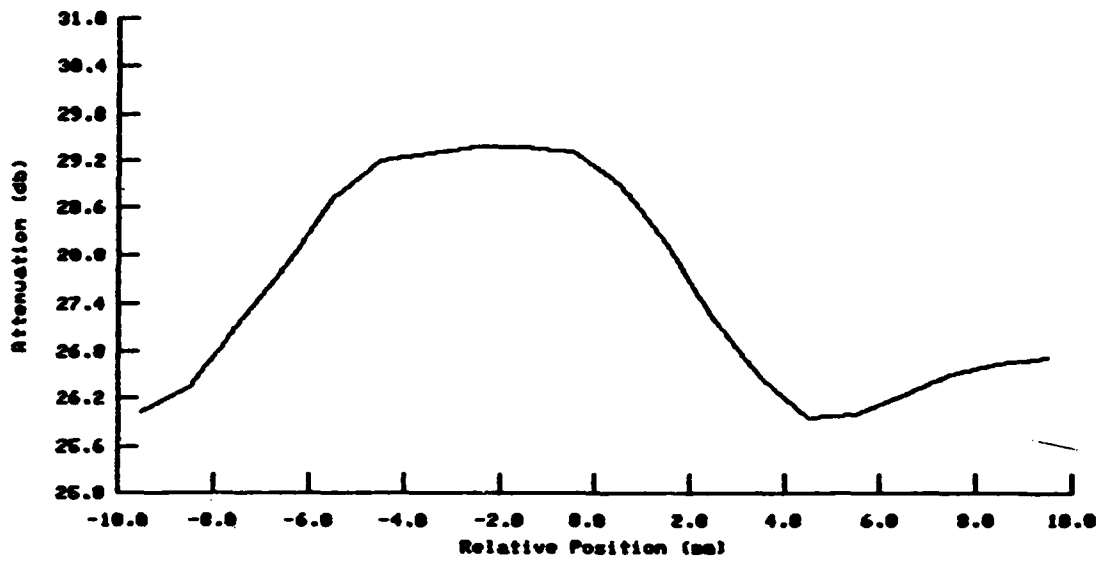
Figure 12



3.4 Giga-hertz

8mm O. D. tube

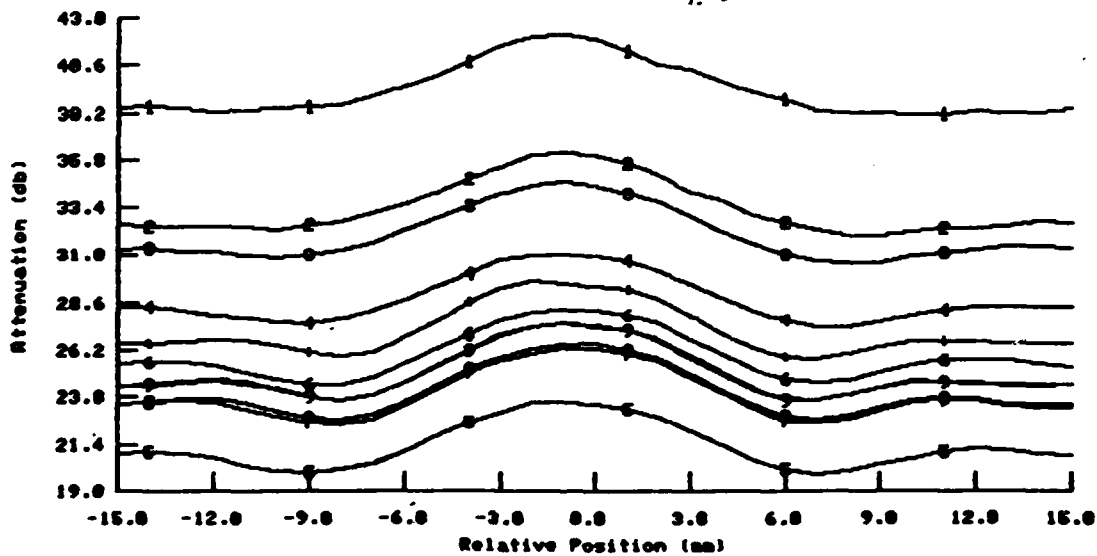
Figure 13



3.5 Giga-hertz

8mm O. D. tube

Figure 14



2.5 - 3.5 Giga-hertz

8mm O. D. tube

B. RASTER SCAN

The user has the capability of making a two dimensional (raster) scan. This is done as a series of line scans, with each one incremented in elevation. The equipment is capable of a range of elevation of about 195 mm and a range of azimuth of about 155 mm.

The user is also capable of scanning over many frequencies during a raster scan. This is done by scanning over the frequencies at every position of the raster scan. The possible range of frequencies is 2.5 to 3.5 Giga-hertz, with the limiting factor being the efficiency range of the antennae.

The user has the capability of measuring the attenuation of either the transmitted or the reflected wave in a raster scan. The main difference between the two is that the reflected wave has much more attenuation.

The position, attenuation, and phase are stored in a disc file at every position. At the end of every line scan, the elevation and frequency are recorded. If a frequency scan is taken, each line scan is recorded separately for each frequency. Thus each record on disc consists of a line scan. For any type of scan the record format on disc is the same.

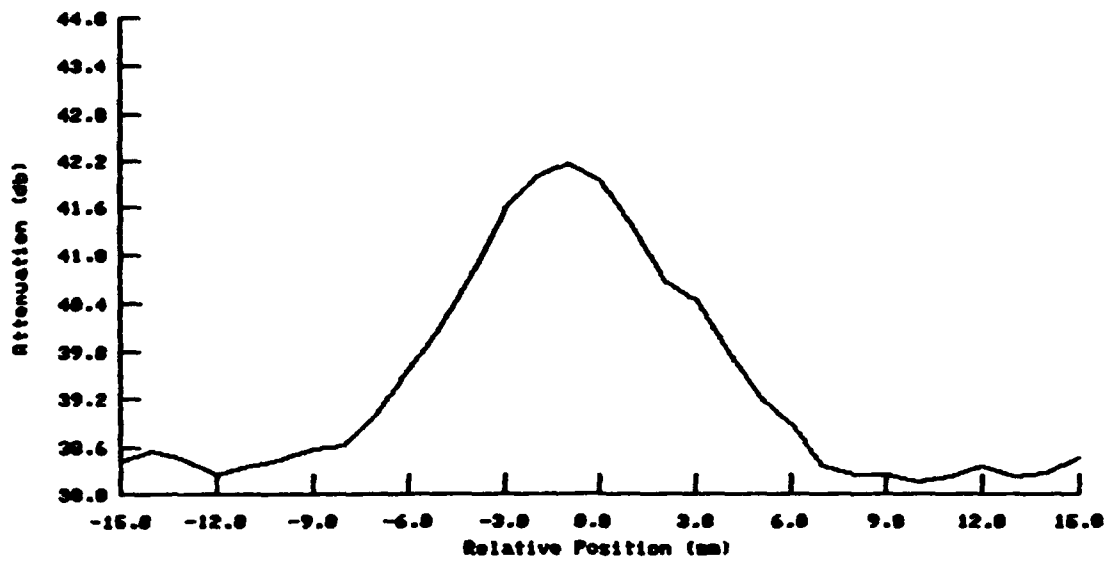
The user has the capability of displaying the data in various ways during a raster scan. He can have the frequency, azimuth, attenuation, and phase listed on a printer. He can have graphs of the attenuation plotted on the CRT or on a hard copy plotter. A graph plotted on the CRT can be copied onto a different hard copy plotter. One line scan is plotted per graph. Thus, if a frequency scan is done, a graph will contain plots of all the frequencies scanned. Figure 14 shows such a graph of a line scan with 11 frequencies plotted. Each line has its own marker with the first 1 to 9 frequencies marked with a "1" to "9" respectively. The tenth line is marked with a "." and the eleventh with "+". If the user later decides he wants to look more closely at a graph of one frequency, he can retrieve the data from the disc file and have a single frequency plotted. Figures 15 to 25 show the output of the raster scan program for one line. Since the object being scanned is a uniform tube, the other 63 line scans are similar to these graphs.

The user also has the capability of taking reflection scans in the same manner as transmission scans are taken. The data is similar to the transmission data except that the reflection attenuation is much greater.

The user also has the capability of repeating each measurement several times for statistical averaging. If a frequency scan is done, a frequency scan is completed and then repeated for the statistical number of times and then the antennae are moved on to the next position. This method provides the greatest time between measurements of the same frequency while keeping the time per scan to a minimum.

Since a raster scan consists of many line scans, the beginning position is not reset for each line scan. Instead, every other line scan moves in the opposite direction.

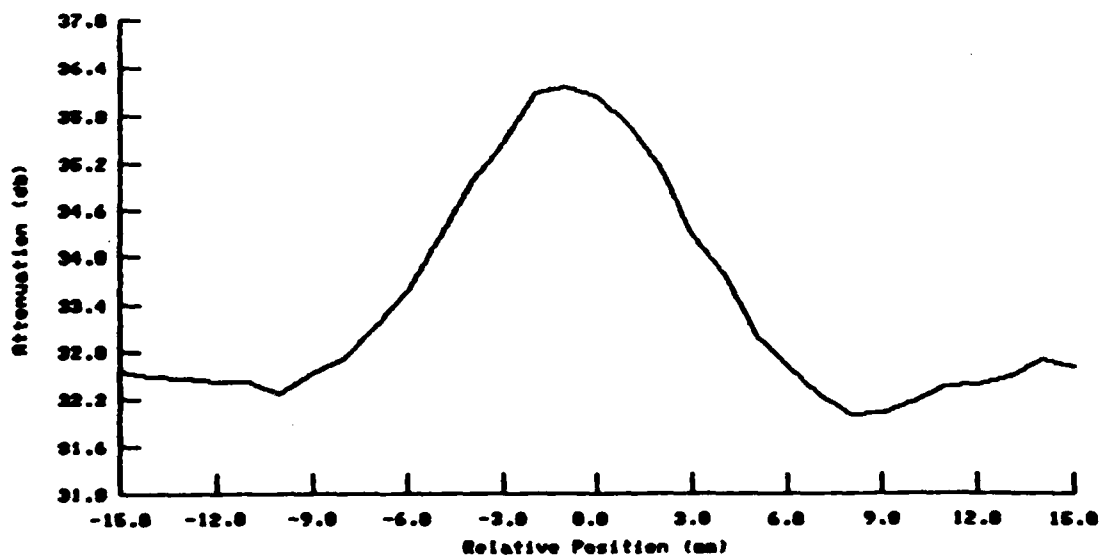
Figure 15



2.5 Giga-hertz

8mm O. D. tube

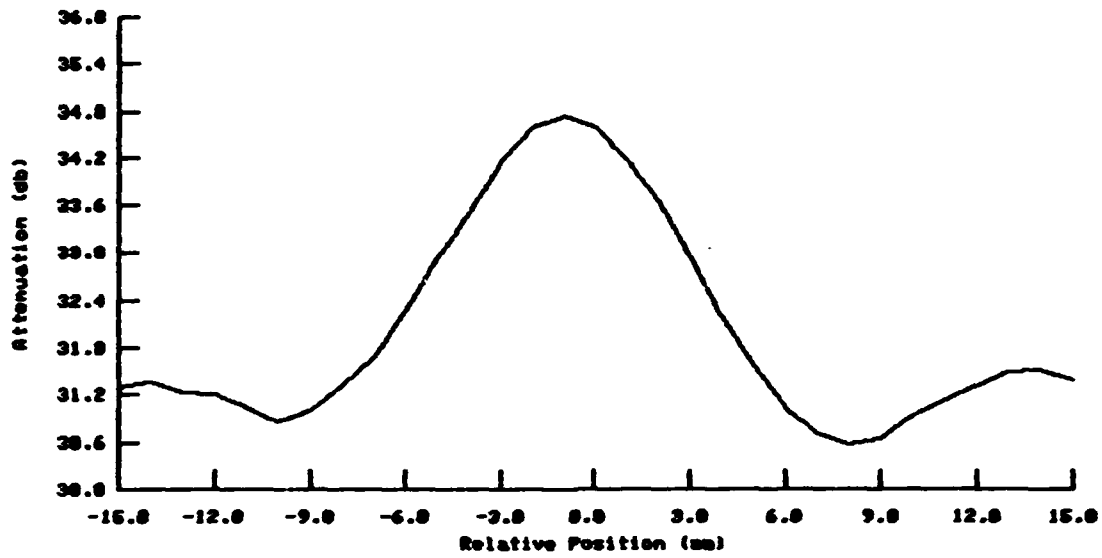
Figure 16



2.6 Giga-hertz

8mm O. D. tube

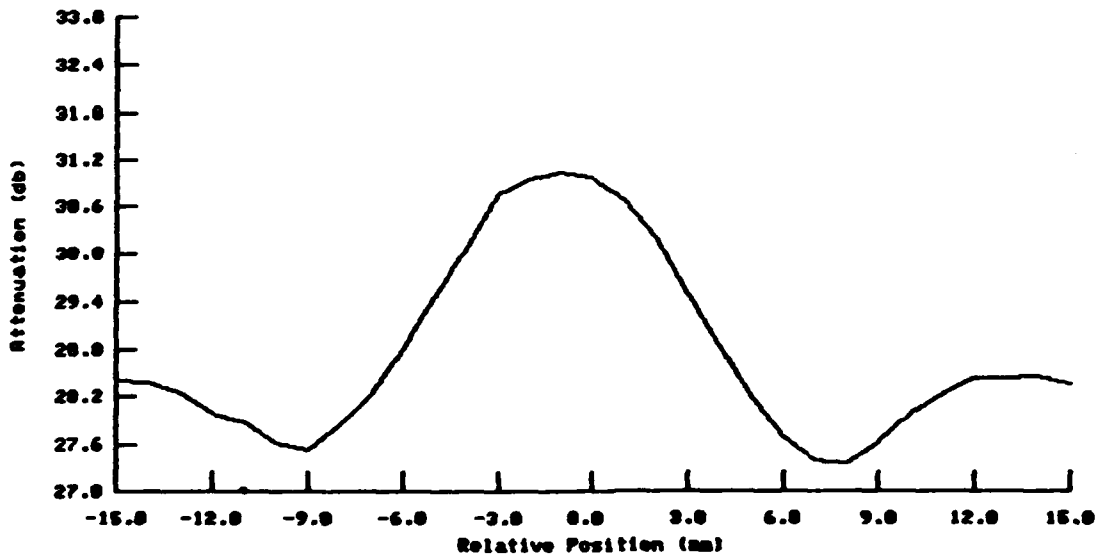
Figure 17



2.7 Giga-hertz

8mm O. D. tube

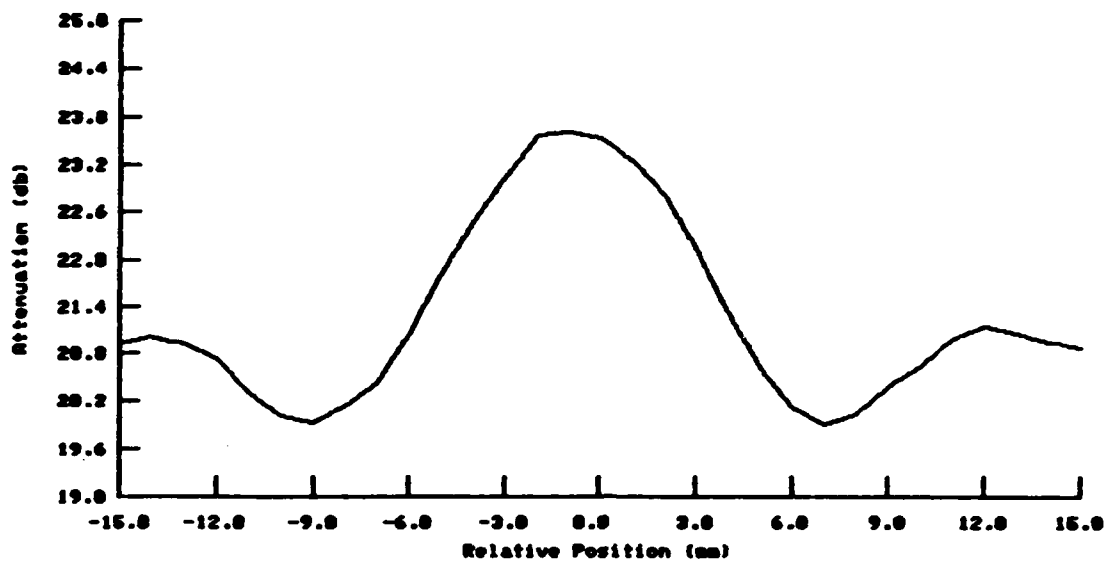
Figure 18



2.8 Giga-hertz

8mm O. D. tube

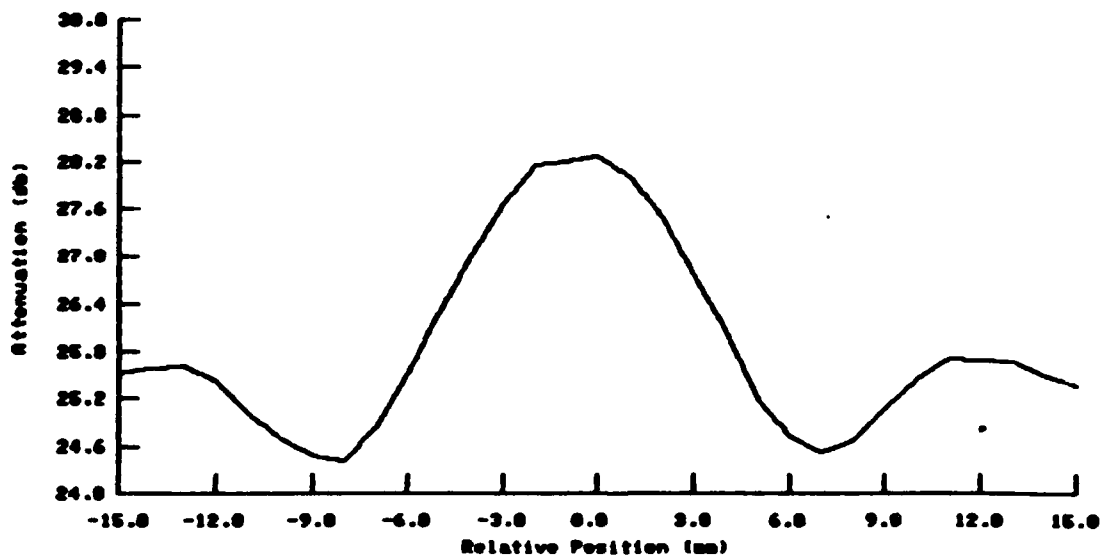
Figure 19



2.9 Giga-hertz

8mm O. D. tube

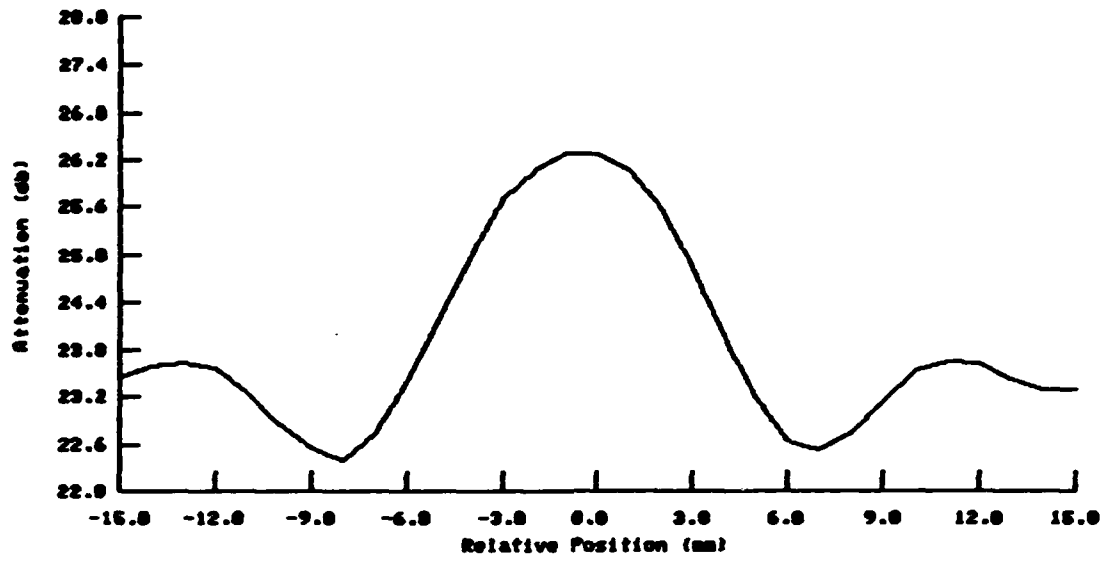
Figure 20



3.0 Giga-hertz

8mm O. D. tube

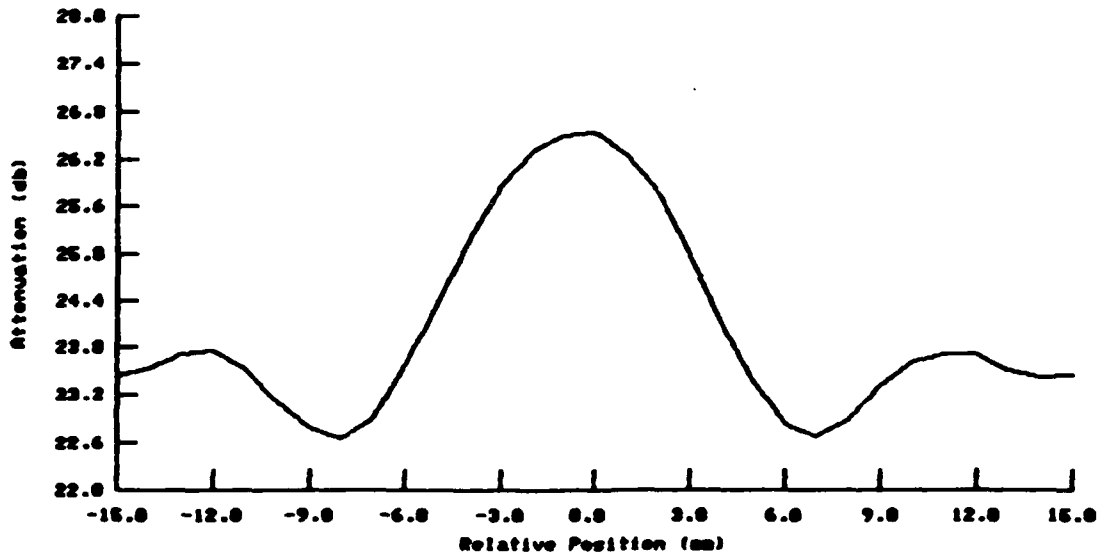
Figure 21



3.1 Giga-hertz

8mm O. D. tube

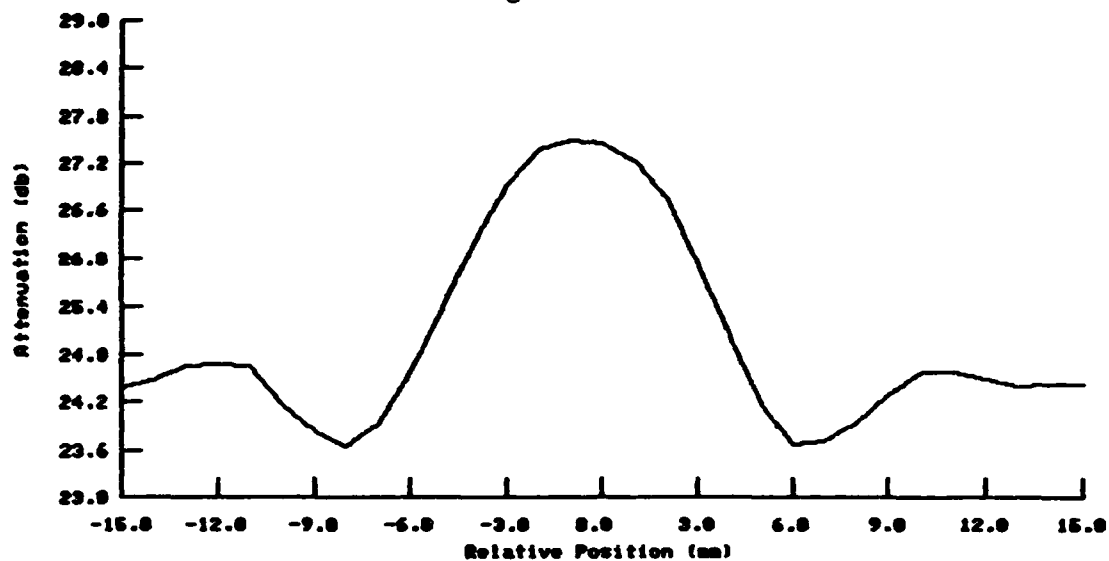
Figure 22



3.2 Giga-hertz

8mm O. D. tube

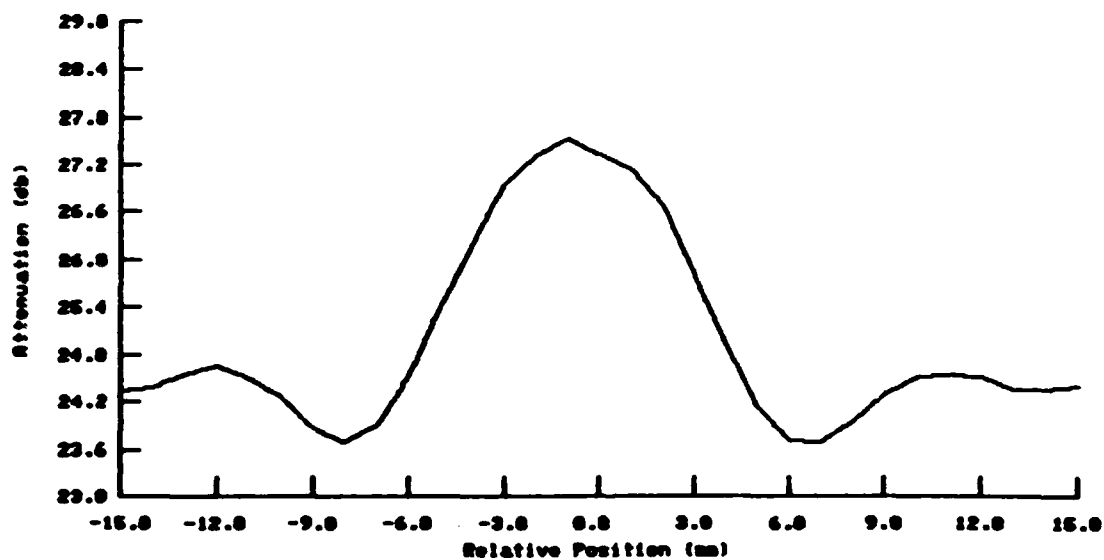
Figure 23



3.3 Giga-hertz

8mm O. D. tube

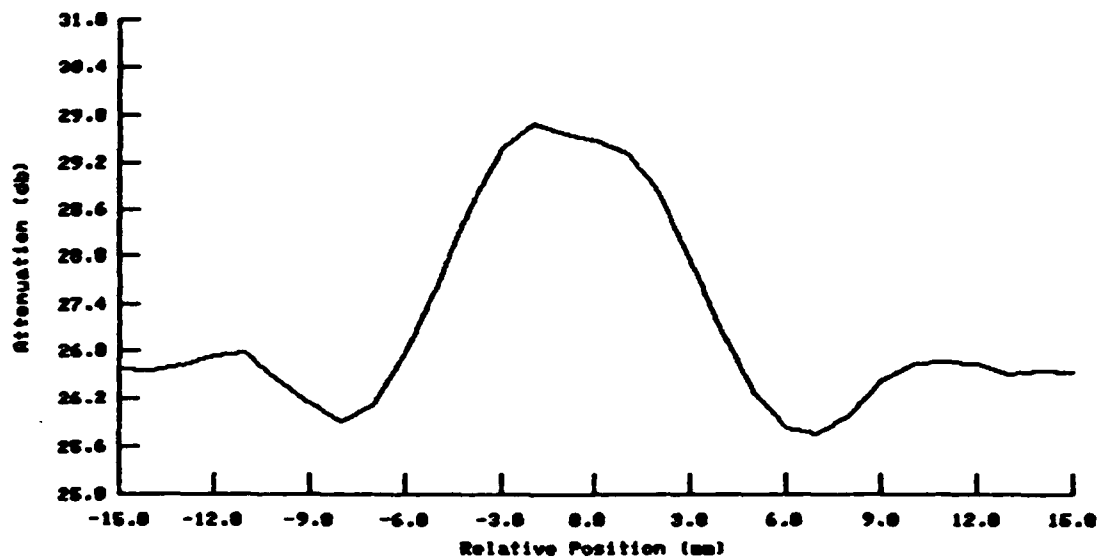
Figure 24



3.4 Giga-hertz

8mm O. D. tube

Figure 25



3.5 Giga-hertz

8mm O. D. tube

C. ROTATION AND TRANSLATION

The user has the capability of making a linear scan coupled with a rotational scan. These are done as a series of line scans, each one at a slightly different angle. The equipment is capable of a maximum rotation of 190 degrees. If the user starts the scan at the endpoint of this range, he can scan over the full range of 190 degrees.

The transmission attenuation is measured and stored in a disc file along with the position and phase at every data point. At the end of every line scan the angle and frequency are recorded before changing the angle.

The user has the capability of displaying the data in various ways during the scan. He can have the position, attenuation and phase recorded on a printer. He can have graphs of the attenuation plotted on the CRT or on a hard copy plotter. A graph plotted on the CRT can be copied onto a different hard copy plotter. The user has the capability of plotting only every nth line scan, where n can be any integer from 1 up to the number of scans. Before any graphs are plotted on the CRT, the position, attenuation, and phase are listed on the CRT. Thus the user has the capability of checking the data as soon as it is taken.

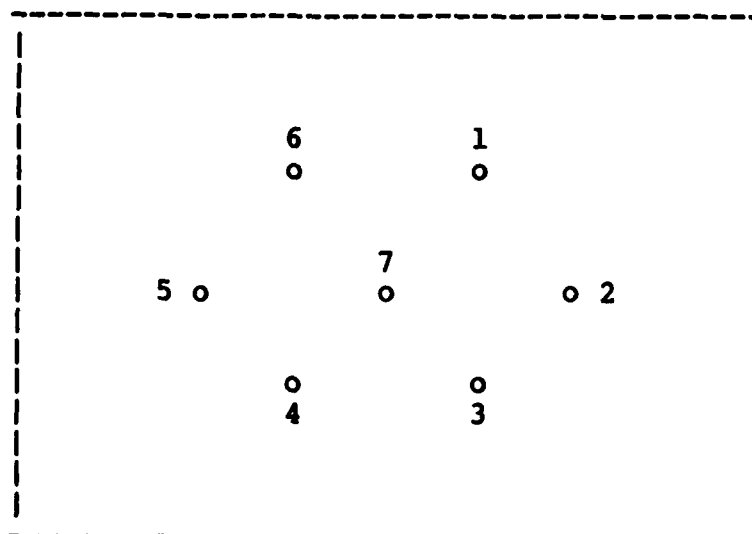
The user has the capability of repeating the measurement any number of times at each data point for the purpose of statistical averaging. When more than one measurement is taken per data point, the averaging is done before any data is recorded in the disc file or on the printer or plotted so that there is only one value of attenuation and phase recorded at each position. The fact that many measurements were averaged to arrive at each recorded value is recorded at the beginning of the file.

Since many line scans can be done at many angles, the time involved can be quite long. Therefore after a line scan is finished and the angle is incremented, the azimuth position is not reset to the same position where the last line scan started. Instead, every other line scan moves in the opposite direction so that no resetting is necessary.

D. Antenna Subarray Verification

A seven element subarray of the much larger array was fabricated and tested for the purpose of verifying the antenna design. Two programs were written to make the required measurements. The first program measured the VSWR of each element when driven from a 50 Ohm source. The second program measured the coupling between various elements in the subarray.

The data presented on the following pages was collected with the subarray mounted on the water loaded scanner. The subarray was positioned approximately twelve inches below the surface of the water. The numbering for the elements of the subarray and their relative position is shown in figure 6.



Subarray Element Identification

Figure 6

```

*****
*
*      Walter Reed Army Institute of Research
*      Department of Microwave Research
*      Walter Reed Army Medical Center
*      Washington, DC 20012
*
*****

```

SUBARRAY VERIFICATION
ELEMENT # 1

Measurement Date: 12:50 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.5946	118.7	3.933	4.516
2050.000	.5684	-90.2	3.634	4.907
2100.000	.5683	58.9	3.632	4.909
2150.000	.5124	-151.0	3.102	5.808
2200.000	.5215	-8	3.180	5.654
2250.000	.4594	150.1	2.700	6.755
2300.000	.4390	-52.4	2.565	7.151
2350.000	.4149	84.6	2.418	7.641
2400.000	.3665	-102.1	2.157	8.718
2450.000	.3738	35.3	2.194	8.548
2500.000	.3190	-165.7	1.937	9.924
2550.000	.3213	-15.5	1.947	9.862
2600.000	.2687	-130.7	1.735	11.415
2650.000	.2479	-63.8	1.659	12.116
2700.000	.2149	85.2	1.547	13.357
2750.000	.1816	-114.1	1.444	14.816
2800.000	.1842	44.0	1.452	14.693
2850.000	.1419	-150.1	1.331	16.960
2900.000	.1646	-9	1.394	15.673
2950.000	.1273	174.6	1.292	17.905
3000.000	.1690	-29.2	1.407	15.443
3050.000	.1493	-132.5	1.351	16.519
3100.000	.1970	-65.5	1.491	14.112
3150.000	.2018	80.8	1.506	13.901
3200.000	.2218	-106.6	1.570	13.079
3250.000	.2435	35.3	1.644	12.272
3300.000	.2516	-162.5	1.673	11.984
3350.000	.2988	-11.3	1.852	10.494
3400.000	.2865	140.4	1.803	10.859
3450.000	.3425	-67.9	2.042	9.308
3500.000	.3308	77.4	1.989	9.609
3550.000	.3680	-127.4	2.165	8.682
3600.000	.3750	28.5	2.200	8.518
3650.000	.3724	177.6	2.187	8.580
3700.000	.4281	-27.3	2.497	7.368
3750.000	.4021	124.7	2.345	7.912
3800.000	.4450	-83.2	2.604	7.033
3850.000	.4453	60.8	2.605	7.027
3900.000	.4306	-141.6	2.513	7.318
3950.000	.4664	4.7	2.748	6.624
3999.999	.4445	166.7	2.600	7.043

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 ELEMENT # 2

Measurement Date: 12:52 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.3957	81.7	2.318	8.052
2050.000	.3645	-117.5	2.147	8.766
2100.000	.4054	35.4	2.363	7.843
2150.000	.3813	-171.8	2.233	8.374
2200.000	.4345	-19.7	2.537	7.240
2250.000	.4084	128.8	2.381	7.778
2300.000	.4143	-72.5	2.414	7.655
2350.000	.4199	61.8	2.447	7.538
2400.000	.3725	-126.7	2.187	8.577
2450.000	.4013	18.5	2.348	7.931
2500.000	.3460	169.2	2.058	9.218
2550.000	.3736	-42.0	2.193	8.552
2600.000	.3216	101.7	1.948	9.853
2650.000	.3166	-93.7	1.927	9.990
2700.000	.2936	50.5	1.831	10.644
2750.000	.2575	-158.4	1.694	11.785
2800.000	.2729	4.7	1.751	11.281
2850.000	.2133	161.8	1.542	13.420
2900.000	.2471	-52.2	1.656	12.143
2950.000	.2010	109.7	1.503	13.935
3000.000	.2293	-89.2	1.595	12.793
3050.000	.2033	52.1	1.510	13.838
3100.000	.2087	-131.7	1.528	13.609
3150.000	.2254	4.7	1.582	12.942
3200.000	.2031	-174.4	1.510	13.845
3250.000	.2563	-32.6	1.689	11.826
3300.000	.2035	125.8	1.511	13.838
3350.000	.2722	-74.4	1.748	11.301
3400.000	.2361	66.5	1.618	12.539
3450.000	.2828	-123.6	1.789	10.969
3500.000	.2984	11.9	1.858	10.505
3550.000	.2820	175.8	1.786	10.995
3600.000	.3435	-31.8	2.046	9.282
3650.000	.2987	115.5	1.852	10.496
3700.000	.3669	-85.3	2.159	8.708
3750.000	.3367	63.1	2.015	9.454
3800.000	.3785	-139.3	2.218	8.448
3850.000	.3932	1.5	2.296	8.108
3900.000	.3752	157.5	2.201	8.514
3950.000	.4318	-53.2	2.528	7.294
3999.999	.3995	105.1	2.331	7.969

```

*****
*
*      Walter Reed Army Institute of Research
*      Department of Microwave Research
*      Walter Reed Army Medical Center
*      Washington, DC 20012
*
*****

```

SUBARRAY VERIFICATION
ELEMENT # 3

Measurement Date: 12:53 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.6463	85.7	4.655	3.791
2050.000	.3384	180.0	2.023	9.412
2100.000	.6186	27.0	4.136	4.285
2150.000	.5668	173.0	3.616	4.932
2200.000	.5684	-35.1	3.634	4.907
2250.000	.5335	111.3	3.288	5.457
2300.000	.4879	-92.8	2.905	6.234
2350.000	.4782	44.8	2.833	6.408
2400.000	.4006	-150.2	2.336	7.946
2450.000	.4075	-9.1	2.376	7.797
2500.000	.3401	146.8	2.031	9.369
2550.000	.3457	-61.6	2.057	9.225
2600.000	.2870	80.1	1.805	10.844
2650.000	.2596	-114.9	1.701	11.712
2700.000	.2390	29.5	1.628	12.430
2750.000	.1758	-170.4	1.427	15.099
2800.000	.1929	-15.3	1.478	14.295
2850.000	.1196	141.1	1.272	18.443
2900.000	.1458	-61.9	1.341	16.724
2950.000	.0990	100.9	1.220	20.090
3000.000	.1280	-85.7	1.294	17.853
3050.000	.1043	63.7	1.233	19.637
3100.000	.1311	-111.0	1.302	17.646
3150.000	.1425	25.3	1.332	16.921
3200.000	.1510	-149.3	1.356	16.420
3250.000	.1936	-11.9	1.480	14.260
3300.000	.1733	152.5	1.419	15.222
3350.000	.2412	-54.8	1.636	12.352
3400.000	.2132	91.1	1.542	13.425
3450.000	.2739	-107.8	1.754	11.249
3500.000	.2816	30.8	1.784	11.008
3550.000	.2937	-170.9	1.832	10.641
3600.000	.3431	-18.1	2.045	9.291
3650.000	.3155	129.4	1.922	10.019
3700.000	.3724	-73.7	2.187	8.579
3750.000	.3555	74.6	2.103	8.983
3800.000	.3949	-138.4	2.305	8.871
3850.000	.4078	12.0	2.378	7.790
3900.000	.3939	165.2	2.300	8.891
3950.000	.4457	-45.8	2.608	7.018
3999.999	.4197	113.2	2.446	7.542

```

*****
*
*   Walter Reed Army Institute of Research
*   Department of Microwave Research
*   Walter Reed Army Medical Center
*   Washington, DC 20012
*
*****

```

SUBARRAY VERIFICATION
ELEMENT # 4

Measurement Date: 12:54 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.6499	92.2	4.712	3.743
2050.000	.6037	-113.5	4.046	4.384
2100.000	.6259	33.6	4.347	4.069
2150.000	.5657	-178.1	3.606	4.948
2200.000	.5894	-25.9	3.871	4.592
2250.000	.5332	118.0	3.285	5.462
2300.000	.4979	-81.7	2.984	6.056
2350.000	.4888	50.5	2.906	6.231
2400.000	.3964	-139.2	2.314	8.037
2450.000	.4216	-1.8	2.458	7.502
2500.000	.3276	153.6	1.974	9.694
2550.000	.3507	-52.5	2.080	9.101
2600.000	.2744	83.1	1.756	11.232
2650.000	.2454	-102.9	1.651	12.201
2700.000	.2263	32.6	1.585	12.907
2750.000	.1426	-153.5	1.333	16.915
2800.000	.1786	-6.3	1.435	14.963
2850.000	.0810	162.4	1.176	21.835
2900.000	.1444	-39.6	1.337	16.811
2950.000	.0692	125.7	1.149	23.194
3000.000	.1511	-58.4	1.356	16.415
3050.000	.1001	85.4	1.222	19.995
3100.000	.1719	-89.3	1.415	15.295
3150.000	.1688	38.8	1.406	15.453
3200.000	.1820	-131.7	1.445	14.798
3250.000	.2321	-3.4	1.605	12.686
3300.000	.1891	165.8	1.467	14.464
3350.000	.2807	-45.6	1.781	11.035
3400.000	.2241	99.6	1.578	12.993
3450.000	.3031	-100.2	1.870	10.367
3500.000	.2956	35.5	1.839	10.585
3550.000	.3023	-158.0	1.866	10.393
3600.000	.3490	-10.9	2.072	9.143
3650.000	.2971	140.9	1.846	10.541
3700.000	.3824	-63.2	2.238	8.351
3750.000	.3318	85.1	1.993	9.584
3800.000	.3925	-116.7	2.292	8.123
3850.000	.3938	21.8	2.299	8.095
3900.000	.3718	-178.0	2.184	8.594
3950.000	.4352	-32.7	2.541	7.227
3999.999	.3845	129.0	2.249	8.302

```

*****
*
*   Walter Reed Army Institute of Research
*   Department of Microwave Research
*   Walter Reed Army Medical Center
*   Washington, DC 20012
*
*****

```

SUBARRAY VERIFICATION
ELEMENT # 5

Measurement Date: 12:57 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.5703	90.1	3.655	4.878
2050.000	.5009	-114.6	3.007	6.005
2100.000	.5175	33.2	3.145	5.722
2150.000	.4250	-170.3	2.478	7.432
2200.000	.4553	-22.2	2.672	6.835
2250.000	.3803	122.8	2.227	8.397
2300.000	.3690	-70.6	2.170	8.658
2350.000	.3641	60.8	2.145	8.776
2400.000	.2921	-120.4	1.825	10.691
2450.000	.3350	14.8	2.011	9.479
2500.000	.2393	173.7	1.629	12.423
2550.000	.2934	-29.7	1.830	10.652
2600.000	.2173	108.7	1.555	13.259
2650.000	.2200	-75.2	1.564	13.153
2700.000	.1974	61.3	1.492	14.094
2750.000	.1555	-120.3	1.368	16.162
2800.000	.1906	27.0	1.471	14.396
2850.000	.1205	-157.8	1.274	18.382
2900.000	.1926	-14.4	1.477	14.308
2950.000	.1220	153.2	1.278	18.274
3000.000	.2100	-46.7	1.532	13.555
3050.000	.1616	101.7	1.385	15.834
3100.000	.2295	-84.7	1.596	12.785
3150.000	.2348	49.5	1.614	12.586
3200.000	.2380	-130.0	1.627	12.448
3250.000	.2935	3.6	1.831	10.647
3300.000	.2543	165.4	1.682	11.893
3350.000	.3401	-41.0	2.031	9.369
3400.000	.2931	101.6	1.829	10.659
3450.000	.3680	-94.8	2.164	8.684
3500.000	.3723	39.5	2.186	8.581
3550.000	.3681	-158.6	2.165	8.680
3600.000	.4209	-7.8	2.453	7.517
3650.000	.3748	140.0	2.199	8.523
3700.000	.4442	-61.6	2.598	7.049
3750.000	.4163	84.8	2.426	7.613
3800.000	.4496	-117.2	2.634	6.943
3850.000	.4715	22.8	2.784	6.531
3900.000	.4318	178.6	2.520	7.295
3950.000	.4980	-31.0	2.984	6.056
3999.999	.4493	125.4	2.632	6.958

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 ELEMENT # 6

Measurement Date: 12:58 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.6504	90.3	4.721	3.736
2050.000	.6108	-113.2	4.138	4.283
2100.000	.6327	32.1	4.445	3.976
2150.000	.5691	-177.1	3.641	4.897
2200.000	.6053	-26.4	4.067	4.368
2250.000	.5409	119.0	3.357	5.337
2300.000	.5214	-80.7	3.179	5.656
2350.000	.5064	50.9	3.052	5.910
2400.000	.4248	-136.5	2.477	7.436
2450.000	.4518	-1.3	2.648	6.901
2500.000	.3598	157.2	2.124	8.880
2550.000	.3985	-51.9	2.325	7.991
2600.000	.3152	86.0	1.921	10.028
2650.000	.3042	-102.6	1.875	10.336
2700.000	.2789	32.3	1.774	11.090
2750.000	.2051	-157.5	1.516	13.760
2800.000	.2391	-13.3	1.629	12.428
2850.000	.1316	146.5	1.303	17.615
2900.000	.1895	-60.7	1.468	14.449
2950.000	.0984	91.4	1.218	20.138
3000.000	.1505	-86.2	1.354	16.451
3050.000	.0980	44.6	1.217	20.178
3100.000	.1300	-105.5	1.299	17.724
3150.000	.1319	12.8	1.304	17.592
3200.000	.1365	-136.7	1.316	17.296
3250.000	.1855	-14.1	1.456	14.632
3300.000	.1402	169.2	1.326	17.067
3350.000	.2375	-50.3	1.623	12.485
3400.000	.1723	99.6	1.416	15.273
3450.000	.2795	-97.1	1.776	11.073
3500.000	.2527	34.9	1.676	11.948
3550.000	.2875	-154.4	1.807	10.827
3600.000	.3202	-13.0	1.942	9.893
3650.000	.2887	143.3	1.812	10.790
3700.000	.3728	-65.5	2.189	8.571
3750.000	.3221	85.9	1.958	9.840
3800.000	.3990	-119.1	2.328	7.988
3850.000	.3857	19.8	2.256	8.276
3900.000	.3820	-179.7	2.241	8.340
3950.000	.4344	-37.4	2.536	7.242
3999.999	.3935	127.2	2.297	8.102

```

*****
*
*   Walter Reed Army Institute of Research
*   Department of Microwave Research
*   Walter Reed Army Medical Center
*   Washington, DC 20312
*
*****

```

SUBARRAY VERIFICATION
ELEMENT # 7

Measurement Date: 12:59 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S11		VSWR	Return Loss (dB)
	Magnitude	Phase		
2000.000	.4700	98.1	2.773	6.558
2050.000	.4580	-113.8	2.690	6.783
2100.000	.4498	42.1	2.635	6.940
2150.000	.4486	-169.4	2.627	6.964
2200.000	.4394	-19.2	2.568	7.143
2250.000	.4264	134.9	2.487	7.404
2300.000	.4017	-74.6	2.343	7.923
2350.000	.3514	92.3	2.083	9.085
2400.000	.3611	-127.1	2.131	8.847
2450.000	.3383	15.4	2.023	9.413
2500.000	.3261	173.9	1.968	9.733
2550.000	.2983	-40.6	1.850	10.506
2600.000	.2684	112.3	1.734	11.426
2650.000	.2468	-93.6	1.655	12.152
2700.000	.2092	66.4	1.529	13.589
2750.000	.1982	-144.1	1.494	14.058
2800.000	.1675	23.1	1.402	15.521
2850.000	.1642	-177.4	1.393	15.691
2900.000	.1487	-30.1	1.349	16.556
2950.000	.1595	146.7	1.379	15.947
3000.000	.1715	-65.3	1.414	15.317
3050.000	.1698	105.8	1.409	15.400
3100.000	.2113	-103.3	1.536	13.503
3150.000	.2032	51.7	1.510	13.842
3200.000	.2444	-147.4	1.647	12.237
3250.000	.2469	.8	1.656	12.151
3300.000	.2805	158.7	1.780	11.843
3350.000	.2968	-49.9	1.844	10.550
3400.000	.3019	102.7	1.865	10.404
3450.000	.3463	-106.8	2.059	9.211
3500.000	.3461	39.6	2.059	9.216
3550.000	.3802	-168.2	2.227	8.401
3600.000	.3822	-11.5	2.237	8.354
3650.000	.3937	135.9	2.298	8.098
3700.000	.4143	-70.1	2.415	7.653
3750.000	.4163	85.6	2.426	7.613
3800.000	.4432	-127.9	2.592	7.067
3850.000	.4450	22.0	2.604	7.032
3900.000	.4540	171.3	2.663	6.868
3950.000	.4649	-37.2	2.737	6.654
3999.999	.4713	122.7	2.783	6.533

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 6 dB ATTENUATOR WITH SMA ADAPTORS

Measurement Date: 11:39 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.4966	.9	6.079
2050.000	.4965	-8.4	6.081
2100.000	.4976	-17.3	6.062
2150.000	.4976	-26.1	6.063
2200.000	.4935	-35.6	6.135
2250.000	.4937	-44.8	6.138
2300.000	.4964	-53.5	6.083
2350.000	.4907	-62.0	6.183
2400.000	.4885	-71.0	6.223
2450.000	.4922	-80.4	6.157
2500.000	.4932	-89.5	6.140
2550.000	.4954	-98.3	6.100
2600.000	.4929	-106.5	6.144
2650.000	.4902	-115.6	6.193
2700.000	.4919	-125.0	6.163
2750.000	.4980	-133.6	6.055
2800.000	.4978	-142.1	6.058
2850.000	.4952	-151.6	6.105
2900.000	.4975	-161.1	6.064
2950.000	.4979	-169.6	6.058
3000.000	.4962	-179.0	6.087
3050.000	.4956	172.0	6.098
3100.000	.4954	163.1	6.100
3150.000	.4938	154.4	6.129
3200.000	.4938	145.8	6.129
3250.000	.4929	136.6	6.145
3300.000	.4929	127.4	6.145
3350.000	.4935	118.2	6.135
3400.000	.4963	109.8	6.086
3450.000	.4933	100.9	6.138
3500.000	.4909	91.6	6.180
3550.000	.5005	82.0	6.012
3600.000	.5011	73.7	6.002
3650.000	.4978	64.5	6.073
3700.000	.4947	55.7	6.113
3750.000	.4953	46.7	6.102
3800.000	.4968	37.3	6.076
3850.000	.4964	28.2	6.083
3900.000	.4944	19.4	6.118
3950.000	.4937	10.3	6.138
3999.999	.4948	1.5	6.111

