2500-4-T = RL-2057

D A R P

DATA ACQUISITION AND REDUCTION PROGRAM

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INTRODUCTION

This manual is divided into six chapters. The first four chapters are designed for the DARP user. The last two chapters are designed to aid programmers making modifications and corrections to DARP.

The user who is unfamiliar with DARP will probably want to begin reading this manual starting with Chapter IV. As more capability is needed, the user can refer to the first three chapters for suggestions.

The familiar user should, at one point or another, read the first two chapters in their entirety.

Finally, the user who gets the job of modifying DARP should be very familiar with the contents and structure of the first chapter. The various reference listings in Chapter V should be consulted before making any changes.

CHAPTER DARP HELP DOCUMENTS

The following help documents are in ascending order from 1 to 12. The purpose of these documents is to explain the commands which are accessed via the various special function keys as well as the accompanying prompts. The documents are designed to be used as a reference while DARP is running. To determine which help document to refer to, look at the bottom of the CRT screen. Immediately underneath the line of dashes and to the far left you will see the word "HELP" followed by a number. The number is the number of the help document you should refer to for information on the use of the commands.

There are some standard patterns which run throughout all of the commands. The abort command is always in the upper right-hand corner and may be used by pressing (shift) k8. When an option is selected, the command which represents the option will usually be underlined. For example, if the hard copy option is on, the hard copy command will be presented as "hdCopy". If the option is off, the command will be listed as "hdCopy". If a command permits the choice of one of two options, then the option selected will be underlined. For example, in the polar-linear command, if polar is selected, the command will be presented as "PolLin". If linear is selected the command will be displayed as "PolLin".

If you are trying to find information on a prompt and how to respond to it, you should check the guide to prompts and messages, (Chapter III), to see where the prompt is described.

1.1 DARP Help Document No. 1

HELP1 TapeCO END ABORT

DataAC GRAPH REINIT DataPa

These are the commands displayed when the computer is in the Primary Command Mode under Data Commands (PCMDC). This mode may be accessed by pressing DataCO when in the Primary Command Mode under Tape Commands (PCMTC) or by pressing ABORT when in a subcommand mode of PCMDC. The function of these commands is the acquisition and processing of data.

DataAC

This is the Data Acquisition command. The function of this command is to prepare the computer and 3437A voltmeter to take data, and then to perform the actual data acquisition. When DataAC is pressed, the computer will respond with a series of prompts:

P: ENTER CENTER FREQUENCY?

The user's response should be a character string of one to ten characters. The user's response will be used in the title of the graph.

P: ENTER ANTENNA TYPE?

Again, a one to ten character string is expected. This response, and the preceding one, will be joined to form the graph title using the format below.

"Antenna-Type" at "Center Frequency"

P: ENTER POLARIZATION [E,H or X]?

The user is requested to enter one of the letters, E, H, or X. When the graph summary is printed, this input will result in the labelling of "ELECTRIC POLARIZATION", "MAGNETIC POLARIZATION", or "VARIABLE POLARIZATION", respectively.

P: ENTER REFERENCE LEVEL?

A one to ten character response is expected. Ideally, this should be a known value against which the data may be calibrated. For example, in the "ANTENNA" mode there might be a main lobe which has a peak value of -5 dBm at 15 degrees. The user might then enter -5 dBm. The location, 15 degrees, is entered after the pattern has been taken. Since the program selects a default reference point at the highest point on the graph, choosing the main lobe is a handy reference. However, the user may elect to choose another point as reference without encountering much difficulty.

The next four prompts all expect one to ten character responses.

P: ENTER TRANSMITTER POWER?

P: ENTER TRANSMITTING ANTENNA?

P: ENTER RANGE?

P: ENTER PROJECT #?

The responses will all be included in the graph summary. However, the responses have no other use and hence the user is free to enter any information he feels appropriate.

If the Frequency Scan has been selected the user will then be prompted with:

P: ENTER FREQUENCY RANGE, THEN

PRESS APPROPRIATE MULTIPLIER?

The user is referred to help document # 11.

If Time Scan has been selected the user will then be prompted with:

P: ENTER DURATION OF TIME-SCAN?

A numeric input is expected and assumes units of seconds. Any number between 1 and 3600 (1 hour) is valid. If a number greater than 150 is entered, the data will be plotted in real time. If a number less than 150 is entered, all data will be recorded before the graph is generated.

The user will then be prompted with:

P: ENTER COMMENTS:

This response, unlike previous ones, is optional.
The user may enter a null line if no comments are needed. Any relevant information the user did not enter previously should be entered now. A 0 to 26 character string is expected. Any commands entered will be appended to the graph summary.

After this last response has been completed, the computer will proceed to draw the graph, and then display a new set of commands. For a description of the graph, see comments in Chapter II. For a description of the commands, see help document #2.

The command DataAC will not be accessible if there is unstored data in memory. This is a safeguard against accidental erasure of data with a new set of data. If you have unstored data in memory and wish to gain access to this command, you have two options. You must either use the STORE command under PCMTC or the DELETE command under

PCMTC followed by the MEMORY subcommand. The former will store the data on tape. The latter option will delete the data from memory. In any event, after using either of the above options you will have access to DataAC since you will no longer have unstored data in memory.

GRAPH

The function of this command is to invoke the graphics subcommand mode. Pressing GRAPH causes the computer to immediately enter the graphics subcommand mode. For information on the graphics subcommand mode, see help document #3.

The GRAPH subcommand is only accessible if there is data in memory.

REINIT

This is the Reinitialization command. The function of the REINIT command is to permit the user to respecify the type of measurement desired, as well as the conversion from volts to dBm. The result of pressing "REINIT" is that the computer will enter the initialization subcommand mode. For information on the initialization subcommand mode, see help document #7. Note that pressing "REINIT" will result in the loss of all data currently in memory.

"REINIT" is not accessible if there is unstored data in memory. This is a safeguard against accidental data loss. For methods of regaining access to "REINIT", see the last paragraph of description under DataAC.

DataPa

This is the Data Parameters command. The function of the "DataPa" command is to provide access to commands which perform various data related operations. When "DataPa" is pressed, the computer will immediately enter the data parameters subcommand mode. For help on the data parameters subcommand mode, see help document #8.

The "DataPa" command is only accessible when there is data in memory.

TapeCO

This is the Tape Commands commands. The function of "TapeCO" is to cause the computer to enter the primary command mode under tape commands (PCMTC). For a description of PCMTC, see help document #10.

"TapeCO" and "DataCO" are sister commands and are both defined on key k6. When in the primary command mode, pressing k6 will cause the computer to alternate between PCMTC and PCMDC.

END

This is a rather straightforward commend. Its function and immediate result is to end DARP.

ABORT

The "ABORT" command is ineffectual in PCMTC or PCMDC. The command is retained for consistency with the subcommand modes. When "ABORT" is pressed, the computer will beep to remind you that the computer is already in the primary command mode.

1.2 DARP Help Document #2

HELP2 SHORT FHSINT ABORT

START PolLin INC .1 RETRY

These are the commands displayed when the computer is in the "DataAC" subcommand mode. This mode is entered after "DataAC" is pressed and after the ensuing dialog. The function of these subcommands is to specify exactly how the data acquisition and display process is to occur, to initiate that process, and if necessary to terminate the process prematurely. This mode is only accessible via the "DataAC" command.

START

The function of the START command is to begin data acquisition. If the source of the measurements is an antenna pattern or backscatter, then "START" is an immediate command. That is, the computer will start recording data immediately upon "START" being pressed. If the computer is in the Frequency Scan or Time Scan mode, then "START" will merely prepare the computer and 3437A voltmeter for data acquisition. If Frequency Scan is in effect, then data acquisition will commence with the next sweep of the spectrum analyzer. If Time Scan is operating, then the voltmeter will be placed in the local mode.

Warning: If Time Scan has been selected be careful not to accidentally press voltmeter buttons after "START" has been pressed. In Time Scan mode, data acquisition begins when the HOLD/MAN button is pressed and released. The computer begins recording data after "START" has been pressed and as the HOLD/MAN button is released.

PolLin

This is the Polar Display/Linear Display command. The function of this command is to permit the user to select the mode (polar or linear) through which the data should be displayed. When "PolLin" is pressed, the mode alternates between polar and linear. The selected mode is denoted by an underline. For example, if the linear mode is currently active, the command will be displayed as "PolLin".

The user should be aware that the polar mode is slightly slower than the linear mode. Therefore, if interupt transfer is specified for data acquisition (see FHSINT), the maximum data rate at which the computer can maintain real-time graphics is slightly lower in the polar mode than it is in the linear mode. Note, however, that even if this data rate is exceeded, the only consequence is that a lag will develop between data acquisition and data display. The validity of the data will not be affected.

The "PolLin" command is available only in antenna pattern and backscatter measurements. For Frequency Scan and Time Scan measurements, the computer is fixed in the linear mode.

INC .X (INC .1, INC .2, INC .4)

This is the increment of rotation specification command. The function of this command is to specify at what rate data should be taken. When "INC.X" is pressed, the increment will cycle from .1 degree per data point, to .2 degrees per data point, to .4, and back to .1. The ".1" setting will result in 4000 data points being recorded, the ".2" setting will result in 2000 data points being recorded, and

the ".4" setting will result in 1000 data points being recorded. This command is designed to be used in conjunction with the pulse generator switch so that a full 400 degree pattern is always recorded.

This command is only accessible with antenna pattern and backscatter measurements. For frequency scan and time scan measurements, 4000 points are always recorded. Additionally, the "INC .X" command is not accessible if the "SHORT" option is in effect, and will default to .1 degree per data point. If "INC .X" is at a setting other than "INC .1", the "SHORT" command will not be accessible.

RETRY

This is the Retry data acquisition command. Its function is to terminate data acquisition and display, clear memory, and prepare the computer to accept the "START" command. When "START" is pressed again, data acquisition will restart at the beginning, in exactly the same manner as was done the first time.

The "RETRY" command is also used to deactivate the "SHORT" option. Note that whenever "RETRY" is used, the "SHORT" option will be turned off.

The "RETRY" command will not operate while data acquisition is in progress if the fast handshake transfer is being used (see FHSINT). However, the command may still be used during data display after the transfer has completed.

The "RETRY" command is visible during data acquisition and display by pressing the "key label" button. The "RETRY" and "ABORT" commands are the only commands which remain active under data acquisition and display.