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 1 TO 2

Measurement Date: 11:42 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0032	-4.0	49.968
2050.000	.0037	137.6	48.549
2100.000	.0039	-84.3	48.104
2150.000	.0046	54.9	46.796
2200.000	.0050	-166.0	46.019
2250.000	.0056	-28.6	45.069
2300.000	.0060	113.1	44.419
2350.000	.0065	-117.3	43.750
2400.000	.0070	27.4	43.112
2450.000	.0073	158.8	42.702
2500.000	.0080	-60.6	41.897
2550.000	.0081	73.1	41.828
2600.000	.0086	-155.1	41.263
2650.000	.0086	-16.4	41.354
2700.000	.0086	120.0	41.314
2750.000	.0082	-107.0	41.214
2800.000	.0083	32.1	41.652
2850.000	.0081	165.6	41.832
2900.000	.0075	-66.2	42.475
2950.000	.0073	74.7	42.697
3000.000	.0067	-150.9	43.422
3050.000	.0063	-13.7	43.974
3100.000	.0057	122.8	44.839
3150.000	.0052	-102.6	45.655
3200.000	.0048	42.9	46.343
3250.000	.0042	177.3	47.486
3300.000	.0038	-43.7	48.438
3350.000	.0033	94.7	49.551
3400.000	.0029	-128.6	50.647
3450.000	.0025	9.0	52.086
3500.000	.0021	145.4	53.379
3550.000	.0019	-76.6	54.310
3600.000	.0016	70.3	55.990
3650.000	.0013	-150.9	57.474
3700.000	.0010	-5.5	59.850
3750.000	.0009	138.4	60.749
3800.000	.0008	-76.4	62.050
3850.000	.0007	62.3	63.504
3900.000	.0005	-147.1	65.635
3950.000	.0005	-5.1	66.260
3999.999	.0004	144.6	67.169

```

*****
*
*   Walter Reed Army Institute of Research
*   Department of Microwave Research
*   Walter Reed Army Medical Center
*   Washington, DC 20012
*
*****

```

SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 1 TO 3

Measurement Date: 11:44 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21 Magnitude	Phase	Insertion Loss (dB)
2000.000	.0016	142.8	55.843
2050.000	.0015	-89.4	56.318
2100.000	.0012	41.3	58.603
2150.000	.0012	174.2	58.694
2200.000	.0010	-48.6	60.047
2250.000	.0011	85.3	59.260
2300.000	.0009	-138.3	61.041
2350.000	.0008	-7.9	61.720
2400.000	.0008	142.6	61.938
2450.000	.0007	-89.0	63.447
2500.000	.0010	47.6	60.356
2550.000	.0008	-170.4	62.184
2600.000	.0008	-57.0	61.766
2650.000	.0008	87.0	62.166
2700.000	.0005	-145.2	65.469
2750.000	.0007	-17.3	63.034
2800.000	.0005	127.3	65.326
2850.000	.0004	-119.2	67.623
2900.000	.0005	24.9	65.558
2950.000	.0003	147.8	69.925
3000.000	.0003	-85.5	70.054
3050.000	.0002	65.3	72.373
3100.000	.0002	164.3	76.177
3150.000	.0001	-48.1	78.256
3200.000	.0001	53.2	81.517
3250.000	.0001	-148.6	81.096
3300.000	.0001	105.3	82.730
3350.000	.0001	85.2	84.090
3400.000	.0000	133.9	89.200
3450.000	.0000	-112.8	91.249
3500.000	.0001	3.6	85.727
3550.000	.0000	165.2	86.215
3600.000	.0000	33.0	100.708
3650.000	.0000	-10.3	87.401
3700.000	.0001	-174.5	83.135
3750.000	.0001	-23.5	81.749
3800.000	.0000	36.1	90.780
3850.000	.0000	-168.7	92.239
3900.000	.0001	-5.8	83.281
3950.000	.0000	-42.3	88.205
3999.999	.0000	-144.9	104.294

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 1 TO 4

Measurement Date: 11:46 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0011	-163.9	59.110
2050.000	.0010	-42.8	59.865
2100.000	.0007	79.3	63.421
2150.000	.0006	-144.4	64.965
2200.000	.0004	-5.2	67.697
2250.000	.0004	121.9	68.835
2300.000	.0003	-91.2	71.290
2350.000	.0000	103.8	94.400
2400.000	.0001	-62.6	82.244
2450.000	.0003	43.6	70.575
2500.000	.0003	-171.1	71.875
2550.000	.0003	-51.2	70.793
2600.000	.0004	94.9	68.525
2650.000	.0004	-121.1	67.951
2700.000	.0005	-6.0	65.494
2750.000	.0005	125.9	66.009
2800.000	.0004	-107.6	68.076
2850.000	.0006	35.7	65.122
2900.000	.0004	156.6	67.317
2950.000	.0004	-70.5	67.748
3000.000	.0004	66.6	67.551
3050.000	.0003	-166.7	69.357
3100.000	.0003	-28.2	69.528
3150.000	.0003	99.6	70.352
3200.000	.0003	-111.3	71.584
3250.000	.0002	11.4	72.366
3300.000	.0003	144.6	70.639
3350.000	.0002	-76.8	73.202
3400.000	.0002	51.9	74.164
3450.000	.0001	-159.3	77.831
3500.000	.0002	-21.1	76.419
3550.000	.0001	137.1	78.531
3600.000	.0000	-128.6	89.482
3650.000	.0001	-24.8	81.845
3700.000	.0001	166.3	80.697
3750.000	.0001	-60.8	79.596
3800.000	.0000	160.8	86.852
3850.000	.0000	156.2	94.577
3900.000	.0000	23.8	88.364
3950.000	.0001	28.0	84.121
3999.999	.0000	-104.6	86.204

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 1 TO 5

Measurement Date: 11:40 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0012	144.2	58.091
2050.000	.0011	-75.5	58.858
2100.000	.0010	55.1	59.587
2150.000	.0011	-175.9	58.932
2200.000	.0008	-43.5	61.656
2250.000	.0008	93.3	62.228
2300.000	.0007	-107.3	63.556
2350.000	.0007	12.8	62.716
2400.000	.0008	156.7	61.778
2450.000	.0006	-75.7	64.096
2500.000	.0008	62.2	61.756
2550.000	.0007	-152.2	63.087
2600.000	.0008	-38.6	62.049
2650.000	.0008	102.5	61.801
2700.000	.0006	-128.4	64.711
2750.000	.0007	-6.8	62.688
2800.000	.0006	145.6	64.965
2850.000	.0004	-95.2	67.046
2900.000	.0005	33.7	65.203
2950.000	.0003	159.3	69.782
3000.000	.0004	-78.2	68.516
3050.000	.0003	77.5	71.199
3100.000	.0002	172.8	75.667
3150.000	.0002	-17.6	74.172
3200.000	.0001	95.1	79.325
3250.000	.0001	-130.3	80.165
3300.000	.0001	89.8	82.214
3350.000	.0000	142.9	90.294
3400.000	.0000	-152.6	88.377
3450.000	.0000	160.8	104.649
3500.000	.0001	0.0	82.911
3550.000	.0000	172.8	89.097
3600.000	.0001	18.1	86.002
3650.000	.0001	5.1	82.181
3700.000	.0000	-168.3	86.196
3750.000	.0001	-72.6	82.980
3800.000	.0000	-142.3	87.085
3850.000	.0001	160.4	85.408
3900.000	.0000	14.3	90.294
3950.000	.0000	-33.5	91.203
3999.999	.0001	-68.9	83.619

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 1 TO 6

Measurement Date: 11:50 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0043	-18.7	47.429
2050.000	.0046	123.8	46.752
2100.000	.0005	-14.9	66.418
2150.000	.0052	43.9	45.758
2200.000	.0055	-176.0	45.218
2250.000	.0062	-40.1	44.122
2300.000	.0064	102.8	43.875
2350.000	.0068	-126.0	43.399
2400.000	.0074	20.9	42.673
2450.000	.0077	151.4	42.291
2500.000	.0084	-67.7	41.501
2550.000	.0082	66.9	41.676
2600.000	.0089	-161.4	41.057
2650.000	.0088	-21.3	41.130
2700.000	.0087	115.0	41.172
2750.000	.0088	-112.3	41.085
2800.000	.0082	27.4	41.686
2850.000	.0081	161.7	41.814
2900.000	.0074	-69.9	42.622
2950.000	.0071	71.2	42.964
3000.000	.0066	-154.3	43.635
3050.000	.0061	-16.7	44.302
3100.000	.0055	120.5	45.124
3150.000	.0050	-104.8	46.096
3200.000	.0044	40.8	47.141
3250.000	.0039	176.1	48.110
3300.000	.0034	-43.8	49.337
3350.000	.0029	94.3	50.719
3400.000	.0026	-128.3	51.703
3450.000	.0022	10.6	53.335
3500.000	.0018	146.6	54.909
3550.000	.0015	-71.0	56.522
3600.000	.0013	78.4	57.982
3650.000	.0010	-140.7	59.945
3700.000	.0008	5.4	61.654
3750.000	.0007	153.7	63.153
3800.000	.0006	-59.1	64.383
3850.000	.0006	80.2	64.970
3900.000	.0005	-127.5	66.046
3950.000	.0004	21.4	67.214
3999.999	.0004	171.9	67.706

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 1 TO 7

Measurement Date: 11:55 AM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	921		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0018	134.9	54.718
2050.000	.0019	-77.8	54.501
2100.000	.0018	77.5	55.071
2150.000	.0021	-134.1	53.718
2200.000	.0025	12.7	52.143
2250.000	.0028	158.5	51.030
2300.000	.0033	-53.9	49.675
2350.000	.0040	82.5	48.022
2400.000	.0045	-132.5	47.013
2450.000	.0052	-2.4	45.757
2500.000	.0056	141.3	45.084
2550.000	.0058	-84.9	44.745
2600.000	.0063	47.8	43.971
2650.000	.0063	-173.0	43.956
2700.000	.0063	-36.3	44.008
2750.000	.0064	97.8	43.873
2800.000	.0059	-121.6	44.528
2850.000	.0058	12.7	44.785
2900.000	.0053	141.9	45.512
2950.000	.0047	-76.1	46.470
3000.000	.0044	58.6	47.199
3050.000	.0039	-159.4	48.088
3100.000	.0034	-21.1	49.431
3150.000	.0031	115.8	50.118
3200.000	.0026	-94.7	51.781
3250.000	.0023	42.6	52.668
3300.000	.0021	-175.3	53.582
3350.000	.0017	-28.9	55.271
3400.000	.0016	108.7	55.936
3450.000	.0012	-105.9	58.261
3500.000	.0011	34.4	58.898
3550.000	.0010	179.9	60.138
3600.000	.0008	-26.3	62.229
3650.000	.0007	110.5	63.648
3700.000	.0006	-99.1	64.695
3750.000	.0005	52.7	66.744
3800.000	.0004	-157.5	67.115
3850.000	.0004	-10.4	68.141
3900.000	.0003	137.1	69.873
3950.000	.0004	-57.6	68.933
3999.999	.0003	90.6	71.254

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 2 TO 3

Measurement Date: 12:11 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0039	118.0	48.121
2050.000	.0041	-101.4	47.642
2100.000	.0040	40.7	47.951
2150.000	.0044	-179.1	47.080
2200.000	.0045	-37.4	46.860
2250.000	.0048	101.2	46.321
2300.000	.0049	-111.7	46.164
2350.000	.0051	21.5	45.904
2400.000	.0055	168.5	45.271
2450.000	.0055	-57.3	45.212
2500.000	.0058	84.6	44.683
2550.000	.0058	-136.6	44.794
2600.000	.0061	-2.9	44.267
2650.000	.0060	138.7	44.460
2700.000	.0060	-82.8	44.450
2750.000	.0060	52.2	44.420
2800.000	.0056	-167.4	45.003
2850.000	.0056	-30.1	45.058
2900.000	.0051	99.4	45.855
2950.000	.0048	-119.5	46.338
3000.000	.0044	17.2	47.083
3050.000	.0041	155.9	47.757
3100.000	.0036	-65.8	48.783
3150.000	.0033	69.9	49.614
3200.000	.0029	-142.7	50.776
3250.000	.0026	-7.5	51.867
3300.000	.0023	134.5	52.752
3350.000	.0019	-84.3	54.604
3400.000	.0017	53.3	55.407
3450.000	.0013	-168.7	57.482
3500.000	.0011	-26.7	58.911
3550.000	.0010	116.0	60.097
3600.000	.0007	-92.0	62.531
3650.000	.0007	46.0	63.309
3700.000	.0006	-172.4	64.831
3750.000	.0005	-21.0	65.852
3800.000	.0004	125.7	68.543
3850.000	.0003	-82.6	69.141
3900.000	.0002	53.4	72.143
3950.000	.0002	-138.8	74.823
3999.999	.0002	14.9	73.033

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 2 TO 4

Measurement Date: 12:14 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0013	139.5	57.807
2050.000	.0013	-92.9	57.911
2100.000	.0010	30.5	59.580
2150.000	.0010	172.0	59.739
2200.000	.0009	-53.5	61.014
2250.000	.0010	73.6	59.711
2300.000	.0008	-143.2	61.692
2350.000	.0007	-21.2	62.513
2400.000	.0008	131.0	61.956
2450.000	.0007	-97.5	63.251
2500.000	.0009	34.5	60.957
2550.000	.0007	172.5	62.860
2600.000	.0007	-74.0	62.769
2650.000	.0007	71.5	62.580
2700.000	.0006	-156.9	65.119
2750.000	.0007	-32.5	63.600
2800.000	.0005	109.6	65.692
2850.000	.0004	-139.3	67.842
2900.000	.0005	1.5	66.784
2950.000	.0003	124.5	70.709
3000.000	.0004	-103.9	69.050
3050.000	.0002	61.0	72.527
3100.000	.0002	144.2	74.426
3150.000	.0001	-52.0	77.497
3200.000	.0001	48.2	80.580
3250.000	.0001	-171.4	80.909
3300.000	.0001	133.9	83.568
3350.000	.0000	21.9	87.375
3400.000	.0000	61.0	94.159
3450.000	.0000	-74.4	90.885
3500.000	.0000	-21.7	87.324
3550.000	.0001	163.6	83.776
3600.000	.0000	-152.7	88.536

3650.000	.0001	-24.2	79.464
3700.000	.0001	128.9	81.267
3750.000	.0001	-73.9	79.662
3800.000	.0000	59.1	86.929
3850.000	.0000	89.2	88.773
3900.000	.0000	-63.0	86.916
3950.000	.0001	31.2	80.806
3999.999	.0000	-93.3	87.060

```

*****
*                                     *
*   Walter Reed Army Institute of Research   *
*   Department of Microwave Research         *
*   Walter Reed Army Medical Center         *
*   Washington, DC 20012                   *
*                                     *
*****

```

SUBARRAY VERIFICATION
MUTUAL COUPLING ELEMENTS 2 TO 5

Measurement Date: 12:15 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0016	66.1	56.021
2050.000	.0019	-160.7	54.567
2100.000	.0016	-.8	56.083
2150.000	.0021	-95.0	53.425
2200.000	.0020	-133.1	53.766
2250.000	.0020	-5.4	53.847
2300.000	.0021	133.0	53.515
2350.000	.0020	-103.7	53.919
2400.000	.0023	32.3	52.853
2450.000	.0021	161.2	53.370
2500.000	.0021	-67.0	53.502
2550.000	.0022	61.2	53.295
2600.000	.0021	-160.9	53.673
2650.000	.0021	-40.2	53.729
2700.000	.0020	96.7	53.990
2750.000	.0010	-139.4	55.011
2800.000	.0010	-5.7	54.886
2850.000	.0017	127.2	55.320
2900.000	.0015	-115.0	56.662
2950.000	.0015	23.7	56.552
3000.000	.0012	154.1	58.652
3050.000	.0001	-163.4	83.570
3100.000	.0011	60.2	59.162
3150.000	.0009	179.6	60.703
3200.000	.0009	-31.9	60.520
3250.000	.0007	89.9	63.146
3300.000	.0007	-138.9	63.188
3350.000	.0006	2.1	64.757
3400.000	.0005	123.9	65.940
3450.000	.0004	-95.8	67.479
3500.000	.0004	29.4	68.000
3550.000	.0004	172.0	69.023
3600.000	.0002	-44.9	73.367
3650.000	.0002	63.3	72.632
3700.000	.0002	-144.5	74.755
3750.000	.0002	-22.3	73.253
3800.000	.0001	135.7	79.225
3850.000	.0001	-147.1	85.927
3900.000	.0001	15.2	79.964
3950.000	.0001	-75.1	85.859
3999.999	.0000	-23.0	86.051

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 2 TO 6

Measurement Date: 12:17 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0021	166.0	53.754
2050.000	.0025	-59.5	52.017
2100.000	.0027	72.9	51.472
2150.000	.0032	-153.7	49.896
2200.000	.0035	-20.0	49.081
2250.000	.0041	107.9	47.684
2300.000	.0043	-115.5	47.239
2350.000	.0045	7.0	46.928
2400.000	.0049	146.9	46.258
2450.000	.0050	-87.2	45.975
2500.000	.0054	46.6	45.353
2550.000	.0053	175.6	45.522
2600.000	.0055	-56.9	45.158
2650.000	.0052	76.9	45.626
2700.000	.0053	-150.2	45.452
2750.000	.0052	-21.0	45.681
2800.000	.0050	111.0	45.998
2850.000	.0049	-115.5	46.220
2900.000	.0044	7.3	47.177
2950.000	.0045	142.9	46.974
3000.000	.0040	-85.7	47.906
3050.000	.0038	44.7	48.366
3100.000	.0035	178.8	49.131
3150.000	.0031	-51.5	50.256
3200.000	.0030	88.3	50.592
3250.000	.0016	-89.9	56.094
3300.000	.0023	-8.9	52.775
3350.000	.0020	126.3	53.820
3400.000	.0018	-104.6	54.963
3450.000	.0016	28.7	56.001
3500.000	.0013	160.6	57.913
3550.000	.0012	-64.6	58.500
3600.000	.0010	76.6	60.304
3650.000	.0008	-149.2	61.486
3700.000	.0007	-10.1	63.314
3750.000	.0006	126.9	64.763
3800.000	.0005	-91.6	65.633
3850.000	.0004	36.7	67.100
3900.000	.0003	-174.2	69.122
3950.000	.0003	-48.2	69.361
3999.999	.0003	110.9	71.915

 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 2 TO 7

Measurement Date: 12:18 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0032	-18.3	49.980
2050.000	.0036	122.7	48.933
2100.000	.0042	-96.5	47.567
2150.000	.0047	38.7	46.503
2200.000	.0052	173.7	45.660
2250.000	.0056	-49.3	45.033
2300.000	.0059	98.7	44.620
2350.000	.0063	-138.3	43.953
2400.000	.0067	5.1	43.535
2450.000	.0069	135.4	43.230
2500.000	.0072	-82.5	42.822
2550.000	.0073	50.2	42.757
2600.000	.0077	-175.9	42.267
2650.000	.0076	-38.6	42.421
2700.000	.0075	98.3	42.478
2750.000	.0075	-128.9	42.501
2800.000	.0071	10.3	42.915
2850.000	.0070	144.6	43.040
2900.000	.0064	-87.1	43.874
2950.000	.0063	53.1	44.056
3000.000	.0058	-171.7	44.746
3050.000	.0053	-35.5	45.443
3100.000	.0049	101.4	46.164
3150.000	.0044	-124.7	47.129
3200.000	.0040	20.6	47.868
3250.000	.0035	155.8	49.095
3300.000	.0031	-67.0	50.161
3350.000	.0027	72.4	51.255
3400.000	.0024	-151.8	52.544
3450.000	.0020	-15.3	53.787
3500.000	.0017	123.0	55.438
3550.000	.0015	-99.7	56.380
3600.000	.0013	49.5	57.931

3650.000	.0010	-171.1	59.866
3700.000	.0008	-32.3	61.960
3750.000	.0007	117.1	63.200
3800.000	.0006	-99.1	64.468
3850.000	.0005	36.9	65.231
3900.000	.0004	-170.1	68.505
3950.000	.0004	-19.7	68.351
3999.999	.0003	127.3	70.269

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 3 TO 4

Measurement Date: 12:20 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0047	-37.3	46.512
2050.000	.0054	104.0	45.335
2100.000	.0054	-118.3	45.412
2150.000	.0061	18.0	44.245
2200.000	.0063	159.1	44.016
2250.000	.0069	-65.3	43.166
2300.000	.0073	78.1	42.718
2350.000	.0076	-153.7	42.374
2400.000	.0081	-7.6	41.832
2450.000	.0082	123.2	41.724
2500.000	.0088	-96.7	41.107
2550.000	.0086	38.1	41.288
2600.000	.0090	169.5	40.900
2650.000	.0088	-50.5	41.146
2700.000	.0085	86.2	41.394
2750.000	.0084	-140.5	41.464
2800.000	.0078	-9	42.109
2850.000	.0078	133.8	42.197
2900.000	.0078	-97.7	43.082
2950.000	.0067	43.9	43.428
3000.000	.0062	179.6	44.191
3050.000	.0057	-42.7	44.884
3100.000	.0052	95.0	45.744
3150.000	.0046	-130.3	46.758
3200.000	.0042	16.1	47.510
3250.000	.0036	150.9	48.825
3300.000	.0033	-69.1	49.705
3350.000	.0028	71.8	51.035
3400.000	.0025	-152.0	52.009
3450.000	.0021	-13.0	53.401
3500.000	.0018	123.3	54.886
3550.000	.0016	-95.8	55.975
3600.000	.0013	54.7	57.482
3650.000	.0012	-167.4	58.676
3700.000	.0009	-20.1	61.135
3750.000	.0009	122.7	61.198
3800.000	.0007	-90.5	62.988
3850.000	.0006	51.2	64.834
3900.000	.0005	-163.4	66.194
3950.000	.0005	-13.6	66.115
3999.999	.0004	137.5	67.588

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 3 TO 5

Measurement Date: 12:21 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0027	155.9	51.415
2050.000	.0032	-70.4	49.935
2100.000	.0033	63.6	49.553
2150.000	.0037	-165.2	48.604
2200.000	.0039	-29.8	48.108
2250.000	.0044	102.5	47.040
2300.000	.0048	-121.4	46.389
2350.000	.0050	3.0	46.093
2400.000	.0052	141.9	45.716
2450.000	.0054	-91.1	45.336
2500.000	.0057	43.7	44.852
2550.000	.0055	172.5	45.152
2600.000	.0058	-59.2	44.720
2650.000	.0055	74.3	45.266
2700.000	.0055	-152.1	45.179
2750.000	.0053	-22.6	45.510
2800.000	.0051	110.5	45.920
2850.000	.0049	-116.5	46.194
2900.000	.0044	7.5	47.142
2950.000	.0043	142.0	47.277
3000.000	.0039	-86.1	48.187
3050.000	.0036	46.5	48.804
3100.000	.0033	179.5	49.721
3150.000	.0029	-50.2	50.773
3200.000	.0026	89.0	51.606
3250.000	.0023	-136.9	52.732
3300.000	.0020	-3.4	53.919
3350.000	.0018	130.6	54.951
3400.000	.0015	-97.0	56.243
3450.000	.0013	34.9	57.412
3500.000	.0010	170.7	59.941
3550.000	.0009	-56.6	60.547
3600.000	.0008	85.2	61.672
3650.000	.0007	-131.8	63.682
3700.000	.0005	7.5	65.359
3750.000	.0004	145.6	67.156
3800.000	.0004	-72.3	68.981
3850.000	.0003	62.3	69.472
3900.000	.0003	-154.0	71.657
3950.000	.0003	-17.1	71.280
3999.999	.0002	147.5	73.401

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 3 TO 6

Measurement Date: 12:23 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0024	46.1	52.256
2050.000	.0027	-179.6	51.431
2100.000	.0025	-54.3	51.926
2150.000	.0029	72.4	50.699
2200.000	.0026	-155.9	51.759
2250.000	.0025	-29.6	51.993
2300.000	.0025	111.6	51.907
2350.000	.0024	-126.3	52.521
2400.000	.0026	12.5	51.812
2450.000	.0023	142.5	52.841
2500.000	.0023	-86.4	52.633
2550.000	.0023	44.6	52.767
2600.000	.0021	174.4	53.366
2650.000	.0022	-55.9	53.281
2700.000	.0020	80.5	53.982
2750.000	.0018	-153.5	54.740
2800.000	.0018	-19.1	54.766
2850.000	.0017	114.3	55.226
2900.000	.0015	-128.7	56.514
2950.000	.0015	12.3	56.493
3000.000	.0012	141.9	58.095
3050.000	.0012	-89.2	58.199
3100.000	.0011	50.9	59.392
3150.000	.0010	170.0	60.385
3200.000	.0009	-43.5	61.405
3250.000	.0007	83.0	63.334
3300.000	.0007	-151.4	63.023
3350.000	.0006	-8.3	64.933
3400.000	.0005	118.8	65.961
3450.000	.0003	-112.4	69.295
3500.000	.0003	25.1	69.655
3550.000	.0003	156.4	69.811
3600.000	.0002	-37.0	74.500

3650.000	.0002	59.4	74.835
3700.000	.0002	-149.2	74.364
3750.000	.0001	-18.1	80.079
3800.000	.0001	139.8	78.713
3850.000	.0001	-85.0	85.396
3900.000	.0001	40.9	81.558
3950.000	.0000	-132.7	93.228
3999.999	.0001	-70.6	83.697

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20812 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 3 TO 7

Measurement Date: 12:24 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0045	-35.7	46.886
2050.000	.0050	104.4	46.030
2100.000	.0053	-115.0	45.595
2150.000	.0059	-21.2	44.642
2200.000	.0062	158.1	44.083
2250.000	.0065	-65.3	43.808
2300.000	.0067	76.3	43.532
2350.000	.0070	-150.6	43.137
2400.000	.0073	-6.7	42.764
2450.000	.0076	123.9	42.419
2500.000	.0077	-94.6	42.219
2550.000	.0078	39.8	42.199
2600.000	.0081	173.2	41.815
2650.000	.0079	-48.2	41.994
2700.000	.0078	89.3	42.152
2750.000	.0077	-137.2	42.290
2800.000	.0072	2.9	42.886
2850.000	.0071	137.1	42.963
2900.000	.0065	-93.1	43.728
2950.000	.0062	46.9	44.202
3000.000	.0057	-178.1	44.891
3050.000	.0052	-39.8	45.684
3100.000	.0048	96.7	46.443
3150.000	.0042	-127.8	47.495
3200.000	.0038	17.5	48.350
3250.000	.0033	153.0	49.624
3300.000	.0028	-68.0	50.936
3350.000	.0025	72.3	52.158
3400.000	.0021	-150.0	53.519
3450.000	.0019	-12.6	54.626
3500.000	.0015	125.0	56.770
3550.000	.0013	-94.3	57.871
3600.000	.0011	57.8	59.462
3650.000	.0008	-164.9	61.717
3700.000	.0006	-13.1	64.169
3750.000	.0005	137.7	65.510
3800.000	.0005	-77.9	65.797
3850.000	.0005	68.0	66.592
3900.000	.0004	-144.8	68.288
3950.000	.0004	5.8	68.980
3999.999	.0003	162.3	70.696

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 4 TO 5

Measurement Date: 12:27 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0041	-35.2	47.838
2050.000	.0044	109.2	47.159
2100.000	.0043	-110.4	47.378
2150.000	.0051	29.1	45.836
2200.000	.0053	168.5	45.459
2250.000	.0059	-55.3	44.598
2300.000	.0062	89.1	44.179
2350.000	.0066	-140.1	43.570
2400.000	.0073	5.2	42.759
2450.000	.0074	134.8	42.588
2500.000	.0080	-85.4	41.898
2550.000	.0079	49.5	42.101
2600.000	.0083	-179.8	41.578
2650.000	.0082	-40.0	41.685
2700.000	.0080	96.1	41.910
2750.000	.0088	-130.7	41.978
2800.000	.0074	8.4	42.611
2850.000	.0073	142.2	42.736
2900.000	.0066	-88.6	43.657
2950.000	.0063	51.4	44.070
3000.000	.0056	-173.5	45.051
3050.000	.0052	-35.6	45.628
3100.000	.0046	102.0	46.667
3150.000	.0041	-123.7	47.819
3200.000	.0037	23.6	48.704
3250.000	.0032	158.3	50.024
3300.000	.0028	-61.9	50.987
3350.000	.0023	80.4	52.641
3400.000	.0021	-144.3	53.633
3450.000	.0017	-3.4	55.214
3500.000	.0014	135.3	57.019
3550.000	.0012	-83.2	58.234
3600.000	.0011	66.2	59.545
3650.000	.0009	-153.6	61.340
3700.000	.0007	-3.6	63.481
3750.000	.0006	142.7	64.823
3800.000	.0005	-74.0	65.231
3850.000	.0005	75.7	66.540
3900.000	.0004	-134.3	67.998
3950.000	.0004	7.9	68.397
3999.999	.0001	-133.7	76.503

 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 4 TO 6

Measurement Date: 12:28 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0014	126.3	56.985
2050.000	.0015	-99.3	56.447
2100.000	.0013	23.2	57.979
2150.000	.0012	149.9	58.119
2200.000	.0009	-77.6	60.932
2250.000	.0008	65.5	61.929
2300.000	.0007	-143.5	62.533
2350.000	.0008	-30.2	62.116
2400.000	.0008	121.2	62.338
2450.000	.0005	-116.3	65.577
2500.000	.0008	36.8	62.225
2550.000	.0006	179.9	64.087
2600.000	.0007	-75.7	62.766
2650.000	.0007	72.0	63.303
2700.000	.0004	-163.4	66.941
2750.000	.0006	-27.7	64.403
2800.000	.0005	125.0	66.105
2850.000	.0004	-133.5	68.779
2900.000	.0005	9.1	66.623
2950.000	.0003	131.1	71.548
3000.000	.0003	-94.5	70.785
3050.000	.0002	54.0	73.714
3100.000	.0002	160.8	75.873
3150.000	.0002	-38.8	75.185
3200.000	.0001	79.5	82.204
3250.000	.0001	-137.3	79.368
3300.000	.0001	106.9	78.237
3350.000	.0000	84.6	87.780
3400.000	.0000	39.3	88.305
3450.000	.0001	105.8	83.490
3500.000	.0001	12.7	83.905
3550.000	.0001	118.7	83.842
3600.000	.0000	-101.8	90.621

3650.000	.0000	-9.5	86.955
3700.000	.0001	174.4	83.562
3750.000	.0001	-75.4	85.368
3800.000	.0000	12.2	91.175
3850.000	.0000	131.6	89.181
3900.000	.0000	-58.2	88.485
3950.000	.0001	60.2	84.297
3999.999	.0001	-73.4	85.283

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 4 TO 7

Measurement Date: 12:25 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0019	123.9	54.556
2050.000	.0022	-89.5	53.329
2100.000	.0021	60.5	53.411
2150.000	.0024	-153.7	52.506
2200.000	.0028	-6.2	51.174
2250.000	.0033	139.0	49.554
2300.000	.0038	-77.4	48.360
2350.000	.0043	56.0	47.284
2400.000	.0048	-157.1	46.459
2450.000	.0054	-25.6	45.410
2500.000	.0060	115.9	44.466
2550.000	.0060	-109.7	44.501
2600.000	.0064	22.0	43.927
2650.000	.0064	163.0	43.944
2700.000	.0062	-60.6	44.142
2750.000	.0064	73.1	43.936
2800.000	.0058	-145.9	44.738
2850.000	.0056	-10.7	45.076
2900.000	.0052	119.1	45.675
2950.000	.0047	-99.1	46.620
3000.000	.0043	36.4	47.425
3050.000	.0038	178.2	48.375
3100.000	.0033	-43.1	49.599
3150.000	.0030	95.0	50.320
3200.000	.0026	-114.8	51.809
3250.000	.0023	21.2	52.814
3300.000	.0021	166.0	53.524
3350.000	.0017	-50.1	55.471
3400.000	.0016	89.0	55.956
3450.000	.0013	-126.9	57.530
3500.000	.0012	13.4	58.444
3550.000	.0010	157.9	59.644
3600.000	.0009	-47.4	61.373
3650.000	.0008	92.9	61.782
3700.000	.0007	-120.3	62.810
3750.000	.0006	28.6	64.062
3800.000	.0005	177.7	66.373
3850.000	.0005	-45.6	66.185
3900.000	.0004	102.1	67.386
3950.000	.0004	-91.8	68.892
3999.999	.0003	51.3	70.393

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 5 TO 6

Measurement Date: 12:29 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0044	115.4	47.098
2050.000	.0046	-98.3	46.812
2100.000	.0042	42.4	47.454
2150.000	.0048	-176.1	46.455
2200.000	.0045	-32.7	46.990
2250.000	.0049	108.4	46.200
2300.000	.0051	-101.1	45.928
2350.000	.0054	30.2	45.401
2400.000	.0058	178.0	44.683
2450.000	.0054	-25.1	45.367
2500.000	.0064	95.2	43.943
2550.000	.0063	-126.8	44.042
2600.000	.0067	6.0	43.483
2650.000	.0066	148.3	43.668
2700.000	.0065	-73.8	43.734
2750.000	.0066	61.9	43.671
2800.000	.0061	-158.1	44.279
2850.000	.0061	-20.6	44.356
2900.000	.0055	108.4	45.257
2950.000	.0052	-110.9	45.679
3000.000	.0046	25.0	46.669
3050.000	.0043	164.7	47.279
3100.000	.0037	-56.6	48.582
3150.000	.0034	77.9	49.417
3200.000	.0029	-132.8	50.738
3250.000	.0025	2.7	52.116
3300.000	.0023	145.2	52.856
3350.000	.0018	-72.6	55.014
3400.000	.0016	65.0	56.107
3450.000	.0012	-150.7	58.298
3500.000	.0011	-11.8	59.495
3550.000	.0009	138.1	61.118
3600.000	.0007	-69.8	63.381
3650.000	.0006	68.3	64.009
3700.000	.0005	-142.2	65.613
3750.000	.0004	8.5	67.881
3800.000	.0003	161.9	69.328
3850.000	.0003	-51.4	69.574
3900.000	.0003	90.1	70.755
3950.000	.0002	-93.6	72.612
3999.999	.0002	53.2	73.499

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 5 TO 7

Measurement Date: 12:31 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0039	-23.5	48.108
2050.000	.0046	115.8	46.804
2100.000	.0047	-105.7	46.528
2150.000	.0050	31.4	45.936
2200.000	.0053	171.6	45.518
2250.000	.0059	-49.3	44.612
2300.000	.0063	91.4	44.029
2350.000	.0067	-137.5	43.533
2400.000	.0069	7.2	43.226
2450.000	.0072	138.2	42.896
2500.000	.0077	-79.8	42.256
2550.000	.0077	54.0	42.282
2600.000	.0081	-174.0	41.838
2650.000	.0080	-34.8	41.977
2700.000	.0078	101.8	42.112
2750.000	.0079	-125.4	42.089
2800.000	.0073	14.4	42.683
2850.000	.0072	147.9	42.839
2900.000	.0065	-83.1	43.728
2950.000	.0062	57.4	44.118
3000.000	.0057	-168.1	44.943
3050.000	.0052	-29.8	45.689
3100.000	.0047	106.4	46.601
3150.000	.0041	-118.6	47.672
3200.000	.0037	28.8	48.671
3250.000	.0032	163.1	49.860
3300.000	.0028	-56.6	51.128
3350.000	.0024	83.1	52.321
3400.000	.0021	-139.5	53.625
3450.000	.0017	-.1	55.201
3500.000	.0015	138.1	56.712
3550.000	.0013	-82.4	57.938
3600.000	.0010	69.2	59.861
3650.000	.0009	-147.9	60.845
3700.000	.0007	0.0	63.063
3750.000	.0006	149.2	64.871
3800.000	.0006	-70.8	65.191
3850.000	.0005	76.9	65.680
3900.000	.0004	-130.4	68.186
3950.000	.0004	12.4	67.815
3999.999	.0003	170.7	70.114

 *
 * Walter Reed Army Institute of Research *
 * Department of Microwave Research *
 * Walter Reed Army Medical Center *
 * Washington, DC 20012 *
 *

SUBARRAY VERIFICATION
 MUTUAL COUPLING ELEMENTS 6 TO 7

Measurement Date: 12:32 PM FRI., 5 OCT., 1984

Calibration Date: 11:34 AM FRI., 5 OCT., 1984

Frequency (MHz)	S21		Insertion Loss (dB)
	Magnitude	Phase	
2000.000	.0043	-27.1	47.281
2050.000	.0048	112.3	46.393
2100.000	.0049	-109.6	46.257
2150.000	.0056	29.7	45.059
2200.000	.0059	167.5	44.513
2250.000	.0065	-57.1	43.746
2300.000	.0066	83.3	43.631
2350.000	.0067	-144.8	43.430
2400.000	.0071	.9	42.924
2450.000	.0075	131.9	42.538
2500.000	.0079	-87.5	42.085
2550.000	.0078	46.2	42.197
2600.000	.0082	179.4	41.746
2650.000	.0079	-40.9	42.004
2700.000	.0079	95.5	42.003
2750.000	.0078	-131.2	42.114
2800.000	.0073	7.4	42.677
2850.000	.0072	142.6	42.819
2900.000	.0065	-88.3	43.768
2950.000	.0063	51.5	43.992
3000.000	.0057	-173.1	44.808
3050.000	.0053	-35.8	45.535
3100.000	.0048	101.4	46.398
3150.000	.0042	-124.1	47.563
3200.000	.0038	21.8	48.397
3250.000	.0033	157.3	49.754
3300.000	.0028	-63.8	50.961
3350.000	.0025	76.9	51.964
3400.000	.0022	-146.5	53.341
3450.000	.0018	-7.9	54.977
3500.000	.0015	130.7	56.669
3550.000	.0012	-89.3	58.132
3600.000	.0011	59.5	59.408
3650.000	.0008	-158.1	61.442
3700.000	.0007	-10.9	63.230
3750.000	.0006	139.5	64.685
3800.000	.0005	-78.5	65.477
3850.000	.0004	64.9	66.996
3900.000	.0004	-143.8	69.096
3950.000	.0004	8.2	68.825
3999.999	.0003	163.9	70.861

E. Improvements in Data Acquisition Speed

An 8542C Automatic Network Analyzer is used to measure transmission loss between two antenna in a water loaded microwave scanner. Because of the number of measurements required, the time to collect data for a single experiment was approximately four hours. The objective of our investigation was to reduce the data collection time as much as possible without redesigning or replacing the existing hardware.

The software that controls the movement of the scanner was the first candidate for improvement. The software already provided for acceleration up to maximum speed. It computed the point to start the deceleration ramp and provided for deceleration such that there was very little chance of overshooting the desired position. Hence, the only change to be made here was to relax the positional accuracy for each axis of motion. The digital readout for this system has a resolution of 1 micron. The software was written to position each axis to within ± 1 micron of the requested location. In the vicinity of the final position, the motor is operated in the single step mode which is it's slow speed mode. Consequently, if one micron of overshoot occurs the direction of travel will be reversed. Reversal of direction requires that the backlash in the gears and lead screw be taken up before translation can occur on that axis. During this time, the motor is operating at its slowest speed since the position must be read after each step. To eliminate much of this slow speed operation, we reduce the azimuth accuracy to ± 10 microns. This resulted in approximately a five percent increase in data acquisition speed for step sizes of 2 millimeters or less with proportionally less improvement as the step size increased.

Next, the time required for the network analyzer to make a measurement was determined. For step sizes of two millimeters or less, fifty percent of the acquisition time was associated with the network analyzer measurement. The program which controls the 8542 during the measurement is named CORS4. Analysis of program CORS4 yielded the following results.

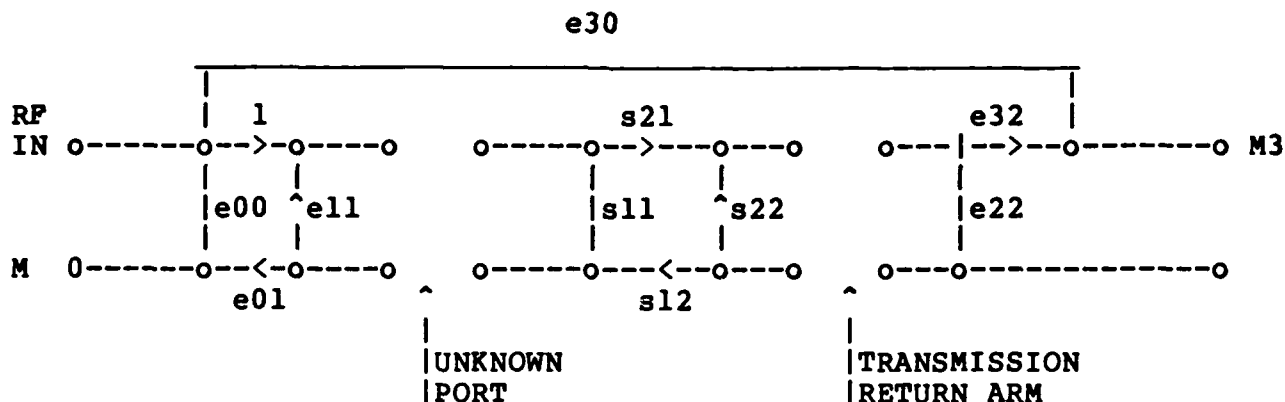
- At each frequency, this program switched an electro-mechanical relay in the input test unit. A time delay in the software was necessary to allow for the switching time. Recruiting the software to eliminate the need for switching the relay will increase program speed.

- When the frequency is initially set, the program assumes that a band change is required. With each band change, the software provides a settling time delay.
- The CORS4 program measures both transmission (S21) and reflection (S11). For this application, only the transmission measurement was required so elimination of the reflection measurement would speed up the data acquisition process.
- CORS4 made the measurements as x and y components and then converted to amplitude and phase. However, it was necessary to convert back to x and y component to make further corrections.
- CORS4 returned the results with the calibration correction done. If the measurement was to be made at a frequency not in the calibration list, we could not tell if the calibration data was close enough to give a usable result.

After reviewing the CORS4 software and the mathematical model for the error correction algorithm, we came to the conclusion that we could use the same subroutine and approximations as CORS4 used, but CORS4 itself needed to be rewritten as two routines and simplified.

One of these routines makes a measurement of the transmission and reflection coefficient at a specified frequency. This routine makes corrections for DC offset and attenuation scaling but the calibrations are left for the other routine. This subroutine is able to speed up the measurement by a factor of two by eliminating a pause between the transmission and reflection measurement which is not necessary since each call to this subroutine only measures at one frequency.

The second subroutine makes calibration corrections to these measurement using a specified set of calibration data. We assumed the model shown on page 3-41 of the 8540 SERIES SOFTWARE PROGRAMMER'S MANUAL is valid. Using the mathematical model, the effect of modifying the measurement algorithm can be predicted.



The measured reflection is:

$$M0 = e00 + (e01 * s11 + e22 * Q) / d$$

The measured gain is:

$$M3 = e30 + (e32 * s21) / d$$

where:

$$Q = s21 * s12 - s11 * s22$$

$$d = 1 - e11 * s11 - e22 * s22 - e11 * s22 * Q$$

These evaluations were solved for the parameters S11 and S21. Using the assumptions defined in the manual, the equations were further simplified.

Subtract leakage and define new terms:

$$T11 = M0 - e00$$

$$T21 = M3 - e30$$

Divided by tracking gives:

$$T11 / e01 = (M0 - e00) / e01$$

$$T21 / e32 = (M3 - e30) / e32$$

Correcting for mismatch gives:

$$S_{11} = (T_{11}/e_{01})/(1+e_{11}*T_{11}/e_{01})$$
$$S_{21} = (T_{21}/e_{01})/(1+e_{11}*T_{11}/e_{01})$$

We overcame each of the 5 above mentioned objections with the following results.

1. The time to get a corrected measurement was shortened by more than fifty percent.
2. The new routines take data at whatever frequency desired.
3. The time could be shortened by another 0.5 seconds by not measuring the reflected wave when only S21 is needed. However, due to the need for the reflection measurement to make the correction, this led to a difference of from 0.2 to 0.3 db in the corrected measurement.

To find the value of S11 we can eliminate the transmission measurement without sacrificing any accuracy.

4. The new routines returned the data as x and y components which makes it straight forward to make further corrections.
5. Since the calibration correction is done separately, the user can vary the calibration data used to see what the change in the corrected reading is. Thus he can tell if he needs more calibration data.

We checked the results of the original CORS4 program measurements against the new routine and found no measureable difference.