SHORT

This is the Short measurement command. Its function is to permit measurement of a portion of an antenna pattern or backscatter measurement without recording the full 400 degrees of measurements. When "SHORT" is pressed, the computer will prompt with:

P: ENTER LIMITS OF ROTATION?

Two numbers are expected in the response, and should assume units of degrees. The first number should be less than the second, and both numbers should be in the range of 0 to 360. After the numbers have been entered, there is a delay of a few seconds as the computer reconfigures memory for short data acquisition. The Data Acquisition subcommands will then reappear, this time with the "SHORT" command underlined, to indicate that the short option is active. To turn off the short option, press "RETRY".

The "SHORT" command is not accessible under Frequency Scan or Time Scan measurements. The "SHORT" command is also not accessible if an increment other than .1 degree per data point has been specified (see INC .X).

When "SHORT" is specified, the following commands become inaccessible: The INC .X command; The "CENTER" subcommand of "DataPa"; The "POINT" subcommand of the "DataPa" subcommands "RANGE" and "REF".

Note that the "RETRY" command will deactivate the "SHORT" option, so that if the "SHORT" option is desired, it must be respecified after using "RETRY".

FHSINT

This is the Fast HandShake transfer/Interrupt transfer command. The function of this command is to permit the user to specify the type of transfer to be used in data acquisition. If the interrupt transfer is selected, the data will be displayed as it is acquired. The fast handshake transfer will not permit data display until after the transfer is complete. However, the fast handshake permits much higher data rates and is the reason why frequency scan and time scan measurements can be completed in as little as 1 second. There is also a nontrivial disadvantage to the fast handshake transfer. When this transfer method is selected, the computer will lock up completely until the transfer is complete. Therefore, if fast handshake is being used and it is impossible to complete the data measurement, you have two choices. Either connect an external pulse generator to the trigger of the 3437A voltmeter, or turn the computer off. It is actually also possible to set interface clear (IFC) on the HP-IB, however, this should only be done by someone experienced with the HP-IB. Incorrectly setting voltages on the HP-IB can result in damage to the HP-IB.

The "FHSINT" command is not accessible in the frequency scan and time scan measurements. In these measurements, if a time under 150 seconds is specified then fast handshake is used. If a time over 150 seconds is specified, then interrupt transfer is used.

ABORT

This is the abort data acquisition and display command. The function of the "ABORT" command is to abort data acquisition and

display, clear memory, and return to PCMDC. The "ABORT" command, like the "RETRY" command, remains active during data acquisition and display.

The "ABORT" command will not function during data acquisition if the computer is engaged in a fast handshake transfer.

1.3 DARP Help Document No. 3.

HELP3 GCopy! PapAdv ABORT

GRAPH→ PolLin hdCopy OUTPUT

These are the commands displayed when the computer is in the GRAPH subcommand mode. This mode is accessed by pressing "GRAPH" when the computer is in PCMDC. The function of these commands is to generate, display, and print a graph and graph summary. The graph mode may only be accessed when there is data in memory.

GRAPH→

This is the generate and display Graph command. If a correct version of the graph exists on the graphics screen the graph will be displayed. Otherwise, a new graph will be generated. When the graph is displayed, it is displayed for 10 seconds. The display may be terminated before 10 seconds complete by pressing "key label" or any special function key.

PolLin

This is the polar display/linear display command. The function of this command is to permit the user to specify the format in which the graph is to be displayed. The option selected, polar or linear,

is denoted by the display of the command as either "PolLin" or "PolLin", respectively. This is the same option as is set under the data acquisition subcommand mode. After this option is set, it will remain in effect until data is fetched from tape or DARP is reinitialized. When "PolLin" is pressed, the option alternates between polar and linear.

The "PolLin" command is not available with Frequency Scan and Time Scan measurements. For these measurements, the mode will default to linear.

hdCopy

This is the hard copy command. The function of this command is to permit the user to select whether or not a hard copy should be generated. When "hdCopy" is pressed the option alternates between hard copy and no hard copy. If the hard copy option is on, the hard copy command will be displayed with an underline.

OUTPUT

This is the Output graph and graph summary command. The function of this command is to display (and print if the hard copy option is on) the graph and graph summary.

GCopy!

This is the Graphics Screen immediate Copy command. The function of this command is to produce a copy of whatever is on the graphics screen. This command will not modify the contents of the graphics screen.

PapAdv

This is the Paper Advance Command. The function of this command is to cause the printer to advance one line.

ABORT

This is the abort command. When "ABORT" is pressed, the computer will return to PCMDC.

1.4 DARP Help Document No. 4

HELP4 ABORT

DELETE

These are the commands displayed when the computer is warning you of an imminent erasure of a tape. The above commands will appear with the following prompt:

P: NOTE -- THIS PROCESS WILL ERASE
EVERYTHING WHICH IS ON THIS TAPE
HIT DELETE TO CONTINUE
HIT ABORT TO RETURN TO PROGRAM

The computer will enter this mode through one of three paths. The first method of access is by pressing one of the "DELETE" subcommands "TAPE" or "INIT". In this case, this subcommand mode is simply a final precaution to prevent accidental erasure of a tape. The other method of access is when a DARP data tape I/O operation is attempted on a non-DARP data tape. In this case, the computer's response is to delete the tape and create a DARP data tape. If this last action was unintentional PRESS ABORT! If you press DELETE,

the tape will be erased and any programs or other information will be deleted.

DELETE

The function of this command is to permit the computer to erase the tape. After the tape is erased, the computer will return to PCMTC.

ABORT

The function of this command is to stop the computer from erasing the tape. After this command is pressed, the computer will return to PCMTC, and the tape will remain intact.

1.5 DARP Help Document No. 5

HELP5	hdCopy		ABORT
LCAT	LFILE	LFILES	PapAdv

These are the commands displayed when the computer is in the tape catalog subcommand mode. This mode is accessed by pressing "CAT" when the computer is in PCMTC. The function of these commands is to display or print a summary of a tape or tape file.

LCAT

This is the list catalog command. The function of this command is to list the name of the tape and the names of all the DARP data files on the tape. If the hard copy option has been selected, this listing will be printed. At the bottom of the listing will be a statement of how many DARP data files are still empty. The total number of DARP data files which may be stored on one tape is 24.

LFILE

This is the list file command. The function of this command is to produce a listing of the DARP catalog for a given DARP data file. The listing which is produced is identical to the graph summary with the exception that the location and relative magnitude of the reference point are omitted.

When "LFILE" is pressed, the computer will prompt with:

P: ENTER NAME OF FILE

A 1 to 8 character response is expected. If the data file exists, a listing will be produced. Otherwise, the computer will display:

FILE NOT FOUND

and will return to the catalog subcommand mode.

LFILES

This is the List Files command. The function of this command is to produce a listing of the DARP catalog for the entire tape. The effect is similar to performing a "LFILE" for each data file on the tape. If hard copy is on, the entire listing will be printed. This command is relatively quick and is a good way to get a detailed "table of contents" of a tape. If only data file names are desired, use "LCAT".

PapAdv

This is the Paper Advance command. The function of this command is to advance the paper on the printer by one line.

hdCopy

This is the hard copy command. The function of this command is to cause output of the catalog subcommands to be printed. When the hard copy option is on, the command is displayed with an underline. Note that this is the same option as in the Graph subcommand mode.

When "hdCopy" is pressed, the option alternates between hard copy and no hard copy.

ABORT

The function of this command is to terminate the catalog subcommand mode and return to PCMTC.

1.6 DARP Help Document No. 6

HELP6	RETAKE	FILES	ABORT
MEMORY	FILE	TAPE	INIT

These are the commands displayed when the computer is in the DELETE subcommand mode. The function of these commands is to, directly or indirectly, delete data. Although this subcommand mode is accessed by pressing "DELETE" while in PCMTC, not all of the commands are tape related. The commands listed in this mode were placed in the delete subcommand mode primarily to avoid accidental data loss.

MEMORY

This is the delete memory command. The function of this command is to erase data from computer memory (the tape is not affected). When "MEMORY" is pressed, the time and date will be displayed, along with the message:

MEMORY HAS BEEN CLEARED

FILE

This is the delete tape File command. The function of this command is to delete one specified file from tape (Memory is not affected). When this command is pressed, the computer will prompt with:

P: ENTER FILE NAME TO BE DELETED:

The user should enter the name of the DARP data file to be deleted. If the file does not exist, the computer will display the message:

FILE NAME NOT FOUND

and will return to PCMTC. If the computer successfully deletes the file, the following message will be printed:

"filename" HAS BEEN PURGED

the computer will then return to PCMTC.

TAPE

This is the clear DARP data tape command, and should only be used on previously initialized DARP data tapes. The function of this command is to completely empty a DARP data tape. When the command "TAPE" is pressed, the computer will issue a warning that the tape is about to be erased. For an explanation of responding to this warning, see DARP Help Document No. 4. After the tape has been cleared, the computer will return to PCMTC.

INIT

This is the initialize and condition DARP data tape command. The function of this command is to completely erase a tape, condition the tape, and then format the tape into the standard DARP data tape

configuration. This command should be used on all blank tapes before an attempt is made to store DARP data files on them. It is also a good idea to subject old DARP data tapes to "INIT" after every 8 to 10 hours of use. If this is not possible, (since "INIT" does destroy the contents of the tape) the user should use the CTAPE command when DARP is not running. (See HP manual).

When "INIT" is pressed, the computer will begin an initialization process which will last about 7 minutes. To warn the user of this, the computer will print:

THIS WILL TAKE ABOUT 7 MINUTES

At the end of 7 minutes, the computer will prompt with:

P: ENTER TAPE NAME

You should enter a 1 to 8 character string. It is a good idea to record the tape name on the outside of the cartridge as well. The computer will then return to PCMTC.

RETAKE

This is the Retake data command. The function of this command is to permit a new set of data to be taken without having to respecify the data parameters. The operation of the RETAKE command is very similar to the DataAC subcommand, RETRY. The difference being that RETRY is active before and during data acqusition and display, whereas RETAKE can be used after data acquisition and display has been completed. RETAKE, like RETRY, resets the short option to off. If SHORT is desired, it should be specified. When RETAKE is pressed, the computer will enter the DataAC subcommand mode.

FILES

This is the delete multiple files command. The function of this command is to permit the user to delete several files without the accompanying delays encountered with the FILE command. When FILES is pressed, the computer will prompt with:

```
P:   TAPE: "tapename"
     TYPE NULL LINE TO RETURN TO
     PROGRAM
     ENTER FILE NAME TO BE DELETED
```

The user should enter the first file name to be deleted. If the file does not exist, the computer will respond with:

```
     FILE "filename" NOT FOUND
     ENTER FILE NAME TO BE DELETED
```

If the computer does locate the file entered, the computer will just prompt with:

```
P: ENTER FILE NAME TO BE DELETED
```

You should continue to enter your list of file names to be deleted until you are through. Then, enter a blank line in response to the prompt. The computer will then perform the actual deletions, and then return to PCMTC. Note that until you hit that blank line, the computer does not record any of the deletions. This fact may be used to advantage. If you make a mistake entering your list of deletions and accidentally "delete" a file unintentionally, just remove the tape cartridge from the tape drive and enter the blank line (in that order). The computer will give you a harmless incidental error message and return to PCMTC. You may then try the deletions again.

ABORT

Press ABORT if you do not wish to use any of the delete subcommands.

1.7 DARP Help Document No. 7

HELP7 ABORT

ANTENA BACKSC F-Scan T-Scan

These are the commands displayed when the computer is in the initialization subcommand mode. The purpose of this subcommand mode is to permit the user to select the type of measurement desired, as well as to specify the conversion of volts to dBm. When the computer prompts with:

P: ENTER MEASUREMENT DESIRED

The user should press one of the bottom four commands.

ANTENA

Pressing this command will select Antenna patterns as the measurement mode.

BACKSC

Pressing this command will select backscatter measurements.

F-Scan

Pressing this command will select Frequency Scan.

T-Scan

Pressing this command will select Time Scan as the measurement type.

ABORT

Since a measurement type must be selected, ABORT will only clear the screen and repeat the prompt.

After one of the four types of measurement has been selected, the computer will prompt with:

P: ENTER VOLTAGE FOR OdBm?

A numeric entry is expected between -2 and +2. The computer sets the voltmeter to local prior to this entry to aid in this and the following response.

After the number is entered, the computer will prompt with:

P: ENTER MIN. dBm AND CORRESPONDING VOLTAGE?

A negative number is expected for dBm and any number between -2 and +2 is expected for the voltage. Based on the above three numbers, the computer will generate a linear transformation from volts to dBm.

1.8 DARP Help Document No. 8

HELP8	REF	ReSpec	ABORT
ORIGIN	RANGE	CENTER	LstMax

These are the commands displayed when the computer is in the data parameters subcommand mode. The function of these commands is to specify various parameters relating to the data and the examination of the data. This mode is accessed by pressing DataPa when in PCMDC. DataPa is only accessible when there is data in memory.

ORIGIN

This is the return to original graph command. The function of this command is to restore the display of the data to its original format. Specifically, any range specifications are reversed, and the center option, if it was selected, is turned off. The ORIGIN command has an additional function if the SHORT option of DataAC is on. Since, with the antenna pattern and backscatter options the computer plots one point per degree, then if a short data pattern of, say 40 to 55 degrees is specified, the data plot will be made using only 16 points. When ORIGIN is pressed, the plot accuracy is increased by the automatic use of 150 points.

RANGE

This is one of the more powerful commands in DARP. By using the RANGE command, a window can be established inside the data so that a particular segment of the data may be examined in more detail. When RANGE is pressed the computer will prompt with:

P: ENTER WINDOW SIZE TO BE USED --

CURRENT SIZE IS xxx (sss)

where xxx is the current size, and sss is the unit of measurements being assumed. The user should enter a positive number that is less than or equal to the original range. If an invalid response is entered, the prompt will be repeated. After a valid window size is entered, the computer will prompt:

P: DO YOU WISH TO POINT TO OR TYPE

IN CENTER OR KEEP OLD CENTER

The user is referred to DARP Help Document No. 9 for help in responding to this prompt. After the center has been entered, the computer will return to DataPa-subcommand mode.

CENTER

The CENTER command is used with antenna patterns and backscatter measurements to center the graph around an arbitrary zero point. The result of using CENTER is that the graph size is reduced from 400 degrees to 360 degrees. A point is chosen within this 360 degree range, and is then referred to as the new 0 degree point. All other points are then shifted and graphed relative to this new 0 degree point. The end points of the 360 degree range are wrapped around and are graphed contiguously with each other. After CENTER has been specified, all range instructions are taken relative to the new zero degree point. It is then possible to specify a range anywhere from -180 to +360 degrees, with a total window size of not more than 360 degrees.

When CENTER is pressed, the computer will respond with

P: DO YOU WISH TO POINT TO OR TYPE
IN CENTER OR KEEP OLD CENTER

The user is referred to help document No. 9. The point which is specified will become the new 0 degree point. After the point has been specified, the computer will return to DataPa, and will now display the CENTER command with an underline to indicate that the CENTER option is in effect. The CENTER option may be turned off by using the ORIGIN command.

Using the CENTER command will reset any previous range specifications. The CENTER command is not available in the time scan and frequency scan

modes, and is not available if SHORT has been specified under DataAC. Additionaly, using CENTER disables the LstMax command.

LstMax

This is the list relative maxima command. The function of this command is to search through the data (or a specified subset of the data, if the RANGE command has been used) and list relative maxima. If, when LstMax is pressed, it is pressed twice instead of just once, (that is, twice within 1 second) then the listing of relative maxima will be printed. After 1 second has elapsed, the computer will prompt:

P: ENTER CUTOFF LEVEL (IN dBm) AND
RESOLUTION (IN sss)

where sss is the unit of measure being assumed. The number entered for cutoff should be the level below which the user is uninterested in maxima. For example, if the data was taken over a dynamic range of 0 to -60 dBm, with the noise level at, say, -50 dBm, then an appropriate number might be -45 or -50.

The resolution is defined for this purpose to be the minimum separation between maxima for the maxima to be resolved as separate. A bit of digression on the need for a resolution parameter is perhaps appropriate.

In a typical signal recording, a peak will appear as a relatively smooth rise in the graph over a relatively wide area. For example, in an antenna pattern, a lobe may peak at -10 dBm and be 4 or 5 degrees wide. However, another component of the signal is spurious fluctuation which may be only a few tenths of a degree wide

and represent a change of only a small fraction of a dB. Nevertheless, such spurious fluctuations, when imposed on a relatively smooth signal, will constitute a relative maxima. What is needed is a way to differentiate maxima in the signal from maxima resulting from noise. This brings us back to the resolution parameter.

If, in the above example, 1 is entered for resolution, then all the noise related peaks (which are presumably closer together than 1 degree) will be smeared together and only the largest peak (presumably occurring at the maxima of the original signal) will be listed as a maxima. Therefore, when entering a number for resolution, the number should represent a separation smaller than the separation between peaks in the signal, but larger than the separation between peaks resulting from noise. The number entered for resolution must be between 1/10 and and 1/400 of the total size of the original graph. If SHORT is specified, then the number must be between 1 and 40.

After the user has entered the two numbers for cutoff and resolution, the computer will print a heading, and begin listing values. This is a rather time consuming process, so the user should not be alarmed if there is a delay of several minutes before the first maxima is listed.

Since this is a time consuming process and the correct specification of cutoff and resolution may require a trial and error process, the user is provided with an ABORT command. The ABORT command becomes active as soon as the computer begins the listing (press "key label" to see the command). The ABORT command will abort LstMax and return the computer to the DataPa subcommand mode.

REF

This is the specify reference point command. The reference point entered will be used in conjunction with the reference level entered under the DataAC prompts for external calibration. Note that the user must only specify the location of the reference point. When REF is pressed, the computer will prompt with:

P: DO YOU WISH TO POINT TO OR TYPE

IN REF OR KEEP OLD REF

The user is referred to help document No. 9 for explanation. After the location of the reference point has been entered, the computer will return to the DataPa subcommand mode.

ReSpec

This is the respecify data parameters command. The results of using this command are rather complicated, so this command should only be invoked by experienced users. ReSpec enables the user to respecify all of the data parameters. When the ReSpec command is pressed, the computer will enter the initialization subcommand mode (see help document No. 7). Although the user may switch the classification of a set of data from antenna pattern to backscatter, other changes in classification can lead to highly unpredictable results. The respecification of the voltage to dBm conversion is a much more useful device. Since the computer records all data between -2 and +2 regardless of voltage to dBm conversion. This process may be used to eliminate clipping, or, alternatively, to blow up the vertical scale to enhance the display of dynamic variation.

After the Initialization routine is completed, the computer will immediately enter the DataAc prompting sequency (see Help Document No. 1).

Since the information resulting from the users responses in this section is primarily for documentation purposes, the user is fairly free is respecifying data parameters as is felt necessary. When the computer finishes the DataAC promping sequence, it immediately returns to PCMDC.

ABORT

ABORT is used to end DataPa and return the computer to PCMDC.

1.9 DARP Help Document No. 9

HELP9 ABORT

POINT TypeIn Keep

This subcommand mode is used and entered via the DataPa subcommands REF, RANGE, and CENTER. The function of this subcommand mode is to permit the user to enter the location of a particular point on the graph. To this end, the user is permitted to point to the data point desired, type in the location desired, or simply keep the previously specified or defaulted point.

The prompt for this rotuine will vary depending on the calling routine, however the commands remain the same. The POINT command, however, will not be accessible if SHORT has been specified in DataAc.

POINT

If the POINT command is invoked, a graph of the data will be displayed, along with a flashing arrow. By manipulating the arrow, the user specifies which point is to be entered. When the user presses POINT, the computer will enter the point subcommand mode. See Help document No. 12 for explanation. POINT is not accessible if the SHORT option is active. Further, using POINT will reset any range which has been specified. Therefore, as a general rule, RANGE should be the last parameter set.

TypeIn

This is the type in data point command. The function of this command is to permit the user to simply type in the location of the data point desired. When the user presses TypeIn, the computer will prompt with either:

P: ENTER CENTER?

or

P: ENTER REF?

depending on the calling routine. (RANGE AND CENTER result in the first prompt, REF results in the second.) When using the RANGE command, if the CENTER option is on, the center point should be specified relative to the new zero point. When entering REF, the location of the point should always be specified in absolute coordinates, regardless of whether or not the CENTER option is active. If an invalid point is entered, the prompts will be repeated. When using the RANGE command, remember to leave adequate space for the window.

KEEP

This command instructs the computer to keep the previously specified or defaulted value. For RANGE, the value will be the center of the old graph. For CENTER and REF the value will be the highest point on the graph, unless the parameter has already been specified otherwise.