SECTION III
DATA COLLECTION SOFTWARE


```

0063 IF(IERR.EQ.0) GOTO 65 %
0064 CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
0065 GOTO 9000 %
0066 65 CALL WR1(CRT,LUZE,PRESNT(2),IERR,MESS)%
0067 IF(IERR.EQ.0) GOTO 70 %
0068 CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
0069 GOTO 9000 %
0070 70 CALL WR1(CRT,LUEL,PRESNT(3),IERR,MESS)%
0071 IF(IERR.EQ.0) GOTO 80 %
0072 CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
0073 GOTO 9000 %
0074 80 CALL WR3(CRT,LURO,PRESNT(4),IERR,MESS)%
0075 IF(IERR.EQ.0) GOTO 90 %
0076 CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
0077 C GO TO 9000%
0078 C-----
0079 C Display headings on CRT. %
0080 C-----
0081 90 IHOME=15510B%
0082 ICLEAR=15512B %
0083 WRITE(CRT,100) IHOME,ICLEAR %
0084 100 FORMAT(2A2) %
0085 WRITE(CRT,105)%
0086 105 FORMAT(21X,"WALTER REED ARMY INSTITUTE OF RESEARCH",/,%
0087 *26X,"SCANNER POSITIONING PROGRAM",/,%
0088 */,%
0089 *1X,"AXIS",16X,"PRESENT POSITION",16X,"NEW POSITION",/,%
0090 *1X,"-----",16X,"-----",16X,"-----",/)%
0091 WRITE(CRT,120)%
0092 120 FORMAT("  &BAZ&@imuth",/,/, %
0093 *"&BZE&@nith",/,/, %
0094 *"&BEL&@elevation",/,%
0095 */,%
0096 *"&BRO&@tation",/,/,/, %
0097 */,%
0098 *"&BGO&@e",/, %
0099 *"&BDE&@no",/, %
0100 *"&BST&@op",/, %
0101 */,%
0102 *"Enter your selection.  ") %
0103 CALL UPDAT(PRESNT,IBUF,IER) %
0104 DO 122 I=1,4%
0105 122 IER(I)=0%
0106 C-----
0107 C Clear selection, reposition cursor for a new one, and read it%
0108 C-----
0109 123 WRITE(CRT,124) I1,I1%
0110 124 FORMAT(1A2,"a 23c 21Y_ ",1A2,"a 23c 21Y_") %
0111 125 READ(CRT,130) OPTION%
0112 130 FORMAT(1A2) %
0113 IF (OPTION .NE. 2HAZ .AND. OPTION .NE. 2HZE .AND. %
0114 * OPTION .NE. 2HEL .AND. OPTION .NE. 2HRD) GO TO 500%
0115 C-----
0116 C Inquire the new position.%
0117 C-----
0118 DO 200 I=1,4%
0119 IF (OPTION .NE. IBUF(I,1)) GO TO 200%
0120 WRITE(CRT,170) I1,IBUF(I,2) %
0121 170 FORMAT(1A2,"a 53c ",1A2,"Y_") %
0122 READ(CRT,*) PNEW(I) %
0123 GO TO 250 %
0124 200 CONTINUE%
0125 250 GO TO 123 %
0126 C-----
0127 C If GO is selected, then move.%
0128 C-----

```

```

&A13V 0129      500 IF (OPTION .NE. 2HGD) GO TO 1000%
&A13V 0130      IF(PNEW(1).EQ.9E13) GOTO 600%
&A13V 0131      CALL WR6(PNEW(1),IER(1),2,0)%
&A13V 0132      IF ((IER(1) .EQ. 0) .OR.%
&A13V 0133      * ((IER(1) .EQ. 210B) .OR. (IER(1) .EQ. 220B))) GO TO 510%
&A13V 0134      CALL WR12(CRT,IER(1),.TRUE.,IERR,IERR,PRGNM,PRGNL)%
&A13V 0135      GO TO 9000%
&A13V 0136      510 CALL WR1(CRT,LUAZ,PRESNT(1),IERR,.TRUE.)%
&A13V 0137      600 IF(PNEW(2).EQ.9E13) GOTO 620%
&A13V 0138      CALL WR6(PNEW(2),IER(2),1,0)%
&A13V 0139      IF ((IER(2) .EQ. 0) .OR.%
&A13V 0140      * ((IER(2) .EQ. 110B) .OR. (IER(2) .EQ. 120B))) GO TO 610%
&A13V 0141      CALL WR12(CRT,IER(2),.TRUE.,IERR,IERR,PRGNM,PRGNL)%
&A13V 0142      GO TO 9000%
&A13V 0143      610 CALL WR1(CRT,LUZE,PRESNT(2),IERR,.TRUE.)%
&A13V 0144      620 IF(PNEW(3).EQ.9E13) GOTO 640%
&A13V 0145      CALL WR6(PNEW(3),IER(3),4,0)%
&A13V 0146      IF ((IER(3) .EQ.0) .OR.%
&A13V 0147      * ((IER(3) .EQ. 410B) .OR. (IER(3) .EQ. 420B))) GO TO 630%
&A13V 0148      CALL WR12(CRT,IER(3),.TRUE.,IERR,IERR,PRGNM,PRGNL)%
&A13V 0149      GO TO 9000%
&A13V 0150      630 CALL WR1(CRT,LUEL,PRESNT(3),IERR,.TRUE.)%
&A13V 0151      640 IF(PNEW(4).EQ.9E13) GOTO 660%
&A13V 0152      CALL WR6(PNEW(4),IER(4),3,0)%
&A13V 0153      IF ((IER(4) .EQ.0) .OR.%
&A13V 0154      * ((IER(4) .EQ. 310B) .OR. (IER(4) .EQ. 320B))) GO TO 650%
&A13V 0155      CALL WR12(CRT,IER(4),.TRUE.,IERR,IERR,PRGNM,PRGNL)%
&A13V 0156      GO TO 9000%
&A13V 0157      650 CALL WR3(CRT,LURO,PRESNT(4),IERR,.TRUE.)%
&A13V 0158      C-----
&A13V 0159      C Call UPDAT to display the current locations and erase the new%
&A13V 0160      C position column. %
&A13V 0161      C-----
&A13V 0162      660 CALL UPDAT(PRESNT,IBUF,IER) %
&A13V 0163      DO 670 I=1,4%
&A13V 0164      PNEW(I) = 9E13%
&A13V 0165      670 IER(I) = 0%
&A13V 0166      GO TO 123 %
&A13V 0167      1000 IF (OPTION .NE. 2HDE) GO TO 2000%
&A13V 0168      C-----
&A13V 0169      C DEMO section.%
&A13V 0170      C-----
&A13V 0171      DO 1050 I=1,4 %
&A13V 0172      1050 DIRECT(I)=1.0 %
&A13V 0173      DO 1800 I=1,10%
&A13V 0174      01055 CALL WR1(1,LUAZ,PRESNT(1),IERR,.TRUE.)%
&A13V 0175      CALL WR1(1,LUZE,PRESNT(2),IERR,.TRUE.)%
&A13V 0176      CALL WR1(1,LUEL,PRESNT(3),IERR,.TRUE.)%
&A13V 0177      CALL WR3(1,LURO,PRESNT(4),IERR,.TRUE.)%
&A13V 0178      DO 1200 J=1,4 %
&A13V 0179      PNEW(J) = PRESNT(J) + INCRE(J)*DIRECT(J)%
&A13V 0180      WRITE(CRT,1100) I1,IBUF(J,2),PRESNT(J),I1,IBUF(J,2),PNEW(J) %
&A13V 0181      1100 FORMAT(1A2,"a 22c ",1A2,"Y",F12.4,1A2,"a 53c ",1A2,"Y",F12.4) %
&A13V 0182      1200 CONTINUE%
&A13V 0183      C-----
&A13V 0184      C Move the Azimuth axis. %
&A13V 0185      C-----
&A13V 0186      CALL WR6(PNEW(1),IERR,2,0)%
&A13V 0187      IF (IERR .EQ. 0) GO TO 1300 %
&A13V 0188      IF ((IER .NE. 210B) .AND. (IER .NE. 220B)) GO TO 1290 %
&A13V 0189      DIRECT(1) = -(DIRECT(1))%
&A13V 0190      GO TO 1300%
&A13V 0191      1290 CALL WR12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)%
&A13V 0192      GO TO 9000%
&A13V 0193      C-----
&A13V 0194      C Move the Zenith axis.%

```

```

0195 C-----
0196 1300 CALL WR6(PNEW(2),IERR,1,1)
0197 IF (IERR.EQ. 0) GO TO 1400
0198 IF ((IERR.NE. 110B).AND. (IERR.NE. 120B)) GO TO 1390
0199 DIRECT(2) = -(DIRECT(2))
0200 GO TO 1400
0201 1390 CALL WK12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
0202 GO TO 9000
0203 C-----
0204 C Move the Elevation axis.
0205 C-----
0206 1400 CALL WR6(PNEW(3),IERR,4,1)
0207 IF (IERR.EQ. 0) GO TO 1500
0208 IF ((IERR.NE. 410B).AND. (IERR.NE. 420B)) GO TO 1490
0209 DIRECT(3) = -(DIRECT(3))
0210 GO TO 1500
0211 1490 CALL WK12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
0212 GO TO 9000
0213 C-----
0214 C Move the rotation axis.
0215 C-----
0216 1500 CALL WR6(PNEW(4),IERR,3,1)
0217 IF (IERR.EQ. 0) GO TO 1800
0218 IF ((IERR.NE. 310B).AND. (IERR.NE. 320B)) GO TO 1590
0219 DIRECT(4) = -(DIRECT(4))
0220 GO TO 1800
0221 1590 CALL WK12(CRT,IERR,.TRUE.,IERR,IERR,PRGNM,PRGNL)
0222 GO TO 9000
0223 1800 CONTINUE
0224 GO TO 123
0225 C-----
0226 C See if the user wishes to stop the program.
0227 C-----
0228 2000 IF (OPTION.EQ. 2HST) GO TO 9000
0229 GO TO 123
0230 C-----
0231 C Terminate the program.
0232 C-----
0233 9000 END
0234 C-----
0235 C-----
0236 C-----
0237 C Subroutine UPDAT will display the current locations and erase new
0238 C position columns.
0239 C-----
0240 SUBROUTINE UPDAT(PRESNT,IBUF,IER)
0241 DIMENSION PRESNT(4),IER(4),IBUF(10,2)
0242 I1=15446B
0243 DO 100 I=1,4
0244 WRITE(1,20) I1,IBUF(I,2),PRESNT(I)
0245 20 FORMAT(1A2,"a 22c ",1A2,"Y",F12.3,30(" "))
0246 IF ((IER(I).NE. 110B).AND. (IER(I).NE. 120B).AND.
0247 * (IER(I).NE. 210B).AND. (IER(I).NE. 220B).AND.
0248 * (IER(I).NE. 310B).AND. (IER(I).NE. 320B).AND.
0249 * (IER(I).NE. 410B).AND. (IER(I).NE. 420B)) GO TO 50
0250 WRITE(1,30) I1
0251 30 FORMAT(1A2,"a 22C Limit Exceeded")
0252 GO TO 100
0253 50 WRITE(1,60) I1
0254 60 FORMAT(1A2,"a 22C",30(" "))
0255 100 CONTINUE
0256 RETURN
0257 C Z

```

0258
0259

END
END*

AWKBM T=00004 IS ON CR00010 USING 00010 BLKS R=0053

```
0001 FTN4,L
0002 C 2499B-1B466 REV.2040 (810304.1057)
0003 C*****
0004 C
0005 C          PROGRAM WRB
0006 C
0007 C  DESCRIPTION:
0008 C  WRB is designed to obtain microwave transmission data at different
0009 C  points along a scan of any object and then to make a graph of
0010 C  attenuation versus position of these data.
0011 C  This program has been divided into three segments because it
0012 C  cannot fit into memory otherwise. The main segment always remains
0013 C  in memory. The other two segments overlay each other by one
0014 C  segment calling EXEC(B, other segment name) to read in the
0015 C  other segment over the calling segment and then pass control
0016 C  to it. It can return to the calling segment only by calling
0017 C  EXEC(B, other segment name) again.
0018 C  This segment is the main segment. It is run by typing in:
0019 C          RU,WRB
0020 C  This segment only defines common, initializes variables, and
0021 C  then calls EXEC(B,WRBC) to read in and pass control to segment
0022 C  WRBC.
0023 C
0024 C*****
0025 C
0026 C          PROGRAM WRB
0027 C
0028 C          DIMENSION DAT(1002,2),IPRNM(3),INAME(3)
0029 C          INTEGER CRT
0030 C          COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESNT,
0031 C          *      OFFSET,STEPSZ,RFREQ,IEND,TEMP1,TEMP2,IRNUM
0032 C          IRNUM = 1
0033 C          CRT = 1
0034 C          IPRNM(1) = 1HW
0035 C          IPRNM(2) = 1HR
0036 C          IPRNM(3) = 1HB
0037 C          IPRNL = 3
0038 C          MESS = -1
0039 C          OFFSET = 10
0040 C          STEPSZ = 10
0041 C          IEND = 3
0042 C-----
0043 C  Call EXEC to read in segment WRBC and pass control to it.
0044 C-----
0045 C
0046 C          ICODE=B
0047 C          INAME(1)=2HWR
0048 C          INAME(2)=2HBC
0049 C          INAME(3)=2H
0050 C          CALL EXEC (ICODE, INAME)
0051 C          END
0052 C          END*
```

AWRBC T=00004 IS ON CR00010 USING 00038 BLKS R=0199

```

0001 FTM4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WRBC
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C * -----
0020 C *          Segment WRBC is the control segment of WRB.  It puts
0021 C *          out a menu with the options:
0022 C *          1 - Enter the offset and step size.
0023 C *          2 - Enter the microwave frequency.
0024 C *          3 - Set antennae to a new position.
0025 C *          4 - Enter number of readings to average for each point.
0026 C *          5 - Scan from present position
0027 C *          9 - Terminate the program.
0028 C *          After 5 is chosen, the antennae are psitioned at the
0029 C *          present position-offset and advanced by stepsize until
0030 C *          the the antennae reach present position+offset.  At each
0031 C *          position, amplitude is averaged over the number of
0032 C *          readings specified in 4 and saved in the array DAT along
0033 C *          with the position.  At the end of the scan, this segment
0034 C *          calls EXEC to read in segment WRBG and pass control to it.*
0035 C *
0036 C *****
0037 PROGRAM WRBC,S
0038 DIMENSION DAT(1002,2),IPRNM(3),INAME(3)
0039 INTEGER CRT
0040 COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESNT,
0041 *      OFFSET,STEPSZ,RFREQ,IEND,TEMP1,TEMP2,IRNUM
0042 C
0043 COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,ONLY,
0044 *CM(4,112),IHEAD(40),IDATE(15)
0045 CALL FILE2(1)
0046 TEMP1 = D(1)
0047 TEMP2 = (D(3)-1) * D(2) + D(1)
0048 LUAZ = 31
0049 C -----
0050 C Clear screen and print heading.
0051 C -----
0052 WRITE(CRT,15)
0053 015 FORMAT(" ",
0054 *      10X,55' ',/,
0055 *10X,"*",20X,"PROGRAM  WRB",21X,"*",/,
0056 *10X,"*",16X,"S21 LINE SCAN PROGRAM",16X,"*",/,
0057 *10X,55' ',/,')
0058 C

```

```

0059 530 CALL WR1 (CRT,LUAZ,PRESNT,IERR,0)
0060      IF (IERR .EQ. 0) GO TO 535
0061      CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0062      GO TO 9090
0063 535 WRITE(CRT,540) PRESNT
0064 540 FORMAT (/,1X,"PRESENT POSITION =",F9.3,"mm")
0065 550 WRITE(CRT,600)
0066 600 FORMAT(/," PLEASE SELECT AN OPTION:",/,
0067      *" 1 - Enter the offset and step size.",/,
0068      *" 2 - Enter the microwave frequency.",/,
0069      *" 3 - Set antennae to a new position.",/,
0070      *" 4 - Enter number of readings to average for each point.",/,
0071      *" 5 - Scan from the present position.",/,
0072      *" 9 - Terminate the program.",/,/,
0073      *" ENTER SELECTION _")
0074      READ(CRT,*) IANS
0075      IF (IANS .EQ. 9999) GO TO 9090
0076      IF (IANS .EQ. 9) GO TO 9090
0077      IF (IANS .EQ. 5) GO TO 5000
0078      IF (IANS .EQ. 4) GO TO 4000
0079      IF (IANS .EQ. 3) GO TO 3000
0080      IF (IANS .EQ. 2) GO TO 2000
0081      IF (IANS .EQ. 1) GO TO 1000
0082      WRITE (CRT,620)
0083 620 FORMAT (/,1X,"ERROR # WR8 - 10201 .....(WR8)",/,
0084      * 1X,"INCORRECT RESPONSE. ENTER 1, 2, 3, 4, 5, OR 9.")
0085      GO TO 550
0086 C-----
0087 C Inquire from the user: step size and starting offset.
0088 C-----
0089 1000 WRITE(CRT,1100)
0090 1100 FORMAT(/," Enter the starting offset (mm). _")
0091      READ(CRT,*) OFFSET
0092      IF (OFFSET .EQ. 9999) GO TO 9090
0093      IF (OFFSET .LT. 105) GO TO 1190
0094      WRITE (CRT,1109)
0095 1109 FORMAT (/,1X,"ERROR # WR8 - 10202 .....(WR8)",/,
0096      * 1X,"THE OFFSET MUST BE LESS THAN 105mm.",/,
0097      * 1X,"REENTER THE STARTING OFFSET.")
0098      GO TO 1000
0099 1190 WRITE(CRT,1200)
0100 1200 FORMAT(/," Enter the step size (mm)..... _")
0101      READ(CRT,*) STEPSZ
0102      IF (STEPSZ .EQ. 9999) GO TO 9090
0103      IEND = (OFFSET*2.0)/STEPSZ + 1.5
0104      IF (IEND .LT. 1001) GO TO 530
0105      WRITE (CRT,1209)
0106 1209 FORMAT (/,1X,"ERROR # WR8 - 10203 .....(WR8)",/,1X,
0107      * "THE NUMBER OF DATA POINTS MUST NOT EXCEED 1000.",/,
0108      * 1X,"REENTER THE STARTING OFFSET AND STEP SIZE.")
0109      GO TO 1000
0110 C-----
0111 C Inquire the microwave frequency.
0112 C-----
0113 2000 WRITE(CRT,2500)
0114 2500 FORMAT(/," Enter the RF frequency (MHz)... _")
0115      READ(CRT,*) RFREQ
0116      IF (RFREQ .EQ. 9999) GO TO 9090
0117      IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 530
0118      WRITE (CRT,2509) TEMP1, TEMP2

```

```

0119 2509 FORMAT (/,1X,"ERROR # WR8 - 10204 .....(WR8)",/,1X,
0120 * "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0121 * /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0122 * /,1X,"Do you wish to recalibrate? (YES/NO) _")
0123 READ (CRT,2599) IANS
0124 2599 FORMAT (A2)
0125 IF (IANS .EQ. 2HYE) GO TO 9000
0126 GO TO 2000
0127 C-----
0128 C Inquire new position and call WR6 to set it.
0129 C-----
0130 3000 WRITE (CRT,3090)
0131 3090 FORMAT (/,1X,"Enter new position (mm). _")
0132 READ (CRT,*) PRESNT
0133 IF (PRESNT .EQ. 9999) GO TO 9090
0134 CALL WR6 (PRESNT,IERR,2,0)
0135 IF (IERR .EQ. 0) GO TO 530
0136 CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0137 GO TO 9090
0138 C-----
0139 C Inquire from the user: number of readings per data point.
0140 C-----
0141 4000 WRITE (CRT,4009)
0142 4009 FORMAT (/,1X,
0143 * "Enter number of readings to average per data point. _")
0144 READ (CRT,*) IRNUM
0145 IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0)) GO TO 530
0146 WRITE (CRT,4509)
0147 4509 FORMAT (/,1X,"ERROR # WR8 - 10205 .....(WR8)",/,
0148 * 1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0149 * 1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0150 GO TO 4000
0151 C-----
0152 C Scan from PRESNT-OFFSET to PRESNT+OFFSET, put S21 in DAT(I,2).
0153 C-----
0154 5000 IF (RFREQ .NE. 0) GO TO 5100
0155 RFREQ = D(1)
0156 5100 POSITN = PRESNT-OFFSET
0157 CALL CALF2(3, MC, RFREQ)
0158 DAT(1,1) = PRESNT - OFFSET
0159 DAT(1,2) = PRESNT + OFFSET
0160 DAT(2,1) = STEPSZ
0161 DAT(2,2) = RFREQ
0162 DO 5800 I=3,IEND+2
0163 IF (IFBRK(IERR)) 9090,5200
0164 5200 PARAM = POSITN
0165 CALL WR6(PARAM,IERR,2,0)
0166 IF (IERR .EQ. 0) GO TO 5700
0167 CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0168 GO TO 9090
0169 C CALL CALF2(2,1,F)
0170 5700 XAVE = 0.
0171 YAVE = 0.
0172 DO 5750 J=1,IRNUM
0173 CALL MESUR(RFREQ, X1, Y1, X, Y)
0174 CALL CORCT(MC, X1, Y1, X, Y)
0175 XAVE = XAVE + X
0176 5750 YAVE = YAVE + Y
0177 XAVE = XAVE / IRNUM
0178 YAVE = YAVE / IRNUM

```

```

0179 RLOSS =-10*ALOGT(XAVE*XAVE + YAVE*YAVE)

```

```

0180      WRITE (CRT,5799) POSITN,RLOSS
0181 5799  FORMAT (1X,"AZIMUTH = ",F8.3," RLOSS = ",F9.4)
0182      DAT(I,2) = RLOSS
0183      DAT(I,1) = POSITN
0184      POSITN = POSITN + STEPSZ
0185      5800 CONTINUE
0186      CALL WR6 (PRESNT,IERR,2,0)
0187 C-----
0188 C  Call EXEC to overlay this segment with WR8G
0189 C-----
0190      INAME(2) = 2H8G
0191      CALL EXEC (ICODE,INAME)
0192      9000 WRITE (CRT,9009)
0193      9009 FORMAT (2/,1X,"Run program AGSD2 for new calibration.")
0194      9090 WRITE (CRT,9099)
0195      9099 FORMAT (3/,10X,
0196      *"***** PROGRAM WR8 TERMINATED *****")
0197      END
0198 C
0199 C  Block data routine for AGS2C
0200 C
0201      BLOCK DATA AGS2C
0202      COMMON /AGS2C/ I(2330)
0203      END
0204      END$

```

SWRBG T=00004 IS ON CR32767 USING 00088 BLKS R=0661

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WRBG
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Segment WRBG is the graphing segment of WRB.  It is
0021 C *          read in and control passed to it by an EXEC(8,WRBG) call
0022 C *          from segment WRBC after a scan is finished.  WRBG then
0023 C *          displays a graph of the attenuation versus position
0024 C *          on the CRT.  This graph is displayed until the user
0025 C *          presses the return key at which point WRBG calls EXEC
0026 C *          (8,WRBC) to read in WRBC and pass control to it, unless
0027 C *          the user enters '9999' first in which case WRBG
0028 C *          terminates the program.
0029 C *
0030 C *****
0031 C PROGRAM WRBG,5
0032 C
0033 C DIMENSION DAT(1002,2),IPRNM(3),INAME(3)
0034 C INTEGER STATUS, ALPHLU,  GOUTLU, CRT
0035 C COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESNT,
0036 C *      OFFSET,STEPSZ,RFREQ,IEND,TEMP1,TEMP2,IRNUM
0037 C DATA ALPHLU, GOUTLU /1,1/
0038 C
0039 C STATUS - Set to zero if no errors occur in a called routine
0040 C ALPHLU - The LU of the alphanumeric device
0041 C GOUTLU - The LU of the graphics output device
0042 C
0043 C *****
0044 C
0045 C XMIN = DAT(1,1)
0046 C XMAX = DAT(1,2)
0047 C YMIN = DAT(3,2)
0048 C YMAX = DAT(3,2)
0049 C DO 5100 I=4,IEND+2
0050 C IF (DAT(I,2) .GT. YMAX) YMAX = DAT(I,2)
0051 C IF (DAT(I,2) .LT. YMIN) YMIN = DAT(I,2)
0052 C 5100 CONTINUE
0053 C 5110 CONTINUE
0054 C -----
0055 C Initialize DGL system
0056 C -----
0057 C WRITE(CRT,S200)
0058 C 5200 FORMAT("")

```

```

0059      CALL ZBEGN
0060 C-----
0061 C  Enable all devices, exit if any errors
0062 C-----
0063      CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0064      IF (STATUS .NE. 0) GOTO 9990
0065 C-----
0066 C  Perform the viewing transformation, exit if any errors
0067 C-----
0068      IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0069      YMIN = INT (YMIN)
0070      GO TO 5400
0071 5300 YMIN = INT (YMIN - .999)
0072 5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0073      YMAX = INT (YMAX + .999)
0074      GO TO 5600
0075 5500 YMAX = INT (YMAX)
0076 5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0077      CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0078      IF (STATUS .NE. 0) GOTO 9990
0079 C-----
0080 C  Draw axis and label, then plot.
0081 C-----
0082      CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IEND)
0083 C-----
0084 C  Disable logical devices
0085 C-----
0086      READ (CRT,*) IANS
0087      IF (IANS .EQ. 9999) GO TO 9990
0088      CALL ZNEWF
0089      CALL CLEAR
0090 C-----
0091 C  Call EXEC to overlay this segment with WRBC and execute it.
0092 C-----
0093      INAME(2) = 2H8C
0094      CALL EXEC (ICODE, INAME)
0095 9990 CONTINUE
0096 C-----
0097      CALL ZAEND
0098      CALL ZDEND
0099 C-----
0100 C  Disable DGL system
0101 C-----
0102      CALL ZEND
0103 C-----
0104 C  Terminate program
0105 C-----
0106 9998 WRITE(CRT,9999)
0107 9999 FORMAT(" ")
0108      END
0109 C-----
0110 C*****
0111 C      ENDEV SUBROUTINE
0112 C-----
0113 C  PURPOSE:      This subroutine enables all logical devices used by
0114 C               the program.
0115 C-----
0116 C  DESCRIPTION:  This subroutine enables the DGL work station.  The DGL
0117 C               workstation contains alphanumeric and graphics output
0118 C               devices.

```

```

0119 C
0120 C CALLING SEQUENCE: CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0121 C
0122 C PARAMETERS:
0123 C     ALPHLU: [INTEGER]; Alphanumeric LU
0124 C     GOUTLU: [INTEGER]; Graphics output LU
0125 C     STATUS: [INTEGER]; Set to zero if no errors occur
0126 C                        during initialization of the
0127 C                        workstation. It is set to the
0128 C                        DGL error return value if an
0129 C                        error is found.
0130 C
0131 C *****
0132 C
0133 C     SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0134 C
0135 C     INTEGER ALPHLU, GOUTLU, STATUS
0136 C     INTEGER CONTRL
0137 C -----
0138 C If an error occurs, write out an error message, and return.
0139 C
0140 C Enable alphanumeric device
0141 C -----
0142 C     CALL ZAIN (ALPHLU,STATUS)
0143 C     IF (STATUS .EQ. 0) GOTO 1000
0144 C     CALL ERRMS (ALPHLU,STATUS,6HZAIN )
0145 C 1000 CONTINUE
0146 C -----
0147 C Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0148 C -----
0149 C     CONTRL = 0
0150 C     CALL ZDINT (GOUTLU,CONTRL,STATUS)
0151 C     IF (STATUS .EQ. 0) GOTO 9999
0152 C     CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0153 C 9999 CONTINUE
0154 C -----
0155 C Return to main program after all devices are properly enabled
0156 C -----
0157 C     RETURN
0158 C     END
0159 C
0160 C *****
0161 C
0162 C     SUBROUTINE VIEW
0163 C
0164 C PURPOSE: This subroutine performs the initial viewing
0165 C          transformation.
0166 C
0167 C DESCRIPTION: This subroutine performs the viewing transformation in
0168 C              the following steps:
0169 C
0170 C              - Places the image on the largest possible area
0171 C              - Sets the window to the desired range.
0172 C              - Resets the viewport to leave room for labels
0173 C              - Recomputes character size based on specified window
0174 C
0175 C CALLING SEQUENCE: CALL VIEW
0176 C
0177 C PARAMETERS: NONE
0178 C

```

```

0179 C*****
0180 C
0181 SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0182 C
0183 INTEGER IDUM, IERR
0184 REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0185 REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0186 C
0187 C IDUM - Dummy var
0188 C IERR - Error return (not used)
0189 C AR - Holds aspect ratio
0190 C VIEW - Holds current viewport bounds
0191 C XSIZE - Temp work variable
0192 C YSIZE - Temp work variable
0193 C XCSIZ - Temp holder of character size X
0194 C YCSIZ - Temp holder of character size Y
0195 C WXMIN - Temp holder of window X - min
0196 C WXMAX - Temp holder of window X - max
0197 C WYMIN - Temp holder of window Y - min
0198 C WYMAX - Temp holder of window Y - max
0199 C MINX - Temp holder of new viewport X - min
0200 C MAXX - Temp holder of new viewport X - max
0201 C MINY - Temp holder of new viewport Y - min
0202 C MAXY - Temp holder of new viewport Y - max
0203 C
0204 C*****
0205 C
0206 C Inquire aspect ratio of logical display limits
0207 C-----
0208 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0209 IF (IERR .EQ. 0) GO TO 555
0210 CALL ERRMS (1,IERR,6HZIWS )
0211 GO TO 9999
0212 C-----
0213 C Make the largest possible area of the logical display available
0214 C for graphical output by setting the aspect ratio(AR).
0215 C-----
0216 555 YSIZE = AR(2)
0217 XSIZE = 1.0
0218 CALL ZASPK (XSIZE,YSIZE)
0219 C-----
0220 C Specify the desired range of X and Y values of the window
0221 C-----
0222 CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0223 C-----
0224 C Inquire current viewport limits
0225 C-----
0226 CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0227 IF (IERR .EQ. 0) GO TO 577
0228 CALL ERRMS (1,IERR,6HZIWS )
0229 GO TO 9999
0230 C-----
0231 C Calculate the lower left hand corner of the viewport and leave
0232 C enough room for labels. The viewport is reduced 12% on each side
0233 C to give room for lables. Set the new viewport
0234 C-----
0235 577 MINX = .12 * VIEW(2)
0236 MAXX = .88 * VIEW(2)
0237 MINY = .12 * VIEW(4)
0238 MAXY = .88 * VIEW(4)

```

```

0239      CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0240 C-----
0241 C   Now set the character size based on the size of the window
0242 C   The constants below produce a readable character size in the new
0243 C   window.
0244 C-----
0245      XCSIZ = .015 * (WXMAX - WXMIN)
0246      YCSIZ = .025 * (WYMAX - WYMIN)
0247      CALL ZCSIZ (XCSIZ,YCSIZ)
0248 C
0249      9999 RETURN
0250      END
0251 C*****
0252 C          SUBROUTINE DRWDT
0253 C
0254 C   PURPOSE:      This subroutine draws the current graph.
0255 C
0256 C   DESCRIPTION:  This subroutine clears the alphanumeric and graphics
0257 C                 displays. It then draws the current graph. Note
0258 C                 that if the user has not changed any data values
0259 C                 the default values will be used.
0260 C
0261 C   CALLING SEQUENCE: CALL DRWDT
0262 C
0263 C   PARAMETERS:   NONE
0264 C
0265 C*****
0266 C
0267      SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IEND)
0268      REAL DAT(1002,2)
0269      DIMENSION ILIST(3)
0270      INTEGER TEXT(12),OPCODE,RSIZE
0271 C
0272      REAL VIEW(4)
0273      DATA MARKNO/6/
0274 C
0275 C   VIEW      - Temp holder of viewport bounds
0276 C
0277 C*****
0278 C
0279 C   Clear the graphics and alphanumeric displays
0280 C-----
0281      CALL ZNEWF
0282      CALL CLEAR
0283 C-----
0284 C   Determine parameters for LAXES call. Search thru data for YMAX.
0285 C-----
0286 C-----
0287      XTIC = (XMAX-XMIN)/10.0
0288      YTIC = (YMAX-YMIN) / 10.0
0289      XORG = XMIN
0290      YORG = YMIN
0291      XMJC = 1.0
0292      YMJC = 1.0
0293      TSIZE = .02
0294      CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0295 C-----
0296 C   Plot the graph.
0297 C-----
0298      CALL ZMOVE(DAT(3,1),DAT(3,2))

```

```

0299      DO 5000 I=4,IEND+2
0300      CALL ZDRAW(DAT(I,1),DAT(I,2))
0301      5000 CONTINUE
0302      C-----
0303      C Change the viewport to the maximum possible so text strings may be
0304      C placed anywhere on the view surface. Output the text strings, then
0305      C reset the viewport.
0306      C-----
0307      6000 CALL VPMAX (VIEW)
0308      TEXT(1) = 2HRe
0309      TEXT(2) = 2Hla
0310      TEXT(3) = 2Hti
0311      TEXT(4) = 2Hve
0312      TEXT(5) = 2H P
0313      TEXT(6) = 2Hos
0314      TEXT(7) = 2Hit
0315      TEXT(8) = 2Hio
0316      TEXT(9) = 2Hn
0317      TEXT(10) = 2H(m
0318      TEXT(11) = 2Hn)
0319      TEXT(12) = 6412B
0320      NMTEXT = 24
0321      XTEXT = 0.0
0322      YTEXT = YMIN + (YMAX-YMIN)/21.0
0323      C
0324      CALL ZMOVE (XTEXT,YTEXT)
0325      OPCODE=1052
0326      ISIZE=1
0327      RSIZE=0
0328      ILIST(1)=6
0329      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0330      IF (IERR .EQ. 0) GO TO 6010
0331      CALL ERRMS (1,IERR,6HZOESC )
0332      6010 CALL ZTEXT (NMTEXT,TEXT)
0333      C
0334      C CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0335      C IF (IERR .EQ. 0) GO TO 6020
0336      C CALL ERRMS (1,IERR,6HZIESC )
0337      C GO TO 9999
0338      6020 TEXT(1) = 2HAm
0339      TEXT(2) = 2Hpl
0340      TEXT(3) = 2Hit
0341      TEXT(4) = 2Hud
0342      TEXT(5) = 2He
0343      TEXT(6) = 2H(d
0344      TEXT(7) = 2Hb)
0345      TEXT(8) = 6412B
0346      NMTEXT = 16
0347      XTEXT = XMIN + (XMAX -XMIN)/30.0
0348      YTEXT = YMIN + (YMAX-YMIN)/2.0
0349      OPCODE = 1050
0350      ILIST(1) = 1
0351      ISIZE = 1
0352      RSIZE = 0
0353      CALL ZMOVE(XTEXT,YTEXT)
0354      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0355      IF (IERR .EQ. 0) GO TO 6030
0356      CALL ERRMS (1,IERR,6HZOESC )
0357      GO TO 9999
0358      6030 CALL ZTEXT(NMTEXT,TEXT)

```

```

0359      OPCODE=1050
0360      ILIST(1) = 0
0361      ISIZE = 1
0362      RSIZE = 0
0363      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0364      IF (IERR .EQ. 0) GO TO 6040
0365      CALL ERRMS (1,IERR,6HZOESC )
0366      GO TO 9999
0367 C
0368 6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0369      CALL ZMCUR
0370 C
0371 9999 RETURN
0372      END
0373 C
0374 C*****
0375 C      SUBROUTINE ERRMS
0376 C
0377 C      PURPOSE:      To write out an error message.
0378 C
0379 C      DESCRIPTION:  This subroutine writes an error message to the alphanumeric
0380 C                   LU. The error number and DGL subroutine name that the error
0381 C                   occurred during is reported.
0382 C
0383 C      CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0384 C
0385 C      PARAMETERS:
0386 C                   ALPHLU:  [INTEGER]; The alphanumeric LU
0387 C
0388 C                   ERROR:   [INTEGER]; The error number of the error to
0389 C                               reported
0390 C
0391 C                   SUBR:    [INTEGER]; An array containing the name of
0392 C                               the subroutine where the error occurred
0393 C
0394 C*****
0395 C
0396 C      SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0397 C      INTEGER ALPHLU,ERROR,SUBR(3)
0398 C
0399 C      Write out the error message
0400 C
0401 C      CALL ZMCUR
0402 C      WRITE(ALPHLU,100) ERROR, SUBR
0403 C      100 FORMAT(" Error ",I2," occurred in subroutine ",3A2)
0404 C
0405 C      RETURN
0406 C      END
0407 C
0408 C*****
0409 C      SUBROUTINE CLEAR
0410 C
0411 C      PURPOSE:      To clear the alphanumeric display
0412 C
0413 C      DESCRIPTION:  This subroutine will clear the alphanumeric display
0414 C                   of a HP 2647 or HP 2648 terminal. If the display is
0415 C                   not a HP 2647 or HP 2648 then the call has no effect.
0416 C
0417 C      CALLING SEQUENCE: CALL CLEAR
0418 C

```

```

0419 C PARAMETERS:      NONE
0420 C
0421 C *****
0422 C
0423 C      SUBROUTINE CLEAR
0424 C      INTEGER ILIST(7), STRING(2), IERR
0425 C      REAL DUMMY
0426 C
0427 C      ILIST - Information list returned by ZIWS
0428 C      IERR - Error information returned by ZIWS (not used here)
0429 C      DUMMY - Real information returned by ZIWS (none in this case)
0430 C      STRING - Device-dependent commands that clear a 264X terminal
0431 C
0432 C      DATA STRING /15550B,          15512B/
0433 C                  /      \          /      \
0434 C                  33B   +   150B      33B   +   112B
0435 C                  esc     h          esc     J
0436 C                  (home cursor)      (clear display)
0437 C
0438 C *****
0439 C
0440 C      Inquire the status of the alphanumeric device:
0441 C      upon return, ILIST(4) = -1 ==> no alpha device,
0442 C                          = 0 ==> it is disabled,
0443 C                          = 1 ==> it is enabled.
0444 C      If it is not enabled, just return.
0445 C
0446 C      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0447 C      IF (IERR .EQ. 0) GO TO 7070
0448 C      CALL ERRMS (1,IERR,6HZIWS )
0449 C      GO TO 9999
0450 C      7070 IF (ILIST(4) .NE. 1) GOTO 9999
0451 C
0452 C      Alpha device is enabled. Make sure it is '264X' type then clear.
0453 C
0454 C      IF (ILIST(1) .NE. 2H26) GOTO 9999
0455 C      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0456 C      CALL ZALPH (4,STRING)
0457 C
0458 C      9999 RETURN
0459 C      END
0460 C
0461 C *****
0462 C
0463 C      SUBROUTINE VPMAX
0464 C
0465 C      PURPOSE:      Set the viewport to the maximum limits.
0466 C
0467 C      DESCRIPTION:  The current viewport is saved in VIEW. The viewport
0468 C                    is then set to the maximum limits.
0469 C
0470 C      CALLING SEQUENCE: CALL VPMAX (VIEW)
0471 C
0472 C      PARAMETERS:
0473 C      VIEW: [REAL ARRAY OF 4]; This array contains the
0474 C                    viewport before it was
0475 C                    maxumized.
0476 C
0477 C *****
0478 C

```

```

0479      SUBROUTINE UPMAX (VIEW)
0480      REAL VIEW(4)
0481      C
0482      INTEGER IDUM
0483      REAL AR(2), NEWX, NEWY
0484      C
0485      C IDUM - Dummy work variable
0486      C AR - Temp holder of the aspect ratio
0487      C NEWX - Temp work variable
0488      C NEWY - Temp work variable
0489      C
0490      C*****
0491      C
0492      C Inquire current viewport and save it in array VIEW
0493      C
0494      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0495      IF (IERR .EQ. 0) GO TO 8080
0496      CALL ERRHS (1,IERR,6HZIWS )
0497      GO TO 9999
0498      C
0499      C Inquire the maximum aspect ratio
0500      C
0501      8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0502      C
0503      C Set viewport to maximum dimensions
0504      C
0505      NEWY = 1.
0506      NEWX = 1.
0507      IF (AR(2) .LE. 1.) NEWY = AR(2)
0508      IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0509      CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0510      C
0511      9999 RETURN
0512      END
0513      END$

```

&WR10 T=00003 IS ON CR00015 USING 00020 BLKS R=0000

```
0001 FTN4
0002 C
0003 C *****
0004 C *
0005 C *          GENERAL PURPOSE S11 MEASUREMENT PROGRAM
0006 C *
0007 C *          ++++++
0008 C *
0009 C *          FOR:  Walter Reed Army Institute of Research
0010 C *                Department of Microwave Research
0011 C *                Walter Reed Army Medical Center
0012 C *                Washington, DC
0013 C *                20012
0014 C *
0015 C *          ++++++
0016 C *
0017 C *          BY:  Technology-USA, Inc.
0018 C *                P.O. Box 55333
0019 C *                Fort Washington, Maryland  20744
0020 C *                Phone: (301) 292-2592
0021 C *
0022 C * -----
0023 C *          This program measures S11 at every frequency in the
0024 C *          calibration list. It also provides a listing of the data.
0025 C *
0026 C *****
0027 C
0028 C          PROGRAM WR10
0029 C
0030 C -----
0031 C          Define block common array and the variables which are in the array.
0032 C -----
0033 C
0034 C          INTEGER CRT,PRINT
0035 C          COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0036 C          *CM(4,112),IHEAD(40),IDATE(15)
0037 C          DIMENSION J(20),ITIME(15),IBUF(41),IREG(2),NBUF(41)
0038 C          EQUIVALENCE (D,J),(REG,IREG)
0039 C          CRT=1
0040 C          PRINT=6
0041 C          FF=20014B
0042 C          IRP=0
0043 C -----
0044 C          Display heading on the CRT.
0045 C -----
0046 C          IHOME=15510B
0047 C          ICLEAR=15512B
0048 C          WRITE(CRT,9500) IHOME,ICLEAR
0049 C          WRITE(CRT,910)
0050 C          910  FORMAT(
0051 C            *10X,"*****",/,
0052 C            *10X,"*          PROGRAM WR10          *",/,
0053 C            *10X,"*          GENERAL PURPOSE S11 MEASUREMENT PROGRAM  *",/,
0054 C            *10X,"*****",/,
0055 C            *")
0056 C -----
0057 C          Call subroutine FILE2 to read the block common data from the disk
0058 C          file and transfer it to the array AGS2C.
```

```

0059 C
0060 C Display the date on which this data was acquired, the starting frequency,
0061 C the step size, and the number of steps in the frequency list.
0062 C-----
0063 CALL FILE2(1)
0064 WRITE(CRT,1020) (IDATE(I), I=1,15)
0065 1020 FORMAT(3/,"Calibration data was taken on ..... ",15A2)
0066 C WRITE(CRT,1030) D(1),D(2),D(3)
0067 1030 FORMAT(1/,"Starting Freq. = "F8.3" MHz",
0068 */, "Step Size = " F8.3" MHz",/"Number of steps = "I3)
0069 WRITE(CRT,1050)
0070 1050 FORMAT(3/,"Do you wish to recalibrate ? (YES/NO) _")
0071 IANS=2H
0072 READ (CRT,9502) IANS
0073 IF (IANS.EQ.2H) GO TO 9000
0074 C-----
0075 C Measure and correct data.
0076 C-----
0077 1500 WRITE (CRT,9500) IHOME,ICLEAR
0078 WRITE (CRT,1510)
0079 1510 FORMAT (1/,5X,"Press RETURN to start the measurement. _")
0080 READ (CRT,9502) IANS
0081 WRITE (CRT,1520)
0082 1520 FORMAT (3/,5X,"Measurement in process. _")
0083 1600 CALL CORS4(1,4,1)
0084 C-----
0085 C Print heading on the line printer.
0086 C-----
0087 WRITE(PRINT,2000)
0088 2000 FORMAT(2/,
0089 *10X,"*****",/,
0090 *10X,"* * * * *",/,
0091 *10X,"* Walter Reed Army Institute of Research *",/,
0092 *10X,"* Department of Microwave Research *",/,
0093 *10X,"* Walter Reed Army Medical Center *",/,
0094 *10X,"* Washington, DC 20012 *",/,
0095 *10X,"* * * * *",/,
0096 *10X,"*****")
0097 WRITE (CRT,9500) IHOME,ICLEAR
0098 IF (IRPT.GT.0) GOTO 2055
0099 WRITE (CRT,2050)
0100 2050 FORMAT (1/,5X,"Enter first line of title for the data list.",
0101 *2/,5X,"(Press RETURN if no title is to be printed.)",
0102 *2/)
0103 REG=EXEC(1,401B,IBUF,41)
0104 IF (IREG(2).EQ.0) GO TO 2100
0105 LINE1=IREG(2)
0106 2055 WRITE (PRINT,9501)
0107 WRITE (PRINT,9503) (IBUF(I),I=1,LINE1)
0108 WRITE (CRT,2060)
0109 2060 FORMAT (1/,5X,"Enter second line of title for the data list.",
0110 *2/,5X,"(Press RETURN if no second line is to be printed.)",
0111 *2/)
0112 REG=EXEC(1,401B,NBUF,41)
0113 IF (IREG(2).EQ.0) GO TO 2100
0114 LINE2=IREG(2)
0115 WRITE (PRINT,9503) (NBUF(I),I=1,LINE2)
0116 2100 CALL FTIME (ITIME)
0117 WRITE (PRINT,2105) (ITIME(I),I=1,15)
0118 2105 FORMAT (2/,10X,"Measurement Date: ",15A2)

```

```

0119      WRITE (PRINT,2110) (IDATE(I),I=1,15)
0120 2110 FORMAT (1/,10X,"Calibration Date: ",15A2)
0121      WRITE (PRINT,2500)
0122 2500 FORMAT (3/,
0123      *10X," Frequency          S11          VSWR          Return",/,
0124      *10X," (MHz)              "15X"        Loss (dB)",/,
0125      *10X,"              Magnitude    Phase",/)
0126 C-----
0127 C Print the data.
0128 C-----
0129      CALL CALF2(4,M,F)
0130      DO 3900 I=1,M
0131      IF (IFBRK(IDUM)) 9100,3100
0132 3100 CALL CALF2(2,I,F)
0133      CALL CPOL2(CH(1,I),X,Y)
0134      VSWR = ((1+X)/(1-X))
0135      RLOSS = -10*ALOGT(X**2)
0136      IF (X .GE. 0.9802) X=0.9802
0137      IF (X .GE. 0.98) VSWR=100.0
0138      IF (X .GE. 0.98) RLOSS =0.174
0139      WRITE (PRINT,3200) F,X,Y,VSWR,RLOSS
0140 3200 FORMAT (10X,F10.3,2X,F10.4,2X,F9.1,5X,F7.3,5X,F7.3)
0141 3900 CONTINUE
0142      WRITE (PRINT,9504)
0143 C-----
0144 C Ask operator if he wants another measurement.
0145 C-----
0146      WRITE (CRT,4050)
0147 4050 FORMAT (1/,5X,"Do you wish to make another run ? (YES/NO) _")
0148      READ (CRT,9502) IANS
0149      IF (IANS.NE.2HYES) GO TO 9100
0150      IRPT=1
0151      WRITE (CRT,9500) IHOME,ICLEAR
0152      GO TO 1500
0153 C-----
0154 C Program termination.
0155 C-----
0156 9000 WRITE (CRT,9010)
0157 9010 FORMAT (2/,"Run program AGS02 for new calibration.")
0158 9100 WRITE (CRT,9110)
0159 9110 FORMAT (3/,10X,
0160      *"***** PROGRAM WR10 TERMINATED *****")
0161 C-----
0162 C Format statements.
0163 C-----
0164 9500 FORMAT (2A2)
0165 9501 FORMAT (2/)
0166 9502 FORMAT (A2)
0167 9503 FORMAT (10X,40A2)
0168 9504 FORMAT (H1)
0169      END
0170      BLOCK DATA
0171      COMMON /AGS2C/ I(2330)
0172      END
0173      END$

```

WR11 T=00004 IS ON CR32767 USING 00035 BLKS R=0176

```

0001 FTN4,L
0002 C
0003 C *****
0004 C *
0005 C *          GENERAL PURPOSE S21 MEASUREMENT PROGRAM          *
0006 C *
0007 C *          ++++++
0008 C *
0009 C *          FOR:  Walter Reed Army Institute of Research
0010 C *                Department of Microwave Research
0011 C *                Walter Reed Army Medical Center
0012 C *                Washington, DC
0013 C *                20012
0014 C *
0015 C *          ++++++
0016 C *
0017 C *          BY:   Technology-USA, Inc.
0018 C *                P.O. Box 55333
0019 C *                Fort Washington, Maryland  20744
0020 C *                Phone: (301) 292-2592
0021 C *
0022 C *          -----
0023 C *          This program measures S21 at every frequency in the
0024 C *          calibration list. It also provides a listing of the data.
0025 C *
0026 C *****
0027 C
0028 C          PROGRAM WR11
0029 C
0030 C -----
0031 C Define block common array and the variables which are in the array.
0032 C -----
0033 C
0034 C          INTEGER CRT,PRINT
0035 C          COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,NONLY,
0036 C          *CM(4,112),IHEAD(40),IDATE(15)
0037 C          DIMENSION J(20),ITIME(15),IBUF(41),IREG(2),NBUF(41)
0038 C          EQUIVALENCE (D,J),(REG,IREG)
0039 C          CRT=1
0040 C          PRINT=6
0041 C          FF=20014B
0042 C          IRPT=0
0043 C -----
0044 C Display heading on the CRT.
0045 C -----
0046 C          IHOME=15510B
0047 C          ICLEAR=15512B
0048 C          WRITE(CRT,9500) IHOME,ICLEAR
0049 C          WRITE(CRT,910)
0050 C          910 FORMAT(
0051 C          *10X,"*****",/,
0052 C          *10X,"*          PROGRAM WR11          *",/,
0053 C          *10X,"*          GENERAL PURPOSE S21 MEASUREMENT PROGRAM          *",/,
0054 C          *10X,"*****",/,
0055 C          *")
0056 C -----
0057 C Call subroutine FILE2 to read the block common data from the disk
0058 C file and transfer it to the array AGS2C.

```

```

0059 C
0060 C Display the date on which this data was acquired, the starting frequency,
0061 C the step size, and the number of steps in the frequency list.
0062 C-----
0063 CALL FILE2(1)
0064 WRITE(CRT,1020) (IDATE(I), I=1,15)
0065 1020 FORMAT(3/,"Calibration data was taken on ..... ",15A2)
0066 WRITE(CRT,1030) D(1),D(2),D(3)
0067 1030 FORMAT(1/,"Starting Freq. = "F8.3" MHz",
0068 */,"Step Size = " F8.3" MHz",/"Number of steps = "I3)
0069 WRITE(CRT,1050)
0070 1050 FORMAT(3/,"Do you wish to recalibrate ? (YES/NO) _")
0071 IANS=2H
0072 READ (CRT,9502) IANS
0073 IF (IANS.EQ.2HYES) GO TO 9000
0074 C-----
0075 C Measure and correct data.
0076 C-----
0077 1500 WRITE (CRT,9500) IHOME,ICLEAR
0078 WRITE (CRT,1510)
0079 1510 FORMAT (1/,5X,"Press RETURN to start the measurement. _")
0080 READ (CRT,9502) IANS
0081 WRITE (CRT,1520)
0082 1520 FORMAT (3/,5X,"Measurement in process. _")
0083 1600 CALL CORS3(1,4,1)
0084 C-----
0085 C Print heading on the line printer.
0086 C-----
0087 WRITE(PRINT,2000)
0088 2000 FORMAT(2/,
0089 *10X,"*****",
0090 *10X,"*
0091 *10X,"* Walter Reed Army Institute of Research *",
0092 *10X,"* Department of Microwave Research *",
0093 *10X,"* Walter Reed Army Medical Center *",
0094 *10X,"* Washington, DC 20012 *",
0095 *10X,"*
0096 *10X,"*****")
0097 WRITE (CRT,9500) IHOME,ICLEAR
0098 IF (IRPT.GT.0) GOTO 2055
0099 WRITE (CRT,2050)
0100 2050 FORMAT (1/,5X,"Enter first line of title for the data list.",
0101 *2/,5X,"(Press RETURN if no title is to be printed.)",
0102 *2/)
0103 REG=EXEC(1,401B,IBUF,41)
0104 IF (IREG(2).EQ.0) GO TO 2100
0105 LINE1=IREG(2)
0106 2055 WRITE (PRINT,9501)
0107 WRITE (PRINT,9503) (IBUF(I),I=1,LINE1)
0108 WRITE (CRT,2060)
0109 2060 FORMAT (1/,5X,"Enter second line of title for the data list.",
0110 *2/,5X,"Press RETURN if no second line is to be printed.)",
0111 *2/)
0112 REG=EXEC(1,401B,NBUF,41)
0113 IF (IREG(2).EQ.0) GO TO 2100
0114 LINE2=IREG(2)
0115 WRITE (PRINT,9503) (NBUF(I),I=1,LINE2)
0116 2100 CALL FTIME (ITIME)
0117 WRITE (PRINT,2105) (ITIME(I),I=1,15)
0118 2105 FORMAT (2/,10X,"Measurement Date: ",15A2)

```