ABORT

The ABORT command, in this subcommand mode, performs the same function as the KEEP command.

1.10 DARP Help Document No. 10

HELP10 DataCO END ABORT

CAT STORE DELETE FETCH

These are the commands displayed when the computer is in the Primary Command Mode under Tape Commands (PCMTC). The four principle commands: CAT, STORE, DELETE, and FETCH all perform tape operations. DELETE also performs non-tape related operations.

CAT

This is the tape catalog command. When this command is pressed the catalog subcommand mode is entered. The catalog subcommands permit the user to obtain summaries of tape data files or of entire tapes. For a description of the catalog subcommands, see help document No. 5.

STORE

This is the store data command. The function of STORE is to copy memory (data and data parameters) onto tape. When STORE is pressed, the computer will scan the tape for empty files. If no

files are empty, the computer will display the message:

TAPE IS FULL

STORE HAS BEEN ABORTED

and will return to PCMTC. If there is at least one file empty, the computer will prompt:

P: ENTER FILE NAME

A 1 to 8 character name is expected. If the file name already exists, the computer will respond with:

DUPLICATE FILE NAME

and will then return to PCMTC. However, if the file name already exists but contains the same data as in memory (for example, if you fetch a file from tape, modify some of the data parameters, and then wish to store your modification in the original file) then the computer will respond with:

MODIFICATION HAS BEEN STORED

and will then return to PCMTC.

If the file name you specify does not alreasy exist on tape, then the computer will store memory (data and data parameters) and then respond with

DATA HAS BEEN STORED

and will then return to PDMTC.

The store command is only accessible if there is data in memory.

DELETE

The DELETE command is used to enter the DELETE subcommand mode. The delete subcommands are used to perform functions which directly or indirectly result in the loss of data in either computer memory or on tape. These commands are placed in the delete subcommand mode to help prevent the accidental loss of data. For explanation of the commands, see help document No. 6.

FETCH

FETCH is used to load a previously stored DARP data file. When FETCH is pressed, the computer will prompt with:

P: ENTER FILE NAME

The name of a DARP data file on the tape should be entered. If the file is not found, the computer will respond with

FILE NAME NOT FOUND

and will return to PCMTC. If a valid file name is entered, the computer will load the data file into memory and when finished will display:

DATA HAS BEEN LOADED INTO MEMORY

FETCH is not available if there is unstored data in memory. See the discussion under DataAC in help document No. 1 for an explanation of how to regain access to FETCH and other commands.

DataCO

This command is used to switch from PCMTC to PCMDC. As described in help document No. 1, this is the sister command to TapeCO.

END and ABORT

These commands have the same function as they do in PCMDC. See help document No. 1 for explanation.

1.11 DARP Help Document No. 11

HELP11 ABORT

Khz Mhz Ghz

This subcommand mode is entered via the DataAC prompt sequence when frequency scan has been specified. Before the commands are displayed, the following prompt is given:

P: ENTER FREQUENCY RANGE, THEN
PRESS APPROPRIATE MULTIPLIER?

In response to this prompt, the user is expected to enter a pair of numbers, the first smaller than the second, representing a frequency range. One of the above units (Khz, Mhz, Ghz) should be assumed and omitted. After the two numbers are entered, the computer will display the above listed commands.

Khz, Mhz, and Ghz

These commands instruct the computer to use Khz, Mhz, and GHz, respectively, when taking the frequency scan.

ABORT

Pressing ABORT will cause the computer to repeat the original prompt, and permit the user to respecify the two numbers for the frequency range.

After one of the above units has been specified, the computer will prompt with:

P: ENTER TOTAL TIME REQUIRED FOR
SPECTRUM ANALYZER TO SCAN
SPECIFIED RANGE (IN SECONDS)?

The user should specify a number between 1 and 100 assuming and omitting units in seconds. The computer will then prompt with:

P: ENTER COMMENTS?

The computer is now back in the standard DataAC prompt sequence. For explanation, see help document No. 1.

1.12 DARP Help Document No. 12

HELP12	REPEAT		REPEAT
	LEFT	ENTER	RIGHT

or

HELP12	REPEAT		REPEAT
	CCW	ENTER	CW

These are the commands displayed when the computer is in the POINT subcommand mode. This mode is entered via the DataPa subcommands RANGE, REF, and CENTER. The upper set of commands will be displayed if the computer is in the linear mode. The lower set of commands will be displayed if the computer is in the polar mode. After the appropriate set of commands are displayed, the computer will shift back to the graphics screen. The graph of the data will be displayed, and imposed on the graph will be a flashing arrow. The general idea is to move the flashing arrow under the data point desired. Additionally, the data point currently selected will also

be flashing. The selected data point is located directly above the flashing arrow.

To move the flashing arrow and selected data point to the desired data point, the above commands are employed.

LEFT (k2)

Pressing the left key causes the flashing point to move one data point to the left. Note that this is not a very large distance since there are 400 data points displayed on the screen. To move large distances, use the REPEAT (k6) key.

REPEAT (k6)

To save wear and tear on the user's fingers, the REPEAT key is available. By pressing the same key $[^{k6}_{k2}]$ with the shift key held down, the arrow can be made to move continuously left. In the REPEAT mode, the selected data point moves two data points to the left with each jump, so the final positioning of the selected data point should be made using the LEFT key. The movement to the left halts when another special function key is pressed.

RIGHT (k4) and REPEAT (k8)

The RIGHT key and the REPEAT key above it $[^{k8}_{k4}]$ operate in exactly the same manner as the LEFT (k2) and REPEAT (k6) keys, but move the arrow to the right.

CCW and CW

These keys will replace the LEFT and RIGHT keys when the polar display mode is in effect. Their operation is identical

to the above described keys, with the exception that these keys will move the arrow in the counterclockwise and clockwise directions, respectively. The associated REPEAT keys work in a similar fashion.

HELP12

Unlike all other HELPX keys, HELP12 does perform a function. When HELP12 is pressed, the arrow will stop moving.

ENTER

When the flashing arrow is under the desired data point, and the desired data point is flashing, the data point may be entered by pressing ENTER. This will terminate the point subcommand mode and return the computer to the calling routine.

ABORT

As the user may have noticed, the POINT subcommand mode does not contain an ABORT key. The only way to terminate the POINT subcommand mode is by pressing ENTER.

Note: When using the POINT subcommand mode it is impossible to enter an invalid data point. Thus, when the arrow goes off one edge of the graph, it will appear on the other side. Also, when using the RANGE subcommand, the window size is taken into account. Thus if one edge of the imaginary window centered on the arrow bumps up against the edge of the graph, the arrow will be repositioned on the other side of the graph, half the window's width away from the edge.

If the CENTER option is active, the graph displayed will be centered. If the SHORT option is active, the POINT subcommand mode will not be accessible.

CHAPTER 2. COMMENTS

2.1 The Hard Copy Option

The hard copy option may be turned on or off in either the CAT subcommand mode or the GRAPH subcommand mode. The user should be aware that it is the same option in both subcommand modes and that the computer maintains the status of this option after the subcommand mode is left.

2.2 Graphs and PolLin

The user has a choice of having data displayed in either the polar or linear format. (Only linear is available for frequency scan and time scan.) The option selected is maintained, even when memory is cleared or a new set of data is taken. (However, the mode is set to linear during the initialization subcommand mode.) The graph generated reflects the user specified Data Parameters. For example, if the dynamic range specified was 0 to -50 dBm and the range from 0 to 400 degrees, a graph like figure 1 would be produced. The vertical scale will always have a tick mark at 0 dBm. Starting at 0 dBm the vertical scale will be marked off in 5 dB increments. The horizontal scale will be marked off starting at the center point (the intersection of the axes) in increments of 1,2, or 5 times a power of 10 in whatever units are appropriate. The selection of the horizontal increment is performed automatically by the computer to provide a readable axis. In this case, the tick marks occur every 20 degrees. A bit more explanation is needed when the axes do not divide quite so neatly. For example, in Fig. 2 the frequency scan has

a dynamic range of 0 to -47 dBm, and the frequency range extends from 3.1 to 14.7 GHz. For the vertical scale, the tick marks will again start at 0 dBm and descend in 5 dB increments. The -47 dBm at the bottom merely indicates the value of the vertical scale when it intersects the horizontal axis, and cannot be used in determining the value of the tick marks above it. Note that the tick marks always occur at multiples of -5 dBm so that values such as -10 dBm and -30 dBm are always exactly known.

The horizontal axis is again divided by tick marks beginning from the center. This time the increment is 0.5 GHz. Since the marking begins at the center, the tick marks to the right correspond to 9.4, 9.9, 10.4,...,GHz, whereas those to the left correspond to 8.4, 7.9, 7.4,... GHz. The values 3.1 GHz and 14.7 GHz at the left and right of the axis this time do not correspond to a tick mark value, thus there is no tick mark at the left and right ends of the graph. 3.1 and 14.7 are merely the minimum and maximum values.

For the polar display, there is a similar interpretation to the axes. In Fig. 3, the dynamic range is from 0 to -40 dBm. The 0 degree point is assumed to be at the top and angle increases positively in the clockwise direction. (To get a correct, non-inverted image of a pattern, the object under measurement should be rotated counterclockwise as viewed from the top.) Again, as with the linear display, the dynamic scale is marked in increments of 5 dB, starting at the 0 dBm point. The angle is marked off in 5 degree increments. Each point on the outer circle corresponds to a 5 degree increment. Each point on the inner circle corresponds to a 10 degree increment. The outer circle is aligned

with the 0 dBm point. The inner circle is aligned with a tick mark that is approximately halfway to the center. Therefore, the inner circle will always correspond to a multiple of -5 dBm. In this case it is positioned at -20 dBm.

In Fig. 4 the dynamic range is 0 to -37 dBm. Again, the tick marks are measured from 0 dBm in 5 dB increments. Therefore, this time -37 dBm is merely the minimum valued and does not fall on a tick mark. Note that this time the inner circle is aligned with the -15 dBm point.

Although either polar or linear display may be used throughout DARP (even in the POINT subcommand), the user is warned that the polar mode is slightly slower than the linear mode. Therefore, if data acquisition is desired in polar mode, the measurements should proceed at a slightly slower pace than for the linear display if the user wishes to maintain the real-time display of data acquisition. However, the maximum transfer rate of the data is independent of the display mode and even if the real-time display is lost (i.e., a lag develops between acquisition and display) the validity of the data will not be affected.

2.3 Data Acquisition, FHSINT, and INC .X

When measurements are being made of either antenna patterns or of backscatter, there is the possibility of data being lost. This is because a data point is obtained every time a pulse is generated by the optical decoder. If the optical decoder generates pulses faster than the computer can record the voltage values, then a data point(s) will be lost. (Note that frequency scan and time scan measurements are not susceptible to data loss since the data transfer is governed by an

internal clock which is not susceptible to large fluctuations in pulse rate.) The optimal solution to preventing data loss would be to design the mechanical system so that the optical decoder would not be subjected to fluctuations in speed of rotation. Since there is some slop in the mechanical system, nonuniform rotation speeds might imply less than optimally precise recording of patterns. However, it is not known at the time of the writing of this manual how precise the recording system will be.

In any event, there are several corrective actions DARP can use to overcome the fluctuation in data rate to prevent data loss.

The first method is the brute force approach. By switching from the interrupt transfer to the fast handshake transfer the computer can handle data rates approximately 50 times higher. It is this method which permits the computer to record frequency scan and time scan measurements in periods down to 1 second. The main disadvantage to the fast handshake transfer is that the real-time graph display is lost. Additionally, it is impossible to interrupt a fast handshake transfer, so that data acquisition must go to completion before DataAC may be interrupted.

The second method is to use the INC .X command. By using this option, the data rate can be halved or fourthed by using INC .2 or INC .4 respectively. (The pulse generator should be set at 1800 and 900 respectively when the option is used.) If only the INC .X option is used, it is possible to keep the real-time display.

As a last resort, one can use both the INC .X and the fast handshake transfer. The effect is multiplicative, so that is INC .4

and fast handshake are both used the maximum pulse rate is theoretically increased by about a factor of 200.

When data is lost, the ignore trigger light on the 3437A will come on. Shortly after this, the computer will display a message indicating that data has been lost. When diagnosing the system as to the cause of the data loss, it may be useful to watch the left-most decimal point. (Not the "real" decimal point.) The left-most decimal point will light up every time a trigger pulse is received. If the light remains off for a long period of time, say, 1 second, then something is probably wrong with the pulse generator. The average data rate at which measurements are made (assuming 3 minutes per revolution) is 20 Hz. The real time display can be maintained up to approximately 35 Hz on the linear display, and the maximum data rate using the interrupt transfer is over 100 Hz (less than 10 msec between pulses.).

2.4 PAUSE

To aid in debugging, the PAUSE is always kept active. If the PAUSE key is pressed accidentally, the computer may be restarted, without any loss, by pressing the CONT key.

DARP ENDED

You pressed the END key and DARP has ended. If you would like to run DARP again, press the RUN key.

DATA ACQUISITION

HAS BEEN ABORTED

You pressed ABORT under DataAC. See HD2 (DARP Help Document No. 2).

DATA HAS BEEN LOADED INTO MEMORY

See HD10

DATA HAS BEEN STORED

See HD10

DATA HAS BEEN SUCCESSFULLY

RECORDED

See HD2

DO YOU WISH TO POINT TO OR TYPE

IN xxxx OR KEEP OLD xxxx

See HD9

(Duplicate File name see HD10)

ENTER ANTENNA TYPE

See HD2

ENTER CENTER FREQUENCY

See HD2

ENTER COMMENTS

See HD2

ENTER CUTOFF LEVEL (IN DBm) AND

RESOLUTION (IN xxx)

See HD8

ENTER DURATION OF TIME SCAN

See HD2

ENTER FILE NAME

See HD10

ENTER FILE NAME TO BE DELETED:

See HD6

ENTER FREQUENCY RANGE

See HD11

ENTER LIMITS OF ROTATION

See HD2

ENTER MEASUREMENT DESIRED

See HD7

ENTER MIN. dBm AND CORRESPONDING

VOLTAGE

See HD7

ENTER NAME OF FILE

See HD5

ENTER NAME OR NUMBER

(MAX 8 CHARACTERS)

You should enter a 1 to 8 character string to be used as either a tape name or file name.

ENTER POLARIZATION [E,H or X]

See HD2

ENTER PROJECT #

See HD2

ENTER RANGE

See HD2

ENTER REFERENCE LEVEL

See HD2

ENTER TAPE NAME

You have just initialized a tape, and you must now give it a name. Any 1 to 8 character string will suffice. You should write this name on the outside of the tape as well, for easy reference.

ENTER TOTAL TIME REQUIRED FOR
SPECTRUM ANALYZER TO SCAN
SPECIFIED RANGE

See HD11

ENTER TRANSMITTER POWER

See HD2

ENTER TRANSMITTING ANTENNA

See HD2

ENTER VOLTAGE FOR 0 dBm

See HD7

ENTER WINDOW SIZE TO BE USED --
CURRENT SIZE IS xxx

See HD8

Error 7 : NULL DATA

This is an HP-85 error message. The cause of this error may either be an internal DARP programming error, or a user input error.

To recover from this error: Press the "CONT" key. If the cause of the error was a user input, the computer will display: ? The user should respond by reentering the last response (this time correctly).

ERROR # xxxx at LINE yyyy

PROGRAM HALTED

This is an internal DARP error. Find someone who knows how to fix the program. Do not erase the screen. Do not press any buttons, do not turn off the computer.

FILE NAME NOT FOUND

See HD6 or HD10

ERROR IN INPUT

The entry just made is invalid, check description of the prompt preceding your response, and reenter your response.

FILE NOT FOUND

See HD5

MODIFICATION HAS BEEN STORED

See HD10

NOTE -- THIS PROCESS WILL ERASE

EVERYTHING WHICH IS ON THIS TAPE

HIT DELETE TO CONTINUE

HIT ABORT TO RETURN TO PROGRAM

See HD4

PROBLEM WITH TAPE

You are attempting a tape operation and there is something wrong with either the tape or the tape drive.

PROBLEM WITH VOLTMETER

The computer is unsuccessfully trying to communicate with the voltmeter. There is something wrong with either the voltmeter or the HP-IB. Make sure the voltmeter is on and the HP-IB is connected.

TAPE DRIVE IS EMPTY

You are attempting a tape operation without a tape in the tape drive.

TAPE IS FULL

STORE HAS BEEN ABORTED

You have attempted to store a data file on a tape that does not have any empty files. Try another tape or delete a file from the tape to make more space.

TAPE IS WRITE PROTECTED

You are attempting to either store data on a tape or erase a tape which is write protected. If the write protection is unintentional. remove the tape and slide the "record" tab all the way to the right. Then reinsert the tape and try the tape operation again.

THIS TAPE HAS NOT BEEN

PREVIOUSLY USED TO STORE DARP

DATA FILES -- OK TO CONDITION

AND ERASE TAPE

You are attempting a tape operation on a non-DARP data tape. The computer's response to such attempts is to erase the tape and create a DARP data tape. If you do not wish to erase the tape, press ABORT.

See HD4.

THIS WILL TAKE ABOUT 7 MIN.

Your tape is now being initialized, a process which takes about 7 minutes.

WARNING ** WARNING

DATA HAS BEEN LOST

This is a warning that data has been lost during data acquisition. You may wish to press RETRY to take a fresh set of data. See HD2 and comments on DataAC.

CHAPTER 4. AN EXAMPLE

The following is an example of using DARP to measure an antenna pattern; store the pattern on tape; and produce a copy of the standard output. If you find any part of this example confusing, or if you just want more information, you should check the guide to error messages and prompts or the help documents.

Step 1

Take tape marked "PROGRAM" and place in tape drive.

STEP 2

Turn on HP-85 (switch is in rear), HP3437A, and any other needed equipment. Connect any needed cables.

Step 3

Wait unitl computer prompts with:

P: ENTER DATA MM/DD/YY:

then type in the date, using the indicated format. For example, a valid response might be:

R: 7/23/81

The computer will then prompt with:

P: ENTER TIME HH:MM [AM or PM]

You should now enter the time. For example:

R: 9:34 AM

Step 4

After about 40 seconds, the computer will display:

REMOVE PROGRAM TAPE NOW

You should now remove the tape marked "PROGRAM" and insert either a blank tape or a tape that has already been used to store DARP data files and is not yet full.

Step 5

The computer will prompt with:

P: ENTER MEASUREMENT DESIRED

For this example, press ANTENA (key k1, located directly underneath the CRT.

Step 6

The computer will prompt with:

P: ENTER VOLTAGE FOR 0 dBm?

At this point you should rotate the antenna so that you are recording the peak value. Adjust the spectrum analyzer display to the 0 dBm line (or whatever detector you are using). Note the voltage on the 3437A. If the value is under +2 volts, enter the number into the computer. If it is not under +2 volts, adjust the spectrum analyzer until the voltage is under 2 volts. For example, on one of the spectrum analyzers, this might be 0.8 volts:

R: 0.8

The computer will now prompt with:

P: ENTER MIN. dBm AND CORRESPONDING VOLTAGE?

You should now either proceed to measure this minimum value or calculate it. In this case we know that a 0.1 voltage drop corresponds to a 10 dB drop. Therefore, you might enter:

R: -60, 0.2

Step 7

The computer will now present you with a choice of commands. Press DataAC (k1).

Step 8

The computer will now present you with a series of prompts. The following set of responses is simply for example, and you will probably want to enter more meaningful and appropriate responses.

P: ENTER CENTER FREQUENCY?

R: 30 GHz

P: ENTER ANTENNA TYPE?

R: YAGI

P: ENTER POLARIZATION [E,H or X]?

R: X

P: ENTER REFERENCE LEVEL?

Note that this response will be used in calibration, therefore an appropriate action might be to locate a reference point, such as the peak of the main lobe, and enter the externally measured value, for example:

R: 5 Watts

P: ENTER TRANSMITTER POWER?

R: 30 Watts

P: ENTER TRANSMITTING ANTENNA?

R: HORN

P: ENTER RANGE?

R: 5.3 METERS

P: ENTER PROJECT #?

R: 772340A

P: ENTER COMMENTS?

R: UP TO 26 CHARACTERS

Step 9

After the last response, the computer will generate the graph labels and axis. The computer will then display a set of commands. When you are ready (the antenna should be turning) press START (k1). Hopefully, your data will look better than the data should in Fig. 5.

Step 10

After the computer has finished recording the data, the computer will display a new set of commands. We now wish to store the data on tape, so press STORE (k2).