```

0119      WRITE (PRINT,2110) (IDATE(I),I=1,15)
0120      2110 FORMAT (1/,10X,"Calibration Date: ",15A2)
0121      WRITE (PRINT,2500)
0122      2500 FORMAT (3/,
0123          *10X," Frequency           S21           Insertion",/,
0124          *10X," (MHz)           -----"4X"      Loss (dB)",/,
0125          *10X,"           Magnitude   Phase",/,)
0126      C-----
0127      C Print the data.
0128      C-----
0129          CALL CALF2(4,M,F)
0130          DO 3900 I=1,M
0131              IF (IFBRK(IDUM)) 9100,3100
0132          3100 CALL CALF2(2,I,F)
0133              CALL CPOL2(CM(2,I),X,Y)
0134              RLOSS =-10*ALOGT(X*X)
0135              IF (X .GE. 0.9802) X=0.9802
0136              IF (X .GE. 0.98) RLOSS =0.174
0137              WRITE (PRINT,3200) F,X,Y,RLOSS
0138          3200 FORMAT (10X,F10.3,2X,F10.4,2X,F9.1,7X,F7.3)
0139          3900 CONTINUE
0140              WRITE (PRINT,9504)
0141      C-----
0142      C Ask operator if he wants another measurement.
0143      C-----
0144          WRITE (CRT,4050)
0145          4050 FORMAT (1/,5X,"Do you wish to make another run ? (YES/NO)  _")
0146          READ (CRT,9502) IANS
0147          IF (IANS.NE.2HYES) GO TO 9100
0148          IRPT=1
0149          WRITE (CRT,9500) IHOME,ICLEAR
0150          GO TO 1500
0151      C-----
0152      C Program termination.
0153      C-----
0154          9000 WRITE (CRT,9010)
0155          9010 FORMAT (2/,"Run program AGS02 for new calibration.")
0156          9100 WRITE (CRT,9110)
0157          9110 FORMAT (3/,10X,
0158              ***** PROGRAM WR11 TERMINATED *****")
0159      C-----
0160      C Format statements.
0161      C-----
0162          9500 FORMAT (2A2)
0163          9501 FORMAT (2/)
0164          9502 FORMAT (A2)
0165          9503 FORMAT (10X,40A2)
0166          9504 FORMAT (H1)
0167          END
0168          BLOCK DATA
0169          COMMON /AGS2C/ I(2330)
0170          END
0171          END$

```

R1.1

R1.2

&WK12 T=00004 IS ON CR00010 USING 00028 BLKS R=0167

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SUBROUTINE: WR12
0005 C *
0006 C *          ++++++
0007 C *
0008 C *          FOR:  Walter Reed Army Institute of Research
0009 C *                Department of Microwave Research
0010 C *                Walter Reed Army Medical Center
0011 C *                Washington DC
0012 C *                20112
0013 C *
0014 C *          ++++++
0015 C *
0016 C *          BY:   Technology-USA, Inc.
0017 C *                P.O. Box 55333
0018 C *                Fort Washington, Maryland  20744
0019 C *                Phone: (301) 292-2592
0020 C *
0021 C *          -----
0022 C *          Subroutine WR12 displays an error message on the CRT
0023 C *          or any specified LU#.
0024 C *
0025 C *****
0026 C SUBROUTINE WR12(LUN,ERRN,FL3,K,L,PRGNM,PRGNL)
0027 C INTEGER ERRN,PRGNM,PRGNL,CLOSP
0028 C DIMENSION PRGNM(PRGNL)
0029 C LOGICAL FL3
0030 C CLOSP=1H)
0031 C J=2H
0032 C I=ERRN/1000B
0033 C IF (I .EQ. 0) I=6
0034 C IF (I .LT. 10) GO TO 15
0035 C J=I-(I/10)*10+2H00
0036 C I=I/10
0037 15 WRITE(LUN,19) I,J,ERRN,(PRGNM(I),I=1,PRGNL),CLOSP
0038 19 FORMAT(1X,"ERROR # WR",I1,R1," - ",05," .....(",6A1)
0039 C IF (PRGNM(1) .NE. 2HW ) GO TO 50000
0040 C IF (PRGNM(2) .NE. 2HR ) GO TO 50000
0041 C IF (ERRN .NE. 1101B) GO TO 1103
0042 C WRITE (LUN,1101)
0043 1101 FORMAT (1X,"Heidenhain for ZENITH axis is not set to ",
0044 C *          "millimeter position.")
0045 C IF (FL3) WRITE (LUN,1102)
0046 1102 FORMAT(1X,"Place switch in 'MM' position and rerun ",
0047 C *          "the program.")
0048 C RETURN
0049 1103 IF (ERRN .NE. 1102B) GO TO 1106
0050 C WRITE(LUN,1104)
0051 1104 FORMAT(1X,"Program cannot read the measurement",
0052 C *          " units from the ZENITH axis Heidenhain.")
0053 C IF (FL3) WRITE (LUN,1105)
0054 1105 FORMAT(1X,"Set the power control lever on the right",
0055 C *          " of the scanner control panel to 'ON'.")
0056 C RETURN
0057 1106 IF ((ERRN-1100B)/10 .NE. 3) GO TO 1200
0058 C WRITE (LUN,1107)

```

```

0059 1107  FORMAT (1X,"Heidenhain for ZENITH axis is sending ",
0060      *      "erroneous data.")
0061      IF (FL3) WRITE (LUN,1108)
0062 1108  FORMAT (1X,"Call system manager about problem with",
0063      *      " the VRZ-100 readout device for ZENITH.")
0064      RETURN
0065 1200  IF (ERRN .NE. 1201B) GO TO 1203
0066      WRITE(LUN,1201)
0067 1201  FORMAT (1X,"Heidenhain for AZIMUTH Axis is not set to ",
0068      *      "millimeter position.")
0069      IF (FL3) WRITE (LUN,1202)
0070 1202  FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0071      RETURN
0072 1203  IF (ERRN .NE. 1202B) GO TO 1206
0073      WRITE(LUN,1204)
0074 1204  FORMAT(1X,"Program cannot read the measurement",
0075      *      " units from the AZIMUTH axis Heidenhain.")
0076      IF (FL3) WRITE (LUN,1205)
0077 1205  FORMAT(1X,"Set the power control lever on the right",
0078      *      " of the scanner control panel to 'ON'.")
0079      RETURN
0080 1206  IF ((ERRN-1200B)/10 .NE. 3) GO TO 1400
0081      WRITE (LUN,1207)
0082 1207  FORMAT (1X,"Heidenhain for AZIMUTH axis is sending ",
0083      *      "erroneous data.")
0084      IF (FL3) WRITE (LUN,1208)
0085 1208  FORMAT (1X,"Call system manager about problem with",
0086      *      " the VRZ-100 readout device for AZIMUTH.")
0087      RETURN
0088 1400  IF (ERRN .NE. 1401B) GO TO 1403
0089      WRITE(LUN,1401)
0090 1401  FORMAT (1X,"Heidenhain for ELEVATION Axis is not set to ",
0091      *      "millimeter position.")
0092      IF (FL3) WRITE (LUN,1402)
0093 1402  FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0094      RETURN
0095 1403  IF (ERRN .NE. 1402B) GO TO 1406
0096      WRITE(LUN,1404)
0097 1404  FORMAT(1X,"Program cannot read the measurement",
0098      *      " units from the ELEVATION axis Heidenhain.")
0099      IF (FL3) WRITE (LUN,1405)
0100 1405  FORMAT(1X,"Set the power control lever on the right",
0101      *      " of the scanner control panel to 'ON'.")
0102      RETURN
0103 1406  IF ((ERRN-1400B)/10 .NE. 3) GO TO 3300
0104      WRITE (LUN,1407)
0105 1407  FORMAT (1X,"Heidenhain for ELEVATION axis is sending ",
0106      *      "erroneous data.")
0107      IF (FL3) WRITE (LUN,1408)
0108 1408  FORMAT (1X,"Call system manager about problem with ",
0109      *      "VRZ-100 readout device for ELEVATION.")
0110      RETURN
0111 3300  IF (ERRN .NE. 3301B) GO TO 3303
0112      WRITE(LUN,3301)
0113 3301  FURMAT (1X,"Farrand for ROTATION Axis is not set to ",
0114      *      "right setting.")
0115      IF (FL3) WRITE (LUN,3302)
0116 3302  FORMAT(1X,"Put Farrand in right setting and rerun ",
0117      *      "the program.")
0118      RETURN

```

```

0119 3303 IF (ERRN .NE. 3302B) GO TO 3306
0120      WRITE(LUN,3304)
0121 3304  FORMAT(1X,"Program cannot read the measurement",
0122      *      " units from the ROTATION axis Farrand.")
0123      IF (FL3) WRITE (LUN,3305)
0124 3305  FORMAT(1X,"Call system manager about problem with",
0125      *      " VRZ-100 readout device for ROTATION.")
0126      RETURN
0127 3306 IF ((ERRN-3300B)/10 .NE. 3) GO TO 6100
0128      WRITE (LUN,3307)
0129 3307  FORMAT(1X,"Farrand for ROTATION axis is sending ",
0130      *      "erroneous data.")
0131      IF (FL3) WRITE (LUN,3308)
0132 3308  FORMAT(1X,"Call system manager about problem with ",
0133      *      "the VRZ-100 readout device for ROTATION.")
0134      RETURN
0135 6100 IF (ERRN .NE. 101B) GO TO 6103
0136      WRITE(LUN,6101)
0137 6101  FORMAT (1X,"Heidenhain for ZENITH Axis is not set to ",
0138      *      "millimeter position.")
0139      IF (FL3) WRITE (LUN,6102)
0140 6102  FORMAT(1X,"Place switch in 'MM' position and rerun ",
0141      *      "the program.")
0142      RETURN
0143 6103 IF (ERRN .NE. 102B) GO TO 6106
0144      WRITE(LUN,6104)
0145 6104  FORMAT(1X,"Program cannot read the measurement",
0146      *      " units from the ZENITH axis Heidenhain.")
0147      IF (FL3) WRITE (LUN,6105)
0148 6105  FORMAT(1X,"Call system manager about problem with",
0149      *      " the VRZ-100 readout device for ZENITH.")
0150      RETURN
0151 6106 IF (ERRN .NE. 103B) GO TO 6109
0152      WRITE (LUN,6107)
0153 6107  FORMAT(1X,"There is no power to the ZENITH motor.")
0154      IF (FL3) WRITE (LUN,6108)
0155 6108  FORMAT(1X,"Set the power control lever on the right",
0156      *      " of the scanner control panel to 'ON'.")
0157      RETURN
0158 6109 IF (ERRN .NE. 104B) GO TO 6112
0159      WRITE (LUN,6110)
0160 6110  FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0161      *      " the computer position.")
0162      IF (FL3) WRITE (LUN,6111)
0163 6111  FORMAT (1X,"Set the mode switch to the computer position",
0164      *      " and run the program again.")
0165      RETURN
0166 6112 IF (ERRN .NE. 105B) GO TO 6115
0167      WRITE (LUN,6113)
0168 6113  FORMAT(1X,"Time out while reading from the ",
0169      *      "ZENITH axis Heidenhain.")
0170      IF (FL3) WRITE (LUN,6114)
0171 6114  FORMAT (1X,"Call system manager about problem with ",
0172      *      "the VRZ-100 readout device for ZENITH.")
0173      RETURN
0174 6115 IF (ERRN .NE. 106B) GO TO 6118
0175      WRITE (LUN,6116)
0176 6116  FORMAT (1X,"Unable to reach the desired ZENITH ",
0177      *      "position after 1024 tries.")
0178      IF (FL3) WRITE (LUN,6117)

```

```

0179 6117  FORMAT (1X,"Call system manager about problem with",
0180      *      " ZENITH controller, motor, or drive.")
0181      RETURN
0182 6118  IF (ERRN .NE. 110B) GO TO 6121
0183      WRITE (LUN,6119)
0184 6119  FORMAT (1X,"The ZENITH axis + direction limit switch ",
0185      *      "has been tripped.")
0186      IF (FL3) WRITE (LUN,6120)
0187 6120  FORMAT (1X,"Move in the - direction on ZENITH axis.")
0188      RETURN
0189 6121  IF (ERRN .NE. 120B) GO TO 6200
0190      WRITE (LUN,6122)
0191 6122  FORMAT (1X,"The ZENITH axis - direction limit switch ",
0192      *      "has been tripped.")
0193      IF (FL3) WRITE (LUN,6123)
0194 6123  FORMAT (1X,"Move in the + direction on ZENITH axis.")
0195      RETURN
0196 6200  IF (ERRN .NE. 201B) GO TO 6203
0197      WRITE(LUN,6201)
0198 6201  FORMAT (1X,"Heidenhain for AZIMUTH Axis is not set to ",
0199      *      "millimeter position.")
0200      IF (FL3) WRITE (LUN,6202)
0201 6202  FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0202      RETURN
0203 6203  IF (ERRN .NE. 202B) GO TO 6206
0204      WRITE(LUN,6204)
0205 6204  FORMAT(1X,"Program cannot read the measurement",
0206      *      " units from the AZIMUTH axis Heidenhain.")
0207      IF (FL3) WRITE (LUN,6205)
0208 6205  FORMAT(1X,"Call system manager about problem with",
0209      *      " the VRZ-100 readout device for AZIMUTH.")
0210      RETURN
0211 6206  IF (ERRN .NE. 203B) GO TO 6209
0212      WRITE (LUN,6207)
0213 6207  FORMAT(1X,"There is no power to the AZIMUTH motor.")
0214      IF (FL3) WRITE (LUN,6208)
0215 6208  FORMAT(1X,"Set the power control lever on the right",
0216      *      " of the scanner control panel to 'ON'.")
0217      RETURN
0218 6209  I (ERRN .NE. 204B) GO TO 6212
0219      RITE (LUN,6210)
0220 6210  FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0221      *      " the computer position.")
0222      IF (FL3) WRITE (LUN,6211)
0223 6211  FORMAT (1X,"Set the mode switch to the computer position",
0224      *      " and run the program again.")
0225      RETURN
0226 6212  IF (ERRN .NE. 205B) GO TO 6215
0227      WRITE (LUN,6213)
0228 6213  FORMAT(1X,"Time out while reading from the ",
0229      *      "AZIMUTH axis Heidenhain.")
0230      IF (FL3) WRITE (LUN,6214)
0231 6214  FORMAT (1X,"Call system manager about problem with ",
0232      *      "the VRZ-100 readout device for AZIMUTH.")
0233      RETURN
0234 6215  IF (ERRN .NE. 206B) GO TO 6218
0235      WRITE (LUN,6216)
0236 6216  FORMAT (1X,"Unable to reach the desired AZIMUTH ",
0237      *      "position after 1024 tries.")
0238      IF (FL3) WRITE (LUN,6217)

```

```

0239 6217  FORMAT (1X,"Call system manager about problem with"
0240      *      " AZIMUTH motor, controller, or drive.")
0241      RETURN
0242 6218  IF (ERRN .NE. 210B) GO TO 6221
0243      WRITE (LUN,6219)
0244 6219  FORMAT (1X,"The AZIMUTH axis + direction limit switch ",
0245      *      "has been tripped.")
0246      IF (FL3) WRITE (LUN,6220)
0247 6220  FORMAT (1X,"Move in the - direction on AZIMUTH axis.")
0248      RETURN
0249 6221  IF (ERRN .NE. 220B) GO TO 6300
0250      WRITE (LUN,6222)
0251 6222  FORMAT (1X,"The AZIMUTH axis - direction limit switch ",
0252      *      "has been tripped.")
0253      IF (FL3) WRITE (LUN,6223)
0254 6223  FORMAT (1X,"Move in the + direction on AZIMUTH axis.")
0255      RETURN
0256 6300  IF (ERRN .NE. 301B) GO TO 6303
0257      WRITE(LUN,6301)
0258 6301  FORMAT (1X,"Farrand for ROTATION Axis is not set to ",
0259      *      "right setting.")
0260      IF (FL3) WRITE (LUN,6302)
0261 6302  FORMAT(1X,"Put Farrand in right setting and rerun ",
0262      *      "the program.")
0263      RETURN
0264 6303  IF (ERRN .NE. 302B) GO TO 6306
0265      WRITE(LUN,6304)
0266 6304  FORMAT(1X,"Program cannot read the measurement",
0267      *      " units from the ROTATION axis Farrand.")
0268      IF (FL3) WRITE (LUN,6305)
0269 6305  FORMAT(1X,"Call system manager about problem with",
0270      *      " VRZ-100 readout device for ROTATION.")
0271      RETURN
0272 6306  IF (ERRN .NE. 303B) GO TO 6309
0273      WRITE (LUN,6307)
0274 6307  FORMAT(1X,"There is no power to the ROTATION motor.")
0275      IF (FL3) WRITE (LUN,6308)
0276 6308  FORMAT(1X,"Set the power control lever on the right",
0277      *      " of the scanner control panel to 'ON'.")
0278      RETURN
0279 6309  IF (ERRN .NE. 304B) GO TO 6312
0280      WRITE (LUN,6310)
0281 6310  FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0282      *      " the computer position.")
0283      IF (FL3) WRITE (LUN,6311)
0284 6311  FORMAT (1X,"Set the mode switch to the computer position",
0285      *      " and run the program again.")
0286      RETURN
0287 6312  IF (ERRN .NE. 305B) GO TO 6315
0288      WRITE (LUN,6313)
0289 6313  FORMAT(1X,"Time out while reading from the ",
0290      *      "ROTATION axis Farrand.")
0291      IF (FL3) WRITE (LUN,6314)
0292 6314  FORMAT (1X,"Call system manager about problem with ",
0293      *      "VRZ-100 readout device for ROTATION.")
0294      RETURN
0295 6315  IF (ERRN .NE. 306B) GO TO 6318
0296      WRITE (LUN,6316)
0297 6316  FORMAT (1X,"Unable to reach the desired ROTATION ",
0298      *      "position after 1024 tries.")

```

```

0299      IF (FL3) WRITE (LUN,6317)
0300 6317  FORMAT (1X,"Call system manager about problem with",
0301      *      " ROTATION controller, motor, or drive.")
0302      RETURN
0303 6318  IF (ERRN .NE. 310B) GO TO 6321
0304      WRITE (LUN,6319)
0305 6319  FORMAT (1X,"The ROTATION axis CCW direction limit switch ",
0306      *      "has been tripped.")
0307      IF (FL3) WRITE (LUN,6320)
0308 6320  FORMAT (1X,"Move in the CW direction on ROTATION axis.")
0309      RETURN
0310 6321  IF (ERRN .NE. 320B) GO TO 6400
0311      WRITE (LUN,6322)
0312 6322  FORMAT (1X,"The ROTATION axis CW direction limit switch ",
0313      *      "has been tripped.")
0314      IF (FL3) WRITE (LUN,6323)
0315 6323  FORMAT (1X,"Move in the CCW direction on ROTATION axis.")
0316      RETURN
0317 6400  IF (ERRN .NE. 401B) GO TO 6403
0318      WRITE(LUN,6401)
0319 6401  FORMAT (1X,"Heidenhain for ELEVATION Axis is not set to ",
0320      *      "millimeter position.")
0321      IF (FL3) WRITE (LUN,6402)
0322 6402  FORMAT(1X,"Place switch in 'MM' position and rerun the program.")
0323      RETURN
0324 6403  IF (ERRN .NE. 402B) GO TO 6406
0325      WRITE(LUN,6404)
0326 6404  FORMAT(1X,"Program cannot read the measurement",
0327      *      " units from the ELEVATION axis Heidenhain.")
0328      IF (FL3) WRITE (LUN,6405)
0329 6405  FORMAT(1X,"Call system manager about problem with",
0330      *      " VRZ-100 readout device for ELEVATION.")
0331      RETURN
0332 6406  IF (ERRN .NE. 403B) GO TO 6409
0333      WRITE (LUN,6407)
0334 6407  FORMAT(1X,"There is no power to the ELEVATION motor.")
0335      IF (FL3) WRITE (LUN,6408)
0336 6408  FORMAT(1X,"Set the power control lever on the right",
0337      *      " of the scanner control panel to 'ON'.")
0338      RETURN
0339 6409  IF (ERRN .NE. 404B) GO TO 6412
0340      WRITE (LUN,6410)
0341 6410  FORMAT (1X,"The COMPUTER/MANUAL switch is not set to",
0342      *      " the computer position.")
0343      IF (FL3) WRITE (LUN,6411)
0344 6411  FORMAT (1X,"Set the mode switch to the computer position",
0345      *      " and run the program again.")
0346      RETURN
0347 6412  IF (ERRN .NE. 405B) GO TO 6415
0348      WRITE (LUN,6413)
0349 6413  FORMAT(1X,"Time out while reading from the ",
0350      *      "ELEVATION axis Heidenhain.")
0351      IF (FL3) WRITE (LUN,6414)
0352 6414  FORMAT (1X,"Call system manager about problem with ",
0353      *      "VRZ-100 readout device for ELEVATION.")
0354      RETURN
0355 6415  IF (ERRN .NE. 406B) GO TO 6418
0356      WRITE (LUN,6416)
0357 6416  FORMAT (1X,"Unable to reach the desired ELEVATION ",
0358      *      "position after 1024 tries.")

```

```

0359      IF (FL3) WRITE (LUN,6417)
0360 6417  FORMAT (1X,"Call system manager about problem with"
0361      *      " ELEVATION motor, controller, or drive.")
0362      RETURN
0363 6418  IF (ERRN .NE. 410B) GO TO 6421
0364      WRITE (LUN,6419)
0365 6419  FORMAT (1X,"The Elevation axis + direction limit switch ",
0366      *      "has been tripped.")
0367      IF (FL3) WRITE (LUN,6420)
0368 6420  FORMAT (1X,"Move in the - direction on Elevation axis.")
0369      RETURN
0370 6421  IF (ERRN .NE. 420B) GO TO 50000
0371      WRITE (LUN,6422)
0372 6422  FORMAT (1X,"The Elevation axis - direction limit switch ",
0373      *      "has been tripped.")
0374      IF (FL3) WRITE (LUN,6423)
0375 6423  FORMAT (1X,"Move in the + direction on Elevation axis.")
0376      RETURN
0377 50000 RETURN
0378      END

```

&WR13M T=00004 IS ON CR00010 USING 00008 BLKS R=0052

```
0001 FTM4,L
0002 C 24998-18466 REV.2040 (B10304.1057)
0003 C*****
0004 C
0005 C          PROGRAM WR13
0006 C
0007 C  DESCRIPTION:
0008 C  WR13 is designed to obtain microwave transmission data at different
0009 C  points along a scan and at different angles and to store the data
0010 C  in a disc file.
0011 C  This program has been divided into four segments because it
0012 C  cannot fit into memory otherwise. The main segment always remains
0013 C  in memory. The main segment merely calls EXEC(8,WR13C) to read
0014 C  in the control segment, WR13C, and pass control to it. The other
0015 C  two segments are WR13G, which plots a graph on the plotter and
0016 C  WR13T, which plots a graph on the terminal. Segment WR13C gives
0017 C  the user the option of plotting either on the plotter or the CRT
0018 C  for each run. Therefor each run uses three segments: 1. the main
0019 C  segment, WR13. 2. the control segment, WR13C. 3. a graphing
0020 C  segment, either WR13G or WR13T. The two segments besides the
0021 C  the main segment overlay each other by one segment calling
0022 C  EXEC(8, other segment name) to read in the other segment over
0023 C  the calling segment and then pass control to it. It can
0024 C  return to the calling segment only by calling EXEC(8, calling
0025 C  segment name) again.
0026 C  This segment is the main segment. It is run by typing in:
0027 C          RU,WR13
0028 C  This segment only defines common, initializes variables, and
0029 C  then calls EXEC(8,WR13C) to read in and pass control to segment
0030 C  WR13C.
0031 C
0032 C*****
0033 C
0034 C          PROGRAM WR13
0035 C
0036 C          DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0037 C          *          ISIZE(2),ITITL(40),PLUNIT(2)
0038 C          INTEGER CRT,PRNT
0039 C          COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0040 C          *          IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IEND,PRESRO,IDCB,NAMEF,
0041 C          *          ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0042 C          *          PLUNIT,ITITL,PRNT,IGRLOC
0043 C          COMMON/AGS2C/ D(10)
0044 C          IRNUM = 1
0045 C          CRT = 1
0046 C          IPRNM(1) = 1HW
0047 C          IPRNM(2) = 1HR
0048 C          IPRNM(3) = 1H1
0049 C          IPRNM(4) = 1H3
0050 C          IPRNL = 4
0051 C          MESS = -1
0052 C          ASTEPS = 5
0053 C          IAEND = 4
0054 C          RSTEPS = 30
0055 C          IEND = 3
0056 C          IPEND = 1
0057 C          ISEND = 1
0058 C          IDONE = 0
```

```

0059      PRESAZ = 999.9
0060      IPFLAG = 1
0061      ILFLAG = 1
0062      PLUNIT(1) = 4H - C
0063      PLUNIT(2) = 4HRT
0064      IGRLOC = 1
0065      NAMEF(1) = 2H9R
0066      NAMEF(2) = 2HS2
0067      NAMEF(3) = 2H10
0068      PRNT = 6
0069      CALL FILE2(1)
0070      TEMP1 = D(1)
0071      TEMP2 = (D(3) - 1) * D(2) + D(1)
0072      RFREQ = D(1)
0073 C-----
0074 C  Call EXEC to read in segment WR13C and pass control to it.
0075 C-----
0076 C
0077      ICODE=8
0078      INAME(1)=2HWR
0079      INAME(2)=2H13
0080      INAME(3)=2HC
0081      CALL EXEC (ICODE, INAME)
0082      END
0083 C
0084 C  Block data routine for AGS2C
0085 C
0086      BLOCK DATA AGS2C
0087      COMMON /AGS2C/ I(2330)
0088      END
0089      END$

```

&WR13C T=00004 IS ON CR00002 USING 0007B BLKS R=0431

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR13C
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Segment WR13C is the control segment of WR13.  It puts
0021 C *          out a Menu with the options:
0022 C *          1 - Enter the number of azimuth steps and step size.
0023 C *          2 - Enter the number of rotation steps and step size.
0024 C *          3 - Enter the microwave frequency.
0025 C *          4 - Set antennae to a new azimuth position.
0026 C *          5 - Rotate antennae to a new angle.
0027 C *          6 - Enter number of readings to average for each point.
0028 C *          7 - Request graphs on the CRT.
0029 C *          10 - List on printer.
0030 C *          8 - Scan from the present position
0031 C *          9 - Terminate the program.
0032 C *          After 8 is chosen, the antennae are positioned at the
0033 C *          present position-(number of data points-1)*step size/2.
0034 C *          The amplitude and phase are each averaged over the number
0035 C *          of readings specified in 6 and saved in the array DAT
0036 C *          along with the position.  Then the antennae are advanced
0037 C *          by step size and the amplitude and phase are read again.
0038 C *          This is repeated for the specified number of steps per
0039 C *          scan.
0040 C *          After each scan, the data accumulated in array DAT is
0041 C *          read out to a disc file, SRS21A.  If there is a file
0042 C *          with that name already, the last letter is incremented.
0043 C *          After the data is read out, the angle is incremented by
0044 C *          rotation step size and the whole process repeated for
0045 C *          the number of rotation steps.
0046 C *
0047 C *****
0048 PROGRAM WR13C,5
0049 DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0050 *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0051 *          PLUNIT(2),FAT(1560)
0052 INTEGER CRT,PRNT
0053 COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0054 *          IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IEND,PRESRO,IDCB,NAMEF,
0055 *          ISIZE,1DONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,1D,IDRCT,
0056 *          PLUNIT,ITITL,PRNT,IGRLOC
0057 EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
0058 C

```

```

0059      COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,ONLY,
0060      *CH(4,112),IHEAD(40),IDATE(15)
0061      DATA LUAZ/31/,LURO/33/,I1/15446B/
0062 C-----
0063 C   Set number of scans if plots requested.
0064 C-----
0065      IF (PRESAZ .EQ. 999.9) GO TO 525
0066      IF (IGRLOC .EQ. 1) ILFLAG = 0
0067      IF (IDONE .GE. IREND) GO TO 515
0068      IF (IPEND .EQ. 1) GO TO 8701
0069      IF (IDONE .NE. 1) GO TO 511
0070      IF (IPEND .GT. IREND) GO TO 513
0071      ISEND = IPEND - 1
0072      GO TO 8701
0073      511 IF (IDONE+IPEND .GT. IREND) GO TO 513
0074      ISEND = IPEND
0075      GO TO 8701
0076      513 ISEND = IREND - IDONE
0077      IPFLAG = -1
0078      GO TO 8701
0079 C-----
0080 C   Reset original position and print menu.
0081 C-----
0082      515 WRITE (CRT, 519)
0083      519 FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0084      *           "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0085      *           /,1X,"PLEASE EXCUSE THE DELAY")
0086      CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0087      IF (IERR .EQ. 0) GO TO 522
0088      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0089      GO TO 9090
0090      522 PRESRO = PRESRO - RSTEPS*(IREND-1)
0091      CALL SETPO (CRT, LURO, PRESRO, 3, IERR)
0092      IF (IERR .EQ. 0) GO TO 523
0093      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0094      GO TO 9090
0095      523 IF (IPFLAG .EQ. 0) GO TO 525
0096      ISEND = 1
0097      IPFLAG = 1
0098      ILFLAG = 1
0099      525 IDONE = 0
0100 C-----
0101 C   Clear screen and print heading.
0102 C-----
0103      WRITE(CRT,529)
0104      0529 FORMAT("
0105      *           10X,55'*',/,
0106      *10X,"*",20X,"PROGRAM WR13",20X,"*",/,
0107      *10X,"*",11X,"S21 LINE AND ANGLE SCAN PROGRAM",11X,"*",/,
0108      *10X,55'*',/)
0109      530 CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)
0110      IF (IERR .EQ. 0) GO TO 540
0111      CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0112      GO TO 9090
0113      540 CALL WR3 (CRT,LURO,PRESRO,IERR,0)
0114      IF (IERR .EQ. 0) GO TO 550
0115      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0116      GO TO 9090
0117      550 IF (PRNT .EQ. 0) GO TO 555
0118      PRNTL(1) = 4H PRI

```

```

0119          PRNTL(2) = 4HNT
0120          GO TO 560
0121      555      PRNTL(1) = 4HNO P
0122          PRNTL(2) = 4HRINT
0123      560      WRITE(CRT,600) IAEND,ASTEPS,IEND,RSTEPS,RFREQ,PRESAZ,PRESRO,
0124          *IRNUM,IPEND,(PLUNIT(I),I=1,2),(PRNTL(I),I=1,2)
0125      0600      FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0126          *" 1 - Number of azimuth steps and step size.....",
0127          *I3," x",F6.2," mm",/,
0128          *" 2 - Number of rotation steps and step size.....",
0129          *I3," x",F6.2," degrees",/,
0130          *" 3 - Microwave frequency.....",
0131          *F7.0," MHz",/,
0132          *" 4 - Azimuth position.....",
0133          *F8.3," mm",/,
0134          *" 5 - Angle.....",
0135          *F8.3," degrees",/,
0136          *" 6 - Number of readings to average per point.....",IS,/,
0137          *" 7 - Number scans per graph.....",IS,1X,2A4,/,
0138          *" 10 - Toggle switch for listing on printer.....",2X,2A4,/,
0139          *" EXECUTION OPTIONS",/,
0140          *" 8 - Scan from the present position.",/,
0141          *" 9 - Terminate the program.",/,"")
0142      610      WRITE (CRT,619)
0143      0619      FORMAT ("")
0144      620      WRITE (CRT,629)
0145      629      FORMAT (1X,"SELECT OPTION NUMBER _")
0146          READ(CRT,*) IANS
0147          IF (IANS .EQ. 9999) GO TO 9090
0148          IF (IANS .EQ. 10) GO TO 700
0149          IF (IANS .EQ. 9) GO TO 9090
0150          IF (IANS .EQ. 8) GO TO 8000
0151          IF (IANS .EQ. 7) GO TO 7000
0152          IF (IANS .EQ. 6) GO TO 6000
0153          IF (IANS .EQ. 5) GO TO 5000
0154          IF (IANS .EQ. 4) GO TO 4000
0155          IF (IANS .EQ. 3) GO TO 3000
0156          IF (IANS .EQ. 2) GO TO 2000
0157          IF (IANS .EQ. 1) GO TO 1000
0158          WRITE (CRT,659)
0159      659      FORMAT (/,1X,"ERROR # WR13 - 15001 .....(WR13)",/,1X,
0160          *" INCORRECT RESPONSE. ENTER ANY NUMBER FROM 1 TO 10.")
0161          GO TO 620
0162      C-----
0163      C Set to print on the printer.
0164      C-----
0165      700      IF (PRNT .EQ. 6) GO TO 750
0166          PRNT = 6
0167          PRNTL(1) = 4H PRI
0168          PRNTL(2) = 4HNT
0169          GO TO 760
0170      750      PRNT = 0
0171          PRNTL(1) = 4HNO P
0172          PRNTL(2) = 4HRINT
0173      760      WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0174      769      FORMAT (1A2, "a 54c 13Y",2A4)
0175          GO TO 610
0176      C-----
0177      C Inquire from the user: azimuth step size and rate
0178      C-----

```

AD-A192 590

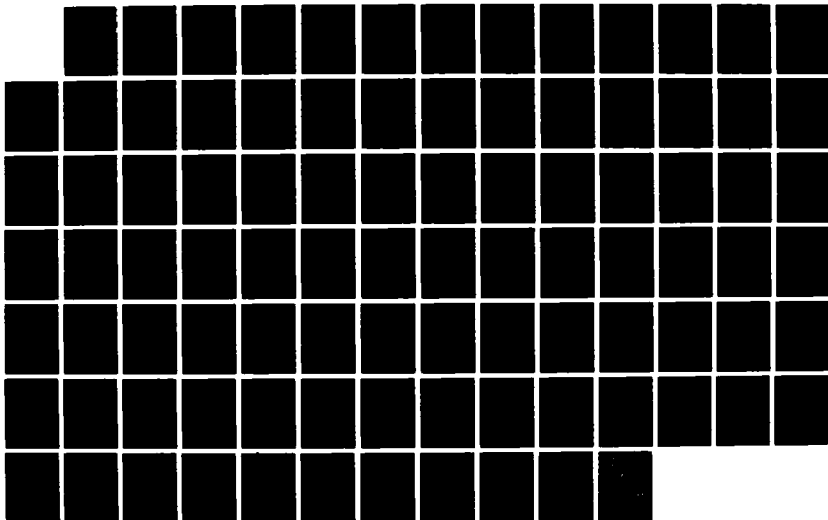
ANALYSIS TECHNIQUES FOR MICROWAVE DOSIMETRIC DATA(U)
TECHNOLOGY-USA INC FORT WASHINGTON MD J R DEMOS ET AL.
OCT 85 DAND17-79-C-9151

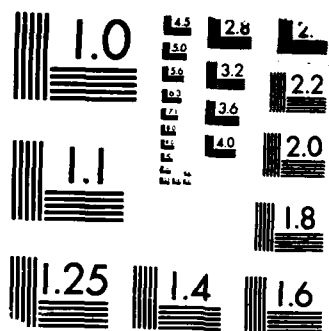
2/2

UNCLASSIFIED

F/G 14/2

NL





MICROCOPY RESOLUTION TEST CHART
 BUREAU OF STANDARDS 1963-A

```

0179 1000 WRITE(CRT,1100)
0180 1100 FORMAT(/," Enter the number of steps per scan. _")
0181 READ(CRT,*) IAEND
0182 IF (IAEND .EQ. 9999) GO TO 9090
0183 IF ((IAEND .LT. 513) .AND. (IAEND .GT. 0)) GO TO 1190
0184 WRITE (CRT,1109)
0185 1109 FORMAT (/,"ERROR # WR13 - 15202 .....(WR13)",/,
0186 * 1X,"THE NUMBER OF STEPS MUST BE FROM 1 - 512.",/,
0187 * 1X,"REENTER THE NUMBER OF STEPS.")
0188 GO TO 1000
0189 1190 WRITE(CRT,1200)
0190 1200 FORMAT(/," Enter the step size (mm)..... _")
0191 READ(CRT,*) ASteps
0192 IF (ASteps .EQ. 9999) GO TO 9090
0193 WRITE (CRT,1209) I1,IAEND,ASteps
0194 1209 FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0195 GO TO 610
0196 C-----
0197 C Inquire from user: rotation step size and number of steps.
0198 C-----
0199 2000 WRITE (CRT,2009)
0200 2009 FORMAT (/,"Enter the number of rotation steps. _")
0201 READ (CRT,*) IREND
0202 IF (IREND .EQ. 9999) GO TO 9090
0203 IF (IREND .GT. 0) GO TO 2020
0204 WRITE (CRT,2019)
0205 2019 FORMAT (/,"ERROR # WR13 - 15302 .....(WR13)",/,
0206 * 1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0207 * 1X,"REENTER THE NUMBER OF ROTATION STEPS.")
0208 GO TO 2000
0209 2020 WRITE (CRT,2029)
0210 2029 FORMAT (/,"Enter the rotation step size. _")
0211 READ (CRT,*) RSteps
0212 IF (RSteps .EQ. 9999) GO TO 9090
0213 WRITE (CRT,2039) I1, IREND, RSteps
0214 2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0215 GO TO 610
0216 C-----
0217 C Inquire from the user: microwave frequency.
0218 C-----
0219 3000 WRITE(CRT,3500)
0220 3500 FORMAT(/," Enter the RF frequency (MHz)... _")
0221 READ(CRT,*) RFREQ
0222 IF (RFREQ .EQ. 9999) GO TO 9090
0223 IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0224 WRITE (CRT,3509) TEMP1, TEMP2
0225 3509 FORMAT (/,"ERROR # WR13 - 15004 .....(WR13)",/,1X,
0226 * "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0227 * /,"1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0228 * /,"1X,"Do you wish to recalibrate? (YES/NO) _")
0229 READ (CRT,3599) IANS
0230 3599 FORMAT (A2)
0231 IF (IANS .EQ. 2HYE) GO TO 9000
0232 GO TO 3000
0233 3600 WRITE (CRT, 3609) I1, RFREQ
0234 3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0235 GO TO 610
0236 C-----
0237 C Inquire new azimuth position and call WR6 to set it.
0238 C-----

```

```

0239 4000 WRITE (CRT,4090)
0240 4090 FORMAT (/ ,1X,"Enter new position (mm).  _")
0241 READ (CRT,*) PRESAZ
0242 IF (PRESAZ .EQ. 9999) GO TO 9090
0243 CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0244 IF (IERR .EQ. 0) GO TO 4400
0245 CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0246 GO TO 9090
0247 4400 WRITE (CRT,4409) I1,PRESAZ
0248 4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0249 GO TO 610
0250 C-----
0251 C Inquire new rotation and call WR6 to set it.
0252 C-----
0253 5000 WRITE (CRT,5090)
0254 5090 FORMAT (/ ,1X,"Enter new angle...  _")
0255 READ (CRT,*) PRESRO
0256 IF (PRESRO .EQ. 9999) GO TO 9090
0257 CALL SETPO (CRT, LURD, PRESRO, 3, IERR)
0258 IF (IERR .EQ. 0) GO TO 5500
0259 CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0260 GO TO 9090
0261 5500 WRITE (CRT,5509) I1, PRESRO
0262 5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0263 GO TO 610
0264 C-----
0265 C Inquire from the user: number of readings per data point.
0266 C-----
0267 6000 WRITE (CRT,6009)
0268 6009 FORMAT (/ ,1X,
0269 * "Enter number of readings to average per data point.  _")
0270 READ (CRT,*) IRNUM
0271 IF (IRNUM .EQ. 9999) GO TO 9090
0272 IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0)) GO TO 6600
0273 WRITE (CRT,6509)
0274 6509 FORMAT (/ ,1X,"ERROR * WR13 - 15005 .....(WR13)",/,
0275 * 1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0276 * 1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0277 GO TO 6000
0278 6600 WRITE (CRT, 6609) I1, IRNUM
0279 6609 FORMAT (1A2,"a 52c 11Y",I5)
0280 GO TO 610
0281 C-----
0282 C Inquire from user: number of scans per graph.
0283 C-----
0284 7000 WRITE (CRT,7009)
0285 7009 FORMAT (/ ,1X,"Enter number of scans between graphs.  _")
0286 READ (CRT,*) IPEND
0287 IF (IPEND .EQ. 9999) GO TO 9090
0288 IF (IPEND .GE. 0) GO TO 7500
0289 WRITE (CRT,7209)
0290 7209 FORMAT (/ ,1X,"ERROR * WR13 - 15003 .....(WR13)",/,
0291 * 1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0292 * 1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS.")
0293 GO TO 7000
0294 7500 WRITE (CRT,7509)
0295 7509 FORMAT (/ ,1X,"Enter '1' to plot on CRT ",
0296 * "or '0' to plot on plotter.  _")
0297 READ (CRT,*) IGRLOC
0298 IPFLAG = 1

```

```

0299     PLUNIT(1) = 4H-PLO
0300     PLUNIT(2) = 4HTTER
0301     IF (IGRLOC.NE. 1) GO TO 7550
0302         PLUNIT(1) = 4H - C
0303         PLUNIT(2) = 4HRT
0304     7550 IF (IPEND.NE. 0) GO TO 7600
0305         IPFLAG = 0
0306         PLUNIT(1) = 4HGRAP
0307         PLUNIT(2) = 4HHS
0308     7600 ISEND = 1
0309         WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0310     7609 FORMAT (1A2,"a 52c 12Y",I5,1X,2A4)
0311         GO TO 610
0312 C-----
0313 C   Set antennae to first position and create disc data file.
0314 C-----
0315     8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0316     8009 FORMAT (/ ,1X,
0317         *"Enter title of file or press 'RETURN' key for following title.",
0318         */,40A2,/)
0319         REG = EXEC (1,401B,ITITL,-80)
0320         IF (IREG(2) .EQ. 0) GO TO 8100
0321         DO 8050 I = (IREG(2)+3)/2,40
0322     8050 ITITL(I) = 2H
0323         IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0324         ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0325     8100 POSITN = PRESAB-ASTEPS*(IAEND-1)/2
0326         PARAM = POSITN
0327         CALL WR6(PARAM,IERR,2,0)
0328         IF (IERR .EQ. 0) GO TO 8200
0329         CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0330         GO TO 620
0331     8200 CALL CALF2(3, MC, RFREQ)
0332         ISIZE(2) = IAEND*6 + 20
0333         IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0334         ISIZE(1) = (ISIZE(2) * (IREND + 1) + 127)/128
0335     8300 NAMEF(3) = NAMEF(3) + 1
0336         CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0337         IF (IERR .GE. 0) GO TO 8450
0338         IF (IERR .EQ. -2) GO TO 8300
0339         WRITE (CRT,8409) IERR
0340     8409 FORMAT (/ ,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0341         GO TO 9090
0342     8450 IF (PRNT .EQ. 0) GO TO 8500
0343         WRITE (PRNT,8459) ITITL,NAMEF
0344     8459 FORMAT ("1",40A2,/,1X,"FILE = ",3A2)
0345         WRITE (PRNT,600) IAEND,ASTEPS,IREND,RSTEPS,RFREQ,PRESAB,PRESRO,
0346         *      IRNUM,IPEND,PLUNIT,PRNTL
0347     8500 WRITE (CRT,8509) NAMEF
0348     8509 FORMAT (/ ,1X,"NAME OF DATA FILE IS ",3A2)
0349         CALL FTIME(IFAT)
0350         DO 8550 I=1,40
0351     8550 IFAT(15+I) = ITITL(I)
0352         IFAT(56) = 2HRO
0353         IFAT(57) = 0
0354         IFAT(58) = IAEND
0355         IFAT(30) = ASTEPS
0356         IFAT(61) = 0
0357         IFAT(62) = IREND
0358         IFAT(32) = RSTEPS

```

```

0359      FAT(33) = RFREQ
0360      IFAT(67) = ISIZE(1)
0361      IFAT(68) = ISIZE(2)
0362      ILFLAG = 1
0363      CALL WRITF (IDCB, IERR, DAT)
0364      IF (IERR .EQ. 0) GO TO 8700
0365      WRITE (CRT,8609) IERR
0366      8609  FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0367      GO TO 9090
0368  C-----
0369  C Rotation scan from PRESRO to PRESRO+RSTEPS*(IREND-1) or until graph needed.
0370  C-----
0371      8700 IF (IPEND .EQ. 0) ISEND = IREND
0372      ID = 1
0373      IDRCT = 1
0374      8701 DO 8900 J=1,ISEND
0375      IF (J + IDONE .EQ. 1) GO TO 8720
0376      IDRCT = -IDRCT
0377      PRESRO = PRESRO + RSTEPS
0378      PARAM = PRESRO
0379      CALL WR6 (PARAM, IERR, 3, 0)
0380      IF (IERR .EQ. 0) GO TO 8720
0381      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0382      GO TO 9090
0383      8720 CALL WR3 (CRT, LURD, TRURO, IERR, 0)
0384      IF (IERR .EQ. 0) GO TO 8725
0385      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0386      GO TO 9090
0387  C-----
0388  C Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
0389  C-----
0390      8725 DO 8800 I=1,IAEND
0391      IF (IFBRK(IERR)) 9090,8730
0392      8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0393      IF (IERR .EQ. 0) GO TO 8735
0394      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0395      GO TO 9090
0396  C      CALL CALF2(2,1,F)
0397      8735 XAVE = 0.
0398      YAVE = 0.
0399      DO 8750 K=1,IRNUM
0400      CALL MESUR(RFREQ, X1, Y1, X, Y)
0401      CALL CORCT(MC, X1, Y1, X, Y)
0402      YAVE = YAVE + Y
0403      8750 XAVE = XAVE + X
0404      XAVE = XAVE / IRNUM
0405      YAVE = YAVE / IRNUM
0406      RLOSS = -10*ALOGT(XAVE*XAVE + YAVE*YAVE)
0407      PHASE = ATAN2(YAVE, XAVE) * 180./3.141593
0408      IF (ILFLAG .EQ.0) GO TO 8780
0409      WRITE (CRT,8779) I,TRUAZ,RLOSS,PHASE
0410      8779 FORMAT (1X,"STEP",I2," AZIMUTH =",F8.3,
0411      *          " RLOSS =",F9.4," PHASE =",F8.3)
0412      8780 DAT(1,ID) = TRUAZ
0413      DAT(2,ID) = RLOSS
0414      DAT(3,ID) = PHASE
0415      IF (I .GE. IAEND) GO TO 8800
0416      ID = ID + IDRCT
0417      POSITN = POSITN + IDRCT * ASTEPS
0418      PARAM = POSITN

```

```

0419      CALL WR6(PARAM,IERR,2,0)
0420      IF (IERR .EQ. 0) GO TO 8800
0421      CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0422      GO TO 9090
0423      8800 CONTINUE
0424      C-----
0425      C End of azimuth scan loop.
0426      C-----
0427      DAT(1,IAEND+1) = TRURO
0428      DAT(2,IAEND+1) = RFREQ
0429      IF (PRNT .EQ. 0) GO TO 8850
0430      WRITE (PRNT,8829) TRURO, RFREQ
0431      8829 FORMAT (//,5X,"ROTATION =",F8.3,5X,"FREQUENCY =",F6.0)
0432      DO 8830 IE = 1, IAEND
0433      8830 WRITE (PRNT,8839) (DAT(I,IE),I=1,3)
0434      8839 FORMAT (1X,"AZIMUTH =",F8.3,5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0435      8850 CALL WRITF (IDCB,IERR,DAT)
0436      IF (IERR .EQ. 0) GO TO 8900
0437      WRITE (CRT,8859) IERR
0438      8859 FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0439      GO TO 9090
0440      8900 CONTINUE
0441      C-----
0442      C End of rotation scan loop
0443      C-----
0444      IDONE = IDONE + ISEND
0445      IF (IPFLAG .LT. 1) GO TO 515
0446      C-----
0447      C Call EXEC to overlay this segment with WR13C
0448      C-----
0449      8990 IF (IGRLOC .EQ. 1) GO TO 8995
0450      INAME(3) = 2HG
0451      GO TO 8998
0452      8995 INAME(3) = 2HT
0453      8998 CALL EXEC (ICODE,INAME)
0454      9000 WRITE (CRT,9009)
0455      9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0456      9090 WRITE (CRT,9099)
0457      9099 FORMAT (3/,10X,
0458      *"***** PROGRAM WR13 TERMINATED *****")
0459      CALL CLOSE (IDCB)
0460      END
0461      C-----
0462      C Subroutine SETPO calls WR6 to set an azimuth or elevation position
0463      C and then calls WR1 to check the position. If it is within .002 it
0464      C returns, if not it calls WR6 once again.
0465      C-----
0466      SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0467      DO 100 I = 1,2
0468      PARAM = PRES
0469      CALL WR6 (PARAM,IERR,UNIT,0)
0470      IF (IERR .NE. 0) RETURN
0471      IF (I .GT. 1) RETURN
0472      IF (LU .EQ. 33) GO TO 90
0473      CALL WR1 (CRT,LU,NEW,IERR,0)
0474      GO TO 91
0475      90 CALL WR3 (CRT,LU,NEW,IERR,0)
0476      91 IF (IERR .NE. 0) RETURN
0477      IF (ABS(NEW-PRES) .LT. .002) RETURN
0478      100 CONTINUE

```

0479
0480
0481

RETURN
END
END0

&WR13G T=00004 IS ON CR00002 USING 00084 BLKS R=0521

```

0001 FTM4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR13G
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *          Department of Microwave Research
0009 C *          Walter Reed Army Medical Center
0010 C *          Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *          P.O. Box 55333
0016 C *          Fort Washington, Maryland 20744
0017 C *          Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Segment WR13G is the segment of WR13 that plots a
0021 C *          graph on the plotter.  It is read in and control passed
0022 C *          to it by an EXEC(8,WR13G) call from segment WR15C after
0023 C *          a scan is finished.  WR13G then plots a graph on the
0024 C *          plotter of the attenuation versus position for each
0025 C *          frequency with a marker equal to the frequency number.
0026 C *          When this segment is finished, it calls EXEC(8,WR13C) to
0027 C *          read in WR13C and pass control to it.
0028 C *
0029 C *****
0030 C PROGRAM WR13G,S
0031 C
0032 C   DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033 C *       ISIZE(2),ITITL(40),PLUNIT(2)
0034 C   INTEGER STATUS, ALPHLU,  GOUTLU, CRT, PRNT
0035 C   COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036 C *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IEND,PRESRO,IDCB,NAMEF,
0037 C *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038 C *       PLUNIT,ITITL,PRNT,IGRLOC
0039 C   DATA ALPHLU, GOUTLU /1,19/
0040 C
0041 C STATUS - Set to zero if no errors occur in a called routine
0042 C ALPHLU - The LU of the alphanumeric device
0043 C GOUTLU - The LU of the graphics output device
0044 C
0045 C*****
0046 C
0047 C-----
0048 C Initialize DGL system
0049 C-----
0050 C   WRITE(CRT,520)
0051 C   0520 FORMAT("")
0052 C   CALL ZBEGN
0053 C-----
0054 C Enable all devices, exit if any errors
0055 C-----
0056 C   CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0057 C   IF (STATUS .NE. 0) GOTO 9990
0058 C-----

```

```

0059 C Find minimum and maximum values.
0060 C-----
0061      XMIN = DAT(1,1)
0062      XMAX = DAT(1,IAEND)
0063      YMIN = 100000.
0064      YMAX = -YMIN
0065      DO 5100 I=1, IAEND
0066      IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0067      IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0068 5100 CONTINUE
0069      IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0070      YMIN = INT (YMIN)
0071      GO TO 5400
0072 5300 YMIN = INT (YMIN - .999)
0073 5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0074      YMAX = INT (YMAX + .999)
0075      GO TO 5600
0076 5500 YMAX = INT (YMAX)
0077 5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0078      IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0079      XMIN = INT (XMIN)
0080      GO TO 5800
0081 5700 XMIN = INT (XMIN - .999)
0082 5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0083      XMAX = INT (XMAX + .999)
0084      GO TO 5950
0085 5900 XMAX = INT (XMAX)
0086 C-----
0087 C Perform the viewing transformation, exit if any errors
0088 C-----
0089 5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0090      IF (STATUS .NE. 0) GOTO 9990
0091 C-----
0092 C Draw axis and label, then plot.
0093 C-----
0094      CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0095      GO TO 9000
0096 C-----
0097 C Disable logical devices
0098 C-----
0099 C6000 CALL ZNEWF
0100 C      CALL CLEAR
0101 6000 CALL ZAEND
0102      CALL ZDEND
0103      CALL ZEND
0104 C-----
0105 C Call EXEC to overlay this segment with WR13C and execute it.
0106 C-----
0107 9000 INAME(3) = 2HC
0108      CALL EXEC (ICODE, INAME)
0109 9990 CONTINUE
0110 C
0111      CALL ZAEND
0112      CALL ZDEND
0113 C-----
0114 C Disable DGL system
0115 C-----
0116      CALL ZEND
0117 C-----
0118 C Terminate program

```

```

0119 C-----
0120 9998 WRITE(CRT,9999)
0121 9999 FORMAT("")
0122 END
0123 C
0124 C*****
0125 C ENDEV SUBROUTINE
0126 C
0127 C PURPOSE: This subroutine enables all logical devices used by
0128 C the program.
0129 C
0130 C DESCRIPTION: This subroutine enables the DGL work station. The DGL
0131 C workstation contains alphanumeric and graphics output
0132 C devices.
0133 C
0134 C CALLING SEQUENCE: CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0135 C
0136 C PARAMETERS:
0137 C ALPHLU: [INTEGER]; Alphanumeric LU
0138 C GOUTLU: [INTEGER]; Graphics output LU
0139 C STATUS: [INTEGER]; Set to zero if no errors occur
0140 C during initialization of the
0141 C workstation. It is set to the
0142 C DGL error return value if an
0143 C error is found.
0144 C
0145 C*****
0146 C
0147 SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0148 C
0149 INTEGER ALPHLU, GOUTLU, STATUS
0150 INTEGER CONTRL
0151 C-----
0152 C If an error occurs, write out an error message, and return.
0153 C
0154 C Enable alphanumeric device
0155 C-----
0156 C CALL ZAJNT (ALPHLU,STATUS)
0157 C IF (STATUS .EQ. 0) GOTO 1000
0158 C CALL ERRMS (ALPHLU,STATUS,6HZAJNT )
0159 C1000 CONTINUE
0160 C-----
0161 C Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0162 C-----
0163 CONTRL = 0
0164 CALL ZDINT (GOUTLU,CONTRL,STATUS)
0165 IF (STATUS .EQ. 0) GOTO 9999
0166 CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0167 9999 CONTINUE
0168 C-----
0169 C Return to main program after all devices are properly enabled
0170 C-----
0171 RETURN
0172 END
0173 C
0174 C*****
0175 C
0176 C SUBROUTINE VIEWT
0177 C
0178 C PURPOSE: This subroutine performs the initial viewing

```

```

0179 C          transformation.
0180 C
0181 C  DESCRIPTION:  This subroutine performs the viewing transformation in
0182 C                the following steps:
0183 C
0184 C                - Places the image on the largest possible area
0185 C                - Sets the window to the desired range.
0186 C                - Resets the viewport to leave room for labels
0187 C                - Recomputes character size based on specified window
0188 C
0189 C  CALLING SEQUENCE:  CALL VIEWT
0190 C
0191 C  PARAMETERS:      NONE
0192 C
0193 C*****
0194 C
0195 C          SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0196 C
0197 C          INTEGER IDUM, IERR
0198 C          REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0199 C          REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0200 C
0201 C  IDUM      - Dummy var
0202 C  IERR      - Error return (not used)
0203 C  AR        - Holds aspect ratio
0204 C  VIEW      - Holds current viewport bounds
0205 C  XSIZE     - Temp work variable
0206 C  YSIZE     - Temp work variable
0207 C  XCSIZ     - Temp holder of character size X
0208 C  YCSIZ     - Temp holder of character size Y
0209 C  WXMIN     - Temp holder of window X - min
0210 C  WXMAX     - Temp holder of window X - max
0211 C  WYMIN     - Temp holder of window Y - min
0212 C  WYMAX     - Temp holder of window Y - max
0213 C  MINX      - Temp holder of new viewport X - min
0214 C  MAXX      - Temp holder of new viewport X - max
0215 C  MINY      - Temp holder of new viewport Y - min
0216 C  MAXY      - Temp holder of new viewport Y - max
0217 C
0218 C*****
0219 C
0220 C  Inquire aspect ratio of logical display limits
0221 C-----
0222 C          CALL ZIWS (254,0,2,IDUM,AR,IERR)
0223 C          IF (IERR .EQ. 0) GO TO 555
0224 C          CALL ERRMS (1,IERR,6HZIWS )
0225 C          GO TO 9999
0226 C-----
0227 C  Make the largest possible area of the logical display available
0228 C  for graphical output by setting the aspect ratio(AR).
0229 C-----
0230 C          555 YSIZE = AR(2)
0231 C          XSIZE = 1.0
0232 C          CALL ZASPK (XSIZE,YSIZE)
0233 C-----
0234 C  Specify the desired range of X and Y values of the window
0235 C-----
0236 C          CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0237 C-----
0238 C  Inquire current viewport limits

```

```

0239 C-----
0240 CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0241 IF (IERR .EQ. 0) GO TO 577
0242 CALL ERRMS (1,IERR,6HZIWS )
0243 GO TO 9999
0244 C-----
0245 C Calculate the lower left hand corner of the viewport and leave
0246 C enough room for labels. The viewport is reduced 12% on each side
0247 C to give room for labels. Set the new viewport
0248 C-----
0249 577 MINX = .12 * VIEW(2)
0250 MAXX = .88 * VIEW(2)
0251 MINY = .12 * VIEW(4)
0252 MAXY = .88 * VIEW(4)
0253 CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0254 C-----
0255 C Now set the character size based on the size of the window
0256 C The constants below produce a readable character size in the new
0257 C window.
0258 C-----
0259 XCSIZ = .015 * (WXMAX - WXMIN)
0260 YCSIZ = .025 * (WYMAX - WYMIN)
0261 CALL ZCSIZ (XCSIZ,YCSIZ)
0262 C
0263 9999 RETURN
0264 END
0265 C*****
0266 C SUBROUTINE DRWDT
0267 C
0268 C PURPOSE: This subroutine draws the current graph.
0269 C
0270 C DESCRIPTION: This subroutine clears the alphanumeric and graphics
0271 C displays. It then draws the current graph. Note
0272 C that if the user has not changed any data values
0273 C the default values will be used.
0274 C
0275 C CALLING SEQUENCE: CALL DRWDT
0276 C
0277 C PARAMETERS: NONE
0278 C
0279 C*****
0280 C
0281 SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0282 REAL DAT(3,520)
0283 DIMENSION ILIST(3),RLIST(2)
0284 INTEGER TEXT(12),OPCODE,RSIZE
0285 C
0286 REAL VIEW(4)
0287 C
0288 C VIEW - Temp holder of viewport bounds
0289 C
0290 C*****
0291 C
0292 C Clear the graphics and alphanumeric displays
0293 C-----
0294 CALL ZNEWF
0295 CALL CLEAR
0296 C-----
0297 C Determine parameters for LAXES call. Search thru data for YMAX.
0298 C-----

```

```

0299 C-----
0300      XTIC = (XMAX-XMIN)/10.0
0301      YTIC = (YMAX-YMIN) / 10.0
0302      XORG = XMIN
0303      YORG = YMIN
0304      XMJC = 1.0
0305      YMJC = 1.0
0306      TSIZE = .02
0307      CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0308 C-----
0309 C Plot the graph.
0310 C-----
0311      CALL ZMOVE(DAT(1,1),DAT(2,1))
0312      DO 5000 I=2, IAEND
0313      CALL ZDRAW(DAT(1,I),DAT(2,I))
0314      5000 CONTINUE
0315 C-----
0316 C Change the viewport to the maximum possible so text strings may be
0317 C placed anywhere on the view surface. Output the text strings, then
0318 C reset the viewport.
0319 C-----
0320      6000 CALL VPMAX (VIEW)
0321      TEXT(1) = 2HRe
0322      TEXT(2) = 2H1a
0323      TEXT(3) = 2Ht1
0324      TEXT(4) = 2Hve
0325      TEXT(5) = 2H P
0326      TEXT(6) = 2Hos
0327      TEXT(7) = 2Hit
0328      TEXT(8) = 2Hio
0329      TEXT(9) = 2Hn
0330      TEXT(10) = 2H(m
0331      TEXT(11) = 2Hn)
0332      TEXT(12) = 6412B
0333      NMTEXT = 24
0334      XTEXT = XMIN + (XMAX - XMIN) * .3
0335      YTEXT = YMIN + (YMAX-YMIN)/21.0
0336 C
0337      CALL ZMOVE (XTEXT,YTEXT)
0338 C      OPCODE=1052
0339 C      ISIZE=1
0340 C      RSIZE=0
0341 C      ILIST(1)=6
0342 C      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0343 C      IF (IERR .EQ. 0) GO TO 6010
0344 C      CALL ERRMS (1,IERR,6HZOESC )
0345      6010 CALL ZTEXT (NMTEXT,TEXT)
0346 C
0347 C      CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0348 C      IF (IERR .EQ. 0) GO TO 6020
0349 C      CALL ERRMS (1,IERR,6HZIESC )
0350 C      GO TO 9999
0351      6020 TEXT(1) = 2HAt
0352      TEXT(2) = 2Hte
0353      TEXT(3) = 2Hnu
0354      TEXT(4) = 2Hat
0355      TEXT(5) = 2Hio
0356      TEXT(6) = 2Hn
0357      TEXT(7) = 2H(d
0358      TEXT(8) = 2Hb)

```

```

0359      TEXT(9) = 6412B
0360      NMTEXT = 18
0361      XTEXT = XMIN + (XMAX - XMIN)/30.0
0362      YTEXT = YMIN + (YMAX - YMIN) * .3
0363      OPCODE = 250
0364      RLIST(1) = 0
0365      RLIST(2) = 1.
0366      ISIZE = 0
0367      RSIZE = 2
0368      CALL ZMOVE(XTEXT,YTEXT)
0369      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0370      IF (IERR .EQ. 0) GO TO 6030
0371          CALL ERRMS (1,IERR,6HZOESC )
0372          GO TO 9999
0373 6030 CALL ZTEXT(NMTEXT,TEXT)
0374      OPCODE=250
0375      RLIST(1) = 1.
0376      RLIST(2) = 0
0377      ISIZE = 0
0378      RSIZE = 2
0379      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0380      IF (IERR .EQ. 0) GO TO 6040
0381          CALL ERRMS (1,IERR,6HZOESC )
0382          GO TO 9999
0383  C
0384 6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0385      CALL ZMCUR
0386  C
0387 9999 RETURN
0388      END
0389  C
0390 C*****
0391 C                                     SUBROUTINE ERRMS
0392 C
0393 C PURPOSE:           To write out an error message.
0394 C
0395 C DESCRIPTION:       This subroutine writes an error message to the alphanumeric
0396 C                     LU. The error number and DGL subroutine name that the error
0397 C                     occurred during is reported.
0398 C
0399 C CALLING SEQUENCE:  CALL ERRMS(ALPHLU,ERROR,SUBR)
0400 C
0401 C PARAMETERS:
0402 C                     ALPHLU:  [INTEGER];  The alphanumeric LU
0403 C
0404 C                     ERROR:   [INTEGER];  The error number of the error to
0405 C                                     reported
0406 C
0407 C                     SUBR:    [INTEGER];  An array containing the name of
0408 C                                     the subroutine where the error occurred.
0409 C
0410 C*****
0411 C
0412      SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0413      INTEGER ALPHLU,ERROR,SUBR(3)
0414  C
0415 C Write out the error message
0416 C
0417      CALL ZMCUR
0418      WRITE(ALPHLU,100) ERROR, SUBR

```

```

0419      100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
0420 C
0421      RETURN
0422      END
0423 C
0424 C*****
0425 C          SUBROUTINE CLEAR
0426 C
0427 C      PURPOSE:      To clear the alphanumeric display
0428 C
0429 C      DESCRIPTION:  This subroutine will clear the alphanumeric display
0430 C                   of a HP 2647 or HP 2648 terminal. If the display is
0431 C                   not a HP 2647 or HP 2648 then the call has no effect.
0432 C
0433 C      CALLING SEQUENCE: CALL CLEAR
0434 C
0435 C      PARAMETERS:      NONE
0436 C
0437 C*****
0438 C
0439 C          SUBROUTINE CLEAR
0440 C          INTEGER ILIST(7), STRING(2), IERR
0441 C          REAL DUMMY
0442 C
0443 C      ILIST - Information list returned by ZIWS
0444 C      IERR - Error information returned by ZIWS (not used here)
0445 C      DUMMY - Real information returned by ZIWS (none in this case)
0446 C      STRING - Device-dependant commands that clear a 264X terminal
0447 C
0448 C          DATA STRING /15550B,          15512B/
0449 C                   /      \      /      \
0450 C                   33B   + 150B   33B   + 112B
0451 C                   esc     h     esc     J
0452 C                   (home cursor) (clear display)
0453 C
0454 C*****
0455 C
0456 C      Inquire the status of the alphanumeric device:
0457 C      upon return, ILIST(4) = -1 ==> no alpha device,
0458 C                           = 0 ==> it is disabled,
0459 C                           = 1 ==> it is enabled.
0460 C      If it is not enabled, just return.
0461 C
0462 C          CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0463 C          IF (IERR .EQ. 0) GO TO 7070
0464 C          CALL ERRMS (1,IERR,6HZIWS )
0465 C          GO TO 9999
0466 C      7070 IF (ILIST(4) .NE. 1) GOTO 9999
0467 C
0468 C      Alpha device is enabled. Make sure it is '264X' type then clear.
0469 C
0470 C          IF (ILIST(1) .NE. 2H26) GOTO 9999
0471 C          IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0472 C          CALL ZALPH (4,STRING)
0473 C
0474 C      9999 RETURN
0475 C      END
0476 C
0477 C*****
0478 C

```

```

0479 C                               SUBROUTINE VPMAX
0480 C
0481 C   PURPOSE:      Set the viewport to the maximum limits.
0482 C
0483 C   DESCRIPTION:  The current viewport is saved in VIEW. The viewport
0484 C                 is then set to the maximum limits.
0485 C
0486 C   CALLING SEQUENCE: CALL VPMAX (VIEW)
0487 C
0488 C   PARAMETERS:
0489 C                 VIEW: [REAL ARRAY OF 4]; This array contains the
0490 C                 viewport before it was
0491 C                 maxumized.
0492 C
0493 C*****
0494 C
0495 C       SUBROUTINE VPMAX (VIEW)
0496 C       REAL VIEW(4)
0497 C
0498 C       INTEGER IDUM
0499 C       REAL AR(2), NEWX, NEWY
0500 C
0501 C   IDUM    - Dummy work variable
0502 C   AR      - Temp holder of the aspect ratio
0503 C   NEWX    - Temp work variable
0504 C   NEWY    - Temp work variable
0505 C
0506 C*****
0507 C
0508 C   Inquire current viewport and save it in array VIEW
0509 C
0510 C       CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0511 C       IF (IERR .EQ. 0) GO TO 8080
0512 C       CALL ERRMS (1,IERR,6HZIWS )
0513 C       GO TO 9999
0514 C
0515 C   Inquire the maximum aspect ratio
0516 C
0517 C   8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0518 C
0519 C   Set viewport to maximum dimensions
0520 C
0521 C       NEWY = 1.
0522 C       NEWX = 1.
0523 C       IF (AR(2) .LE. 1.) NEWY = AR(2)
0524 C       IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0525 C       CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0526 C
0527 C   9999 RETURN
0528 C       END
0529 C       ENDS

```

&WR13T T=00004 IS ON CR00002 USING 00084 BLKS R=0522

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR13T
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C * -----
0020 C *          Segment WR13T is the segment of WR15 that plots a
0021 C *          graph on the terminal.  It is read in and control passed
0022 C *          to it by an EXEC(8,WR13T) call from segment WR13C after
0023 C *          a scan is finished.  WR13T then displays a graph on the
0024 C *          CRT of the attenuation versus position of the scan.
0025 C *          When this segment finishes, this graph is still displayed
0026 C *          while the next scan is done and is not erased until just
0027 C *          before the next graph is plotted.  The last graph is
0028 C *          displayed while the antennae are repositioned and then
0029 C *          WR13C turns the graphic display off without erasing it.
0030 C *          The user can reenale the display by pressing the "SHIFT"
0031 C *          and "G CURSOR" keys.  When this segment is finished, it
0032 C *          calls EXEC(8,WR13C) to read in WR13C and pass control to
0033 C *          it.
0034 C *****
0035 C PROGRAM WR13T,S
0036 C
0037 C   DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0038 C             ISIZE(2),ITITL(40)
0039 C   INTEGER STATUS, ALPHLU, GOUTLU, CRT, PRNT
0040 C   COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0041 C             IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IEND,PRESRO,IDCB,NAMEF,
0042 C             ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0043 C             PLUNIT,ITITL,PRNT,IGRLOC
0044 C   EQUIVALENCE (GOUTLU,CRT),(ALPHLU,CRT)
0045 C
0046 C STATUS - Set to zero if no errors occur in a called routine
0047 C ALPHLU - The LU of the alphanumeric device
0048 C GOUTLU - The LU of the graphics output device
0049 C
0050 C*****
0051 C
0052 C-----
0053 C Initialize DGL system
0054 C-----
0055 C   WRITE(CRT,520)
0056 C   0520 FORMAT("")
0057 C   CALL ZBEGN
0058 C-----

```

```

0059 C Enable all devices, exit if any errors
0060 C-----
0061 CALL ENDEV (ALPHLU,COUPLU,STATUS)
0062 IF (STATUS .NE. 0) GOTO 9990
0063 IF (IPFLAG .EQ. -1) GO TO 6000
0064 C-----
0065 C Find minimum and maximum values.
0066 C-----
0067 XMIN = DAT(1,1)
0068 XMAX = DAT(1,IAEND)
0069 YMIN = 100000.
0070 YMAX = -YMIN
0071 DO 5100 I=1,IAEND
0072 IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0073 IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0074 5100 CONTINUE
0075 IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0076 YMIN = INT (YMIN)
0077 GO TO 5400
0078 5300 YMIN = INT (YMIN - .999)
0079 5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0080 YMAX = INT (YMAX + .999)
0081 GO TO 5600
0082 5500 YMAX = INT (YMAX)
0083 5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0084 IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0085 XMIN = INT (XMIN)
0086 GO TO 5800
0087 5700 XMIN = INT (XMIN - .999)
0088 5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0089 XMAX = INT (XMAX + .999)
0090 GO TO 5950
0091 5900 XMAX = INT (XMAX)
0092 C-----
0093 C Perform the viewing transformation, exit if any errors
0094 C-----
0095 5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0096 IF (STATUS .NE. 0) GOTO 9990
0097 C-----
0098 C Draw axis and label, then plot.
0099 C-----
0100 CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0101 GO TO 9000
0102 C-----
0103 C Disable logical devices
0104 C-----
0105 C6000 CALL ZNEWF
0106 C CALL CLEAR
0107 6000 CALL ZAEND
0108 CALL ZDEND
0109 CALL ZEND
0110 C-----
0111 C Call EXEC to overlay this segment with WR13C and execute it.
0112 C-----
0113 9000 INAME(3) = 2HC
0114 CALL EXEC (ICODE, INAME)
0115 9990 CONTINUE
0116 C
0117 CALL ZAEND
0118 CALL ZDEND

```

```

0119 C-----
0120 C  Disable DGL system
0121 C-----
0122 C      CALL ZEND
0123 C-----
0124 C  Terminate program
0125 C-----
0126 C      9998 WRITE(CRT,9999)
0127 C      9999 FORMAT("")
0128 C      END
0129 C
0130 C*****
0131 C      ENDEV SUBROUTINE
0132 C
0133 C  PURPOSE:      This subroutine enables all logical devices used by
0134 C                the program.
0135 C
0136 C  DESCRIPTION:  This subroutine enables the DGL work station.  The DGL
0137 C                workstation contains alphanumeric and graphics output
0138 C                devices.
0139 C
0140 C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0141 C
0142 C  PARAMETERS:
0143 C                ALPHLU:  [INTEGER]; Alphanumeric LU
0144 C                GOUTLU:  [INTEGER]; Graphics output LU
0145 C                STATUS:  [INTEGER]; Set to zero if no errors occur
0146 C                        during initialization of the
0147 C                        workstation.  It is set to the
0148 C                        DGL error return value if an
0149 C                        error is found.
0150 C
0151 C*****
0152 C
0153 C      SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0154 C
0155 C      INTEGER ALPHLU, GOUTLU,  STATUS
0156 C      INTEGER CONTRL
0157 C-----
0158 C  If an error occurs, write out an error message, and return.
0159 C
0160 C  Enable alphanumeric device
0161 C-----
0162 C      CALL ZAIN (ALPHLU,STATUS)
0163 C      IF (STATUS .EQ. 0) GOTO 1000
0164 C      CALL ERRMS (ALPHLU,STATUS,6HZAIN )
0165 C      1000 CONTINUE
0166 C-----
0167 C  Enable graphical display device w/out speeling; e.g. CONTRL = 0.
0168 C-----
0169 C      CONTRL = 0
0170 C      CALL ZDINT (GOUTLU,CONTRL,STATUS)
0171 C      IF (STATUS .EQ. 0) GOTO 9999
0172 C      CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0173 C      9999 CONTINUE
0174 C-----
0175 C  Return to main program after all devices are properly enabled
0176 C-----
0177 C      RETURN
0178 C      END

```

```

0179 C
0180 C*****
0181 C
0182 C
0183 C
0184 C PURPOSE: This subroutine performs the initial viewing
0185 C transformation.
0186 C
0187 C DESCRIPTION: This subroutine performs the viewing transformation in
0188 C the following steps:
0189 C
0190 C - Places the image on the largest possible area
0191 C - Sets the window to the desired range.
0192 C - Resets the viewport to leave room for labels
0193 C - Recomputes character size based on specified window
0194 C
0195 C CALLING SEQUENCE: CALL VIEWT
0196 C
0197 C PARAMETERS: NONE
0198 C
0199 C*****
0200 C
0201 C SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0202 C
0203 C INTEGER IDUM, IERR
0204 C REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0205 C REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0206 C
0207 C IDUM - Dummy var
0208 C IERR - Error return (not used)
0209 C AR - Holds aspect ratio
0210 C VIEW - Holds current viewport bounds
0211 C XSIZE - Temp work variable
0212 C YSIZE - Temp work variable
0213 C XCSIZ - Temp holder of character size X
0214 C YCSIZ - Temp holder of character size Y
0215 C WXMIN - Temp holder of window X - min
0216 C WXMAX - Temp holder of window X - max
0217 C WYMIN - Temp holder of window Y - min
0218 C WYMAX - Temp holder of window Y - max
0219 C MINX - Temp holder of new viewport X - min
0220 C MAXX - Temp holder of new viewport X - max
0221 C MINY - Temp holder of new viewport Y - min
0222 C MAXY - Temp holder of new viewport Y - max
0223 C
0224 C*****
0225 C
0226 C Inquire aspect ratio of logical display limits
0227 C-----
0228 C CALL ZIWS (254,0,2,IDUM,AR,IERR)
0229 C IF (IERR .EQ. 0) GO TO 555
0230 C CALL ERRMS (1,IERR,6HZIWS )
0231 C GO TO 9999
0232 C-----
0233 C Make the largest possible area of the logical display available
0234 C for graphical output by setting the aspect ratio(AR).
0235 C-----
0236 C 555 YSIZE = AR(2)
0237 C XSIZE = 1.0
0238 C CALL ZASPK (XSIZE,YSIZE)

```

```

0239 C-----
0240 C Specify the desired range of X and Y values of the window
0241 C-----
0242 CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0243 C-----
0244 C Inquire current viewport limits
0245 C-----
0246 CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0247 IF (IERR.EQ. 0) GO TO 577
0248 CALL ERRMS (1,IERR,6HZIWS )
0249 GO TO 9999
0250 C-----
0251 C Calculate the lower left hand corner of the viewport and leave
0252 C enough room for labels. The viewport is reduced 12% on each side
0253 C to give room for labels. Set the new viewport
0254 C-----
0255 577 MINX = .12 * VIEW(2)
0256 MAXX = .88 * VIEW(2)
0257 MINY = .12 * VIEW(4)
0258 MAXY = .88 * VIEW(4)
0259 CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0260 C-----
0261 C Now set the character size based on the size of the window
0262 C The constants below produce a readable character size in the new
0263 C window.
0264 C-----
0265 XCSIZ = .015 * (WXMAX - WXMIN)
0266 YCSIZ = .025 * (WYMAX - WYMIN)
0267 CALL ZCSIZ (XCSIZ,YCSIZ)
0268 C
0269 9999 RETURN
0270 END
0271 C*****
0272 C SUBROUTINE DRWDT
0273 C
0274 C PURPOSE: This subroutine draws the current graph.
0275 C
0276 C DESCRIPTION: This subroutine clears the alphanumeric and graphics
0277 C displays. It then draws the current graph. Note
0278 C that if the user has not changed any data values
0279 C the default values will be used.
0280 C
0281 C CALLING SEQUENCE: CALL DRWDT
0282 C
0283 C PARAMETERS: NONE
0284 C
0285 C*****
0286 C
0287 SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0288 REAL DAT(3,520)
0289 DIMENSION ILIST(3)
0290 INTEGER TEXT(12),OPCODE,RSIZE
0291 C
0292 REAL VIEW(4)
0293 C
0294 C VIEW - Temp holder of viewport bounds
0295 C
0296 C*****
0297 C
0298 C Clear the graphics and alphanumeric displays

```

```

0299 C-----
0300      CALL ZNEWF
0301      CALL CLEAR
0302 C-----
0303 C   Determine parameters for LAXES call.  Search thru data for YMAX.
0304 C-----
0305 C-----
0306      XTIC = (XMAX-XMIN)/10.0
0307      YTIC = (YMAX-YMIN) / 10.0
0308      XORG = XMIN
0309      YORG = YMIN
0310      XMJC = 1.0
0311      YMJC = 1.0
0312      TSIZE = .02
0313      CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0314 C-----
0315 C   Plot the graph.
0316 C-----
0317      CALL ZMOVE(DAT(1,1),DAT(2,1))
0318      DO 5000 I=2,IAEND
0319      CALL ZDRAW(DAT(1,I),DAT(2,I))
0320      5000 CONTINUE
0321 C-----
0322 C   Change the viewport to the maximum possible so text strings may be
0323 C   placed anywhere on the view surface.  Output the text strings, then
0324 C   reset the viewport.
0325 C-----
0326      6000 CALL VPMAX (VIEW)
0327      TEXT(1) = 2HRe
0328      TEXT(2) = 2H1a
0329      TEXT(3) = 2Ht1
0330      TEXT(4) = 2Hve
0331      TEXT(5) = 2H P
0332      TEXT(6) = 2Hos
0333      TEXT(7) = 2H1t
0334      TEXT(8) = 2H1o
0335      TEXT(9) = 2Hn
0336      TEXT(10) = 2H(M
0337      TEXT(11) = 2Hn)
0338      TEXT(12) = 6412B
0339      NMTEXT = 24
0340      XTEXT = 0.0
0341      YTEXT = YMIN + (YMAX-YMIN)/21.0
0342 C
0343      CALL ZMOVE (XTEXT,YTEXT)
0344      OPCODE=1052
0345      ISIZE=1
0346      RSIZE=0
0347      ILIST(1)=6
0348      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0349      IF (IERR .EQ. 0) GO TO 6010
0350      CALL ERRMS (1,IERR,6HZOESC )
0351      6010 CALL ZTEXT (NMTEXT,TEXT)
0352 C
0353 C   CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0354 C   IF (IERR .EQ. 0) GO TO 6020
0355 C   CALL ERRMS (1,IERR,6HZIESC )
0356 C   GO TO 9999
0357      6020 TEXT(1) = 2HAt
0358      TEXT(2) = 2Hte

```

```

0359      TEXT(3) = 2Hnu
0360      TEXT(4) = 2Hat
0361      TEXT(5) = 2Hie
0362      TEXT(6) = 2Hn
0363      TEXT(7) = 2H(d
0364      TEXT(8) = 2Hb)
0365      TEXT(9) = 6412B
0366      NMTEXT = 18
0367      XTEXT = XMIN + (XMAX - XMIN)/30.0
0368      YTEXT = YMIN + (YMAX - YMIN)/2.0
0369      OPCODE = 1050
0370      ILIST(1) = 1
0371      ISIZE = 1
0372      RSIZE = 0
0373      CALL ZMOVE(XTEXT,YTEXT)
0374      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0375      IF (IERR .EQ. 0) GO TO 6030
0376          CALL ERRMS (1,IERR,6HZOESC )
0377      GO TO 9999
0378 6030 CALL ZTEXT(NMTEXT,TEXT)
0379      OPCODE=1050
0380      ILIST(1) = 0
0381      ISIZE = 1
0382      RSIZE = 0
0383      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0384      IF (IERR .EQ. 0) GO TO 6040
0385          CALL ERRMS (1,IERR,6HZOESC )
0386      GO TO 9999
0387  C
0388 6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0389      CALL ZMCUR
0390  C
0391 9999 RETURN
0392      END
0393  C
0394  C*****
0395  C          SUBROUTINE ERRMS
0396  C
0397  C  PURPOSE:      To write out an error message.
0398  C
0399  C  DESCRIPTION:  This subroutine writes an error message to the alphanumeric
0400  C                LU. The error number and DGL subroutine name that the error
0401  C                occurred during is reported.
0402  C
0403  C  CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0404  C
0405  C  PARAMETERS:
0406  C                ALPHLU:  [INTEGER];  The alphanumeric LU
0407  C                ERROR:   [INTEGER];  The error number of the error to
0408  C                        reported
0409  C                SUBR:    [INTEGER];  An array containing the name of
0410  C                        the subroutine where the error occurred
0411  C
0412  C*****
0413  C
0414  C*****
0415  C
0416      SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0417      INTEGER ALPHLU,ERROR,SUBR(3)
0418  C

```

```

0419 C Write out the error message
0420 C
0421 CALL ZMCUR
0422 WRITE(ALPHLU,100) ERROR, SUBR
0423 100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
0424 C
0425 RETURN
0426 END
0427 C
0428 C*****
0429 C SUBROUTINE CLEAR
0430 C
0431 C PURPOSE: To clear the alphanumeric display
0432 C
0433 C DESCRIPTION: This subroutine will clear the alphanumeric display
0434 C of a HP 2647 or HP 2648 terminal. If the display is
0435 C not a HP 2647 or HP 2648 then the call has no effect.
0436 C
0437 C CALLING SEQUENCE: CALL CLEAR
0438 C
0439 C PARAMETERS: NONE
0440 C
0441 C*****
0442 C
0443 SUBROUTINE CLEAR
0444 INTEGER ILIST(7), STRING(2), IERR
0445 REAL DUMMY
0446 C
0447 C ILIST - Information list returned by ZIWS
0448 C IERR - Error information returned by ZIWS (not used here)
0449 C DUMMY - Real information returned by ZIWS (none in this case)
0450 C STRING - Device-dependent commands that clear a 264X terminal
0451 C
0452 DATA STRING /15550B, 15512B/
0453 C / \ / \
0454 C 33B + 150B 33B + 112B
0455 C esc h esc J
0456 C (home cursor) (clear display)
0457 C
0458 C*****
0459 C
0460 C Inquire the status of the alphanumeric device:
0461 C upon return, ILIST(4) = -1 ==> no alpha device,
0462 C = 0 ==> it is disabled,
0463 C = 1 ==> it is enabled.
0464 C If it is not enabled, just return.
0465 C
0466 CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0467 IF (IERR .EQ. 0) GO TO 7070
0468 CALL ERRMS (1,IERR,6HZIWS )
0469 GO TO 9999
0470 7070 IF (ILIST(4) .NE. 1) GOTO 9999
0471 C
0472 C Alpha device is enabled. Make sure it is '264X' type then clear.
0473 C
0474 IF (ILIST(1) .NE. 2H26) GOTO 9999
0475 IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0476 CALL ZALPH (4,STRING)
0477 C
0478 9999 RETURN

```

```

0479      END
0480 C
0481 C*****
0482 C
0483 C      SUBROUTINE VPMAX
0484 C
0485 C      PURPOSE:      Set the viewport to the maximum limits.
0486 C
0487 C      DESCRIPTION:  The current viewport is saved in VIEW. The viewport
0488 C                  is then set to the maximum limits.
0489 C
0490 C      CALLING SEQUENCE: CALL VPMAX (VIEW)
0491 C
0492 C      PARAMETERS:
0493 C                  VIEW: [REAL ARRAY OF 4]; This array contains the
0494 C                  viewport before it was
0495 C                  maximized.
0496 C
0497 C*****
0498 C
0499 C      SUBROUTINE VPMAX (VIEW)
0500 C      REAL VIEW(4)
0501 C
0502 C      INTEGER IDUM
0503 C      REAL AR(2), NEWX, NEWY
0504 C
0505 C      IDUM - Dummy work variable
0506 C      AR - Temp holder of the aspect ratio
0507 C      NEWX - Temp work variable
0508 C      NEWY - Temp work variable
0509 C
0510 C*****
0511 C
0512 C      Inquire current viewport and save it in array VIEW
0513 C
0514 C      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0515 C      IF (IERR .EQ. 0) GO TO 8080
0516 C      CALL ERRMS (1,IERR,6HZIWS )
0517 C      GO TO 9999
0518 C
0519 C      Inquire the maximum aspect ratio
0520 C
0521 C      8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0522 C
0523 C      Set viewport to maximum dimensions
0524 C
0525 C      NEWY = 1.
0526 C      NEWX = 1.
0527 C      IF (AR(2) .LE. 1.) NEWY = AR(2)
0528 C      IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0529 C      CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0530 C
0531 C      9999 RETURN
0532 C      END
0533 C      END$

```

&WR14 T=00004 IS ON CR32767 USING 00104 BLKS R=0657

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          PROGRAM:  WR14
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Program WR14 is designed to read a file of attenuation
0021 C *          readings created by program WR13, WR15, WR16, or WR17.
0022 C *          It lists the readings on the printer and plots them on
0023 C *          the CRT or plotter and writes them out to tape.
0024 C *
0025 C *****
0026 C PROGRAM WR14
0027 C DIMENSION DAT(3,520),NAMEF(3),NAMES(3),IDCB(144),IDATIN(15),
0028 C *          ITITL(40),IFAT(3120),IUNAM(5),FAT(1560),TYPEF(2)
0029 C INTEGER ALPHLU,GOUTLU,CRT,PRNT,TAPE
0030 C LOGICAL UP
0031 C EQUIVALENCE (DAT,IFAT),(ALPHLU,CRT),(DAT,FAT)
0032 C DATA CRT,GOUTLU,PRNT,TAPE/1,1,6,8/,
0033 C *          PRINT,PLCRT,PLPLT,STAPE/4*4HYES /,I1/15446B/,
0034 C *          NF/0/,TYPEF/4HTAPE,4HDISC/
0035 C -----
0036 C Clear screen and print heading.
0037 C -----
0038 C          IWAIT = 0
0039 C          CALL CHCK1 (CRT, TAPE, IWAIT, 0, 1)
0040 C          IF (IWAIT .EQ. 0) GO TO 10
0041 C          STAPE = 4HNO
0042 C          CALL LPSTS (PRNT, UP)
0043 C          IF (UP .EQ. .TRUE.) GO TO 10
0044 C          PRINT = 4HNO
0045 C          10 WRITE(CRT,15)
0046 C          015 FORMAT("",
0047 C *          10X,55'$',/,
0048 C *          10X,"*",20X,"PROGRAM  WR14",20X,"*",/,
0049 C *          10X,"*",7X,"READ, LIST, AND STORE A DISC SCAN FILE",8X,"*",/,
0050 C *          10X,55'$',)
0051 C          WRITE (CRT,29) PRINT,PLCRT,STAPE,NAMEF
0052 C          029 FORMAT (1X,"TOGGLE SWITCH OPTIONS",14X,"PRESENT VALUES",/,
0053 C *          1 - List data on printer.....",1A4,/,
0054 C *          2 - Plot data on the CRT.....",1A4,/,
0055 C *          4 - Store data on tape.....",1A4,/,
0056 C *          1X,"ACTION OPTIONS",/,
0057 C *          5 - Enter file name.....",3A2,/,
0058 C *          6 - List files and specs on CRT.....",/,

```

```

0059      * 7 - List tape file per switches 1 & 2.,/,
0060      * 8 - Execute toggle switch options.....,/,
0061      * 9 - Terminate.....,/,")
0062      610 WRITE(CRT,619)
0063      0619 FORMAT ("")
0064      C      CALL CHCK1 (CRT, TAPE, 0, 0, 1)
0065      620 WRITE (CRT, 629)
0066      629 FORMAT (/,1X,"SELECT AN OPTION NUMBER. _")
0067
0068      READ (CRT,*) IANS
0069      IF (IANS .EQ. 9999) GO TO 9990
0070      IF (IANS .EQ. 9) GO TO 9990
0071      IF (IANS .EQ. 8) GO TO 8000
0072      IF (IANS .EQ. 7) GO TO 7000
0073      IF (IANS .EQ. 6) GO TO 6000
0074      IF (IANS .EQ. 5) GO TO 5000
0075      IF (IANS .EQ. 4) GO TO 4000
0076      IF (IANS .EQ. 3) GO TO 3000
0077      IF (IANS .EQ. 2) GO TO 2000
0078      IF (IANS .EQ. 1) GO TO 1000
0079      WRITE (CRT,659)
0080      659 FORMAT (/,1X,"ERROR # WR14 - 16001 .....(WR14)",/,1X,
0081      *      "INCORRECT RESPONSE. ENTER ANY DIGIT EXCEPT 0.")
0082      GO TO 610
0083      C-----
0084      C Toggle the "PRINT" switch.
0085      C-----
0086      1000 IF (PRINT .EQ. 4HYES ) GO TO 1100
0087      PRINT = 4HYES
0088      C      CALL LPSTS (PRNT, UP)
0089      C      IF (UP .EQ. .TRUE.) GO TO 1400
0090      C      WRITE (CRT, 1009)
0091      C1009 FORMAT (/,1X,"ERROE # WR14 - 16004 .....(WR14)",/,1X,
0092      C      *      "PRINTER IS NOT UP")
0093      C      GO TO 620
0094      GO TO 1400
0095      1100 PRINT = 4HNO
0096      1400 WRITE (CRT, 1409) I1, PRINT
0097      1409 FORMAT (1A2, "a 41c 5Y",1A4)
0098      GO TO 610
0099      C-----
0100      C Toggle the "plot on CRT" switch.
0101      C-----
0102      2000 IF (PLCRT .EQ. 4HYES ) GO TO 2100
0103      PLCRT = 4HYES
0104      GO TO 2400
0105      2100 PLCRT = 4HNO
0106      2400 WRITE (CRT, 2409) I1, PLCRT
0107      2409 FORMAT (1A2, "a 41c 6Y",1A4)
0108      GO TO 610
0109      C-----
0110      C Toggle the "plot on plotter" switch.
0111      C-----
0112      3000 IF (PLPLT .EQ. 4HYES ) GO TO 3100
0113      PLPLT = 4HYES
0114      GO TO 3400
0115      3100 PLPLT = 4HNO
0116      3400 WRITE (CRT, 3409) I1, PLPLT
0117      3409 FORMAT (1A2, "a 41c 7Y",1A4)
0118      GO TO 610

```

```

0119 C-----
0120 C Toggle the "store data on tape" switch.
0121 C-----
0122 4000 IF (STAPE .EQ. 4HYES ) GO TO 4100
0123      IWAIT = 1
0124      CALL CHCK1 (CRT, TAPE, IWAIT, 0, 1)
0125      STAPE = 4HYES
0126      GO TO 4400
0127 4100 STAPE = 4HNO
0128 4400 WRITE (CRT, 4409) I1, STAPE
0129 4409 FORMAT (1A2,"a 41c 8Y",1A4)
0130      GO TO 610
0131 C-----
0132 C Enter file name.
0133 C-----
0134 5000 WRITE (CRT,5009)
0135 5009 FORMAT (/,1X,"Enter file name. _")
0136      READ (CRT,5019) NAMEF
0137 5019 FORMAT (3A2)
0138      IF ((NAMEF(1) .EQ. 2H99) .AND. (NAMEF(2) .EQ. 2H99)) GO TO 9998
0139 5300 WRITE (CRT, 5309) I1, NAMEF
0140 5309 FORMAT (1A2,"a 41c 10Y",3A2)
0141      GO TO 610
0142 C-----
0143 C List files and specifications on the CRT.
0144 C-----
0145 6000 WRITE (CRT,6009)
0146 6009 FORMAT ("", "FILE      TIME      DATE      #AZ ASTEPS  ",
0147      *      "VA      #VA VSTEPS  RFREQ  #FR  FSTEP",/,
0148      *      "-----",
0149      *      "-----")
0150      NAMES(1) = 2HSC
0151      NAMES(2) = 2HS1
0152 6010 NAMES(3) = 2H10
0153      DO 6200 I = 1,31
0154      IF (IFBRK(IERR)) 10,6020
0155 6020 NAMES(3) = NAMES(3) + 1
0156      CALL OPEN (IDCB, IERR, NAMES)
0157      IF (IERR .EQ. -6) GO TO 6200
0158      IF (IERR .GE. 0) GO TO 6050
0159      CALL ERRMS (ALPHLU, IERR, 6HOPEN )
0160      GO TO 620
0161 6050 CALL READF (IDCB, IERR, IFAT, 3120)
0162      IF (IERR .EQ. 0) GO TO 6100
0163      CALL ERRMS (ALPHLU, IERR, 6HREADF )
0164      GO TO 620
0165 6100 WRITE (CRT,6109) NAMES, (IFAT(J), J=1,4), (IFAT(J), J=9,12),
0166      *      IFAT(15), IFAT(58), FAT(30), IFAT(56), IFAT(62),
0167      *      (FAT(J), J=32,33), IFAT(70), FAT(36),
0168      *      (IFAT(J), J=16,54)
0169 6109 FORMAT (3A2,1X,4A2,1X,5A2,2X,I3,1X,F6.2,2X,1A2,2X,I3,1X,F6.2,
0170      *      2X,F5.0,2X,I3,2X,F5.0,/,39A2)
0171 6200 CONTINUE
0172      IF (NAMES(2) .NE. 2HS1) GO TO 6250
0173      NAMES(2) = NAMES(2) + 1
0174      GO TO 6010
0175 6250 IF (NAMES(1) .NE. 2HSC) GO TO 6300
0176      NAMES(1) = 2HSR
0177      GO TO 6010
0178 6300 WRITE (CRT, 6309)

```

```

0179 6309 FORMAT (1X,"THAT IS ALL THE FILES.  PRESS 'RETURN' WHEN READY.")
0180 READ (CRT,*) IANS
0181 GO TO 10
0182 -----
0183 C List tape file per switches 1 & 2.
0184 C -----
0185 7000 IF (NF .NE. 0) GO TO 7100
0186 WRITE (CRT, 7009)
0187 7009 FORMAT (/ ,1X,"ERROR # WR14 - 16002 .....(WR14)",/,1X,
0188 * "THERE ARE NO TAPE FILES TO LIST.")
0189 GO TO 620
0190 7100 WRITE (CRT, 7109)
0191 7109 FORMAT (/ ,1X,"Enter 0 for last file or N for file #N. _")
0192 READ (CRT,*) JANS
0193 IF (JANS .EQ. 9999) GO TO 9998
0194 IF (JANS .EQ. 0) GO TO 7500
0195 IF (JANS .LE. NF) GO TO 7200
0196 WRITE (CRT, 7119) NF
0197 7119 FORMAT (/ ,1X,"ERROR # WR14 - 16003 .....(WR14)",/,1X,
0198 * "NO SUCH FILE #.  ENTER ANY NUMBER UP TO ",I2)
0199 GO TO 7100
0200 7200 CALL EXEC (3, 410B)
0201 IF (JANS .EQ. 1) GO TO 7700
0202 DO 7300 I = 1, JANS-1
0203 7300 CALL EXEC (3, 1310B)
0204 GO TO 7700
0205 7500 CALL EXEC (3, 1410B)
0206 CALL EXEC (3, 1410B)
0207 IF (NF .EQ. 1) GO TO 7700
0208 CALL EXEC (3, 1310B)
0209 7700 ICODE = 1
0210 GO TO 8090
0211 -----
0212 C Read and write first record and distribute data.
0213 C -----
0214 8000 IF (NAMEF(1) .NE. 2H ) GO TO 8010
0215 WRITE (CRT,8009)
0216 8009 FORMAT (/ ,1X,"ERROR # WR14 - 16004 .....(WR14)",
0217 * / ,1X,"NO FILE NAME HAS BEEN ENTERED.")
0218 GO TO 620
0219 8010 CALL OPEN (IDCB,IERR,NAMEF)
0220 IF (IERR .NE. -6) GO TO 8020
0221 WRITE (CRT,8019)
0222 8019 FORMAT (/ ,1X,"ERROR # WR14 - 16005 .....(WR14)",/,
0223 * 1X,"THIS FILE NOT FOUND ON DISC.",/,
0224 * 1X,"TRY A DIFFERENT FILE NAME.")
0225 GO TO 620
0226 8020 IF (IERR .GE. 0) GO TO 8040
0227 CALL ERRMS (ALPHLU, IERR, 6HOPEN )
0228 GO TO 9998
0229 8040 CALL READF (IDCB, IERR, IFAT, 3120, LEN)
0230 IF (IERR .EQ. 0) GO TO 8060
0231 CALL ERRMS (ALPHLU, IERR, 6HREADF )
0232 GO TO 620
0233 8060 ICODE = 2
0234 IRECS = IFAT(68)
0235 IF (STAPE .EQ. 4HNO ) GO TO 8100
0236 DO 8080 I = 1, 3
0237 8080 IFAT(72+I) = NAMEF(I)
0238 8090 CALL EXEC (ICODE, 10B, IFAT, IRECS)

```

```

0239 8100 WRITE (CRT, 8109)
0240 8109 FORMAT ("")
0241 DO 8200 I = 1, 15
0242 8200 IDATIM(I) = IFAT(I)
0243 DO 8300 I = 1, 40
0244 8300 ITITL(I) = IFAT (15+I)
0245 NOTAV = IFAT(56)
0246 IAEND = IFAT(58)
0247 ASTEPS = FAT(30)
0248 IVEND = IFAT(62)
0249 VSTEPS = FAT(32)
0250 RFREQ = FAT(33)
0251 IF (IANS .NE. 7) GO TO 8370
0252 DO 8350 I = 1, 3
0253 8350 NAMEF(I) = IFAT (72+I)
0254 8370 IF (NOTAV .EQ. 2HRO) GO TO 8400
0255 IFEND = IFAT(70)
0256 FSTEPS = FAT(36)
0257 IVNAM(1) = 2HEL
0258 IVNAM(2) = 2HEV
0259 IVNAM(3) = 2HAT
0260 IVNAM(4) = 2HIO
0261 IVNAM(5) = 2HN
0262 GO TO 8450
0263 8400 IFEND = 1
0264 IVNAM(1) = 2HAN
0265 IVNAM(2) = 2HGL
0266 IVNAM(3) = 2HE
0267 IVNAM(4) = 2H
0268 IVNAM(5) = 2H
0269 C-----
0270 C Variable loop from 1 to IVEND and frequency loop from 0 to IFEND-1
0271 C-----
0272 8450 PRESVA = 0
0273 DO 8800 J=1,IVEND
0274 DO 8700 K = 0,IFEND-1
0275 PRESFR = RFREQ + K * FSTEPS
0276 IF (IANS .EQ. 7) GO TO 8463
0277 CALL READF (IDCB, IERR, IFAT, IRECS)
0278 IF (IERR .EQ. 0) GO TO 8460
0279 CALL ERRMS (ALPHLU, IERR, 6HREADF )
0280 GO TO 620
0281 8460 IF (STAPE .EQ. 4HNO ) GO TO 8465
0282 8463 CALL EXEC(ICODE, 10B, IFAT, IRECS)
0283 8465 IF (PRINT .EQ. 4HNO ) GO TO 8480
0284 PRESVA = DAT(1, IAEND+1)
0285 WRITE (PRNT,8469) TYPEF(ICODE),NAMEF,IDATIM,ITITL,IVNAM,PRESVA,
0286 * PRESFR
0287 8469 FORMAT ("1",/,1X,1A4," FILE ",3A2,1X,15A2,/,1X,40A2,/,
0288 * 1X,5A2,"=",F8.3," FREQUENCY =",F6.0,/,
0289 * 1X,"AZIMUTH ATTENUATION PHASE",/,
0290 * 1X,"-----")
0291 8480 IF (PLCRT .EQ. 4HNO ) GO TO 8590
0292 YMIN = 100000.
0293 YMAX = -YMIN
0294 XMIN = DAT(1,1)
0295 XMAX = DAT(1,IAEND)
0296 DO 8500 I=1, IAEND
0297 IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0298 IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)

```