If you are using a tape that has not been previously used to store DARP data files, the computer will want to erase and initialize the tape. If this is OK with you, (see help document #4) press DELETE (k1). After the tape initialization process completes, press STORE again.

Step 11

The computer will now prompt with:

P: ENTER FILE NAME

You should now enter an appropriate file name:

R: Yagi-1

The computer will now attempt to store the data on tape. If it does this successfully, the computer will come back with the message:

DATA HAS BEEN STORED

and display a set of commands.

Step 12

We have now measured a pattern and stored the pattern on tape. All that remains to produce a copy of our results. Press GRAPH (k2).

Step 13

Now press hdCopy (k3) so that we can get a copy of the output. (It should look something like Fig. 5).

Step 14

Now press OUTPUT (k4) and sit back and watch.

Step 15

When the computer finishes, press PapAdv (k7) several times as needed, and tear off paper.

Step 16

We are now finished, so press ABORT (k8).

Step 17

If you want to try the whole thing over again, press DataAC (k1), and you will be able to take a new pattern. If you would like to readjust the dBm-voltage calibration or perhaps try a different type of measurements, press REINIT (k3).

If you have had your fill of this stuff, press END (k7).

CHAPTER 5. INFORMATION FOR PROGRAMMERS

5.1 Scalar Variable Definitions

A7, A8, and A9

are all used in the FNA1 routine for decoding data. A9 is also used as a flag in the point routine to determine whether or not the graph should be redrawn.

C9 is a temporary variable used in the FNC3 routine.

D1 contains the data in memory that was recorded.

D3 is the same as D1, but is used as a temporary variable in examining tape files.

F1 is a flag which is used primarily in the RETRY and ABORT routines.

H3 is the variable which contains the help document number.

I is used as an index in for loops throughout the program.

I2 is also used as an index, primarily when I is already in use.

N1 is used as an index to the files.

S7, S8 and S9 are used to contain status information on IO$ and on Interface 7.

T1 and T3 contain the time at which the data was recorded. T3 is used with tape files.

T6,T7,T8 and T9 are all used as temporary storage variables. T9 is used almost everywhere for this purpose. T8 is also used as an index in the DataAC prompt sequence.

Z9 is another temporary variable.

5.2 Scalar Variable Cross Reference

Variable	Definition	Referenced
A7		8915,8918
A8		8915,8918
A9		3663,8655,8906,8909,8910,8912,8918,8924
C9		8043,8046
D1		2406,2860,4645,4650,4710,5725
D3		2860,2952,4228,4320,4640,4645
F1		2390,2395,2407,2436,3816
H3		408,1025,1325,2057,2344,2704 3656,4015,5030,8541,8581,481,2730
I		403,411,412,413,2000,2023,2024,2410, 2430,2431,2435,2437,2472,2474,2476,2850, 2855,3850,3855,4125,4130,4135,4150,4312, 4316,4320,4328,4734,4736,4737,5105,5110, 5115,5729,5730,5732,8150,8155,8160,8174, 8190,8194,8370,8373,8375,8376,8378,8379, 8384,8388,8389,8836,8838,8839,8844,8846, 8848,8854,8856,8878,8880,8881,9104,9105, 9110,3863,3866
I2		3847,4311,8120,8128,8129,8131,8135,8140, 8150,8174,3863,3864,3865
N1		4635,4640,4650,4700,4710,4715,4731,5720, 5735,5726
S7		9002,2408
S8		2449,9000,9001,9007

Variable	Definition	Referenced
S9		9000,9002,9003,9004
T1		2406,2860,4645,4650,4710,5725
T3		2860,2952,4228,4320,4640,4645
T6		2409,2431,8155,8178,8182,8186,8188,8190, 8878,8880,8881
T7		2415,2420,8255,8256,8264,8662,8675, 3850,3863,3866
T8		2029,2031,2033,2039,2040,2044,2046,2048, 2050,2054,2063,2065,2075,2415,2420,3606,3607, 3610,3618,8170,8186,8188,8240,8241,8245 8264,8265,8266,8268,8270,8350,8356,8359, 8362,8365,8372,8373,8381,8606,8615,8618, 8624,8668,8675,3825,3827,3830,3863
T9		415,2035,415,416,417,418,2036,2059,2060, 2061,2090,2330,2332,2405,2408,2415,2420, 2447,2465,2710,2791,2974,2976,3560,3606, 3624,3625,3629,3630,3664,3666,3673,3690, 3692,3705,3720,3725,3910,4115,4135,4140, 4145,4155,4160,4165,4170,4220,4224,4228, 4715,4720,5225,5230,5235,5435,5440,5445, 5775,8005,8090,8125,8128,8129,8131,8134, 8135,8140,8254,8255,8256,8261,8262,8264, 8265,8266,8370,8373,8507,8510,8515,8520 8525,8530,8531,8550,8555,8560,8565,8570, 8575,8580,8603,8606,8609,8615,8618,8630, 8632,8633,8636,8656,8666,8675,8840,8841, 8843,8846

Variable	Definition	Referenced
Z9		2430,2431,2435,3618,3624,3625,3629,3630, 3650,3664,3666,3690,3692,3700,3825,3830, 3845,3900,8373,8375,8376,3862

5.3 String Variable Definitions

B1$ Contains blanks and is initialized in Autost.

C1$ Contains the various user responses obtained during the DataAC prompt sequence.

C3$ is the same as C1$ but is used as a temporary variable in examining tape files.

IO$ is the iobuffer used to contain the readings for all 4000 data points. When data is in "MEMORY" IO$ is where is resides.

I3$ is used to contain the contents of a tape catalog.

M$ contains the names of the four measurement types. M$ is initialized in Autost.

N1$ contains the file names where the data current in memory is stored (if it is stored).

N2$ contains the tape name where the data is stored.

N3$ and N4$ perform the same functions as N1$ and N2$ respectively, but are used as temporary variables in examining tape files.

T1$ and T3$ hold the title for the graph. T3$ is a temporary variable.

T6$ is used in conjunction with FNQ to display commands.

T9$ is used as a temporary string variable.

5.4 String Variable Cross Reference

Variable	Definition	References
B1$	10	2080,4120,4145,8007,8430,8612,8621
C1$	15	2041,2045,2047,2049,2051,2076,2860, 4650,4710,5725
C3$	17	2860,2926,2936,2940,2944,2970,2980, 4228,4320,4640
I0$	10	2280,2404,2408,2415,2474,4730,4733,4736, 4739,5724,5727,5730,5733,8912,8915,9000, 9100
I3$	10	4105,4110,4130,4135,4208,4220,4229,4308, 4309,4316,4615,4630,4635,4652,4700,4720, 4725,4762,5205,5210,5225,5235,5240, 5331,5332,5355,5360,5405,5410,5435,5445, 5480,5710,5715,5720,5741,9260,9265,9270, 9283,9286
M$	35	2976
N1$	15	2860,4652,4762,5610,5715,5720,5725,5727
N2$	15	2860,4652,4762,5741
N3$	17	2860,2962,4216,4220,4228,4320,4625,4630, 4635,4640,4650,4652,4710,4720,4733,4762, 5220,5225,5247,5425,5430,5435,5440
N4$	17	2860,2962,4229,4309,5332,5355,5370
T1$	15	2080,2100,2860,4650,4710,5725,8215,8334, 8852,2030,2032,2078
T3$	17	2860,2906,4228,4320,4640

Variable	Definition	References
T6$	20	407,1020,1320,2056,2310,2311,2312,2314, 2315,2478,2701,2702,2703,3505,3654,4000, 4001,5025,8507,8510,8515,8520,8525,8530, 8531,8532,8538
T9$	10	2030,2034,2035,2036,2041,2045,2047,2049, 2051,2078,2090,2100,2401,2402,2908,2910, 2914,2920,3604,3650,3652,3672,3842,4120, 4135,4145,4155,5121,6540,6560,8007,8010, 8015,8016,8090,8221,8222,8223,8224,8226, 8282,8371,8390,8391,8405,8410,8415,8420, 8430,8612,8615,8618,8621,8624,8630,8636, 8639,8640,8650,8675,8678,8782,8784,8786, 8788,8792,8852,8853,8854,8862,8884,8888, 9220,9225,9330,9255,9260

5.5 Array Variable Definitions

There are two arrays, G1 and G3. Both hold data parameters and are used identically. G3 is used in examining tape files as a temporary variable. Since G3 is a temporary variable, it is also used in non-tape related parts of the program for other temporary uses. The following usage table also applies to G3.

G1(1) is a flag

=0, no data in memory

=1, data in memory

=-1, stored data in memory

=2, data in memory, currently respecifying data parameters

=-2, stored data in memory, currently respecifying data parameters

G1(2) contains the position of the zero point of the graph when the center option is in effect.

G1(3) contains the switch point of the graph when the center option is in effect. (Designating which 40 degrees to lop off.)

contains the total time duration of measurement when the frequency scan or time scan modes are being used.

G1(4) and G1(5) contain the current specified range. G1(4) is the minimum, G1(5) is the maximum.

G1(6) and G1(7) contain the original (total) specified range. G1(6) is the minimum. G1(7) is the maximum.

G1(8) contains the location of the reference point.

G1(9) contains the voltage corresponding to the minimum dBm.

G1(10) contains flags. The usage of the bits is as follows:

bit 0 =0, no hard copy

=1, hard copy

bit 1 =0, linear display

=1, polar display

bits (3,2) =(0,1), electric polarization

=(1,0), magnetic polarization

=(1,1), variable polarization

bits (4,5) =(0,0), antenna pattern

=(0,1), backscatter

=(1,0), frequency scan

=(1,1), time scan

bit 6 =0, standard data

=1, short data

bit 7 =0, graphics screen does not contain correct copy of currently specified graph

=1, graphic screen does contain correct copy of currently specified graph

bit 8 =0, use interrupt transfer

=1, use fast handshake

bit 9 =0, center option not active

=1, center option active

bits(10,11)=(0,0), use Khz (for frequency scan)

=(0,1), use Mhz (for frequency scan)

=(1,0), use Ghz (for frequency scan)

bits(10,11)=(0,0), use .1 degree increment per data point

=(0,1), use .2 degree increment per data point

=(1,0), use .4 degree increment per data point

bits(12,13)=(0,0), use Khz (for frequency scan)

=(0,1), use Mhz (for frequency scan)

=(1,0), use Ghz (for frequency scan)

Gl(11) contains voltage corresponding to 0 dBm

Gl(12) contains the minimum dBm.