```

0299 8500 CONTINUE
0300 CALL ZBEGN
0301 CALL ENDEV (ALPHLU, GOUTLU, IERR)
0302 IF (IERR .NE. 0) GO TO 620
0303 C-----
0304 C Perform the viewing transformation, exit if any errors
0305 C-----
0306 IF (ABS(YMIN) .NE. YMIN) GO TO 8510
0307 YMIN = INT (YMIN)
0308 GO TO 8520
0309 8510 YMIN = INT (YMIN - .999)
0310 8520 IF (ABS(YMAX) .NE. YMAX) GO TO 8530
0311 YMAX = INT (YMAX + .999)
0312 GO TO 8540
0313 8530 YMAX = INT (YMAX)
0314 8540 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0315 IF (ABS(XMIN) .NE. XMIN) GO TO 8550
0316 XMIN = INT (XMIN)
0317 GO TO 8560
0318 8550 XMIN = INT (XMIN - .999)
0319 8560 IF (ABS(XMAX) .NE. XMAX) GO TO 8570
0320 XMAX = INT (XMAX + .999)
0321 GO TO 8580
0322 8570 XMAX = INT (XMAX)
0323 8580 CALL VIEWT (IERR,XMIN,XMAX,YMIN,YMAX)
0324 IF (IERR .NE. 0) GOTO 620
0325 C-----
0326 C Draw axis and label, then plot.
0327 C-----
0328 CALL DRWDT (XMIN, XMAX, YMIN, YMAX, DAT, IAEND)
0329 C-----
0330 C Print out data on line printer
0331 C-----
0332 8590 IF (PRINT .EQ. 4HNO ) GO TO 8700
0333 DO 8600 I = 1, IAEND
0334 8600 WRITE (PRNT,8609) (DAT(II,I),II=1,3)
0335 8609 FORMAT (1X,F8.3,7X,F8.3,7X,F8.3)
0336 8700 CONTINUE
0337 8800 CONTINUE
0338 C-----
0339 C End of rotation loop
0340 C-----
0341 IF (IANS .EQ. 7) GO TO 8810
0342 IF (STAPE .EQ. 4HNO ) GO TO 8803
0343 CALL EXEC (3, 110B)
0344 NF = NF + 1
0345 8803 CALL RWNDF (IDCB,IERR)
0346 IF (IERR .EQ. 0) GO TO 8900
0347 CALL ERRMS (ALPHLU, IERR, 6HRWNDF )
0348 GO TO 620
0349 8810 IF (JANS .NE. 0) GO TO 8850
0350 CALL EXEC (3, 1310B)
0351 GO TO 8900
0352 8850 DO 8860 I = 1, NF-JANS+1
0353 8860 CALL EXEC (3, 1310B)
0354 8900 WRITE (CRT,8909)
0355 8909 FORMAT (" 0356 GO TO 10
0357 C-----
0358 C Terminate program
0359 C-----

```

```

0360 9990 CONTINUE
0361 9998 WRITE(CRT,9999)
0362 89999 FORMAT(" 0363 WRITE (CRT,999)
0364 999 FORMAT (/ ,10X,
0365 *"***** PROGRAM WR14 TERMINATED *****")
0366 CALL CLOSE (IDCB)
0367 END
0368 C
0369 C*****
0370 C ENDEV SUBROUTINE
0371 C
0372 C PURPOSE: This subroutine enables all logical devices used by
0373 C the program.
0374 C
0375 C DESCRIPTION: This subroutine enables the DGL work station. The DGL
0376 C workstation contains alphanumeric and graphics output
0377 C devices.
0378 C
0379 C CALLING SEQUENCE: CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0380 C
0381 C PARAMETERS:
0382 C ALPHLU: [INTEGER]; Alphanumeric LU
0383 C GOUTLU: [INTEGER]; Graphics output LU
0384 C STATUS: [INTEGER]; Set to zero if no errors occur
0385 C during initialization of the
0386 C workstation. It is set to the
0387 C DGL error return value if an
0388 C error is found.
0389 C
0390 C*****
0391 C
0392 C SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0393 C
0394 C INTEGER ALPHLU, GOUTLU, STATUS
0395 C INTEGER CONTRL
0396 C-----
0397 C If an error occurs, write out an error message, and return.
0398 C
0399 C Enable alphanumeric device
0400 C-----
0401 CALL ZAIN (ALPHLU,STATUS)
0402 IF (STATUS .EQ. 0) GOTO 1000
0403 CALL ERRMS (ALPHLU,STATUS,6HZAIN )
0404 1000 CONTINUE
0405 C-----
0406 C Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0407 C-----
0408 CONTRL = 0
0409 CALL ZDINT (GOUTLU,CONTRL,STATUS)
0410 IF (STATUS .EQ. 0) GOTO 9999
0411 CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0412 9999 CONTINUE
0413 C-----
0414 C Return to main program after all devices are properly enabled
0415 C-----
0416 RETURN
0417 END
0418 C
0419 C*****
0420 C

```

```

0421 C                               SUBROUTINE VIEWT
0422 C
0423 C PURPOSE:      This subroutine performs the initial viewing
0424 C                transformation.
0425 C
0426 C DESCRIPTION:   This subroutine performs the viewing transformation in
0427 C                the following steps:
0428 C
0429 C                - Places the image on the largest possible area
0430 C                - Sets the window to the desired range.
0431 C                - Resets the viewport to leave room for labels
0432 C                - Recomputes character size based on specified window
0433 C
0434 C CALLING SEQUENCE: CALL VIEWT
0435 C
0436 C PARAMETERS:    NONE
0437 C
0438 C*****
0439 C
0440 C      SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0441 C
0442 C      INTEGER IDUM, IERR
0443 C      REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0444 C      REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0445 C
0446 C      IDUM      - Dummy var
0447 C      IERR      - Error return (not used)
0448 C      AR        - Holds aspect ratio
0449 C      VIEW      - Holds current viewport bounds
0450 C      XSIZE     - Temp work variable
0451 C      YSIZE     - Temp work variable
0452 C      XCSIZ     - Temp holder of character size X
0453 C      YCSIZ     - Temp holder of character size Y
0454 C      WXMIN     - Temp holder of window X - min
0455 C      WXMAX     - Temp holder of window X - max
0456 C      WYMIN     - Temp holder of window Y - min
0457 C      WYMAX     - Temp holder of window Y - max
0458 C      MINX      - Temp holder of new viewport X - min
0459 C      MAXX      - Temp holder of new viewport X - max
0460 C      MINY      - Temp holder of new viewport Y - min
0461 C      MAXY      - Temp holder of new viewport Y - max
0462 C
0463 C*****
0464 C
0465 C      Inquire aspect ratio of logical display limits
0466 C-----
0467 C      CALL ZIWS (254,0,2,IDUM,AR,IERR)
0468 C      IF (IERR.EQ. 0) GO TO 555
0469 C      CALL ERRMS (1,IERR,6HZIWS )
0470 C      GO TO 9999
0471 C-----
0472 C      Make the largest possible area of the logical display available
0473 C      for graphical output by setting the aspect ratio(AR).
0474 C-----
0475 C      555 YSIZE = AR(2)
0476 C          XSIZE = 1.0
0477 C          CALL ZASPK (XSIZE,YSIZE)
0478 C-----
0479 C      Specify the desired range of X and Y values of the window
0480 C-----

```

```

0481      CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0482 C-----
0483 C   Inquire current viewport limits
0484 C-----
0485      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0486      IF (IERR .EQ. 0) GO TO 577
0487      CALL ERRMS (1,IERR,6HZIWS )
0488      GO TO 9999
0489 C-----
0490 C   Calculate the lower left hand corner of the viewport and leave
0491 C   enough room for labels. The viewport is reduced 12% on each side
0492 C   to give room for labels. Set the new viewport
0493 C-----
0494      577 MINX = .12 * VIEW(2)
0495          MAXX = .88 * VIEW(2)
0496          MINY = .12 * VIEW(4)
0497          MAXY = .88 * VIEW(4)
0498          CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0499 C-----
0500 C   Now set the character size based on the size of the window
0501 C   The constants below produce a readable character size in the new
0502 C   window.
0503 C-----
0504          XCSIZ = .015 * (WXMAX - WXMIN)
0505          YCSIZ = .025 * (WYMAX - WYMIN)
0506          CALL ZCSIZ (XCSIZ,YCSIZ)
0507 C
0508      9999 RETURN
0509      END
0510 C*****
0511 C          SUBROUTINE DRWDT
0512 C
0513 C   PURPOSE:      This subroutine draws the current graph.
0514 C
0515 C   DESCRIPTION:  This subroutine clears the alphanumeric and graphics
0516 C                 displays. It then draws the current graph. Note
0517 C                 that if the user has not changed any data values
0518 C                 the default values will be used.
0519 C
0520 C   CALLING SEQUENCE: CALL DRWDT
0521 C
0522 C   PARAMETERS:   NONE
0523 C
0524 C*****
0525 C
0526      SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND)
0527      REAL DAT(3,520)
0528      DIMENSION ILIST(3)
0529      INTEGER TEXT(12),OPCODE,RSIZE
0530 C
0531      REAL VIEW(4)
0532 C
0533 C   VIEW      - Temp holder of viewport bounds
0534 C
0535 C*****
0536 C
0537 C   Clear the graphics and alphanumeric displays
0538 C-----
0539      CALL ZNEWF
0540      CALL CLEAR

```

```

0541 C-----
0542 C Determine parameters for LAXES call.
0543 C-----
0544 C-----
0545 XTIC = (XMAX-XMIN)/10.0
0546 YTIC = (YMAX-YMIN) / 10.0
0547 XORG = XMIN
0548 YORG = YMIN
0549 XMJC = 1.0
0550 YMJC = 1.0
0551 TSIZE = .02
0552 CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0553 C-----
0554 C Plot the graph.
0555 C-----
0556 CALL ZMOVE(DAT(1,1),DAT(2,1))
0557 DO 5000 I=2, IAEND
0558 CALL ZDRAW(DAT(1,I),DAT(2,I))
0559 5000 CONTINUE
0560 C-----
0561 C Change the viewport to the maximum possible so text strings may be
0562 C placed anywhere on the view surface. Output the text strings, then
0563 C reset the viewport.
0564 C-----
0565 6000 CALL VPMAX (VIEW)
0566 TEXT(1) = 2HRa
0567 TEXT(2) = 2H1a
0568 TEXT(3) = 2Ht1
0569 TEXT(4) = 2Hve
0570 TEXT(5) = 2H P
0571 TEXT(6) = 2Hos
0572 TEXT(7) = 2Hit
0573 TEXT(8) = 2Hio
0574 TEXT(9) = 2Hn
0575 TEXT(10) = 2H(m
0576 TEXT(11) = 2Hm)
0577 TEXT(12) = 6412B
0578 NMTEXT = 24
0579 XTEXT = 0.0
0580 YTEXT = YMIN + (YMAX-YMIN)/21.0
0581 C
0582 CALL ZMOVE (XTEXT,YTEXT)
0583 OPCODE=1052
0584 ISIZE=1
0585 RSIZE=0
0586 ILIST(1)=6
0587 CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0588 IF (IERR .EQ. 0) GO TO 6010
0589 CALL ERRMS (1,IERR,6HZOESC )
0590 6010 CALL ZTEXT (NMTEXT,TEXT)
0591 C
0592 C CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0593 C IF (IERR .EQ. 0) GO TO 6020
0594 C CALL ERRMS (1,IERR,6HZIESC )
0595 C GO TO 9999
0596 6020 TEXT(1) = 2Hat
0597 TEXT(2) = 2Hta
0598 TEXT(3) = 2Hnu
0599 TEXT(4) = 2Hat
0600 TEXT(5) = 2Hio

```

```

0601      TEXT(6) = 2Hn
0602      TEXT(7) = 2H(d
0603      TEXT(8) = 2Hb)
0604      TEXT(9) = 6412B
0605      NMTEXT = 1B
0606      XTEXT = XMIN + (XMAX - XMIN)/30.0
0607      YTEXT = YMIN + (YMAX - YMIN)/2.0
0608      OPCODE = 1050
0609      ILIST(1) = 1
0610      ISIZE = 1
0611      RSIZE = 0
0612      CALL ZMOVE(XTEXT,YTEXT)
0613      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0614      IF (IERR .EQ. 0) GO TO 6030
0615          CALL ERRMS (1,IERR,6HZOESC )
0616          GO TO 9999
0617 6030  CALL ZTEXT(NMTEXT,TEXT)
0618          OPCODE=1050
0619          ILIST(1) = 0
0620          ISIZE = 1
0621          RSIZE = 0
0622      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0623      IF (IERR .EQ. 0) GO TO 6040
0624          CALL ERRMS (1,IERR,6HZOESC )
0625          GO TO 9999
0626  C
0627 6040  CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0628      CALL ZMCUR
0629  C
0630 9999  RETURN
0631      END
0632  C
0633  C*****
0634  C      SUBROUTINE ERRMS
0635  C
0636  C      PURPOSE:      To write out an error message.
0637  C
0638  C      DESCRIPTION:  This subroutine writes an error message to the alphanumeric
0639  C                    LU. The error number and DGL subroutine name that the error
0640  C                    occurred during is reported.
0641  C
0642  C      CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0643  C
0644  C      PARAMETERS:
0645  C          ALPHLU:    [INTEGER];  The alphanumeric LU
0646  C
0647  C          ERROR:     [INTEGER];  The error number of the error to
0648  C                    reported
0649  C
0650  C          SUBR:      [INTEGER];  An array containing the name of
0651  C                    the subroutine where the error occurred.
0652  C
0653  C*****
0654  C
0655      SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0656      INTEGER ALPHLU,ERROR,SUBR(3)
0657  C
0658  C      Write out the error message
0659  C
0660      CALL ZMCUR

```

```

0661      WRITE(ALPHLU,100) ERROR, SUBR
0662      100 FORMAT(" Error ",I3," occurred in subroutine ",3A2)
0663 C
0664      RETURN
0665      END
0666 C
0667 C*****
0668 C      SUBROUTINE CLEAR
0669 C
0670 C      PURPOSE:      To clear the alphanumeric display
0671 C
0672 C      DESCRIPTION:  This subroutine will clear the alphanumeric display
0673 C                   of a H? 2647 or HP 2648 terminal. If the display is
0674 C                   not a HP 2647 or HP 2648 then the call has no effect.
0675 C
0676 C      CALLING SEQUENCE: CALL CLEAR
0677 C
0678 C      PARAMETERS:      NONE
0679 C
0680 C*****
0681 C
0682 C      SUBROUTINE CLEAR
0683 C      INTEGER ILIST(7), STRING(2), IERR
0684 C      REAL DUMMY
0685 C
0686 C      ILIST - Information list returned by ZIWS
0687 C      IERR - Error information returned by ZIWS (not used here)
0688 C      DUMMY - Real information returned by ZIWS (none in this case)
0689 C      STRING - Device-dependent commands that clear a 264X terminal
0690 C
0691 C      DATA STRING /15550B,          15512B/
0692 C                   /          \          /          \
0693 C                   33B + 150B      33B + 112B
0694 C                   esc   h         esc   J
0695 C                   (home cursor)   (clear display)
0696 C
0697 C*****
0698 C
0699 C      Inquire the status of the alphanumeric device:
0700 C      upon return, ILIST(4) = -1 ==> no alpha device,
0701 C                          = 0 ==> it is disabled,
0702 C                          = 1 ==> it is enabled.
0703 C      If it is not enabled, just return.
0704 C
0705 C      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0706 C      IF (IERR .EQ. 0) GO TO 7070
0707 C      CALL ERRMS (1,IERR,6HZIWS )
0708 C      GO TO 9999
0709 C      7070 IF (ILIST(4) .NE. 1) GOTO 9999
0710 C
0711 C      Alpha device is enabled. Make sure it is '264X' type then clear.
0712 C
0713 C      IF (ILIST(1) .NE. 2H26) GOTO 9999
0714 C      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0715 C      CALL ZALPH (4,STRING)
0716 C
0717 C      9999 RETURN
0718 C      END
0719 C
0720 C*****

```

```

0721 C
0722 C
0723 C
0724 C PURPOSE: Set the viewport to the maximum limits.
0725 C
0726 C DESCRIPTION: The current viewport is saved in VIEW. The viewport
0727 C is then set to the maximum limits.
0728 C
0729 C CALLING SEQUENCE: CALL VPMAX (VIEW)
0730 C
0731 C PARAMETERS:
0732 C VIEW: (REAL ARRAY OF 4); This array contains the
0733 C viewport before it was
0734 C maximized.
0735 C
0736 C*****
0737 C
0738 C SUBROUTINE VPMAX (VIEW)
0739 C REAL VIEW(4)
0740 C
0741 C INTEGER IDUM
0742 C REAL AR(2), NEWX, NEWY
0743 C
0744 C IDUM - Dummy work variable
0745 C AR - Temp holder of the aspect ratio
0746 C NEWX - Temp work variable
0747 C NEWY - Temp work variable
0748 C
0749 C*****
0750 C
0751 C Inquire current viewport and save it in array VIEW
0752 C
0753 C CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0754 C IF (IERR .EQ. 0) GO TO 8080
0755 C CALL ERRMS (1,IERR,6HZIWS )
0756 C GO TO 9999
0757 C
0758 C Inquire the maximum aspect ratio
0759 C
0760 C 8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0761 C
0762 C Set viewport to maximum dimensions
0763 C
0764 C NEWY = 1.
0765 C NEWX = 1.
0766 C IF (AR(2) .LE. 1.) NEWY = AR(2)
0767 C IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0768 C CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0769 C
0770 C 9999 RETURN
0771 C END
0772 C END$

```

WR15M T=00004 IS ON CR00002 USING 00011 BLKS R=0074

```
0001 FTM4,L
0002 C 24998-18466 REV.2040 (810304.1057)
0003 C*****
0004 C
0005 C          PROGRAM WR15
0006 C
0007 C DESCRIPTION:
0008 C WR15 is designed to obtain microwave transmission data at different
0009 C points along a raster scan and to store the data in a disc file.
0010 C This program has been divided into four segments because it cannot
0011 C fit into memory otherwise. The main segment always remains in
0012 C memory. Segment WR15C is the control segment, which is the first
0013 C one read in by the main segment. The other two are WR15G, which
0014 C plots on the plotter and WR15T, which plots on the terminal.
0015 C WR15C gives the user a choice of where to plot for each run, so
0016 C essentially, for each run there are only three segments. The
0017 C two segments beside the main overlay each other by one segment
0018 C calling EXEC(B, other segment name) to read in the other
0019 C segment over the calling segment and then pass control to it.
0020 C It can return to the calling segment only by calling EXEC(B,
0021 C other segment name) again.
0022 C This segment is the main segment. It is run by typing in:
0023 C          RU,WR15
0024 C This segment only defines common, initializes variables, and
0025 C then calls EXEC(B,WR15C) to read in and pass control to segment
0026 C WR15C.
0027 C
0028 C*****
0029 C
0030 C          PROGRAM WR15
0031 C
0032 C          DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033 C          *          ISIZE(2),ITITL(40),PLUNIT(2)
0034 C          INTEGER CRT,PRNT
0035 C          COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036 C          *          IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESL,IDCB,NAMEF,
0037 C          *          ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038 C          *          PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0039 C          COMMON/AGS2C/ D(10)
0040 C          IRNUM = 1
0041 C          CRT = 1
0042 C          IPRNM(1) = 1HW
0043 C          IPRNM(2) = 1HR
0044 C          IPRNM(3) = 1H1
0045 C          IPRNM(4) = 1HS
0046 C          IPRNL = 4
0047 C          MESS = -1
0048 C          ASTEPS = 5
0049 C          IAEND = 4
0050 C          ESTEPS = 30
0051 C          IEEND = 3
0052 C          IPEND = 1
0053 C          ISEND = 1
0054 C          IDONE = 0
0055 C          PRESAZ = 999.9
0056 C          IPFLAG = 1
0057 C          ILFLAG = 1
0058 C          PLUNIT(1) = 4H - C
```

```

0059      PLUNIT(2) = 4HRT
0060      IGRLOC = 1
0061      IFEND = 1
0062      NAMEF(1) = 2HSC
0063      NAMEF(2) = 2HS2
0064      NAMEF(3) = 2H10
0065      PRNT = 6
0066      CALL FILE2(1)
0067      TEMP1 = D(1)
0068      TEMP2 = (D(3) - 1) * D(2) + D(1)
0069      RFREQ = D(1)
0070  C-----
0071  C  Call EXEC to read in segment WR1SC and pass control to it.
0072  C-----
0073  C
0074      ICODE=8
0075      INAME(1)=2HWR
0076      INAME(2)=2H15
0077      INAME(3)=2HC
0078      CALL EXEC (ICODE, INAME)
0079      END
0080  C
0081  C  Block data routine for AGS2C
0082  C
0083      BLOCK DATA AGS2C
0084      COMMON /AGS2C/ I(2330)
0085      END
0086      END$

```

&WR15C T=00004 IS ON CR00015 USING 00101 BLKS R=0562

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR15C
0005 C *
0006 C *          *****
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          *****
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Segment WR15C is the control segment of WR15.  It puts
0021 C *          out a menu with the options:
0022 C *          1 - Enter the number of azimuth steps and step size.
0023 C *          2 - Enter the number of elevation steps and step size.
0024 C *          3 - Enter the microwave frequency.
0025 C *          4 - Set antennae to a new azimuth position.
0026 C *          5 - Set antennae to a new elevation position.
0027 C *          6 - Enter number of readings to average for each point.
0028 C *          7 - Request graphs on the CRT.
0029 C *          10 - List on the printer.
0030 C *          11 - Enter number of frequency steps and step size.
0031 C *          8 - Scan from the present position
0032 C *          9 - Terminate the program.
0033 C *          After 8 is chosen, the antennae are positioned at the
0034 C *          present position-(number of data points-1)*step size/2.
0035 C *          The amplitude and phase are each averaged over the number
0036 C *          of readings specified in 6 and saved in the array DAT
0037 C *          along with the position.  Then the antennae are advanced
0038 C *          by step size and the amplitude and phase are read again.
0039 C *          This is repeated for the specified number of steps per
0040 C *          scan.
0041 C *          After each scan, the data accumulated in array DAT is
0042 C *          read out to a disc file, SCS12A.  If there is a file
0043 C *          with that name already, the last letter is incremented.
0044 C *          After the data is read out, elevation is incremented by
0045 C *          elevation step size and the whole process repeated for
0046 C *          the number of elevation steps.
0047 C *
0048 C *****
0049 C PROGRAM WR15C,S
0050 C DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0051 C *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0052 C *          PLUNIT(2),FAT(1560)
0053 C INTEGER CRT,PRNT
0054 C COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0055 C *          IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESL,IDCB,NAMEF,
0056 C *          ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0057 C *          PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0058 C EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)

```

```

0059 C
0060 COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,ONLY,
0061 *CH(4,112),IHEAD(40),IDATE(15)
0062 DATA LUAZ/31/,LUEL/35/,I1/15446B/
0063 C-----
0064 C Set number of scans if plots requested.
0065 C-----
0066 C If start of program, go to menu.
0067 IF (PRESAZ .EQ. 999.9) GO TO 525
0068 C If graphing on screen, do not list data there.
0069 IF (IGRLOC .EQ. 1) ILFLAG = 0
0070 C If finished with run, go reset position.
0071 IF (IDONE .GE. IEEND) GO TO 515
0072 C If plotting every scan, go do next scan.
0073 IF (IPEND .EQ. 1) GO TO 8701
0074 IF (IDONE .NE. 1) GO TO 511
0075 IF (IPEND .GT. IEEND) GO TO 513
0076 C Plotted first scan so now get back on schedule.
0077 ISEND = IPEND - 1
0078 GO TO 8701
0079 511 IF (IDONE+IPEND .GT. IEEND) GO TO 513
0080 C Plot every specified scan.
0081 ISEND = IPEND
0082 GO TO 8701
0083 C Scan to end of run without plotting.
0084 513 ISEND = IEEND - IDONE
0085 IPFLAG = -1
0086 GO TO 8701
0087 C-----
0088 C Reset original position.
0089 C-----
0090 515 WRITE (CRT, 519)
0091 519 FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0092 * "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0093 * /,1X,"PLEASE EXCUSE THE DELAY")
0094 CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0095 IF (IERR .EQ. 0) GO TO 522
0096 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0097 GO TO 9090
0098 522 PRESEL = PRESEL - ESTEPS*(IEEND-1)
0099 CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0100 IF (IERR .EQ. 0) GO TO 523
0101 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0102 GO TO 9090
0103 C Reset parameters to original values.
0104 523 IF (IPFLAG .EQ. 0) GO TO 525
0105 ISEND = 1
0106 IPFLAG = 1
0107 ILFLAG = 1
0108 525 IDONE = 0
0109 C-----
0110 C Clear screen and print heading and menu.
0111 C-----
0112 WRITE(CRT,529)
0113 0529 FORMAT("
0114 * 10X,55'*',/,
0115 *10X,"*",20X,"PROGRAM WR15",20X,"*",/,
0116 *10X,"*",15X,"S21 RASTER SCAN PROGRAM",15X,"*",/,
0117 *10X,55'*',/)
0118 530 CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)

```

```

0119         IF (IERR .EQ. 0) GO TO 540
0120         CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0121         GO TO 9090
0122     540 CALL WR1 (CRT,LUEL,PRESL,IERR,0)
0123         IF (IERR .EQ. 0) GO TO 550
0124         CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0125         GO TO 9090
0126     550 IF (PRNT .EQ. 0) GO TO 555
0127         PRNTL(1) = 4H PRI
0128         PRNTL(2) = 4HNT
0129         GO TO 560
0130     555 PRNTL(1) = 4HNO P
0131         PRNTL(2) = 4HRINT
0132     560 WRITE(CRT,600) IAEND,ASTEPS,IEEND,ESTEPS,RFREQ,PRESAZ,PRESL,
0133         *IRNUM,IPEND,(PLUNIT(I),I=1,2),(PRNTL(I),I=1,2),IFEND,FSTEPS
0134     0600 FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0135         *" 1 - Number of azimuth steps and step size.....",
0136         *I3," x",F6.2," mm",/,
0137         *" 2 - Number of elevation steps and step size.....",
0138         *I3," x",F6.2," mm",/,
0139         *" 3 - Microwave frequency.....",
0140         *F7.0," MHz",/,
0141         *" 4 - Azimuth position.....",
0142         *F8.3," mm",/,
0143         *" 5 - Elevation position.....",
0144         *F8.3," mm",/,
0145         *" 6 - Number of readings to average per point.....",I5,/,
0146         *" 7 - Number of scans per graphs.....",I5,1X,2A4,/,
0147         *" 10 - Toggle switch for listing on printer.....",2X,2A4,/,
0148         *" 11 - Number of frequency steps and step size.....",
0149         *I3," x",F5.0," MHz",/,
0150         *" EXECUTION OPTIONS",/,
0151         *" 8 - Scan from the present position.",/,
0152         *" 9 - Terminate the program.",/""")
0153     610 WRITE (CRT,619)
0154     C Clear old prompt with Esc h Esc J.
0155     0619 FORMAT (""")
0156     620 WRITE (CRT,629)
0157     629 FORMAT (1X,"SELECT OPTION NUMBER _")
0158     READ(CRT,*) IANS
0159     IF (IANS .EQ. 9999) GO TO 9090
0160     IF (IANS .EQ. 10) GO TO 700
0161     IF (IANS .EQ. 11) GO TO 800
0162     IF (IANS .EQ. 9) GO TO 9090
0163     IF (IANS .EQ. 8) GO TO 8000
0164     IF (IANS .EQ. 7) GO TO 7000
0165     IF (IANS .EQ. 6) GO TO 6000
0166     IF (IANS .EQ. 5) GO TO 5000
0167     IF (IANS .EQ. 4) GO TO 4000
0168     IF (IANS .EQ. 3) GO TO 3000
0169     IF (IANS .EQ. 2) GO TO 2000
0170     IF (IANS .EQ. 1) GO TO 1000
0171     WRITE (CRT,659)
0172     659 FORMAT (/,1X,"ERROR # WR15 - 17001 .....(WR15)",/,1X,
0173         *" INCORRECT RESPONSE. ENTER ANY NUMBER FROM 1 TO 11.")
0174     GO TO 620
0175     C-----
0176     C Set to print on printer.
0177     C-----
0178     700 IF (PRNT .EQ. 6) GO TO 750

```

```

0179      PRNT = 6
0180      PRNTL(1) = 4H PRI
0181      PRNTL(2) = 4HNT
0182      GO TO 760
0183 750   PRNT = 0
0184      PRNTL(1) = 4HNO P
0185      PRNTL(2) = 4HRINT
0186 760   WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0187 769   FORMAT (1A2, "a 54c 13Y",2A4)
0188      GO TO 610
0189 C-----
0190 C   Inquire from user:  frequency step size and number of steps.
0191 C-----
0192      800 WRITE (CRT,809)
0193      809 FORMAT (/,1X,"Enter the number of frequency steps.  _")
0194      READ (CRT,*) IFEND
0195      IF (IFEND .EQ. 9999) GO TO 9090
0196      IF ((IFEND .GT. 0) .AND. (IFEND*(IAEND+1) .LE. 520)) GO TO 825
0197      WRITE (CRT,819)
0198      819 FORMAT (/,1X,"ERROR # WR15 - 17002 .....(WR15)",/,
0199      * 1X,"NUMBER OF STEPS MUST BE FROM 1 - 520/(AZIMUTH STEPS + 1).",
0200      *      /,1X,"REENTER THE NUMBER OF FREQUENCY STEPS.")
0201      GO TO 800
0202      825 WRITE (CRT,829)
0203      829 FORMAT (/,1X,"Enter the frequency step size (MHz).  _")
0204      READ (CRT,*) FSTEPS
0205      IF (FSTEPS .EQ. 9999) GO TO 9090
0206      DO 840 L = 0, IFEND - 1
0207      F = RFREQ + L * FSTEPS
0208      CALL CALF2(3, MC, F)
0209      CALL CALF2(2, MC, FP)
0210      IF (ABS(FP - F) .LT. 1.) GO TO 840
0211      WRITE (CRT, 838) F
0212      838   FORMAT (1X,"ERROR # WR15 - 17010 .....(WR15)",/,
0213      *           "THERE IS NO CALIBRATION DATA FOR FREQUENCY",F7.0,/,
0214      * " Select one of the following numbers for the listed result.",/,
0215      * " 1. Recalibrate.",/,
0216      * " 2. Select different frequency step size or number of steps.",/,
0217      * " 3. Proceed with these frequencies, do not correct if no data.")
0218      READ (CRT, *) IANS
0219      IF (IANS .EQ. 1) GO TO 9000
0220      IF (IANS .EQ. 2) GO TO 800
0221      IF (IANS .EQ. 3) GO TO 850
0222      GO TO 800
0223      840 CONTINUE
0224      850 WRITE (CRT,859) I1, IFEND, FSTEPS
0225      859 FORMAT (1A2,"a 52c 14Y",I3," x",F5.0)
0226      GO TO 610
0227 C-----
0228 C   Inquire from the user:  azimuth step size and number of steps.
0229 C-----
0230      1000 WRITE(CRT,1100)
0231      1100 FORMAT(/," Enter the number of azimuth steps per scan.  _")
0232      READ(CRT,*) IAEND
0233      IF (IAEND .EQ. 9999) GO TO 9090
0234      IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IAEND .GT. 0)) GO TO 1190
0235      WRITE (CRT,1109)
0236      1109   FORMAT (/,1X,"ERROR # WR15 - 17203 .....(WR15)",/,
0237      * 1X,"NUMBER OF STEPS MUST BE FROM 1 - 520/(FREQUENCY STEPS)-1.",/,
0238      *      1X,"REENTER THE NUMBER OF AZIMUTH STEPS.")

```

```

0239      GO TO 1000
0240 1190 WRITE(CRT,1200)
0241 1200 FORMAT(/," Enter the step size (mm)..... _")
0242      READ(CRT,*) ASTEPS
0243      IF (ASTEPS .EQ. 9999) GO TO 9090
0244      WRITE (CRT,1209) I1,IAEND,ASTEPS
0245 1209 FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0246      GO TO 610
0247 C-----
0248 C  Inquire from user: elevation step size and number of steps.
0249 C-----
0250 2000 WRITE (CRT,2009)
0251 2009 FORMAT (/,1X,"Enter the number of elevation steps. _")
0252      READ (CRT,*) IEEND
0253      IF (IEEND .EQ. 9999) GO TO 9090
0254      IF (IEEND .GT. 0) GO TO 2028
0255      WRITE (CRT,2019)
0256 2019 FORMAT (/,1X,"ERROR # WR15 - 17404 .....(WR15)",/,
0257      *          1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0258      *          1X,"REENTER THE NUMBER OF ELEVATION STEPS.")
0259      GO TO 2000
0260 2028 WRITE (CRT,2029)
0261 2029 FORMAT (/,1X,"Enter the elevation step size (mm). _")
0262      READ (CRT,*) ESTEPS
0263      IF (ESTEPS .EQ.9999) GO TO 9090
0264      WRITE (CRT,2039) I1, IEEND, ESTEPS
0265 2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0266      GO TO 610
0267 C-----
0268 C  Inquire from the user: microwave frequency.
0269 C-----
0270 3000 WRITE(CRT,3500)
0271 3500 FORMAT(/," Enter the RF frequency (MHz)... _")
0272      READ(CRT,*) RFREQ
0273      IF (RFREQ .EQ. 9999) GO TO 9090
0274      IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0275      WRITE (CRT,3509) TEMP1, TEMP2
0276 3509 FORMAT (/,1X,"ERROR # WR15 - 17005 .....(WR15)",/,1X,
0277      *          "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0278      *          /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0279      *          /,1X,"Do you wish to recalibrate? (YES/NO) _")
0280      READ (CRT,3599) IANS
0281 3599 FORMAT (A2)
0282      IF (IANS .EQ. 2HYE) GO TO 9000
0283      GO TO 3000
0284 3600 WRITE (CRT, 3609) I1, RFREQ
0285 3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0286      GO TO 610
0287 C-----
0288 C  Inquire new azimuth position and call WR6 to set it.
0289 C-----
0290 4000 WRITE (CRT,4090)
0291 4090 FORMAT (/,1X,"Enter new azimuth (mm). _")
0292      READ (CRT,*) PRESAZ
0293      IF (PRESAZ .EQ. 9999) GO TO 9090
0294      CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0295      IF (IERR .EQ. 0) GO TO 4400
0296      CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0297      GO TO 620
0298 4400 WRITE (CRT,4409) I1,PRESAZ

```

```

0299 4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0300 GO TO 610
0301 C-----
0302 C Inquire new elevation and call WR6 to set it.
0303 C-----
0304 5000 WRITE (CRT,5090)
0305 5090 FORMAT (/,1X,"Enter new elevation _")
0306 READ (CRT,*) PRESEL
0307 IF (PRESEL .EQ. 9999) GO TO 9090
0308 CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0309 IF (IERR .EQ. 0) GO TO 5500
0310 CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0311 GO TO 620
0312 5500 WRITE (CRT,5509) I1, PRESEL
0313 5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0314 GO TO 610
0315 C-----
0316 C Inquire from the user: number of readings per data point.
0317 C-----
0318 6000 WRITE (CRT,6009)
0319 6009 FORMAT (/,1X,
0320 * "Enter number of readings to average per data point. _")
0321 READ (CRT,*) IRNUM
0322 IF (IRNUM .EQ. 9999) GO TO 9090
0323 IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0)) GO TO 6600
0324 WRITE (CRT,6509)
0325 6509 FORMAT (/,1X,"ERROR # WR15 - 17006 .....(WR15)",/,
0326 * 1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0327 * 1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0328 GO TO 6000
0329 6600 WRITE (CRT, 6609) I1, IRNUM
0330 6609 FORMAT (1A2,"a 52c 11Y",I5)
0331 GO TO 610
0332 C-----
0333 C Inquire from user: number of scans per graph.
0334 C-----
0335 7000 WRITE (CRT,7009)
0336 7009 FORMAT (/,1X,"Enter number of scans between graphs on screen. _")
0337 READ (CRT,*) IPEND
0338 IF (IPEND .EQ. 9999) GO TO 9090
0339 IF (IPEND .GE. 0) GO TO 7500
0340 WRITE (CRT,7209)
0341 7209 FORMAT (/,1X,"ERROR # WR15 - 17007 .....(WR15)",/,
0342 * 1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0343 * 1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS ON CRT.")
0344 GO TO 7000
0345 7500 WRITE (CRT,7509)
0346 7509 FORMAT (/,1X,"Enter '1' to plot on CRT or '0' to plot on ",
0347 * "plotter. _")
0348 READ (CRT,*) IGRLOC
0349 IPFLAG = 1
0350 PLUNIT(1) = 4H-PLO
0351 PLUNIT(2) = 4HTTR
0352 IF (IGRLOC .NE. 1) GO TO 7550
0353 PLUNIT(1) = 4H - C
0354 PLUNIT(2) = 4HRT
0355 7550 IF (IPEND .NE. 0) GO TO 7600
0356 IPFLAG = 0
0357 PLUNIT(1) = 4HGRAP
0358 PLUNIT(2) = 4HHS

```

```

0359 7600 ISEND = 1
0360 WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I), I=1, 2)
0361 7609 FORMAT (1A2, "a 52c 12Y", 15, 1X, 2A4)
0362 GO TO 610
0363 C-----
0364 C Set antennae to first position and create disc data file.
0365 C-----
0366 C Find title for file.
0367 8000 WRITE (CRT, 8009) (ITITL(I), I=1, 40)
0368 8009 FORMAT (/ , 1X,
0369 * "Enter title of file or press 'RETURN' key for following title.",
0370 * / , 40A2, /)
0371 C Blank out rest of 80 bytes of title.
0372 REG = EXEC (1, 401B, ITITL, -80)
0373 IF (IREG(2) .EQ. 0) GO TO 8100
0374 IF (IREG(2) .GT. 78) GO TO 8060
0375 DO 8050 I = (IREG(2)+3)/2, 40
0376 8050 ITITL(I) = 2H
0377 8060 IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0378 ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0379 C Set azimuth to -(1/2 of scan).
0380 8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0381 PARAM = POSITN
0382 CALL WR6(PARAM, IERR, 2, 0)
0383 IF (IERR .EQ. 0) GO TO 8200
0384 CALL WR12(CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0385 GO TO 620
0386 C Record size = 3 double words * (steps in scan + 1).
0387 8200 ISIZE(2) = 6 * (IAEND + 1)
0388 C Minimum record size = 128.
0389 IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0390 C File size = record size * (elevation steps * frequency steps + 1).
0391 ISIZE(1) = (ISIZE(2) * (IEEND * IFEND + 1) + 127)/128
0392 8300 NAMEF(3) = NAMEF(3) + 1
0393 CALL CREAT (IDCB, IERR, NAMEF, ISIZE, 2)
0394 IF (IERR .GE. 0) GO TO 8450
0395 IF (IERR .EQ. -2) GO TO 8300
0396 WRITE (CRT, 8409) IERR
0397 8409 FORMAT (/ , 1X, "ERROR #", I3, " OCCURED IN SUBROUTINE CREAT")
0398 GO TO 9090
0399 8450 IF (PRNT .EQ. 0) GO TO 8500
0400 C Print title and menu on line printer.
0401 WRITE (PRNT, 8459) (ITITL(I), I=1, 40), (NAMEF(I), I=1, 3)
0402 8459 FORMAT ("1", 40A2, / , 1X, "FILE = ", 3A2)
0403 WRITE (PRNT, 600) IAEND, ASTEPS, IEEND, ESTEPS, RFREQ, PRESAZ, PRESEL,
0404 * IRNUM, IPEND, PLUNIT, PRNTL, IFEND, FSTEPS
0405 8500 WRITE (CRT, 8509) NAMEF
0406 8509 FORMAT (/ , 1X, "NAME OF DATA FILE IS ", 3A2)
0407 C Put specifications in first record.
0408 CALL FTIME(IFAT)
0409 DO 8550 I=1, 40
0410 8550 IFAT(15+I) = ITITL(I)
0411 IFAT(56) = 2HEL
0412 IFAT(57) = 0
0413 IFAT(58) = IAEND
0414 FAT(30) = ASTEPS
0415 IFAT(61) = 0
0416 IFAT(62) = IEEND
0417 FAT(32) = ESTEPS
0418 FAT(33) = RFREQ

```

```

0419      IFAT(67) = ISIZE(1)
0420      IFAT(68) = ISIZE(2)
0421      IFAT(69) = 0
0422      IFAT(70) = IFEND
0423      FAT(36) = FSTEPS
0424      ILFLAG = 1
0425      CALL WRITF (IDCB, IERR, FAT)
0426      IF (IERR .EQ. 0) GO TO 8700
0427      WRITE (CRT,8609) IERR
0428      8609  FORMAT (/ ,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0429      GO TO 9090
0430  C-----
0431  C Elevation scan from PRESEL to PRESEL+ESTEPS*(IEEND-1) or until graph needed
0432  C-----
0433      8700 IF (IPEND .EQ. 0) ISEND = IEEND
0434      ID = 1
0435      IDRCT = 1
0436      8701 DO 8900 J=1,ISEND
0437      IF (J + IDONE .EQ. 1) GO TO 8720
0438  C If not first scan, switch direction and increment elevation.
0439      IDRCT = -IDRCT
0440      PRESEL = PRESEL + ESTEPS
0441      PARAM = PRESEL
0442      CALL WR6 (PARAM, IERR, 4, 1)
0443      IF (IERR .EQ. 0) GO TO 8720
0444      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0445      GO TO 9090
0446      8720 CALL WR1 (CRT, LUEL, TRUEL, IERR, 0)
0447      IF (IERR .EQ. 0) GO TO 8725
0448      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0449      GO TO 9090
0450  C-----
0451  C Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
0452  C-----
0453      8725 DO 8800 I=1,IAEND
0454  C If break flag set, go back to menu.
0455      IF (IFBRK(IERR)) 523,8730
0456      8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0457      IF (IERR .EQ. 0) GO TO 8735
0458      CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0459      GO TO 9090
0460  C Zero x and y before starting measurement for this position.
0461      8735 DO 8740 IL = ID, ID + (IFEND - 1) * (IAND + 1), IAEND + 1
0462      DAT(2, IL) = 0.
0463      DAT(3, IL) = 0.
0464      8740 CONTINUE
0465  C Loop for statistical averaging.
0466      DO 8750 K = 1,IRNUM
0467  C Do frequency scan
0468      DO 8750 L = 0, IFEND - 1
0469      IL = ID + L * (IAEND + 1)
0470      F = RFREQ + L * FSTEPS
0471      CALL CALF2(3, MC, F)
0472      CALL MESUR (F, X1, Y1, X, Y)
0473      CALL CORCT (MC, X1, Y1, X, Y)
0474      DAT(3, IL) = DAT(3, IL) + Y
0475      8750  DAT(2, IL) = DAT(2, IL) + X
0476      DO 8790 L = 0, IFEND - 1
0477      IL = ID + L * (IAEND + 1)
0478      X = DAT(2, IL) / IRNUM

```

```

0479      Y = DAT(3, IL) / IIRNUM
0480      DAT(3, IL) = ATAN2(Y, X) * 180. / 3.141593
0481      DAT(2, IL) = -10 * ALOGT(X*X + Y*Y)
0482      IF (ILFLAG .EQ. 0) GO TO 8780
0483      F = RFREQ + L * FSTEPS
0484      WRITE (CRT,8779) F, TRUAZ, DAT(2, IL), DAT(3, IL)
0485      8779 FORMAT (1X,"FREQ =",F6.0,5X,"AZIMUTH =",F8.3,5X,
0486      *           "RLOSS =",F9.4,5X,"PHASE =",F8.3)
0487      8780 DAT(1, IL) = TRUAZ
0488      8790 CONTINUE
0489      IF (I .GE. IAEND) GO TO 8800
0490      ID = ID + IDRCT
0491      POSITN = POSITN + IDRCT * ASTEPS
0492      PARAM = POSITN
0493      CALL WR6(PARAM,IERR,2,0)
0494      IF (IERR .EQ. 0) GO TO 8800
0495      CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0496      GO TO 9090
0497      8800 CONTINUE
0498      C-----
0499      C End of azimuth scan loop.
0500      C-----
0501      IF (PRNT .EQ. 0) GO TO 8830
0502      WRITE (PRNT,8829) TRUEL
0503      8829 FORMAT (//,5X,"ELEVATION =",F8.3)
0504      8830 DO 8890 L = 1, IFEND
0505          ILB = 1 + (L - 1) * (IAEND + 1)
0506          ILE = L * (IAEND + 1)
0507          DAT(1,ILE) = TRUEL
0508          DAT(2,ILE) = RFREQ + (L - 1) * FSTEPS
0509          IF (PRNT .EQ. 0) GO TO 8850
0510          DO 8840 IE = ILB,ILE - 1
0511              8840 WRITE (PRNT, 8849) DAT(2,ILE), (DAT(1,IE),I=1,3)
0512              8849 FORMAT (1X,"FREQ =",F6.0,5X,"AZIM =",F8.3,
0513              *           5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0514              8850 CALL WRITF (IDCB,IERR,DAT(1,ILB))
0515              IF (IERR .EQ. 0) GO TO 8890
0516              WRITE (CRT,8859) IERR
0517              8859 FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0518              GO TO 9090
0519      8890 CONTINUE
0520      8900 CONTINUE
0521      C-----
0522      C End of elevation scan loop
0523      C-----
0524      IDONE = IDONE + ISEND
0525      C If no scans, go to reset origianl position.
0526      IF (IPFLAG .LT. 1) GO TO 515
0527      C-----
0528      C Call EXEC to overlay this segment with WR15G
0529      C-----
0530      8990 IF (IGRLOC .EQ. 1) GO TO 8995
0531      INAME(3) = 2HG
0532      GO TO 8998
0533      8995 INAME(3) = 2HT
0534      8998 CALL EXEC (ICODE,INAME)
0535      9000 WRITE (CRT,9009)
0536      9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0537      9090 WRITE (CRT,9099)
0538      09099 FORMAT (/,10X,

```

```

0539      ***** PROGRAM WR15 TERMINATED *****
0540      CALL CLOSE (IDCB)
0541      END
0542 C-----
0543 C Subroutine SETPO calls WR6 to set an azimuth or elevation position
0544 C and then calls WR1 to check the position. If it is within .002 it
0545 C returns, if not it calls WR6 once again.
0546 C-----
0547      SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0548      DO 100 I = 1,2
0549      PARAM = PRES
0550      CALL WR6 (PARAM,IERR,UNIT,0)
0551      IF (IERR .NE. 0) RETURN
0552      IF (I .GT. 1) RETURN
0553 C      IF (LU .EQ. 33) GO TO 90
0554      CALL WR1 (CRT,LU,NEW,IERR,0)
0555 C      GO TO 91
0556 C 90 CALL WR3 (CRT,LU,NEW,IERR,0)
0557 91 IF (IERR .NE. 0) RETURN
0558      IF (ABS(NEW-PRES) .LT. .002) RETURN
0559 100 CONTINUE
0560      RETURN
0561      END
0562      END$

```

WR15G T=00004 IS ON CR00002 USING 00085 BLKS R=0526

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR15G
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C *
0020 C *          -----
0021 C *          Segment WR15G is the segment of WR15 that plots a
0022 C *          graph on the plotter.  It is read in and control passed
0023 C *          to it by an EXEC(8,WR15G) call from segment WR15C after
0024 C *          a scan is finished.  WR15G then plots a graph on the
0025 C *          plotter of the attenuation versus position for each
0026 C *          frequency with a marker equal to the frequency number.
0027 C *          When this segment is finished, it calls EXEC(8,WR15C) to
0028 C *          read in WR15C and pass control to it.
0029 C *
0030 C *****
0031 C PROGRAM WR15G,5
0032 C
0033 C   DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0034 C *         ISIZE(2),ITITL(40),PLUNIT(2)
0035 C   INTEGER STATUS, ALPHLU,  GOUTLU, CRT, PRNT
0036 C   COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0037 C *         IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IEND,PRESRO,IDCB,NAMEF,
0038 C *         ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0039 C *         PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0040 C   DATA ALPHLU, GOUTLU /1,19/
0041 C
0042 C STATUS - Set to zero if no errors occur in a called routine
0043 C ALPHLU - The LU of the alphanumeric device
0044 C GOUTLU - The LU of the graphics output device
0045 C *****
0046 C
0047 C -----
0048 C Initialize DGL system
0049 C -----
0050 C   WRITE(CRT,520)
0051 C   0520 FORMAT("")
0052 C   CALL ZBEGN
0053 C -----
0054 C Enable all devices, exit if any errors
0055 C -----
0056 C   CALL ENDEV (ALPHLU,GOUTLU,STATUS)
0057 C   IF (STATUS .NE. 0) GOTO 9990
0058 C -----

```

```

0059 C Find minimum and maximum values.
0060 C-----
0061     XMIN = DAT(1,1)
0062     XMAX = DAT(1,IAEND)
0063     YMIN = 100000.
0064     YMAX = -100000.
0065     DO 5100 K = 0, IFEND - 1
0066     DO 5100 I=1+(IAEND+1)*K, IAEND+(IAEND+1)*K
0067     IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0068     IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0069 5100 CONTINUE
0070     IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0071     YMIN = INT (YMIN)
0072     GO TO 5400
0073 5300 YMIN = INT (YMIN - .999)
0074 5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0075     YMAX = INT (YMAX + .999)
0076     GO TO 5600
0077 5500 YMAX = INT (YMAX)
0078 5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0079     IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0080     XMIN = INT (XMIN)
0081     GO TO 5800
0082 5700 XMIN = INT (XMIN - .999)
0083 5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0084     XMAX = INT (XMAX + .999)
0085     GO TO 5950
0086 5900 XMAX = INT (XMAX)
0087 C-----
0088 C Perform the viewing transformation, exit if any errors
0089 C-----
0090 5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0091     IF (STATUS .NE. 0) GOTO 9990
0092 C-----
0093 C Draw axis and label, then plot.
0094 C-----
0095     CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0096     GO TO 9900
0097 C-----
0098 C Disable logical devices
0099 C-----
0100 C6000 CALL ZNEWF
0101 C     CALL CLEAR
0102 6000 CALL ZAEN
0103     CALL ZDEND
0104     CALL ZEND
0105 C-----
0106 C Call EXEC to overlay this segment with WR15C and execute it.
0107 C-----
0108 9000 INAME(3) = 2HC
0109     CALL EXEC (ICODE, INAME)
0110 9990 CONTINUE
0111 C
0112     CALL ZAEND
0113     CALL ZDEND
0114 C-----
0115 C Disable DGL system
0116 C-----
0117     CALL ZEND
0118 C-----

```