5.6 Array Variable Cross Reference

Variable	Definition	Referenced
G1	15	412,2024,2855,4650,4710,5110,5725,4750
G1(1)	15	2447,5510,5600,8533,8534,8539,403,410, 465,2105,2956,3950
G1(2)	15	2431,2438,3666,3692,3720,3730,3745,8043, 8046
G1(3)	15	2063,2064,2068,3730,3735,3740,3745, 3750,8170,8174,8378,8379
G1(4)	15	42,2052,2070,2404,2462,2463,2477,3550, 3604,3625,3626,3630,3660,3752,8043,8182, 8226,8240,8254,8260,8264,8266,8655,2109,3631
G1(5)	15	43,2052,2070,2462,2463,2477,3550,3604,3624, 3626,3629,3660,3752,8182,8230,8235,8240,8254, 8260,8264,8265,8655,2109,3631
G1(6)	15	42,43,44,46,2052,2055,2056,2068,2070,2477, 3550,3607,3626,3660,8655,8903,2109,3631, 3673,3827
G1(7)	15	42,43,44,46,2052,2055,2056,2066,2067, 2068,2070,2477,3550,3607,3626,3660,8655, 2109,3631,3673,3827
G1(8)	15	2438,2922,2924,3666,3692,3735,3740,3910
G1(9)	15	45,450,455,8918,8924
G1(10)	15	40,8691,8695
G1(11)	15	45,430,435,8924

Variable	Definition	Referenced
G1(12)	15	45,450,455,8270,8812,8814,8840
G3( )	17	41,2401,2855,4228,4320,4640,2857,2921, 2956,3845,3855,3862,3864,3866

5.7 G1(10) and G3(10) Bit Reference Listing

Bit No.	Definition	Referenced
Flag 0	15	2026,2702,2706,2792,2796,2998,4001, 4007, 4070,4075,5116
Flag 1	15	2026,2037,2311,2320,2435,2703,2705,5116, 8155,8190,8200,8321,8332,8383
Flag 2	15	2035,2037,2910
Flag 3	15	2026,2908,2910,5116
Flag 4	15	42,43,44,415,416,417,418,2052,2401,2402, 2407,2974,8221,3607,3673
Flag 5	15	415,416,417,418,2053,2402,2407,2974,8222
Flag 6	15	2026,2404,2465,5116,8903
Flag 7	15	2026,2447,2710,2791,3560,3606,5116,5775, 8655,8656,2705
Flag 8	15	2026,2312,2319,2408,5116,9001,9002
Flag 9	15	2026,2922,3560,3610,3623,3660,3664, 3705,3725,5116,8145,8373,8374,8384,3631
Flag 10	15	2026,2315,2330,2332,2405,2410,3847,5116, 8126,8127,8903,8910
Flag 11	15	2026,2314,2332,2405,5116,8126,8903,8909, 3847
Flag 12	15	2026,2059,2060,2061,5116,8223,8252,8253
Flag 13	15	2026,2059,2060,2061,5116,8224

5.8 Function Definitions

FNA1 returns the voltage level for a given data point

FNC$ takes the argument string, centers it, and displays the result.

FNC3 is used with the centering option to shift points around "zero" point.

FND1$ operates on either D1 or D3 to generate a character string containing the date.

FNG1 uses the argument to refer to a bit in G1(1) and returns a 1 if the bit is on, a 0 if the bit is off.

FNG3 is the same as FNG1, but works on G3(10).

FNG4 converts G1(4) from the range G1(6) to G1(7) to the range 0 to 400, and returns the answer.

FNG5 does the same as FNG4, but works on G1(5).

FNE4 converts a number from the range 0 to 400 to the range G1(6) to G1(7).

FNL5 Takes a voltage level and converts it to dBm.

FNO1 uses the argument to reference a bit in G1(10) and sets the bit to one.

FNQ uses T6$ to display commands. Returns a number indicating which command was pressed.

FNT$ is used to prompt for a valid tape and file names.

FNT1$ operates on T1 and T3 and returns a character string containing the time.

FNZ1 is the sister function of FNO1. It sets a given bit to zero.

5.9 Function Cross Reference

Function	Definition	Referenced
FNA1	8900,8924	45,2430,8155,8190,8384,8878,8881
FNC$	8000,8020	5121,6540,6560,8792
FNC3	8040,8046	8170,8178,8373,8384,8880,2922
FND1$	8660,8678	2952,8792
FNG1	40	2052,42,43,2053,2311,2312,2314,2315,2330 2332,2401,2402,2404,2405,2407,2408,2410 2435,2702,2703,2710,2791,2792,2796,2998, 3610,3623,3660,3664,3847,4001,4007,4075, 8126,8127,8145,8155,8190,8200,8221,8222, 8223,8224,8325,8332,8373,8374,8383,8384, 8655,8903,8909,8910,9001,9002,2109,3607, 3631,3673
FNG3	41	2908,2910,2922,2974
FNG4	42	2405,2410,3690,8125,8150,8267,8268,8337, 8375,8376,3850,3863
FNG5	43	2405,2410,3690,8125,8150,8267,8268,8337, 8375,8376,3850,3863
FNE4	44	2922,3629,3630,3866
FNL5	45	2924,3855,3864
FNO1	8690,8692	416,417,418,2035,2060,2061,2332,2447,2465, 2710,3725
FNQ	8500,8590	414,1030,1330,2058,2345,2704,3545,3658, 4015,5030,5320
FNT$	8400,8435	4216,4625,5220,5425,5610,8400,9283

Function	Definition	Referenced
FNT1$	8600,8650	2952,8792
FNZ1	8694,8696	415,416,417,2059,2060,2061,2330,2332, 2791,3560,3606,3705,5775,8656,2705

5.10 Subroutine Definitions

1800 turns off all special function keys.

2390 sets F1=2. Used as a flag routine for DataAC and LstMax.

2395 sets F1=3. Used as a flag routine for DataAC.

2850 This is the graph summary printing routine.

2904 This is the same routine as 2850, but is the entrance used by LFILE and LFILES.

3650 This is the Data Point selection routine. It is used by REF, RANGE, and CENTER.

7500 This is the warning routine. It is used when a tape is about to be erased.

7501 same as 7500, but does not clear screen.

7700 is a utility routine used to generate an empty catalog when initializing a tape.

8090 This is the input routine used in the DataAC prompts.

8110 Generates a graph and plots data.

8200 Generates a graph without plotting data.

8221 returns either sec, deg, Khz, Mhz, or Ghz depending on the graph specifications.

8300 This is the data point entry pointing routine.

8350 This is the entry routine for 8300.

8354 Stop arrow.

8356 Move left or ccw.

8359 Move right or cw.

8362 Move left or ccw continuously.

8365 Move right of cw continuously.

8655 Flag routine used with the point routine. Indicate whether or not graph should be redrawn.

8780 Displays the time and date.

8800 Generates a polar graph.

8850 Displays Graph title or polar graph.

8870 Display instructions on polar graph when using point routine.

8878 Plots a point on a polar graph.

9000 This is the status routine. It is activated by timer once every second to check if data acquisition is completed or if data has been lost.

5.11 Subroutine Reference Listing

Subroutine	Definition	Referenced
1800		2510,8281,8306,8505,8585
2390		2400,3816
2395		2400
2850		2793
2904		4229,4323
3650		3622,3715,3905
7500		5300
7501		9210
7700		5335,9255
8090		2030,2032,2041,2045,2047,2049,2051
8110		2710,2791,3662
8200		2110,2320,2479,8110
8221		2919,3604,8220
8300		3668
8350		8315
8354		8316
8356		8318,8325
8359		8324,8325
8362		8327
8365		8330
8655		3603,3710,3901
8780		5120,6500
8800		8200
8850		8832,8849
8870		8832

Subroutine	Definition	References
8878		8155,8190
9000		2407,9008

5.12 Section Definitions

400 Determine if autost schould be invoked.

409 Mask out keyboard.

1000 PCMDC.

1300 PCMTC

2000 DataAC routine

2500 GRAPH subcommand mode.

3500 DataPa subcommand mode.

4000 LCAT subcommand mode.

4500 Store command

5000 DELETE subcommand mode

5500 FETCH command

6500 END command

9100 DARP error trap.

5.13 Statement Number Cross Reference

Statement	Referenced
400	1030
401	402,404
402	400
405	414,3951
415	414
416	414
417	414
418	414
420	415,416,417
425	420,435
445	440,455
1000	476,1330,2380,2704,2796,3545,4765, 5125,2105
1300	1030,2449,2450,4030,4645,4675,5030,5230, 5250,5320,5370,5387,5490,5515,5715,5785, 9110,9125,9155,9225,9292
2000	1030
2029	2039
2031	2039
2033	2037,2039
2038	2027,2056,2064,2067
2040	2037,2039
2044	2039
2046	2039
2048	2039

Statement	Referenced
2050	2039
2054	2039
2059	2058
2060	2058
2061	2058
2062	2039,2059,2060
2065	2039,2053
2070	2064
2075	2037,2052
2109	2348,5030
2310	2319,2320,2334
2319	2345
2320	2345
2330	2345
2344	2316
2345	2480
2346	2345,2436
2350	2345,2436
2400	2345
2415	2420
2437	2436
2460	2345
2461	2460,2463
2500	1030,2711,2720,2730
2701	2705,2701
2705	2704

Statement	Referenced
2706	2704
2710	2704
2720	2704
2730	4015
2791	2704
2925	2921
2970	2956
3500	1030,3570,3626,3631,3755,3880,3915
3550	3545
3600	3545,3610,3626,3631
3604	3602
3629	3623
3660	3658
3667	3658
3668	3664
3690	3658
3700	3545,3720
3800	3545
3810	3800
3816	3805
3820	3830
3863	3862
3868	3862,3864
3870	3868
3875	3868

Statement	Referenced
3900	3545,3910
4000	1330,2730
4015	4080,4175,4224,4236,4332
4030	4015
4070	4015
4100	4015
4150	4130
4200	4015
4300	4015
4328	4316
4500	1330
4700	4630
5000	1330
5100	5030
5200	5030
5300	5030
5330	5320
5350	5030
5400	5030
5420	5440,5450
5480	5430
5500	1330
5600	5510,5515
6500	1030,1330
8131	8127