```

0119 C Terminate program
0120 C-----
0121 9998 WRITE(CRT,9999)
0122 9999 FORMAT("")
0123 END
0124 C
0125 C*****
0126 C ENDEV SUBROUTINE
0127 C
0128 C PURPOSE: This subroutine enables all logical devices used by
0129 C the program.
0130 C
0131 C DESCRIPTION: This subroutine enables the DGL work station. The DGL
0132 C workstation contains alphanumeric and graphics output
0133 C devices.
0134 C
0135 C CALLING SEQUENCE: CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0136 C
0137 C PARAMETERS:
0138 C ALPHLU: [INTEGER]; Alphanumeric LU
0139 C GOUTLU: [INTEGER]; Graphics output LU
0140 C STATUS: [INTEGER]; Set to zero if no errors occur
0141 C during initialization of the
0142 C workstation. It is set to the
0143 C DGL error return value if an
0144 C error is found.
0145 C
0146 C*****
0147 C
0148 C SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0149 C
0150 C INTEGER ALPHLU, GOUTLU, STATUS
0151 C INTEGER CONTRL
0152 C-----
0153 C If an error occurs, write out an error message, and return.
0154 C
0155 C Enable alphanumeric device
0156 C-----
0157 C CALL ZAJNT (ALPHLU,STATUS)
0158 C IF (STATUS.EQ. 0) GOTO 1000
0159 C CALL ERRMS (ALPHLU,STATUS,6HZAINT )
0160 C1000 CONTINUE
0161 C-----
0162 C Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0163 C-----
0164 C CONTRL = 0
0165 C CALL ZDINT (GOUTLU,CONTRL,STATUS)
0166 C IF (STATUS.EQ. 0) GOTO 9999
0167 C CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0168 C 9999 CONTINUE
0169 C-----
0170 C Return to main program after all devices are properly enabled
0171 C-----
0172 C RETURN
0173 C END
0174 C
0175 C*****
0176 C
0177 C SUBROUTINE VIEWT
0178 C

```

```

0179 C PURPOSE: This subroutine performs the initial viewing
0180 C transformation.
0181 C
0182 C DESCRIPTION: This subroutine performs the viewing transformation in
0183 C the following steps:
0184 C
0185 C - Places the image on the largest possible area
0186 C - Sets the window to the desired range.
0187 C - Resets the viewport to leave room for labels
0188 C - Recomputes character size based on specified window
0189 C
0190 C CALLING SEQUENCE: CALL VIEWT
0191 C
0192 C PARAMETERS: NONE
0193 C
0194 C*****
0195 C
0196 C SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0197 C
0198 C INTEGER IDUM, IERR
0199 C REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0200 C REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0201 C
0202 C IDUM - Dummy var
0203 C IERR - Error return (not used)
0204 C AR - Holds aspect ratio
0205 C VIEW - Holds current viewport bounds
0206 C XSIZE - Temp work variable
0207 C YSIZE - Temp work variable
0208 C XCSIZ - Temp holder of character size X
0209 C YCSIZ - Temp holder of character size Y
0210 C WXMIN - Temp holder of window X - min
0211 C WXMAX - Temp holder of window X - max
0212 C WYMIN - Temp holder of window Y - min
0213 C WYMAX - Temp holder of window Y - max
0214 C MINX - Temp holder of new viewport X - min
0215 C MAXX - Temp holder of new viewport X - max
0216 C MINY - Temp holder of new viewport Y - min
0217 C MAXY - Temp holder of new viewport Y - max
0218 C
0219 C*****
0220 C
0221 C Inquire aspect ratio of logical display limits
0222 C-----
0223 C CALL ZIWS (254,0,2,IDUM,AR,IERR)
0224 C IF (IERR .EQ. 0) GO TO 555
0225 C CALL ERRMS (1,IERR,6HZIWS )
0226 C GO TO 9999
0227 C-----
0228 C Make the largest possible area of the logical display available
0229 C for graphical output by setting the aspect ratio(AR).
0230 C-----
0231 C 555 YSIZE = AR(2)
0232 C XSIZE = 1.0
0233 C CALL ZASPK (XSIZE,YSIZE)
0234 C-----
0235 C Specify the desired range of X and Y values of the window
0236 C-----
0237 C CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0238 C-----

```

```

0239 C Inquire current viewport limits
0240 C-----
0241 CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0242 IF (IERR .EQ. 0) GO TO 577
0243 CALL ERRMS (1,IERR,6HZIWS )
0244 GO TO 9999
0245 C-----
0246 C Calculate the lower left hand corner of the viewport and leave
0247 C enough room for labels. The viewport is reduced 12% on each side
0248 C to give room for labels. Set the new viewport
0249 C-----
0250 577 MINX = .12 * VIEW(2)
0251 MAXX = .88 * VIEW(2)
0252 MINY = .12 * VIEW(4)
0253 MAXY = .88 * VIEW(4)
0254 CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0255 C-----
0256 C Now set the character size based on the size of the window
0257 C The constants below produce a readable character size in the new
0258 C window.
0259 C-----
0260 XCSIZ = .015 * (WXMAX - WXMIN)
0261 YCSIZ = .025 * (WYMAX - WYMIN)
0262 CALL ZCSIZ (XCSIZ,YCSIZ)
0263 C
0264 9999 RETURN
0265 END
0266 C*****
0267 C SUBROUTINE DRWDT
0268 C
0269 C PURPOSE: This subroutine draws the current graph.
0270 C
0271 C DESCRIPTION: This subroutine clears the alphanumeric and graphics
0272 C displays. It then draws the current graph. Note
0273 C that if the user has not changed any data values
0274 C the default values will be used.
0275 C
0276 C CALLING SEQUENCE: CALL DRWDT
0277 C
0278 C PARAMETERS: NONE
0279 C
0280 C*****
0281 C
0282 SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0283 REAL DAT(3,520)
0284 DIMENSION ILIST(3),RLIST(2)
0285 INTEGER TEXT(12),OPCODE,RSIZE
0286 C
0287 REAL VIEW(4)
0288 C
0289 C VIEW - Temp holder of viewport bounds
0290 C
0291 C*****
0292 C
0293 C Clear the graphics and alphanumeric displays
0294 C-----
0295 CALL ZNEWF
0296 CALL CLEAR
0297 C-----
0298 C Determine parameters for LAXES call. Search thru data for YMAX.

```

```

0299 C-----
0300 C-----
0301      XTIC = (XMAX-XMIN)/10.0
0302      YTIC = (YMAX-YMIN) / 10.0
0303      XORG = XMIN
0304      YORG = YMIN
0305      XMJC = 1.0
0306      YMJC = 1.0
0307      TSIZE = .02
0308      CALL LAXES(XTIC,YTIC,XORG,YORG,XMJC,YMJC,TSIZE)
0309 C-----
0310 C Plot the graph.
0311 C-----
0312      DO 5500 K = 0,IFEND-1
0313      KM = MOD(K+10,19) + 1
0314      IK = (IAEND + 1) * K
0315      CALL ZMOVE(DAT(1,1+IK), DAT(2,1+IK))
0316      DATM = XMIN
0317      DO 5000 I=2+IK, IAEND+IK
0318      CALL ZDRAW(DAT(1,I),DAT(2,I))
0319      IF (DAT(1,I) .LT. DATM) GO TO 5000
0320      DATM = DATM + 5.
0321      CALL ZMARK(KM)
0322      5000 CONTINUE
0323      5500 CONTINUE
0324 C-----
0325 C Change the viewport to the maximum possible so text strings may be
0326 C placed anywhere on the view surface. Output the text strings, then
0327 C reset the viewport.
0328 C-----
0329      6000 CALL VPMAX (VIEW)
0330      TEXT(1) = 2HRe
0331      TEXT(2) = 2Hla
0332      TEXT(3) = 2Hti
0333      TEXT(4) = 2Hve
0334      TEXT(5) = 2H P
0335      TEXT(6) = 2Hos
0336      TEXT(7) = 2Hit
0337      TEXT(8) = 2Hio
0338      TEXT(9) = 2Hn
0339      TEXT(10) = 2H(m
0340      TEXT(11) = 2Hm)
0341      TEXT(12) = 6412B
0342      NMTEXT = 24
0343      XTEXT = XMIN + (XMAX - XMIN) * .3
0344      YTEXT = YMIN + (YMAX-YMIN)/21.0
0345 C
0346      CALL ZMOVE (XTEXT,YTEXT)
0347 C      OPCODE=1052
0348 C      ISIZE=1
0349 C      RSIZE=0
0350 C      ILIST(1)=6
0351 C      CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0352 C      IF (IERR .EQ. 0) GO TO 6010
0353 C      CALL ERRMS (1,IERR,6HZOESC )
0354      6010 CALL ZTEXT (NMTEXT,TEXT)
0355 C
0356 C      CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0357 C      IF (IERR .EQ. 0) GO TO 6020
0358 C      CALL ERRMS (1,IERR,6HZIESC )

```

```

0359 C          GO TO 9999
0360 6020 TEXT(1) = 2HAt
0361       TEXT(2) = 2Hte
0362       TEXT(3) = 2Hnu
0363       TEXT(4) = 2Hat
0364       TEXT(5) = 2Hlo
0365       TEXT(6) = 2Hn
0366       TEXT(7) = 2H(d
0367       TEXT(8) = 2Hb)
0368       TEXT(9) = 6412B
0369       NMTEXT = 18
0370       XTEXT = XMIN + (XMAX - XMIN)/30.0
0371       YTEXT = YMIN + (YMAX - YMIN) * .3
0372       OPCODE = 250
0373       RLIST(1) = 0
0374       RLIST(2) = 1.
0375       ISIZE = 0
0376       RSIZE = 2
0377       CALL ZMOVE(XTEXT,YTEXT)
0378       CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0379       IF (IERR .EQ. 0) GO TO 6030
0380       CALL ERRMS (1,IERR,6HZOESC )
0381       GO TO 9999
0382 6030 CALL ZTEXT(NMTEXT,TEXT)
0383       OPCODE=250
0384       RLIST(1) = 1.
0385       RLIST(2) = 0
0386       ISIZE = 0
0387       RSIZE = 2
0388       CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0389       IF (IERR .EQ. 0) GO TO 6040
0390       CALL ERRMS (1,IERR,6HZOESC )
0391       GO TO 9999
0392 C
0393 6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0394       CALL ZMCUR
0395 C
0396 9999 RETURN
0397       END
0398 C
0399 C*****
0400 C          SUBROUTINE ERRMS
0401 C
0402 C PURPOSE:      To write out an error message.
0403 C
0404 C DESCRIPTION:  This subroutine writes an error message to the alphanumeric
0405 C               LU. The error number and DGL subroutine name that the error
0406 C               occurred during is reported.
0407 C
0408 C CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0409 C
0410 C PARAMETERS:
0411 C               ALPHLU:  [INTEGER];  The alphanumeric LU
0412 C
0413 C               ERROR:   [INTEGER];  The error number of the error to
0414 C                               reported
0415 C
0416 C               SUBR:    [INTEGER];  An array containing the name of
0417 C                               the subroutine where the error occurred.
0418 C

```

```

0419 C*****
0420 C
0421 C      SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0422 C      INTEGER ALPHLU,ERROR,SUBR(3)
0423 C
0424 C      Write out the error message
0425 C
0426 C      CALL ZMCUR
0427 C      WRITE(ALPHLU,100) ERROR, SUBR
0428 C      100 FORMAT(" Error ",I2," occured in subroutine ",3A2)
0429 C
0430 C      RETURN
0431 C      END
0432 C
0433 C*****
0434 C      SUBROUTINE CLEAR
0435 C
0436 C      PURPOSE:      To clear the alphanumeric display
0437 C
0438 C      DESCRIPTION:  This subroutine will clear the alphanumeric display
0439 C                   of a HP 2647 or HP 2648 terminal.  If the display is
0440 C                   not a HP 2647 or HP 2648 then the call has no effect.
0441 C
0442 C      CALLING SEQUENCE: CALL CLEAR
0443 C
0444 C      PARAMETERS:      NONE
0445 C
0446 C*****
0447 C
0448 C      SUBROUTINE CLEAR
0449 C      INTEGER ILIST(7), STRING(2), IERR
0450 C      REAL DUMMY
0451 C
0452 C      ILIST - Information list returned by ZIWS
0453 C      IERR  - Error information returned by ZIWS (not used here)
0454 C      DUMMY - Real information returned by ZIWS (none in this case)
0455 C      STRING - Device-dependent commands that clear a 264X terminal
0456 C
0457 C      DATA STRING /15550B,          15512B/
0458 C                   /          \      /          \
0459 C                   33B   +  150B    33B   +  112B
0460 C                   esc     h        esc     J
0461 C                   (home cursor)    (clear display)
0462 C
0463 C*****
0464 C
0465 C      Inquire the status of the alphanumeric device:
0466 C      upon return, ILIST(4) = -1 ==> no alpha device,
0467 C                           = 0 ==> it is disabled,
0468 C                           = 1 ==> it is enabled.
0469 C      If it is not enabled, just return.
0470 C
0471 C      CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0472 C      IF (IERR .EQ. 0) GO TO 7070
0473 C      CALL ERRMS (1,IERR,6HZIWS )
0474 C      GO TO 9999
0475 C      7070 IF (ILIST(4) .NE. 1) GOTO 9999
0476 C
0477 C      Alpha device is enabled. Make sure it is '264X' type then clear.
0478 C

```

```

0479      IF (ILIST(1) .NE. 2H26) GOTO 9999
0480      IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0481      CALL ZALPH (4,STRING)
0482  C
0483      9999 RETURN
0484      END
0485  C
0486  C*****
0487  C
0488  C                      SUBROUTINE VPMAX
0489  C
0490  C  PURPOSE:           Set the viewport to the maximum limits.
0491  C
0492  C  DESCRIPTION:      The current viewport is saved in VIEW.  The viewport
0493  C                    is then set to the maximum limits.
0494  C
0495  C  CALLING SEQUENCE:  CALL VPMAX (VIEW)
0496  C
0497  C  PARAMETERS:
0498  C                    VIEW:  [REAL ARRAY OF 4];  This array contains the
0499  C                    viewport before it was
0500  C                    maxumized.
0501  C
0502  C*****
0503  C
0504      SUBROUTINE VPMAX (VIEW)
0505      REAL VIEW(4)
0506  C
0507      INTEGER IDUM
0508      REAL AR(2), NEWX, NEWY
0509  C
0510  C  IDUM    - Dummy work variable
0511  C  AR      - Temp holder of the aspect ratio
0512  C  NEWX    - Temp work variable
0513  C  NEWY    - Temp work variable
0514  C
0515  C*****
0516  C
0517  C  Inquire current viewport and save it in array VIEW
0518  C
0519      CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0520      IF (IERR .EQ. 0) GO TO 8080
0521      CALL ERRMS (1,IERR,6HZIWS )
0522      GO TO 9999
0523  C
0524  C  Inquire the maximum aspect ratio
0525  C
0526      8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0527  C
0528  C  Set viewport to maximum dimensions
0529  C
0530      NEWY = 1.
0531      NEWX = 1.
0532      IF (AR(2) .LE. 1.) NEWY = AR(2)
0533      IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0534      CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0535  C
0536      9999 RETURN
0537      END
0538      END$

```

&WR1ST T=00004 IS ON CR00002 USING 000B4 BLKS R=0522

```

0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR1ST
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Segment WR1ST is the segment of WR15 that plots a
0021 C *          graph on the terminal.  It is read in and control passed
0022 C *          to it by an EXEC(8,WR1ST) call from segment WR15C after
0023 C *          a scan is finished.  WR1ST then displays a graph on the
0024 C *          CRT of the attenuation versus position for each
0025 C *          frequency, with a marker equal to the frequency number.
0026 C *          frequency.  When this segment finishes, this graph is
0027 C *          still displayed while the next scan is done and is erased
0028 C *          before the next graph is plotted.  The last graph is
0029 C *          displayed while the antennae are repositioned and then
0030 C *          WR15C turns off the graphic display without erasing it.
0031 C *          The user can reenale the display by pressing the "SHIFT"
0032 C *          and "G CURSOR" keys.  When this segment is finished, it
0033 C *          calls EXEC(8,WR15C) to read in WR15C and pass control to
0034 C *          it.
0035 C *****
0036 C PROGRAM WR1ST,S
0037 C
0038 C   DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0039 C *       ISIZE(2),ITITL(40),PLUNIT(2)
0040 C   INTEGER STATUS, GOUTLU, CRT, PRNT
0041 C   COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0042 C *       IAEND,TEMP1,TEMP2,IRNUM,RSTEPS,IEND,PRESRO,IDCB,NAMEF,
0043 C *       ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0044 C *       PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0045 C   EQUIVALENCE (CRT, GOUTLU)
0046 C
0047 C STATUS - Set to zero if no errors occur in a called routine
0048 C GOUTLU - The LU of the graphics output device
0049 C
0050 C*****
0051 C
0052 C-----
0053 C Initialize DGL system
0054 C-----
0055 C   WRITE(CRT,520)
0056 C   0520 FORMAT(" ")
0057 C   CALL ZBEGN
0058 C-----

```

```

0059 C Enable all devices, exit if any errors
0060 C-----
0061 CALL ENDEV (CRT,GOUTLU,STATUS)
0062 IF (STATUS .NE. 0) GOTO 9990
0063 C-----
0064 C Find minimum and maximum values.
0065 C-----
0066 XMIN = DAT(1,1)
0067 XMAX = DAT(1,IAEND)
0068 YMIN = 100000.
0069 YMAX = -100000.
0070 DO 5100 K = 0, IFEND - 1
0071 DO 5100 I=1+(IAEND+1)*K, IAEND+(IAEND+1)*K
0072 IF (DAT(2,I) .GT. YMAX) YMAX = DAT(2,I)
0073 IF (DAT(2,I) .LT. YMIN) YMIN = DAT(2,I)
0074 5100 CONTINUE
0075 IF (ABS(YMIN) .NE. YMIN) GO TO 5300
0076 YMIN = INT (YMIN)
0077 GO TO 5400
0078 5300 YMIN = INT (YMIN - .999)
0079 5400 IF (ABS(YMAX) .NE. YMAX) GO TO 5500
0080 YMAX = INT (YMAX + .999)
0081 GO TO 5600
0082 5500 YMAX = INT (YMAX)
0083 5600 IF ((YMAX-YMIN) .LT. 6.) YMAX = YMIN + 6.
0084 IF (ABS(XMIN) .NE. XMIN) GO TO 5700
0085 XMIN = INT (XMIN)
0086 GO TO 5800
0087 5700 XMIN = INT (XMIN - .999)
0088 5800 IF (ABS(XMAX) .NE. XMAX) GO TO 5900
0089 XMAX = INT (XMAX + .999)
0090 GO TO 5950
0091 5900 XMAX = INT (XMAX)
0092 C-----
0093 C Perform the viewing transformation, exit if any errors
0094 C-----
0095 5950 CALL VIEWT (STATUS,XMIN,XMAX,YMIN,YMAX)
0096 IF (STATUS .NE. 0) GOTO 9990
0097 C-----
0098 C Draw axis and label, then plot.
0099 C-----
0100 CALL DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0101 GO TO 9000
0102 C-----
0103 C Disable logical devices
0104 C-----
0105 C6000 CALL ZNEWF
0106 C CALL CLEAR
0107 6000 CALL ZAEND
0108 CALL ZDEND
0109 CALL ZEND
0110 C-----
0111 C Call EXEC to overlay this segment with WR15C and execute it.
0112 C-----
0113 9000 INAME(3) = 2HC
0114 CALL EXEC (ICODE, INAME)
0115 9990 CONTINUE
0116 C
0117 CALL ZAEND
0118 CALL ZDEND

```

```

0119 C-----
0120 C  Disable DGL system
0121 C-----
0122 C      CALL ZEND
0123 C-----
0124 C  Terminate program
0125 C-----
0126 C      9998 WRITE(CRT,9999)
0127 C      9999 FORMAT("")
0128 C      END
0129 C
0130 C*****
0131 C      ENDEV SUBROUTINE
0132 C
0133 C  PURPOSE:      This subroutine enables all logical devices used by
0134 C                the program.
0135 C
0136 C  DESCRIPTION:  This subroutine enables the DGL work station.  The DGL
0137 C                workstation contains alphanumeric and graphics output
0138 C                devices.
0139 C
0140 C  CALLING SEQUENCE:  CALL ENDEV(ALPHLU,GOUTLU,STATUS)
0141 C
0142 C  PARAMETERS:
0143 C                ALPHLU:  [INTEGER]; Alphanumeric LU
0144 C                GOUTLU:  [INTEGER]; Graphics output LU
0145 C                STATUS:  [INTEGER]; Set to zero if no errors occur
0146 C                        during initialization of the
0147 C                        workstation.  It is set to the
0148 C                        DGL error return value if an
0149 C                        error is found.
0150 C
0151 C*****
0152 C
0153 C      SUBROUTINE ENDEV(ALPHLU,GOUTLU,STATUS)
0154 C
0155 C      INTEGER ALPHLU, GOUTLU, STATUS
0156 C      INTEGER CONTRL
0157 C-----
0158 C  If an error occurs, write out an error message, and return.
0159 C
0160 C  Enable alphanumeric device
0161 C-----
0162 C      CALL ZAIN (ALPHLU,STATUS)
0163 C      IF (STATUS .EQ. 0) GOTO 1000
0164 C      CALL ERRMS (ALPHLU,STATUS,6HZAIN )
0165 C      1000 CONTINUE
0166 C-----
0167 C  Enable graphical display device w/out spooling; e.g. CONTRL = 0.
0168 C-----
0169 C      CONTRL = 0
0170 C      CALL ZDINT (GOUTLU,CONTRL,STATUS)
0171 C      IF (STATUS .EQ. 0) GOTO 9999
0172 C      CALL ERRMS (ALPHLU,STATUS,6HZDINT )
0173 C      9999 CONTINUE
0174 C-----
0175 C  Return to main program after all devices are properly enabled
0176 C-----
0177 C      RETURN
0178 C      END

```

```

0179 C
0180 C*****
0181 C
0182 C          SUBROUTINE VIEWT
0183 C
0184 C  PURPOSE:      This subroutine performs the initial viewing
0185 C                transformation.
0186 C
0187 C  DESCRIPTION:   This subroutine performs the viewing transformation in
0188 C                the following steps:
0189 C
0190 C                - Places the image on the largest possible area
0191 C                - Sets the window to the desired range.
0192 C                - Resets the viewport to leave room for labels
0193 C                - Recomputes character size based on specified window
0194 C
0195 C  CALLING SEQUENCE:  CALL VIEWT
0196 C
0197 C  PARAMETERS:      NONE
0198 C
0199 C*****
0200 C
0201 C          SUBROUTINE VIEWT(STATUS,WXMIN,WXMAX,WYMIN,WYMAX)
0202 C
0203 C          INTEGER IDUM, IERR
0204 C          REAL AR(2),VIEW(4),XSIZE,YSIZE,XCSIZ,YCSIZ
0205 C          REAL WXMIN,WXMAX,WYMIN,WYMAX,MINX,MAXX,MINY,MAXY
0206 C
0207 C  IDUM      - Dummy var
0208 C  IERR      - Error return (not used)
0209 C  AR        - Holds aspect ratio
0210 C  VIEW      - Holds current viewport bounds
0211 C  XSIZE     - Temp work variable
0212 C  YSIZE     - Temp work variable
0213 C  XCSIZ     - Temp holder of character size X
0214 C  YCSIZ     - Temp holder of character size Y
0215 C  WXMIN     - Temp holder of window X - min
0216 C  WXMAX     - Temp holder of window X - max
0217 C  WYMIN     - Temp holder of window Y - min
0218 C  WYMAX     - Temp holder of window Y - max
0219 C  MINX      - Temp holder of new viewport X - min
0220 C  MAXX      - Temp holder of new viewport X - max
0221 C  MINY      - Temp holder of new viewport Y - min
0222 C  MAXY      - Temp holder of new viewport Y - max
0223 C
0224 C*****
0225 C
0226 C  Inquire aspect ratio of logical display limits
0227 C-----
0228 C          CALL ZIWS (254,0,2,IDUM,AR,IERR)
0229 C          IF (IERR .EQ. 0) GO TO 555
0230 C          CALL ERRMS (1,IERR,6HZIWS )
0231 C          GO TO 9999
0232 C-----
0233 C  Make the largest possible area of the logical display available
0234 C  for graphical output by setting the aspect ratio(AR).
0235 C-----
0236 C          555 YSIZE = AR(2)
0237 C              XSIZE = 1.0
0238 C          CALL ZASPK (XSIZE,YSIZE)

```

```

0239 C-----
0240 C Specify the desired range of X and Y values of the window
0241 C-----
0242 CALL ZWIND (WXMIN,WXMAX,WYMIN,WYMAX)
0243 C-----
0244 C Inquire current viewport limits
0245 C-----
0246 CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0247 IF (IERR.EQ. 0) GO TO 577
0248 CALL ERRMS (1,IERR,6HZIWS )
0249 GO TO 9999
0250 C-----
0251 C Calculate the lower left hand corner of the viewport and leave
0252 C enough room for labels. The viewport is reduced 12% on each side
0253 C to give room for labels. Set the new viewport
0254 C-----
0255 577 MINX = .12 * VIEW(2)
0256 MAXX = .88 * VIEW(2)
0257 MINY = .12 * VIEW(4)
0258 MAXY = .88 * VIEW(4)
0259 CALL ZVIEW (MINX,MAXX,MINY,MAXY)
0260 C-----
0261 C Now set the character size based on the size of the window
0262 C The constants below produce a readable character size in the new
0263 C window.
0264 C-----
0265 XCSIZ = .015 * (WXMAX - WXMIN)
0266 YCSIZ = .025 * (WYMAX - WYMIN)
0267 CALL ZCSIZ (XCSIZ,YCSIZ)
0268 C
0269 9999 RETURN
0270 END
0271 C*****
0272 C SUBROUTINE DRWDT
0273 C
0274 C PURPOSE: This subroutine draws the current graph.
0275 C
0276 C DESCRIPTION: This subroutine clears the alphanumeric and graphics
0277 C displays. It then draws the current graph. Note
0278 C that if the user has not changed any data values
0279 C the default values will be used.
0280 C
0281 C CALLING SEQUENCE: CALL DRWDT
0282 C
0283 C PARAMETERS: NONE
0284 C
0285 C*****
0286 C
0287 SUBROUTINE DRWDT(XMIN,XMAX,YMIN,YMAX,DAT,IAEND,IFEND)
0288 REAL DAT(3,520)
0289 DIMENSION ILIST(3)
0290 INTEGER TEXT(12),OPCODE,RSIZE
0291 C
0292 REAL VIEW(4)
0293 C
0294 C VIEW - Temp holder of viewport bounds
0295 C
0296 C*****
0297 C
0298 C Clear the graphics and alphanumeric displays

```

```

0299 C-----
0300     CALL ZNEWF
0301     CALL CLEAR
0302 C-----
0303 C Determine parameters for LAX
0304 C-----
0305 C-----
0306     XTIC = (XMAX-XMIN)/10.0
0307     YTIC = (YMAX-YMIN) / 10.0
0308     XORG = XMIN
0309     YORG = YMIN
0310     XMJC = 1.0
0311     YMJC = 1.0
0312     TSIZE = .02
0313     CALL LAXES(XTIC,YTIC,XORG
0314 C-----
0315 C Plot the graph.
0316 C-----
0317     DO 5500 K = 0, IFEND - 1
0318     KM = MOD(K+10,19) + 1
0319     IK = (IAEND + 1) * K
0320     CALL ZMOVE(DAT(1,1+IK),DA
0321     DATM = XMIN
0322     DO 5000 I=2+IK, IAEND+IK
0323     CALL ZDRAW(DAT(1,I),DAT(2
0324     IF (DAT(1,I) .LT. DATM) G
0325     DATM = DATM + 5.
0326     CALL ZMARK(KM)
0327     5000 CONTINUE
0328     5500 CONTINUE
0329 C-----
0330 C Change the viewport to the r
0331 C placed anywhere on the view
0332 C reset the viewport.
0333 C-----

```

```

0342     TEXT(8) = 2H10
0343     TEXT(9) = 2Hn
0344     TEXT(10) = 2H(m
0345     TEXT(11) = 2Hm)
0346     TEXT(12) = 6412B
0347     NMTEXT = 24
0348     XTEXT = 0.0
0349     YTEXT = YMIN + (YMAX-YM
0350 C
0351     CALL ZMOVE (XTEXT,YTEXT
0352     OPCODE=1052
0353     ISIZE=1
0354     RSIZE=0
0355     ILIST(1)=6
0356     CALL ZOESC(OPCODE,ISIZE
0357     IF (IERR .EQ. 0) GO TO
0358     CALL ERRMS (1,IERR,6H

```

```

0359 6010 CALL ZTEXT (NMTEXT,TEXT)
0360 C
0361 C CALL ZIESC(3050,3,0,ILIST,RLIST,IERR)
0362 C IF (IERR .EQ. 0) GO TO 6020
0363 C CALL ERRMS (1,IERR,6HZIESC )
0364 C GO TO 9999
0365 6020 TEXT(1) = 2HAt
0366 TEXT(2) = 2Hte
0367 TEXT(3) = 2Hnu
0368 TEXT(4) = 2Hat
0369 TEXT(5) = 2Hio
0370 TEXT(6) = 2Hn
0371 TEXT(7) = 2H(d
0372 TEXT(8) = 2Hb)
0373 TEXT(9) = 6412B
0374 NMTEXT = 18
0375 XTEXT = XMIN + (XMAX -XMIN)/30.0
0376 YTEXT = YMIN + (YMAX-YMIN)/2.0
0377 OPCODE = 1050
0378 ILIST(1) = 1
0379 ISIZE = 1
0380 RSIZE = 0
0381 CALL ZMOVE(XTEXT,YTEXT)
0382 CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0383 IF (IERR .EQ. 0) GO TO 6030
0384 CALL ERRMS (1,IERR,6HZOESC )
0385 GO TO 9999
0386 6030 CALL ZTEXT(NMTEXT,TEXT)
0387 OPCODE=1050
0388 ILIST(1) = 0
0389 ISIZE = 1
0390 RSIZE = 0
0391 CALL ZOESC(OPCODE,ISIZE,RSIZE,ILIST,RLIST,IERR)
0392 IF (IERR .EQ. 0) GO TO 6040
0393 CALL ERRMS (1,IERR,6HZOESC )
0394 GO TO 9999
0395 C
0396 6040 CALL ZVIEW (VIEW(1),VIEW(2),VIEW(3),VIEW(4))
0397 CALL ZMCUR
0398 C
0399 9999 RETURN
0400 END
0401 C
0402 C*****
0403 C SUBROUTINE ERRMS
0404 C
0405 C PURPOSE: To write out an error message.
0406 C
0407 C DESCRIPTION: This subroutine writes an error message to the alphanumeric
0408 C LU. The error number and DGL subroutine name that the error
0409 C occurred during is reported.
0410 C
0411 C CALLING SEQUENCE: CALL ERRMS(ALPHLU,ERROR,SUBR)
0412 C
0413 C PARAMETERS:
0414 C ALPHLU: [INTEGER]; The alphanumeric LU
0415 C
0416 C ERROR: [INTEGER]; The error number of the error to
0417 C reported
0418 C

```

```

0419 C          SUBR:      [INTEGER];  An array containing the name of
0420 C                               the subroutine where the error occurred.
0421 C
0422 C*****
0423 C
0424 C          SUBROUTINE ERRMS (ALPHLU,ERROR,SUBR)
0425 C          INTEGER ALPHLU,ERROR,SUBR(3)
0426 C
0427 C      Write out the error message
0428 C
0429 C          CALL ZMCUR
0430 C          WRITE(ALPHLU,100) ERROR, SUBR
0431 C      100 FORMAT(" Error ",I2," occurred in subroutine ",3A2)
0432 C
0433 C          RETURN
0434 C          END
0435 C
0436 C*****
0437 C          SUBROUTINE CLEAR
0438 C
0439 C      PURPOSE:      To clear the alphanumeric display
0440 C
0441 C      DESCRIPTION:  This subroutine will clear the alphanumeric display
0442 C                   of a HP 2647 or HP 2648 terminal.  If the display is
0443 C                   not a HP 2647 or HP 2648 then the call has no effect.
0444 C
0445 C      CALLING SEQUENCE: CALL CLEAR
0446 C
0447 C      PARAMETERS:      NONE
0448 C
0449 C*****
0450 C
0451 C          SUBROUTINE CLEAR
0452 C          INTEGER ILIST(7), STRING(2), IERR
0453 C          REAL DUMMY
0454 C
0455 C      ILIST - Information list returned by ZIWS
0456 C      IERR - Error information returned by ZIWS (not used here)
0457 C      DUMMY - Real information returned by ZIWS (none in this case)
0458 C      STRING - Device-dependent commands that clear a 264X terminal
0459 C
0460 C          DATA STRING /15550B,          15512B/
0461 C                   /      \      \      /      \
0462 C                   33B   +   150B       33B   +   112B
0463 C                   esc   h             esc   J
0464 C                   (home cursor)       (clear display)
0465 C
0466 C*****
0467 C
0468 C      Inquire the status of the alphanumeric device:
0469 C      upon return, ILIST(4) = -1 ==> no alpha device,
0470 C                           = 0 ==> it is disabled,
0471 C                           = 1 ==> it is enabled.
0472 C      If it is not enabled, just return.
0473 C
0474 C          CALL ZIWS (7050,7,0,ILIST,DUMMY,IERR)
0475 C          IF (IERR .EQ. 0) GO TO 7070
0476 C          CALL ERRMS (1,IERR,6HZIWS )
0477 C          GO TO 9999
0478 C      7070 IF (ILIST(4) .NE. 1) GOTO 9999

```

```

0479 C
0480 C Alpha device is enabled. Make sure it is '264X' type then clear.
0481 C
0482 IF (ILIST(1) .NE. 2H26) GOTO 9999
0483 IF ((ILIST(2) .NE. 2H47) .AND. (ILIST(2) .NE. 2H48)) GOTO 9999
0484 CALL ZALPH (4,STRING)
0485 C
0486 9999 RETURN
0487 END
0488 C
0489 C*****
0490 C
0491 C SUBROUTINE VPMAX
0492 C
0493 C PURPOSE: Set the viewport to the maximum limits.
0494 C
0495 C DESCRIPTION: The current viewport is saved in VIEW. The viewport
0496 C is then set to the maximum limits.
0497 C
0498 C CALLING SEQUENCE: CALL VPMAX (VIEW)
0499 C
0500 C PARAMETERS:
0501 C VIEW: [REAL ARRAY OF 4]; This array contains the
0502 C viewport before it was
0503 C maximized.
0504 C
0505 C*****
0506 C
0507 SUBROUTINE VPMAX (VIEW)
0508 REAL VIEW(4)
0509 C
0510 INTEGER IDUM
0511 REAL AR(2), NEWX, NEWY
0512 C
0513 C IDUM - Dummy work variable
0514 C AR - Temp holder of the aspect ratio
0515 C NEWX - Temp work variable
0516 C NEWY - Temp work variable
0517 C
0518 C*****
0519 C
0520 C Inquire current viewport and save it in array VIEW
0521 C
0522 CALL ZIWS (451,0,4,IDUM,VIEW,IERR)
0523 IF (IERR .EQ. 0) GO TO 8080
0524 CALL ERRMS (1,IERR,6HZIWS )
0525 GO TO 9999
0526 C
0527 C Inquire the maximum aspect ratio
0528 C
0529 8080 CALL ZIWS (254,0,2,IDUM,AR,IERR)
0530 C
0531 C Set viewport to maximum dimensions
0532 C
0533 NEWY = 1.
0534 NEWX = 1.
0535 IF (AR(2) .LE. 1.) NEWY = AR(2)
0536 IF (AR(2) .GT. 1.) NEWX = 1./AR(2)
0537 CALL ZVIEW (0.0,NEWX,0.0,NEWY)
0538 C

```

0539 9999 RETURN
0540 END
0541 END\$

&WR16M T=00004 IS ON CR32767 USING 00013 BLKS R=0086

```
0001 FTN4,L
0002 C 24998-18466 REV.2040 (810304.1057)
0003 C*****
0004 C
0005 C          PROGRAM WR16
0006 C
0007 C  DESCRIPTION:
0008 C  WR16 is designed to obtain microwave S11 measurements at different
0009 C  points along a raster scan and to store the data in a disc file.
0010 C  This program has been divided into four segments because it cannot
0011 C  fit into memory otherwise. The main segment always remains in
0012 C  memory. Segment WR16C is the control segment, which is the first
0013 C  one read in by the main segment. The other two are WR15G, which
0014 C  plots on the plotter and WR15T, which plots on the terminal.
0015 C  WR16C gives the user a choice of where to plot for each run, so
0016 C  essentially, for each run there are only three segments. The
0017 C  two segments beside the main overlay each other by one segment
0018 C  calling EXEC(8, other segment name) to read in the other
0019 C  segment over the calling segment and then pass control to it.
0020 C  It can return to the calling segment only by calling EXEC(8,
0021 C  other segment name) again.
0022 C  This segment is the main segment. It is run by typing in:
0023 C          RU,WR16
0024 C  This segment only defines common, initializes variables, and
0025 C  then calls EXEC(8,WR16C) to read in and pass control to segment
0026 C  WR16C.
0027 C
0028 C*****
0029 C
0030 C          PROGRAM WR16
0031 C
0032 C          DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0033 C          *          ISIZE(2),ITITL(40),PLUNIT(2)
0034 C          INTEGER CRT,PRNT
0035 C          COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0036 C          *          IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESL,IDCB,NAMEF,
0037 C          *          ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0038 C          *          PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0039 C          COMMON/AGS2C/ D(10)
0040 C          IRNUM = 1
0041 C          CRT = 1
0042 C          IPRNM(1) = 1HW
0043 C          IPRNM(2) = 1HR
0044 C          IPRNM(3) = 1H1
0045 C          IPRNM(4) = 1H6
0046 C          IPRNL = 4
0047 C          MESS = -1
0048 C          ASTEPS = 5
0049 C          IAEND = 4
0050 C          ESTEPS = 30
0051 C          IEEND = 3
0052 C          IPEND = 1
0053 C          ISEND = 1
0054 C          IDONE = 0
0055 C          PRESAZ = 999.9
0056 C          IPFLAG = 1
0057 C          ILFLAG = 1
0058 C          PLUNIT(1) = 4H - C
```

```

0059      PLUNIT(2) = 4HRT
0060      IGRLOC = 1
0061      IFEND = 1
0062      NAMEF(1) = 2HSC
0063      NAMEF(2) = 2HS1
0064      NAMEF(3) = 2H10
0065      PRNT = 6
0066      CALL FILE2(1)
0067      TEMP1 = D(1)
0068      TEMP2 = (D(3) - 1) * D(2) + D(1)
0069      RFREQ = D(1)
0070 C-----
0071 C  Call EXEC to read in segment WR16C and pass control to it.
0072 C-----
0073 C
0074      ICODE=8
0075      INAME(1)=2HWR
0076      INAME(2)=2H16
0077      INAME(3)=2HC
0078      CALL EXEC (ICODE, INAME)
0079      END
0080 C
0081 C  Block data routine for AGS2C
0082 C
0083      BLOCK DATA AGS2C
0084      COMMON /AGS2C/ I(2330)
0085      END
0086      END$

```

&WR16C T=00004 IS ON CR32767 USING 00097 BLKS R=0545

```
0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR16C
0005 C *
0006 C *          ++++++
0007 C *          FDR:  Walter Reed Army Institute of Research
0008 C *                  Department of Microwave Research
0009 C *                  Walter Reed Army Medical Center
0010 C *                  Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                  P.O. Box 55333
0016 C *                  Fort Washington, Maryland 20744
0017 C *                  Phone: (301) 292-2592
0018 C *
0019 C *          -----
0020 C *          Segment WR16C is the control segment of WR16.  It puts
0021 C *          out a menu with the options:
0022 C *          1 - Enter the number of azimuth steps and step size.
0023 C *          2 - Enter the number of elevation steps and step size.
0024 C *          3 - Enter the microwave frequency.
0025 C *          4 - Set antennae to a new azimuth position.
0026 C *          5 - Set antennae to a new elevation position.
0027 C *          6 - Enter number of readings to average for each point.
0028 C *          7 - Request graphs on the CRT.
0029 C *          10 - List on the printer.
0030 C *          11 - Enter number of frequency steps and step size.
0031 C *          8 - Scan from the present position
0032 C *          9 - Terminate the program.
0033 C *          After 8 is chosen, the antennae are positioned at the
0034 C *          present position-(number of data points-1)*step size/2.
0035 C *          The amplitude and phase are each averaged over the number
0036 C *          of readings specified in 6 and saved in the array DAT
0037 C *          along with the position.  Then the antennae are advanced
0038 C *          by step size and the amplitude and phase are read again.
0039 C *          This is repeated for the specified number of steps per
0040 C *          scan.
0041 C *          After each scan, the data accumulated in array DAT is
0042 C *          read out to a disc file, SCS11A.  If there is a file
0043 C *          with that name already, the last letter is incremented.
0044 C *          After the data is read out, elevation is incremented by
0045 C *          elevation step size and the whole process repeated for
0046 C *          the number of elevation steps.
0047 C *
0048 C *          *****
0049 C          PROGRAM WR16C,S
0050          DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0051          *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0052          *          PLUNIT(2),FAT(1560),INA15(3)
0053          INTEGER CRT,PRNT
0054          COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0055          *          IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESL,IDCB,NAMEF,
0056          *          ISIZE,LDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0057          *          PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLUC
0058          EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
```

```

0059 C
0060 COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,ONLY,
0061 *CM(4,112),IHEAD(40),IDATE(15)
0062 DATA LUAZ/31/,LUEL/35/,I1/15446B/,INA15/2HWR,2H15,2HT /
0063 C-----
0064 C Set number of scans if plots requested.
0065 C-----
0066 C If start of program, go to menu.
0067 IF (PRESAZ .EQ. 999.9) GO TO 525
0068 C If graphing on screen, do not list data there.
0069 IF (IGRLOC .EQ. 1) ILFLAG = 0
0070 C If finished with run, go reset position.
0071 IF (IDONE .GE. IEEND) GO TO 515
0072 C If plotting every scan, go do next scan.
0073 IF (IPEND .EQ. 1) GO TO 8701
0074 IF (IDONE .NE. 1) GO TO 511
0075 IF (IPEND .GT. IEEND) GO TO 513
0076 C Plotted first scan so now get back on schedule.
0077 ISEND = IPEND - 1
0078 GO TO 8701
0079 511 IF (IDONE+IPEND .GT. IEEND) GO TO 513
0080 C Plot every specified scan.
0081 ISEND = IPEND
0082 GO TO 8701
0083 C Scan to end of run without plotting.
0084 513 ISEND = IEEND - IDONE
0085 IPFLAG = -1
0086 GO TO 8701
0087 C-----
0088 C Reset original position.
0089 C-----
0090 515 WRITE (CRT, 519)
0091 519 FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0092 * "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0093 * /,1X,"PLEASE EXCUSE THE DELAY")
0094 CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0095 IF (IERR .EQ. 0) GO TO 522
0096 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0097 GO TO 9090
0098 522 PRESEL = PRESEL - ESTEPS*(IEEND-1)
0099 CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0100 IF (IERR .EQ. 0) GO TO 523
0101 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0102 GO TO 9090
0103 C Reset parameters to original values.
0104 523 IF (IPFLAG .EQ. 0) GO TO 525
0105 ISEND = 1
0106 IPFLAG = 1
0107 ILFLAG = 1
0108 525 IDONE = 0
0109 C-----
0110 C Clear screen and print heading and menu.
0111 C-----
0112 WRITE(CRT,529)
0113 0529 FORMAT("
0114 * 10X,55'*',/,
0115 *10X,"*",20X,"PROGRAM WR16",20X,"*",/,
0116 *10X,"*",15X,"S21 RASTER SCAN PROGRAM",15X,"*",/,
0117 *10X,55'*',/)
0118 530 CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)

```

```

0119     IF (IERR .EQ. 0) GO TO 540
0120     CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0121     GO TO 9090
0122 540  CALL WR1 (CRT, LUEL, PRESEL, IERR, 0)
0123     IF (IERR .EQ. 0) GO TO 550
0124     CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0125     GO TO 9090
0126 550  IF (PRNT .EQ. 0) GO TO 555
0127     PRNTL(1) = 4H PRI
0128     PRNTL(2) = 4HNT
0129     GO TO 560
0130 555  PRNTL(1) = 4HNO P
0131     PRNTL(2) = 4HPRINT
0132 560  WRITE(CRT, 600) IAEND, ASteps, IEEND, ESteps, RFREQ, PRESZ, PRESEL,
0133     *IRNUM, IPEND, (PLUNIT(I), I=1, 2), (PRNTL(I), I=1, 2), IFEND, FSteps
0134 0600 FORMAT(" PROGRAM PARAMETER ENTRY", 30X, "PRESENT VALUES", /,
0135     *" 1 - Number of azimuth steps and step size.....",
0136     *I3, " x", F6.2, " mm", /,
0137     *" 2 - Number of elevation steps and step size.....",
0138     *I3, " x", F6.2, " mm", /,
0139     *" 3 - Microwave frequency.....",
0140     *F7.0, " MHz", /,
0141     *" 4 - Azimuth position.....",
0142     *F8.3, " mm", /,
0143     *" 5 - Elevation position.....",
0144     *F8.3, " mm", /,
0145     *" 6 - Number of readings to average per point.....", I5, /,
0146     *" 7 - Number of scans per graphs.....", I5, 1X, 2A4, /,
0147     *" 10 - Toggle switch for listing on printer.....", 2X, 2A4, /,
0148     *" 11 - Number of frequency steps and step size.....",
0149     *I3, " x", F5.0, " MHz", /,
0150     *" EXECUTION OPTIONS", /,
0151     *" 8 - Scan from the present position.", /,
0152     *" 9 - Terminate the program.", /)
0153 610  WRITE (CRT, 619)
0154 C   Clear old prompt with Esc h Esc J.
0155 0619 FORMAT ("")
0156 620  WRITE (CRT, 629)
0157 629  FORMAT (1X, "SELECT OPTION NUMBER _")
0158     READ(CRT, *) IANS
0159     IF (IANS .EQ. 9999) GO TO 9090
0160     IF (IANS .EQ. 10) GO TO 700
0161     IF (IANS .EQ. 11) GO TO 800
0162     IF (IANS .EQ. 9) GO TO 9090
0163     IF (IANS .EQ. 8) GO TO 8000
0164     IF (IANS .EQ. 7) GO TO 7000
0165     IF (IANS .EQ. 6) GO TO 6000
0166     IF (IANS .EQ. 5) GO TO 5000
0167     IF (IANS .EQ. 4) GO TO 4000
0168     IF (IANS .EQ. 3) GO TO 3000
0169     IF (IANS .EQ. 2) GO TO 2000
0170     IF (IANS .EQ. 1) GO TO 1000
0171     WRITE (CRT, 659)
0172 659  FORMAT (/, 1X, "ERROR # WR16 - 20001 .....(WR16)", /, 1X,
0173     *" INCORRECT RESPONSE. ENTER ANY NUMBER FROM 1 TO 11.")
0174     GO TO 620
0175 -----
0176 C   Set to print on printer.
0177 C -----
0178 700  IF (PRNT .EQ. 6) GO TO 750

```

```

0179      PRNT = 6
0180      PRNTL(1) = 4H PRI
0181      PRNTL(2) = 4HNT
0182      GO TO 760
0183 750   PRNT = 0
0184      PRNTL(1) = 4HNO P
0185      PRNTL(2) = 4HRINT
0186      760 WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0187      769 FORMAT (1A2, "a 54c 13Y",2A4)
0188      GO TO 610
0189 C-----
0190 C  Inquire from user:  frequency step size and number of steps.
0191 C-----
0192      800 WRITE (CRT,809)
0193      809 FORMAT (/ ,1X,"Enter the number of frequency steps.  _")
0194      READ (CRT,*) IFEND
0195      IF (IFEND .EQ. 9999) GO TO 9090
0196      IF ((IFEND .GT. 0) .AND. (IFEND*(IAEND+1) .LE. 520)) GO TO 825
0197      WRITE (CRT,819)
0198      819 FORMAT (/ ,1X,"ERROR # WR16 - 20002 .....(WR16)",/,
0199      * 1X,"NUMBER OF STEPS MUST BE FROM 1 TO 520/(AZIMUTH STEPS + 1).",
0200      *      / ,1X,"REENTER THE NUMBER OF FREQUENCY STEPS.")
0201      GO TO 800
0202      825 WRITE (CRT,829)
0203      829 FORMAT (/ ,1X,"Enter the frequency step size (MHz).  _")
0204      READ (CRT,*) FSTEPS
0205      IF (FSTEPS .EQ. 9999) GO TO 9090
0206      IF ((RFREQ+(IFEND-1)*FSTEPS) .LE. TEMP2) GO TO 850
0207      WRITE (CRT,3509) TEMP1, TEMP2
0208      READ (CRT, 839) IANS
0209      839  FORMAT (A2)
0210      IF (IANS .EQ. 2HYE) GO TO 9000
0211      GO TO 800
0212      850 WRITE (CRT,859) I1, IFEND, FSTEPS
0213      859 FORMAT (1A2, "a 52c 14Y", I3, " x", F5.0)
0214      GO TO 610
0215 C-----
0216 C  Inquire from the user:  azimuth step size and number of steps.
0217 C-----
0218      1000 WRITE(CRT,1100)
0219      1100 FORMAT(/ , " Enter the number of azimuth steps per scan.  _")
0220      READ(CRT,*) IAEND
0221      IF (IAEND .EQ. 9999) GO TO 9090
0222      IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IAEND .GT. 0)) GO TO 1190
0223      WRITE (CRT,1109)
0224      1109  FORMAT (/ ,1X,"ERROR # WR16 - 20203 .....(WR16)",/,
0225      * 1X,"NUMBER OF STEPS MUST BE FROM 1 TO 520/(FREQUENCY STEPS)-1.",/,
0226      *      1X,"REENTER THE NUMBER OF AZIMUTH STEPS.")
0227      GO TO 1000
0228      1190 WRITE(CRT,1200)
0229      1200 FORMAT(/ , " Enter the step size (mm).....  _")
0230      READ(CRT,*) ASTEPS
0231      IF (ASTEPS .EQ. 9999) GO TO 9090
0232      WRITE (CRT,1209) I1,IAEND,ASTEPS
0233      1209 FORMAT (1A2, "a 52c 6Y", I3, " x", F6.2)
0234      GO TO 610
0235 C-----
0236 C  Inquire from user:  elevation step size and number of steps.
0237 C-----
0238      2000 WRITE (CRT,2009)

```

```

0239 2009 FORMAT (/ ,1X,"Enter the number of elevation steps. _")
0240 READ (CRT,*) IEEND
0241 IF (IEEND .EQ. 9999) GO TO 9090
0242 IF (IEEND .GT. 0) GO TO 2028
0243 WRITE (CRT,2019)
0244 2019 FORMAT (/ ,1X,"ERROR # WR16 - 20404 .....(WR16)",/,
0245 * 1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0246 * 1X,"REENTER THE NUMBER OF ELEVATION STEPS.")
0247 GO TO 2000
0248 2028 WRITE (CRT,2029)
0249 2029 FORMAT (/ ,1X,"Enter the elevation step size (mm). _")
0250 READ (CRT,*) ESTEPS
0251 IF (ESTEPS .EQ.9999) GO TO 9090
0252 WRITE (CRT,2039) I1, IEEND, ESTEPS
0253 2039 FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0254 GO TO 610
0255 C-----
0256 C Inquire from the user: microwave frequency.
0257 C-----
0258 3000 WRITE(CRT,3500)
0259 3500 FORMAT(/," Enter the RF frequency (MHz)... _")
0260 READ(CRT,*) RFREQ
0261 IF (RFREQ .EQ. 9999) GO TO 9090
0262 IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0263 WRITE (CRT,3509) TEMP1, TEMP2
0264 3509 FORMAT (/ ,1X,"ERROR # WR16 - 20005 .....(WR16)",/,1X,
0265 * "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0266 * /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0267 * /,1X,"Do you wish to recalibrate? (YES/NO) _")
0268 READ (CRT,3599) IANS
0269 3599 FORMAT (A2)
0270 IF (IANS .EQ. 2HYE) GO TO 9000
0271 GO TO 3000
0272 3600 WRITE (CRT, 3609) I1, RFREQ
0273 3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0274 GO TO 610
0275 C-----
0276 C Inquire new azimuth position and call WR6 to set it.
0277 C-----
0278 4000 WRITE (CRT,4090)
0279 4090 FORMAT (/ ,1X,"Enter new azimuth (mm). _")
0280 READ (CRT,*) PRESAZ
0281 IF (PRESAZ .EQ. 9999) GO TO 9090
0282 CALL SETPD (CRT,LUAZ,PRESAZ,2,IERR)
0283 IF (IERR .EQ. 0) GO TO 4400
0284 CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0285 GO TO 620
0286 4400 WRITE (CRT,4409) I1,PRESAZ
0287 4409 FORMAT (1A2,"a 52c 9Y",F8.3)
0288 GO TO 610
0289 C-----
0290 C Inquire new elevation and call WR6 to set it.
0291 C-----
0292 5000 WRITE (CRT,5090)
0293 5090 FORMAT (/ ,1X,"Enter new elevation _")
0294 READ (CRT,*) PRESEL
0295 IF (PRESEL .EQ. 9999) GO TO 9090
0296 CALL SETPD (CRT, LUEL, PRESEL, 4, IERR)
0297 IF (IERR .EQ. 0) GO TO 5500
0298 CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)

```

```

0299      GO TO 620
0300      5500 WRITE (CRT,5509) I1, PRESEL
0301      5509 FORMAT (1A2,"a 52c 10Y",F8.3)
0302      GO TO 610
0303  C-----
0304  C   Inquire from the user: number of readings per data point.
0305  C-----
0306      6000 WRITE (CRT,6009)
0307      6009 FORMAT (/ ,1X,
0308      *      "Enter number of readings to average per data point. _")
0309      READ (CRT,*) IRNUM
0310      IF (IRNUM .EQ. 9999) GO TO 9090
0311      IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0)) GO TO 6600
0312      WRITE (CRT,6509)
0313      6509 FORMAT (/ ,1X,"ERROR # WR16 - 20006 .....(WR16)",/,
0314      *      1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0315      *      1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0316      GO TO 6000
0317      6600 WRITE (CRT, 6609) I1, IRNUM
0318      6609 FORMAT (1A2,"a 52c 11Y",I5)
0319      GO TO 610
0320  C-----
0321  C   Inquire from user:  number of scans per graph.
0322  C-----
0323      7000 WRITE (CRT,7009)
0324      7009 FORMAT (/ ,1X,"Enter number of scans between graphs on screen. _")
0325      READ (CRT,*) IPEND
0326      IF (IPEND .EQ. 9999) GO TO 9090
0327      IF (IPEND .GE. 0) GO TO 7500
0328      WRITE (CRT,7209)
0329      7209 FORMAT (/ ,1X,"ERROR # WR16 - 20007 .....(WR16)",/,
0330      *      1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0331      *      1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS ON CRT.")
0332      GO TO 7000
0333      7500 WRITE (CRT,7509)
0334      7509 FORMAT (/ ,1X,"Enter '1' to plot on CRT or '0' to plot on ",
0335      *      "plotter. _")
0336      READ (CRT,*) IGRLOC
0337      IPFLAG = 1
0338      PLUNIT(1) = 4H-PLO
0339      PLUNIT(2) = 4HTTER
0340      IF (IGRLOC .NE. 1) GO TO 7550
0341      PLUNIT(1) = 4H - C
0342      PLUNIT(2) = 4HRT
0343      7550 IF (IPEND .NE. 0) GO TO 7600
0344      IPFLAG = 0
0345      PLUNIT(1) = 4HGRAP
0346      PLUNIT(2) = 4HHS
0347      7600 ISEND = 1
0348      WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0349      7609 FORMAT (1A2,"a 52c 12Y",I5,1X,2A4)
0350      GO TO 610
0351  C-----
0352  C   Set antennae to first position and create disc data file.
0353  C-----
0354  C   Find title for file.
0355      8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0356      8009 FORMAT (/ ,1X,
0357      *      "Enter title of file or press 'RETURN' key for following title.",
0358      *      / ,40A2,/)

```

```

0359 C Blank out rest of 80 bytes of title.
0360 REG = EXEC (1,401B,ITITL,-80)
0361 IF (IREG(2) .EQ. 0) GO TO 8100
0362 IF (IREG(2) .GT. 78) GO TO 8060
0363 DO 8050 I = (IREG(2)+3)/2,40
0364 8050 ITITL(I) = 2H
0365 8060 IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0366 ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0367 C Set azimuth to -(1/2 of scan).
0368 8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0369 PARAM = POSITN
0370 CALL WR6(PARAM,IERR,2,0)
0371 IF (IERR .EQ. 0) GO TO 8200
0372 CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0373 GO TO 620
0374 8200 D(3) = 1
0375 C Record size = 3 double words * (steps in scan + 1).
0376 ISIZE(2) = 6 * (IAEND + 1)
0377 C Minimum record size = 128.
0378 IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0379 C File size = record size * (elevation steps * frequency steps + 1).
0380 ISIZE(1) = (ISIZE(2) * (IEEND * IFEND + 1) + 127)/128
0381 8300 NAMEF(3) = NAMEF(3) + 1
0382 CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0383 IF (IERR .GE. 0) GO TO 8450
0384 IF (IERR .EQ. -2) GO TO 8300
0385 WRITE (CRT,8409) IERR
0386 8409 FORMAT (/,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0387 GO TO 9090
0388 8450 IF (PRNT .EQ. 0) GO TO 8500
0389 C Print title and menu on line printer.
0390 WRITE (PRNT,8459) (ITITL(I),I=1,40),(NAMEF(I),I=1,3)
0391 8459 FORMAT ("1",40A2,/,1X,"FILE = ",3A2)
0392 WRITE (PRNT,600) IAEND,ASTEPS,IEEND,ESTEPS,RFREQ,PRESAZ,PRESL,
0393 * IRNUM,IPEND,PLUNIT,PRNTL,IFEND,FSTEPS
0394 8500 WRITE (CRT,8509) NAMEF
0395 8509 FORMAT (/,1X,"NAME OF DATA FILE IS ",3A2)
0396 C Put specifications in first record.
0397 CALL FTIME(IFAT)
0398 DO 8550 I=1,40
0399 8550 IFAT(15+I) = ITITL(I)
0400 IFAT(56) = 2HEL
0401 IFAT(57) = 0
0402 IFAT(58) = IAEND
0403 FAT(30) = ASTEPS
0404 IFAT(61) = 0
0405 IFAT(62) = IEEND
0406 FAT(32) = ESTEPS
0407 FAT(33) = RFREQ
0408 IFAT(67) = ISIZE(1)
0409 IFAT(68) = ISIZE(2)
0410 IFAT(69) = 0
0411 IFAT(70) = IFEND
0412 FAT(36) = FSTEPS
0413 ILFLAG = 1
0414 CALL WRITF (IDCB, IERR, FAT)
0415 IF (IERR .EQ. 0) GO TO 8700
0416 WRITE (CRT,8609) IERR
0417 8609 FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0418 GO TO 9090

```

```

0419 C-----
0420 C Elevation scan from PRESEL to PRESEL+ESTEPS*(IEEND-1) or until graph needed.
0421 C-----
0422 8700 IF (IPEND .EQ. 0) ISEND = IEEND
0423     ID = 1
0424     IDRCT = 1
0425 8701 DO 8900 J=1,ISEND
0426     IF (J + IDONE .EQ. 1) GO TO 8720
0427 C If not first scan, switch direction and increment elevation.
0428     IDRCT = -IDRCT
0429     PRESEL = PRESEL + ESTEPS
0430     PARAM = PRESEL
0431     CALL WR6 (PARAM, IERR, 4, 1)
0432     IF (IERR .EQ. 0) GO TO 8720
0433     CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0434     GO TO 9090
0435 8720 CALL WR1 (CRT, LUEL, TRUEL, IERR, 0)
0436     IF (IERR .EQ. 0) GO TO 8725
0437     CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0438     GO TO 9090
0439 C-----
0440 C Azimuth scan from PRESAZ-ASTEPS*(IAEND-1)/2 to PRESAZ+ASTEPS*(IAEND-1)/2
0441 C-----
0442 8725 DO 8800 I=1,IAEND
0443 C If break flag set, go back to menu.
0444     IF (IFBRK(IERR)) 523,8730
0445 8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0446     IF (IERR .EQ. 0) GO TO 8735
0447     CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0448     GO TO 9090
0449 C Do frequency scan at each position.
0450 8735 DO 8790 L=0,IFEND-1
0451     D(1) = RFREQ + L*FSTEPS
0452     YAVE = 0.
0453     XAVE = 0.
0454 C Loop for statistical averaging.
0455     DO 8750 K = 1,IRNUM
0456         CALL CURSS(1,4,1)
0457         CALL CPOL2(CM(1,1),X,Y)
0458         YAVE = YAVE + Y
0459 8750     XAVE = XAVE + X
0460         XAVE = XAVE / IRNUM
0461         YAVE = YAVE / IRNUM
0462         RLOSS = -10*ALOGT(XAVE**2)
0463         IF (ILFLAG .EQ. 0) GO TO 8780
0464         WRITE (CRT,8779) D(1),TRUAZ,RLOSS,YAVE
0465 8779     FORMAT (1X,"FREQ =",F6.0,5X,"AZIMUTH =",F8.3,5X,
0466     *         "RLOSS =",F9.4,5X,"PHASE =",F8.3)
0467 8780     IL = ID + L * (IAEND + 1)
0468         DAT(1,IL) = TRUAZ
0469         DAT(2,IL) = RLOSS
0470         DAT(3,IL) = YAVE
0471 8790     CONTINUE
0472     IF (I .GE. IAEND) GO TO 8800
0473     ID = ID + IDRCT
0474     POSITN = POSITN + IDRCT * ASTEPS
0475     PARAM = POSITN
0476     CALL WR6 (PARAM, IERR, 2, 0)
0477     IF (IERR .EQ. 0) GO TO 8800
0478     CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)

```

```

0479          GO TO 9090
0480      8800 CONTINUE
0481  C-----
0482  C End of azimuth scan loop.
0483  C-----
0484          IF (PRNT .EQ. 0) GO TO 8830
0485          WRITE (PRNT,8829) TRUEL
0486      8829 FORMAT (//,5X,"ELEVATION =",F8.3)
0487      8830 DO 8890 L = 1, IFEND
0488             ILB = 1 + (L - 1) * (IAEND + 1)
0489             ILE = L * (IAEND + 1)
0490             DAT(1,ILE) = TRUEL
0491             DAT(2,ILE) = RFREQ + (L - 1) * FSTEPS
0492             IF (PRNT .EQ. 0) GO TO 8850
0493             DO 8840 IE = ILB, ILE - 1
0494                8840 WRITE (PRNT, 8849) DAT(2,ILE), (DAT(I,IE),I=1,3)
0495                8849 FORMAT (1X,"FREQ =",F6.0,5X,"AZIM =",F8.3,
0496                    *      5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0497      8850 CALL WRITF (IDCB,IERR,DAT(1,ILB))
0498             IF (IERR .EQ. 0) GO TO 8890
0499             WRITE (CRT,8859) IERR
0500      8859 FORMAT (/,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0501             GO TO 9090
0502      8890 CONTINUE
0503      8900 CONTINUE
0504  C-----
0505  C End of elevation scan loop
0506  C-----
0507          IDONE = IDONE + ISEND
0508  C If no scans, go to reset original position.
0509          IF (IPFLAG .LT. 1) GO TO 515
0510  C-----
0511  C Call EXEC to overlay this segment with WR16G
0512  C-----
0513      8990 IF (IGRLOC .EQ. 1) GO TO 8995
0514             INA15(3) = 2HG
0515             GO TO 8998
0516      8995 INA15(3) = 2HT
0517      8998 CALL EXEC (ICODE,INA15)
0518      9000 WRITE (CRT,9009)
0519      9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0520      9090 WRITE (CRT,9099)
0521      09099 FORMAT (/,10X,
0522          ****** PROGRAM WR16 TERMINATED *****")
0523          CALL CLOSE (IDCB)
0524          END
0525  C-----
0526  C Subroutine SETPO calls WR6 to set an azimuth or elevation position
0527  C and then calls WR1 to check the position. If it is within .002 it
0528  C returns, if not it calls WR6 once again.
0529  C-----
0530          SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0531          DO 100 I = 1,2
0532             PARAM = PRES
0533             CALL WR6 (PARAM,IERR,UNIT,0)
0534             IF (IERR .NE. 0) RETURN
0535             IF (I .GT. 1) RETURN
0536  C             IF (LU .EQ. 33) GO TO 90
0537             CALL WR1 (CRT,LU,IEW,IERR,0)
0538  C             GO TO 91

```

```
0539 C 90 CALL WR3 (CRT,LU,NEW,IERR,0)
0540 91 IF (IERR .NE. 0) RETURN
0541 IF (ABS(NEW-PRES) .LT. .002) RETURN
0542 100 CONTINUE
0543 RETURN
0544 END
0545 END*
```

&WR17M T=00004 IS ON CR32767 USING 00013 BLKS R=0086

```

0001 FTN4,L
0002 C 24998-18466 REV.2040 (810304.1057)
0003 C*****
0004 C
0005 C
0006 C
0007 C
0008 C
0009 C
0010 C
0011 C
0012 C
0013 C
0014 C
0015 C
0016 C
0017 C
0018 C
0019 C
0020 C
0021 C
0022 C
0023 C
0024 C
0025 C
0026 C
0027 C
0028 C*****
0029 C
0030 C
0031 C
0032 C
0033 C
0034 C
0035 C
0036 C
0037 C
0038 C
0039 C
0040 C
0041 C
0042 C
0043 C
0044 C
0045 C
0046 C
0047 C
0048 C
0049 C
0050 C
0051 C
0052 C
0053 C
0054 C
0055 C
0056 C
0057 C
0058 C

PROGRAM WR17

DESCRIPTION:
WR17 is designed to obtain microwave S11 measurements at different
points along a raster scan and to store the data in a disc file.
This program has been divided into four segments because it cannot
fit into memory otherwise. The main segment always remains in
memory. Segment WR17C is the control segment, which is the first
one read in by the main segment. The other two are WR15G, which
plots on the plotter and WR15T, which plots on the terminal.
WR17C gives the user a choice of where to plot for each run, so
essentially, for each run there are only three segments. The
two segments beside the main overlay each other by one segment
calling EXEC(B, other segment name) to read in the other
segment over the calling segment and then pass control to it.
It can return to the calling segment only by calling EXEC(B,
other segment name) again.
This segment is the main segment. It is run by typing in:
RU,WR17
This segment only defines common, initializes variables, and
then calls EXEC(B,WR17C) to read in and pass control to segment
WR17C.

PROGRAM WR17

DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
* ISIZE(2),ITITL(40),PLUNIT(2),IDUM(25)
INTEGER CRT,PRNT
COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
* IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESL,IDCB,NAMEF,
* ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
* PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
COMMON/AGS2C/ D(10)
IRNUM = 1
CRT = 1
IPRNM(1) = 1HW
IPRNM(2) = 1HR
IPRNM(3) = 1H1
IPRNM(4) = 1H7
IPRNL = 4
MESS = -1
ASTEPS = 5
IAEND = 4
ESTEPS = 30
IEEND = 3
IPEND = 1
ISEND = 1
IDONE = 0
PRESAZ = 999.9
IPFLAG = 1
ILFLAG = 1
PLUNIT(1) = 4H - C

```

```

0059      PLUNIT(2) = 4HRT
0060      IGRLOC = 1
0061      IFEND = 1
0062      NAMEF(1) = 2HSC
0063      NAMEF(2) = 2HS1
0064      NAMEF(3) = 2H10
0065      PRNT = 6
0066      CALL FILE2(1)
0067      RFREQ = D(1)
0068      FSTEPS = D(2)
0069      IFEND = D(3)
0070  C-----
0071  C  Call EXEC to read in segment WR17C and pass control to it.
0072  C-----
0073  C
0074      ICODE=8
0075      INAME(1)=2HWR
0076      INAME(2)=2H17
0077      INAME(3)=2HC
0078      CALL EXEC (ICODE, INAME)
0079      END
0080  C
0081  C  Block data routine for AGS2C
0082  C
0083      BLOCK DATA AGS2C
0084      COMMON /AGS2C/ I(2330)
0085      END
0086      END$

```

&WR17C T=00004 IS ON CR32767 USING 00098 BLKS R=0545

```
0001 FTN4,L
0002 C *****
0003 C *
0004 C *          SEGMENT:  WR17C
0005 C *
0006 C *          ++++++
0007 C *          FOR:  Walter Reed Army Institute of Research
0008 C *                Department of Microwave Research
0009 C *                Walter Reed Army Medical Center
0010 C *                Washington, DC 20112
0011 C *
0012 C *          ++++++
0013 C *
0014 C *          BY:  Technology USA, Inc.
0015 C *                P.O. Box 55333
0016 C *                Fort Washington, Maryland 20744
0017 C *                Phone: (301) 292-2592
0018 C *
0019 C * -----
0020 C *          Segment WR17C is the control segment of WR17.  It puts
0021 C * out a menu with the options:
0022 C *          1 - Enter the number of azimuth steps and step size.
0023 C *          2 - Enter the number of elevation steps and step size.
0024 C *          3 - Enter subtraction file name.
0025 C *          4 - Set antennae to a new azimuth position.
0026 C *          5 - Set antennae to a new elevation position.
0027 C *          6 - Enter number of readings to average for each point.
0028 C *          7 - Request graphs on the CRT.
0029 C *          10 - List on the printer.
0030 C *          8 - Scan from the present position
0031 C *          9 - Terminate the program.
0032 C * After 8 is chosen, the antennae are positioned at the
0033 C * present position-(number of data points-1)*step size/2.
0034 C * The amplitude and phase are converted to complex
0035 C * components, the corresponding components from the
0036 C * subtraction file deducted, and the results are saved in
0037 C * the array DAT along with the position.  Then the antennae
0038 C * are advanced by step size and the amplitude and phase are
0039 C * read again.  This is repeated for the specified number of
0040 C * steps per scan.
0041 C * After each scan, the data accumulated in array DAT is
0042 C * read out to a disc file, SCS11A.  If there is a file
0043 C * with that name already, the last letter is incremented.
0044 C * After the data is read out, elevation is incremented by
0045 C * elevation step size and the whole process repeated for
0046 C * the number of elevation steps.
0047 C *
0048 C *****
0049 C PROGRAM WR17C,5
0050 C DIMENSION DAT(3,520),IPRNM(4),INAME(3),IDCB(144),NAMEF(3),
0051 C *          ISIZE(2),ITITL(40),IREG(2),IFAT(3120),PRNTL(2),
0052 C *          PLUNIT(2),FAT(1560),INA15(3),SAT(2,15),INSUB(3)
0053 C INTEGER CRT,PRNT
0054 C COMMON DAT,IPRNM,INAME,CRT,IPRNL,MESS,ICODE,PRESAZ,ASTEPS,RFREQ,
0055 C *          IAEND,TEMP1,TEMP2,IRNUM,ESTEPS,IEEND,PRESL,IDCB,NAMEF,
0056 C *          ISIZE,IDONE,IPEND,ISEND,POSITN,IPFLAG,ILFLAG,ID,IDRCT,
0057 C *          PLUNIT,ITITL,PRNT,FSTEPS,IFEND,IGRLOC
0058 C EQUIVALENCE (REG,IREG),(DAT,IFAT),(DAT,FAT)
```

```

0059 C
0060 COMMON/AGS2C/ D(10),CAL(6,112),F1,F2,F3,M1,M2,RP1,RP2,RP3,ONLY,
0061 *CM(4,112),IHEAD(40),IDATE(15)
0062 DATA LUAZ/31/,LUEL/35/,I1/15446B/,INA15/2HWR,2H15,2HT /,
0063 *INSUB/2H0 ,2H ,2H /
0064 C-----
0065 C Set number of scans if plots requested.
0066 C-----
0067 C If start of program, go to menu.
0068 IF (PRESAZ .EQ. 999.9) GO TO 525
0069 C If graphing on screen, do not list data there.
0070 IF (IGRLOC .EQ. 1) ILFLAG = 0
0071 C If finished with run, go reset position.
0072 IF (IDONE .GE. IEEND) GO TO 515
0073 C If plotting every scan, go do next scan.
0074 IF (IPEND .EQ. 1) GO TO 8701
0075 IF (IDONE .NE. 1) GO TO 511
0076 IF (IPEND .GT. IEEND) GO TO 513
0077 C Plotted first scan so now get back on schedule.
0078 ISEND = IPEND - 1
0079 GO TO 8701
0080 511 IF (IDONE+IPEND .GT. IEEND) GO TO 513
0081 C Plot every specified scan.
0082 ISEND = IPEND
0083 GO TO 8701
0084 C Scan to end of run without plotting.
0085 513 ISEND = IEEND - IDONE
0086 IPFLAG = -1
0087 GO TO 8701
0088 C-----
0089 C Reset original position.
0090 C-----
0091 515 WRITE (CRT, 519)
0092 519 FORMAT (/,1X,"SCAN IS FINISHED",/,1X,
0093 * "ANTENNAE ARE BEING RESET TO THEIR ORIGINAL POSITION",
0094 * /,1X,"PLEASE EXCUSE THE DELAY")
0095 CALL SETPO (CRT, LUAZ, PRESAZ, 2, IERR)
0096 IF (IERR .EQ. 0) GO TO 522
0097 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0098 GO TO 9090
0099 522 PRESEL = PRESEL - ESTEPS*(IEEND-1)
0100 CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0101 IF (IERR .EQ. 0) GO TO 523
0102 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0103 GO TO 9090
0104 C Reset parameters to original values.
0105 523 IF (IPFLAG .EQ. 0) GO TO 525
0106 ISEND = 1
0107 IPFLAG = 1
0108 ILFLAG = 1
0109 525 IDONE = 0
0110 C-----
0111 C Clear screen and print heading and menu.
0112 C-----
0113 WRITE(CRT,529)
0114 0529 FORMAT("
0115 * 10X,55'*',/,
0116 *10X,"*",20X,"PROGRAM WR17",20X,"*",/,
0117 *10X,"*",15X,"S11 RASTER SCAN PROGRAM",15X,"*",/,
0118 *10X,55'*',/)

```

```

0119 530 CALL WR1 (CRT, LUAZ, PRESAZ, IERR, 0)
0120 IF (IERR .EQ. 0) GO TO 540
0121 CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0122 GO TO 9090
0123 540 CALL WR1 (CRT, LUEL, PRESEL, IERR, 0)
0124 IF (IERR .EQ. 0) GO TO 550
0125 CALL WR12 (CRT, IERR, .TRUE., 0, 0, IPRNM, IPRNL)
0126 GO TO 9090
0127 550 IF (PRNT .EQ. 0) GO TO 555
0128 PRNTL(1) = 4H PRI
0129 PRNTL(2) = 4HNT
0130 GO TO 560
0131 555 PRNTL(1) = 4HNO P
0132 PRNTL(2) = 4HRINT
0133 560 WRITE(CRT,600) IAEND, ASTEPS, IEEND, ESTEPS, INSUB, PRESAZ,
0134 * PRESEL, IRNUM, IPEND, PLUNIT, PRNTL
0135 0600 FORMAT(" PROGRAM PARAMETER ENTRY",30X,"PRESENT VALUES",/,
0136 *" 1 - Number of azimuth steps and step size.....",
0137 *I3," x",F6.2," mm",/,
0138 *" 2 - Number of elevation steps and step size.....",
0139 *I3," x",F6.2," mm",/,
0140 *" 3 - Subtraction file name.....",2X,3A2,/,
0141 *" 4 - Azimuth position.....",
0142 *F8.3," mm",/,
0143 *" 5 - Elevation position.....",
0144 *F8.3," mm",/,
0145 *" 6 - Number of readings to average per point.....",I5,/,
0146 *" 7 - Number of scans per graphs.....",I5,I5,2A4,/,
0147 *" 10 - Toggle switch for listing on printer.....",2X,2A4,/,
0148 *" EXECUTION OPTIONS",/,
0149 *" 8 - Scan from the present position.",/,
0150 *" 9 - Terminate the program.",/,"")
0151 610 WRITE (CRT,619)
0152 C Clear old prompt with Esc h Esc J.
0153 619 FORMAT ("")
0154 620 WRITE (CRT,629)
0155 629 FORMAT (1X,"SELECT OPTION NUMBER _")
0156 READ(CRT,*) IANS
0157 IF (IANS .EQ. 9999) GO TO 9090
0158 IF (IANS .EQ. 10) GO TO 700
0159 IF (IANS .EQ. 9) GO TO 9090
0160 IF (IANS .EQ. 8) GO TO 8000
0161 IF (IANS .EQ. 7) GO TO 7000
0162 IF (IANS .EQ. 6) GO TO 6000
0163 IF (IANS .EQ. 5) GO TO 5000
0164 IF (IANS .EQ. 4) GO TO 4000
0165 IF (IANS .EQ. 3) GO TO 3000
0166 IF (IANS .EQ. 2) GO TO 2000
0167 IF (IANS .EQ. 1) GO TO 1000
0168 WRITE (CRT,659)
0169 659 FORMAT (/,1X,"ERROR # WR17 - 21001 .....(WR17)",/,1X,
0170 *"INCORRECT RESPONSE. ENTER ANY NUMBER FROM 1 TO 10.")
0171 GO TO 620
0172 C-----
0173 C Set to print on printer.
0174 C-----
0175 700 IF (PRNT .EQ. 6) GO TO 750
0176 PRNT = 6
0177 PRNTL(1) = 4H PRI
0178 PRNTL(2) = 4HNT

```

```

0179          GO TO 760
0180      750      PRNT = 0
0181          PRNTL(1) = 4HNO P
0182          PRNTL(2) = 4HRINT
0183      760      WRITE (CRT,769) I1,(PRNTL(I),I=1,2)
0184      769      FORMAT (1A2, "a 54c 13Y",2A4)
0185          GO TO 610
0186      C-----
0187      C   Inquire from user:  frequency step size and number of steps.
0188      C-----
0189      C 800      WRITE (CRT,809)
0190      C 809      FORMAT (/,1X,"Enter the number of frequency steps.  _")
0191      C          READ (CRT,*) IFEND
0192      C          IF (IFEND .EQ. 9999) GO TO 9090
0193      C          IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IFEND .GT. 0)) GO TO 825
0194      C          WRITE (CRT,819)
0195      C 819      FORMAT (/,1X,"ERROR * WR17 - 21002 .....(WR17)",/,
0196      C          * " THE NUMBER OF STEPS MUST BE FROM 1 TO 520/(AZIMUTH STEPS + 1).",
0197      C          *      /,1X,"REENTER THE NUMBER OF FREQUENCY STEPS.")
0198      C          GO TO 800
0199      C 825      WRITE (CRT,829)
0200      C 829      FORMAT (/,1X,"Enter the frequency step size (MHz).  _")
0201      C          READ (CRT,*) FSTEPS
0202      C          IF (FSTEPS .EQ. 9999) GO TO 9090
0203      C          IF ((RFREQ+(IFEND-1)*FSTEPS) .LE. TEMP2) GO TO 850
0204      C          WRITE (CRT,3509) TEMP1, TEMP2
0205      C          READ (CRT, 839) IANS
0206      C 839      FORMAT (A2)
0207      C          IF (IANS .EQ. 2HYE) GO TO 9000
0208      C          GO TO 800
0209      C 850      WRITE (CRT,859) I1, IFEND, FSTEPS
0210      C 859      FORMAT (1A2,"a 52c 14Y",I3," x",F5.0)
0211      C          GO TO 610
0212      C-----
0213      C   Inquire from the user:  azimuth step size and number of steps.
0214      C-----
0215      1000      WRITE(CRT,1100)
0216      1100      FORMAT(/," Enter the number of azimuth steps per scan.  _")
0217          READ(CRT,*) IAEND
0218          IF (IAEND .EQ. 9999) GO TO 9090
0219          IF ((IFEND*(IAEND+1) .LE. 520) .AND. (IAEND .GT. 0)) GO TO 1190
0220          WRITE (CRT,1109)
0221      1109      FORMAT (/, " ERROR * WR17 - 21203 .....(WR17)",/,
0222      * " NUMBER OF STEPS MUST BE FROM 1 TO 520/(FREQUENCY STEPS)-1.",
0223      *      /, " REENTER THE NUMBER OF AZIMUTH STEPS.")
0224          GO TO 1000
0225      1190      WRITE(CRT,1200)
0226      1200      FORMAT(/," Enter the step size (mm).....  _")
0227          READ(CRT,*) ASTEPS
0228          IF (ASTEPS .EQ. 9999) GO TO 9090
0229          WRITE (CRT,1209) I1,IAEND,ASTEPS
0230      1209      FORMAT (1A2,"a 52c 6Y",I3," x",F6.2)
0231          GO TO 610
0232      C-----
0233      C   Inquire from user:  elevation step size and number of steps.
0234      C-----
0235      2000      WRITE (CRT,2009)
0236      2009      FORMAT (/,1X,"Enter the number of elevation steps.  _")
0237          READ (CRT,*) IEEND
0238          IF (IEEND .EQ. 9999) GO TO 9090

```

```

0239      IF (IEEND .GT. 0) GO TO 2028
0240      WRITE (CRT,2019)
0241      2019  FORMAT (/,1X,"ERROR # WR17 - 21404 .....(WR17)",/,
0242      *      1X,"THE NUMBER OF STEPS MUST BE GREATER THAN 0.",/,
0243      *      1X,"REENTER THE NUMBER OF ELEVATION STEPS.")
0244      GO TO 2000
0245      2028 WRITE (CRT,2029)
0246      2029  FORMAT (/,1X,"Enter the elevation step size (mm). _")
0247      READ (CRT,*) ESTEPS
0248      IF (ESTEPS .EQ.9999) GO TO 9090
0249      WRITE (CRT,2039) I1, IEEND, ESTEPS
0250      2039  FORMAT (1A2,"a 52c 7Y",I3," x",F6.2)
0251      GO TO 610
0252  C-----
0253  C  Inquire from the user:  microwave frequency.
0254  C-----
0255  C3000 WRITE(CRT,3500)
0256  C3500 FORMAT(/," Enter the RF frequency (MHz)... _")
0257  C      READ(CRT,*) RFREQ
0258  C      IF (RFREQ .EQ. 9999) GO TO 9090
0259  C      IF ((RFREQ .GE. TEMP1) .AND. (RFREQ .LE. TEMP2)) GO TO 3600
0260  C      WRITE (CRT,3509) TEMP1, TEMP2
0261  C3509  FORMAT (/,1X,"ERROR # WR17 - 21204 .....(WR17)",/,1X,
0262  C      *      "CALIBRATION ONLY FROM ",F6.0,"MHz TO ",F6.0,"MHz.",
0263  C      *      /,1X,"FREQUENCY MUST BE BETWEEN CALIBRATION LIMITS.",
0264  C      *      /,1X,"Do you wish to recalibrate? (YES/NO) _")
0265  C      READ (CRT,3599) IANS
0266  C3599  FORMAT (A2)
0267  C      IF (IANS .EQ. 2HYE) GO TO 9000
0268  C      GO TO 3000
0269  C3600 WRITE (CRT, 3609) I1, RFREQ
0270  C3609 FORMAT (1A2,"a 54c 8Y",F5.0)
0271  C      GO TO 610
0272  C-----
0273  C  Inquire from user subtraction file name.
0274  C-----
0275  3000 WRITE (CRT, 3009)
0276  3009 FORMAT (/,1X,"Enter subtraction file name... _")
0277  READ (CRT, 3019) INSUB
0278  3019 FORMAT (3A2)
0279  IF ((INSUB(1) .EQ. 2H99) .AND. (INSUB(2) .EQ. 2H99)) GO TO 9090
0280  IF (INSUB(1) .EQ. 1H0) GO TO 610
0281  CALL OPEN (IDCB, IERR, INSUB)
0282  IF (IERR .NE. -6) GO TO 3300
0283  WRITE (CRT, 3029)
0284  3029  FORMAT (/,1X,"ERROR # WR17 - 21005 .....(WR17)",/,1X,
0285  *      "UNABLE TO FIND THIS FILE, TRY AGAIN")
0286  GO TO 3000
0287  3300  IF (IERR .GE. 0) GO TO 3400
0288  WRITE (CRT, 3309) IERR
0289  3309  FORMAT (/,1X,"ERROR #",I3," OCCURRED IN SUBROUTINE OPEN")
0290  GO TO 620
0291  3400 CALL READF(IDCB, IERR, IFAT, 6)
0292  IF (IERR .EQ. 0) GO TO 3500
0293  WRITE (CRT, 3409) IERR
0294  3409  FORMAT (/, " ERROR #",I3," OCCURRED IN SUBROUTINE OPEN")
0295  GO TO 620
0296  3500 DO 3800 I = 1, 15
0297  CALL READF(IDCB, IERR, IFAT, 6, LEN)
0298  IF (IERR .EQ. 0) GO TO 3600

```

```

0299      IF (IERR .EQ. -12) GO TO 3550
0300      WRITE (CRT,3509) IERR
0301 3509  FORMAT (/,1X,"ERROR #",I3," OCCURRED IN SUBROUTINE READF")
0302      GO TO 620
0303 3550  SAT(1,I) = 0.
0304      SAT(2,I) = 0.
0305      GO TO 3850
0306 3600  RADIAN = 3.141593 * DAT(3,1) / 180.
0307      AMPLIT = 10.**( -DAT(2,1) / 20.)
0308      SAT(1,I) = AMPLIT * COS (RADIAN)
0309      SAT(2,I) = AMPLIT * SIN (RADIAN)
0310 3800  CONTINUE
0311 3850  WRITE (CRT, 3859) I1, INSUB
0312 3859  FORMAT (1A2,"a 54c 8Y",3A2)
0313      GO TO 610
0314  C-----
0315  C  Inquire new azimuth position and call WR6 to set it.
0316  C-----
0317 4000  WRITE (CRT,4090)
0318 4090  FORMAT (/,1X,"Enter new azimuth (nm).  _")
0319      READ (CRT,*) PRESAZ
0320      IF (PRESAZ .EQ. 9999) GO TO 9090
0321      CALL SETPO (CRT,LUAZ,PRESAZ,2,IERR)
0322      IF (IERR .EQ. 0) GO TO 4400
0323      CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0324      GO TO 620
0325 4400  WRITE (CRT,4409) I1,PRESAZ
0326 4409  FORMAT (1A2,"a 52c 9Y",F8.3)
0327      GO TO 610
0328  C-----
0329  C  Inquire new elevation and call WR6 to set it.
0330  C-----
0331 5000  WRITE (CRT,5090)
0332 5090  FORMAT (/,1X,"Enter new elevation _")
0333      READ (CRT,*) PRESEL
0334      IF (PRESEL .EQ. 9999) GO TO 9090
0335      CALL SETPO (CRT, LUEL, PRESEL, 4, IERR)
0336      IF (IERR .EQ. 0) GO TO 5500
0337      CALL WR12 (CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0338      GO TO 620
0339 5500  WRITE (CRT,5509) I1, PRESEL
0340 5509  FORMAT (1A2,"a 52c 10Y",F8.3)
0341      GO TO 610
0342  C-----
0343  C  Inquire from the user: number of readings per data point.
0344  C-----
0345 6000  WRITE (CRT,6009)
0346 6009  FORMAT (/,1X,
0347      *      "Enter number of readings to average per data point. _")
0348      READ (CRT,*) IRNUM
0349      IF (IRNUM .EQ. 9999) GO TO 9090
0350      IF ((IRNUM .LE. 32767) .AND. (IRNUM .GT. 0)) GO TO 6600
0351      WRITE (CRT,6509)
0352 6509  FORMAT (/,1X,"ERROR # WR17 - 21006 .....(WR17)",/,
0353      *      1X,"NUMBER TO AVERAGE MUST BE FROM 1 - 32767.",/,
0354      *      1X,"REENTER NUMBER OF READINGS TO AVERAGE PER POINT.")
0355      GO TO 6000
0356 6600  WRITE (CRT, 6609) I1, IRNUM
0357 6609  FORMAT (1A2,"a 52c 11Y",I5)
0358      GO TO 610

```

```

0359 C-----
0360 C Inquire from user: number of scans per graph.
0361 C-----
0362 7000 WRITE (CRT,7009)
0363 7009 FORMAT (/,1X,"Enter number of scans between graphs on screen. _")
0364 READ (CRT,*) IPEND
0365 IF (IPEND .EQ. 9999) GO TO 9090
0366 IF (IPEND .GE. 0) GO TO 7500
0367 WRITE (CRT,7209)
0368 7209 FORMAT (/,1X,"ERROR * WR17 - 21007 .....(WR17)",/,
0369 * 1X,"NUMBER OF SCANS CAN NOT BE LESS THAN 0",/,
0370 * 1X,"REENTER NUMBER OF SCANS BETWEEN GRAPHS ON CRT.")
0371 GO TO 7000
0372 7500 WRITE (CRT,7509)
0373 7509 FORMAT (/,1X,"Enter '1' to plot on CRT or '0' to plot on ",
0374 * "plotter. _")
0375 READ (CRT,*) IGRLOC
0376 IPFLAG = 1
0377 PLUNIT(1) = 4H-PLD
0378 PLUNIT(2) = 4HTTR
0379 IF (IGRLOC .NE. 1) GO TO 7550
0380 PLUNIT(1) = 4H - C
0381 PLUNIT(2) = 4HRT
0382 7550 IF (IPEND .NE. 0) GO TO 7600
0383 IPFLAG = 0
0384 PLUNIT(1) = 4HGRAP
0385 PLUNIT(2) = 4HHS
0386 7600 ISEND = 1
0387 WRITE (CRT, 7609) I1, IPEND, (PLUNIT(I),I=1,2)
0388 7609 FORMAT (1A2,"a 52c 12Y",15,1X,2A4)
0389 GO TO 610
0390 C-----
0391 C Set antennae to first position and create disc data file.
0392 C-----
0393 C Find title for file.
0394 8000 WRITE (CRT,8009) (ITITL(I),I=1,40)
0395 8009 FORMAT (/,1X,
0396 * "Enter title of file or press 'RETURN' key for following title.",
0397 */,40A2,/)
0398 C Blank out rest of 80 bytes of title.
0399 REG = EXEC (1,401B,ITITL,-80)
0400 IF (IREG(2) .EQ. 0) GO TO 8100
0401 IF (IREG(2) .GT. 78) GO TO 8060
0402 DO 8050 I = (IREG(2)+3)/2,40
0403 8050 ITITL(I) = 2H
0404 8060 IF ((IREG(2)/2)*2 .EQ. IREG(2)) GO TO 8100
0405 ITITL(IREG(2)/2+1) = (ITITL(IREG(2)/2+1)/256)*256 + 32
0406 C Set azimuth to -(1/2 of scan).
0407 8100 POSITN = PRESAZ-ASTEPS*(IAEND-1)/2
0408 PARAM = POSITN
0409 CALL WR6(PARAM,IERR,2,0)
0410 IF (IERR .EQ.0) GO TO 8200
0411 CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0412 GO TO 620
0413 C Record size = 3 double words * (steps in scan + 1).
0414 8200 ISIZE(2) = 6 * (IAEND + 1)
0415 C Minimum record size = 128.
0416 IF (ISIZE(2) .LT. 128) ISIZE(2) = 128
0417 C File size = record size * (elevation steps * frequency steps + 1).
0418 ISIZE(1) = (ISIZE(2) * (IEEND * IFEND + 1) + 127)/128

```

```

0419 8300 NAMEF(3) = NAMEF(3) + 1
0420 CALL CREAT (IDCB,IERR,NAMEF,ISIZE,2)
0421 IF (IERR .GE. 0) GO TO 8450
0422 IF (IERR .EQ. -2) GO TO 8300
0423 WRITE (CRT,8409) IERR
0424 8409 FORMAT (/ ,1X,"ERROR #",I3," OCCURED IN SUBROUTINE CREAT")
0425 GO TO 9090
0426 8450 IF (PRNT .EQ. 0) GO TO 8500
0427 C Print title and menu on line printer.
0428 WRITE (PRNT,8459) (ITITL(I),I=1,40),(NAMEF(I),I=1,3)
0429 8459 FORMAT ("1",40A2,/ ,1X,"FILE = ",3A2)
0430 WRITE (PRNT,600) IAEND,ASTEPS,IEEND,ESTEPS,INSUB,PRESAZ,
0431 * PRESEL,IRNUM,IPEND,PLUNIT,PRNTL
0432 8500 WRITE (CRT,8509) NAMEF
0433 8509 FORMAT (/ ,1X,"NAME OF DATA FILE IS ",3A2)
0434 C Put specifications in first record.
0435 CALL FTIME(IFAT)
0436 DO 8550 I=1,40
0437 8550 IFAT(15+I) = ITITL(I)
0438 IFAT(56) = 2HEL
0439 IFAT(57) = 0
0440 IFAT(58) = IAEND
0441 FAT(30) = ASTEPS
0442 IFAT(61) = 0
0443 IFAT(62) = IEEND
0444 FAT(32) = ESTEPS
0445 FAT(33) = RFREQ
0446 IFAT(67) = ISIZE(1)
0447 IFAT(68) = ISIZE(2)
0448 IFAT(69) = 0
0449 IFAT(70) = IFEND
0450 FAT(36) = FSTEPS
0451 ILFLAG = 1
0452 CALL WRITF (IDCB, IERR, FAT)
0453 IF (IERR .EQ. 0) GO TO 8700
0454 WRITE (CRT,8609) IERR
0455 8609 FORMAT (/ ,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WRITF")
0456 GO TO 9090
0457 C-----
0458 C Elevation scan from PRESEL to PRESEL+ESTEPS*(IEEND-1) or until graph needed.
0459 C-----
0460 8700 IF (IPEND .EQ. 0) IBEND = IEEND
0461 ID = 1
0462 IDRCT = 1
0463 8701 DO 8900 J=1,ISEND
0464 IF (J + IDONE .EQ. 1) GO TO 8720
0465 C If not first scan, switch direction and increment elevation.
0466 IDRCT = -IDRCT
0467 PRESEL = PRESEL + ESTEPS
0468 PARAM = PRESEL
0469 CALL WR6 (PARAM, IERR, 4, 1)
0470 IF (IERR .EQ. 0) GO TO 8720
0471 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0472 GO TO 620
0473 8720 CALL WR1 (CRT, LUEL, TRUEL, IERR, 0)
0474 IF (IERR .EQ. 0) GO TO 8725
0475 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0476 GO TO 9090
0477 C-----
0478 C Azimuth scan from PRES AZ-ASTEPS*(IAEND-1)/2 to PRES AZ+ASTEPS*(IAEND-1)/2

```

```

0479 C-----
0480 8725 DO 8800 I=1,IAEND
0481 C If break flag set, go back to menu.
0482 IF (IFBRK(IERR)) 523,8730
0483 8730 CALL WR1 (CRT, LUAZ, TRUAZ, IERR, 0)
0484 IF (IERR .EQ. 0) GO TO 8735
0485 CALL WR12 (CRT, IERR, .TRUE., 0,0, IPRNM, IPRNL)
0486 GO TO 9090
0487 C Do frequency scan at each position.
0488 8735 CALL COR85(1, 4, IRNUM)
0489 DO 8790 L = 1, IFEND
0490 CALL CALF2(2, L, F)
0491 CALL CPOL2(CM(1,L),X,Y)
0492 IF (INSUB(1) .EQ. 1H0) GO TO 8750
0493 RADIAN = 3.141593 * Y / 180.
0494 Y = X * SIN (RADIAN) - SAT (2,L)
0495 X = X * COS (RADIAN) - SAT (1,L)
0496 XX = X*X + Y*Y
0497 Y = 180. * ATAN2(Y, X) / 3.141593
0498 GO TO 8755
0499 8750 XX = X * X
0500 8755 RLOSS = -10 * ALOGT (XX)
0501 IF (ILFLAG .EQ.0) GO TO 8780
0502 WRITE (CRT,8779) F,TRUAZ,RLOSS,Y
0503 8779 FORMAT (1X,"FREQ =",F6.0,5X,"AZIMUTH =",F8.3,5X,
0504 * "RLOSS =",F9.4,5X,"PHASE =",F8.3)
0505 8780 IL = ID + (L - 1) * (IAEND + 1)
0506 DAT(1,IL) = TRUAZ
0507 DAT(2,IL) = RLOSS
0508 DAT(3,IL) = Y
0509 8790 CONTINUE
0510 IF (I .GE. IAEND) GO TO 8800
0511 ID = ID + IDRCT
0512 POSITN = POSITN + IDRCT * ASTEPS
0513 PARAM = POSITN
0514 CALL WR6(PARAM,IERR,2,0)
0515 IF (IERR .EQ.0) GO TO 8800
0516 CALL WR12(CRT,IERR,.TRUE.,0,0,IPRNM,IPRNL)
0517 GO TO 9090
0518 8800 CONTINUE
0519 C-----
0520 C End of azimuth scan loop.
0521 C-----
0522 IF (PRNT .EQ. 0) GO TO 8830
0523 WRITE (PRNT,8829) TRUEL
0524 8829 FORMAT (//,5X,"ELEVATION =",F8.3)
0525 8830 DO 8890 L = 1, IFEND
0526 ILB = 1 + (L - 1) * (IAEND + 1)
0527 ILE = L * (IAEND + 1)
0528 DAT(1,ILE) = TRUEL
0529 DAT(2,ILE) = RFREQ + (L - 1) * FSTEPS
0530 IF (PRNT .EQ. 0) GO TO 8850
0531 DO 8840 IE = ILB, ILE - 1
0532 8840 WRITE (PRNT, 8849) DAT(2,ILE), (DAT(1,IE),I=1,3)
0533 8849 FORMAT (1X,"FREQ =",F6.0,5X,"AZIM =",F8.3,
0534 * 5X,"RLOSS =",F8.3,5X,"PHASE =",F8.3)
0535 8850 CALL WR1F (IDCB,IERR,DAT(1,ILB))
0536 IF (IERR .EQ. 0) GO TO 8890
0537 WRITE (CRT,8859) IERR
0538 8859 FORMAT (/ ,1X,"ERROR # ",I3," OCCURED IN SUBROUTINE WR1F")

```

```

0539          GO TO 9090
0540      8890 CONTINUE
0541      8900 CONTINUE
0542  C-----
0543  C   End of elevation scan loop
0544  C-----
0545          IDONE = IDONE + ISEND
0546  C   If no scans, go to reset original position.
0547          IF (IPFLAG .LT. 1) GO TO 515
0548  C-----
0549  C   Call EXEC to overlay this segment with WR15G
0550  C-----
0551      8990 IF (IGRLOC .EQ. 1) GO TO 8995
0552          INA15(3) = 2HG
0553          GO TO 8998
0554      8995 INA15(3) = 2HT
0555      8998 CALL EXEC (ICODE,INA15)
0556  C9000 WRITE (CRT,9009)
0557  C9009 FORMAT (2/,1X,"Run program AGS02 for new calibration.")
0558      9090 WRITE (CRT,9099)
0559      9099 FORMAT (/,10X,
0560          "***** PROGRAM WR17 TERMINATED *****")
0561          CALL CLOSE (IDCB)
0562          END
0563  C-----
0564  C   Subroutine SETPO calls WR6 to set an azimuth or elevation position
0565  C   and then calls WR1 to check the position.  If it is within .002 it
0566  C   returns, if not it calls WR6 once again.
0567  C-----
0568          SUBROUTINE SETPO(CRT,LU,PRES,UNIT,IERR)
0569          DO 100 I = 1,2
0570              PARAM = PRES
0571              CALL WR6 (PARAM,IERR,UNIT,0)
0572              IF (IERR .NE. 0) RETURN
0573              IF (I .GT. 1) RETURN
0574  C          IF (LU .EQ. 33) GO TO 90
0575              CALL WR1 (CRT,LU,NEW,IERR,0)
0576  C          GO TO 91
0577  C          90 CALL WR3 (CRT,LU,NEW,IERR,0)
0578              91 IF (IERR .NE. 0) RETURN
0579              IF (ABS(NEW-PRES) .LT. .002) RETURN
0580          100 CONTINUE
0581          RETURN
0582          END
0583          END$

```

END

DATE

FILMED

6-1988

DTic