Statement	Referenced
8134	8126
8145	8130,8132,8134,8135
8170	8145
8194	8182
8226	8220
8264	8261
8228	8283
8289	8282
8370	8332,8339
8373	8399,8889
8378	8374
8381	8377
8405	8460
8430	8410
8450	8415,8420
8470	8440
8538	8532
8540	8538
8547	8547,8581
8550	8510
8555	8515
8560	8520
8565	8525
8570	8530
8575	8531
8580	8540

Statement	Referenced
8581	8541
8585	8550,8555,8560,8565,8570.8575,8580
8650	8621
8880	8383
8853	8853
8912	9100
9007	9001
9100	460,2077,2464,3614
9120	9110
9130	9110
9200	9110
9215	9230
9232	5387
9295	9105,9110

5.14 Interface 7 Reference Listing

Interface	Commands
7	421,422,424,426,480,2025,2010,2260, 2270,2290,2347,2355,2402,2407,2408, 2442,6510,6520

```
  5 OPTION BASE 1
  6 DEFAULT OFF
 10 COM T9$[24],I0$[80],S1$[34
    ],I3$[253]
 15 COM G1(12),C1$[93],T1$[34],N
    1$[8],N2$[8]
 17 COM G3(12),C3$[93],T3$[34],N
    3$[8],N4$[8]
 20 COM T6$[36]
 35 COM M$[60]
 40 DEF FNG1(I) = BIT(G1(10),I)
 41 DEF FNG3(I) = BIT(G3(10),I)
 50 PEN 1
 54 F9=0
 55 C1$,N2$,N1$,I1$=" "
 56 M$="ANTENNA PATTERNBACKSCATT
    ER    FREQUENCY SCAN TIME SC
    AN      "
 65 B1$="
                "
 66 FOR I=1 TO 12
 67 G1(I)=0
 68 NEXT I
 69 S1=0
 70 IOBUFFER I0$
100 GOSUB 8780
105 IF DATE$=0 THEN 1000
165 ON ERROR GOTO 170
170 DISP "ENTER DATE MM/DD/YY:"
180 INPUT I0$
190 I0$=I0$&CHR$(10)
200 ENTER I0$ ; T9,T8,T7
210 IF T9>12 OR T8>31 OR T7<81 O
    R T7>99 THEN 170
220 D1=T7*100+T9*32+T8
225 ON ERROR GOTO 230
230 DISP "ENTER TIME HH:MM ["&CH
    R$(193)&CHR$(205)&" or "&CHR
    $(208)&CHR$(205)&"]"
240 INPUT T9$
250 I0$=T9$&CHR$(10)
260 ENTER I0$ ; T9,T8
270 IF T9>12 OR T8>59 THEN 230
275 IF T9=12 THEN T9=0
280 T1=60*(T9*60+T8)
290 IF POS(T9$,"PM")#0 THEN T1=T
    1+12*60*60 @ T9=-1 ELSE T9=1
300 IF POS(T9$,"AM")#0 THEN T9=T
    9*10
310 IF T9=1 OR T9=-10 THEN 230
320 CLEAR
330 SETTIME T1,D1
335 GOTO 100
1000 GCLEAR
1010 PEN 1
1020 PENUP
1030 SCALE 0,255,0,191
1040 MOVE 36,96
1050 LABEL "REMOVE PROGRAM TAPE
     NOW" @ ALPHA
```

Autost (cont.)

```
1060 WAIT 3000
1070 GRAPH @ CHAIN "DARP"
8000 DEF FNC$(C$[32])
8005 T9=LEN(C$)
8007 T9$=B1$[1,32]
8010 T9$[17-INT(T9/2)]=C$
8015 DISP T9$[1,32]
8016 T9$="
                "
8020 FNC$=""
8030 FN END
8600 DEF FNT1$(X)
8603 T9=X\60
8606 T8=T9 MOD 60
8609 T9=T9\60
8612 T9$=B1$
8615 IF T9=0 AND T8=0 THEN T9$="
     MIDNIGHT"
8618 IF T9=12 AND T8=0 THEN T9$=
     "NOON     "
8621 IF T9$#B1$ THEN 8650
8624 IF T9<10 THEN T9$[4,5]="0"&
     VAL$(T8) ELSE T9$[4,5]=VAL$
     (T8)
8630 IF T9>11 THEN T9$[7,8]="PM"
      ELSE T9$[7,8]="AM"
8632 IF T9=0 THEN T9=24
8633 IF T9>12 THEN T9=T9-12
8636 IF T9<10 THEN T9$[2,2]=VAL$
     (T9) ELSE T9$[1,2]=VAL$(T9)
8639 T9$[3,3]=":"
8640 IF T9$[1,1]=" " THEN T9$=T9
     $[2]
8650 FNT1$=T9$[1,8]
8653 FN END
8660 DEF FND1$(X)
8662 T7=X\1000
8664 X=X MOD 1000
8666 T9=X\32
8668 T8=X MOD 32
8675 T9$=VAL$(T9)&"/"&VAL$(T8)&"
     /"&VAL$(T7)&"          "
8678 FND1$=T9$[1,8]
8681 FN END
8780 CLEAR
8782 T9$=FNC$("DATA ACQUISITION"
     )
8784 T9$=FNC$("AND")
8786 T9$=FNC$("REDUCTION")
8788 T9$=FNC$("PROGRAM")
8790 DISP
8791 T9$=FNC$("***** DO NOT REMO
     VE *****") @ T9$=FNC$("###
     PROGRAM TAPE, YET ###") @ D
     ISP
8792 IF DATE#0 THEN T9$=FNC$(FNT
     1$(TIME)&"   "&FND1$(DATE)
      @ DISP
8794 RETURN
```

```
  5 OPTION BASE 1
  8 DEFAULT OFF
 10 COM T9$[34],/0$[8008],B1$[3
    ],I3$[258]
 15 COM G1(12),C1$[93],T1$[34],N
    1$[8],N2$[8]
 17 COM G3(12),C3$[93],T3$[34],N
    3$[8],N4$[8]
    COM T6$[36]
    COM M$[60]
 40 DEF FNG1(I) = BIT(G1(10),I)
 41 DEF FNG3(I) = BIT(G3(10),I)
 42 DEF FNG4 = CEIL((G1(4)-G1(6)
    )/(G1(7)-G1(6))*4000)/10*FNG
    1(4)+(NOT FNG1(4))*G1(4)
 43 DEF FNG5 = FLOOR((G1(5)-G1(6
    ))/(G1(7)-G1(6))*4000)/10*FN
    G1(4)+(NOT FNG1(4))*G1(5)
 44 DEF FNE4(I) = ((G1(7)-G1(6))
    *I/400+G1(6))*FNG1(4)+(NOT F
    NG1(4))*I
 45 DEF FNL5(I) = (G1(11)-FNA1(I
    )/5000)/(G1(11)-G1(9))*G1(12
    )
400 GOTO 402
401 OFF ERROR @ CHAIN "Autost"
402 ON ERROR GOTO 401
403 I=G1(1)
404 OFF ERROR
405 CLEAR
406 DISP "ENTER MEASUREMENT DESI
    RED"
407 T6$="ANTENABACKSCF-ScanT-Sca
    n"
408 H3=7
409 ENABLE KBD 101
410 IF ABS(G1(1))=2 THEN 414
411 FOR I=1 TO 12
412 G1(I)=0
413 NEXT I
414 ON FND+1 GOTO 405,415,416,41
    7,418
415 T9=FNZ1(4)*FNZ1(5) @ GOTO 42
    0
416 T9=FNZ1(4)*FNO1(5) @ GOTO 42
    0
417 T9=FNO1(4)*FNZ1(5) @ GOTO 42
    0
418 T9=FNO1(4)*FNO1(5)
420 ON ERROR GOTO 425
421 SET TIMEOUT 7;10000
422 ON TIMEOUT 7 GOTO 480
424 CLEAR 7 @ REMOTE 724
425 CLEAR @ DISP "ENTER VOLTAGE
    FOR 0dBm";
426 OUTPUT 724 ;"D.1S,N1S,E0S,R2
    ,T1,F2" @ LOCAL 724
430 INPUT G1(11)
435 IF ABS(G1(11))>2 THEN 425
440 ON EPROR GOTO 445
```

DARP (cont.)

```
445 DISP "ENTER MIN  dBm AND COR
    RESPONDINGVOLTAGE";
450 INPUT G1(12),G1(9)
455 IF ABS(G1(9))>2 OR G1(12)>0
    THEN 445
460 CLEAR @ ON ERROR GOTO 9100
465 IF ABS(G1(1))=2 THEN 2025
470 GOTO 1000
480 BEEP @ CLEAR @ DISP ,,,"PRO
    BLEM WITH VOLTMETER" @ RESET
     7
481 IF H3=7 THEN 406
1000 T6$="DataACGRAPH REINITDate
     PaTapeCOEND    "
1025 H3=1
1030 ON FNO GOTO 2000,2500,400,3
     500,1300,6500
1300 T6$="CAT    STORE DELETEFETC
     H DateCOEND    "
1325 H3=10
1330 ON FNO GOTO 4000,4500,5000,
     5500,1000,6500
1800 OFF KEY# 1 @ OFF KEY# 2 @ O
     FF KEY# 3 @ OFF KEY# 4 @ OF
     F KEY# 5 @ OFF KEY# 6 @ OFF
      KEY# 7 @ OFF KEY# 8
1840 RETURN
2000 FOR I=1 TO 8
2023 G1(I)=0
2024 NEXT I
2025 CLEAR @ CLEAR 7 @ REMOTE 72
     4 @ OUTPUT 724 ;"D.1S,N1S,E
     0S,R2,T1,F2" @ LOCAL 724
2026 G1(10)=BINAND(G1(10),50)
2027 ON ERROR GOTO 2038
2029 DISP "ENTER CENTER FREQUENC
     Y";@ T8=1
2030 GOSUB 8090 @ T1$=T9$
2031 DISP "ENTER ANTENNA TYPE";@
      T8=2
2032 GOSUB 8090 @ T1$=T9$&" at "
     &T1$
2033 DISP "ENTER POLARIZATION E
     ,H or X";@ T8=3
2034 INPUT T9$
2035 IF T9$="E" OR T9$="X" THEN
     T9=FNO1(2)
2036 IF T9$="H" OR T9$="X" THEN
     T9=FNO1(3)
2037 IF FNG1(2) OR FNG1(3) THEN
     2040 ELSE 2033
2038 BEEP @ DISP "ERROR IN INPUT
     "
2039 ON T8 GOTO 2029,2031,2033,2
     040,2044,2046,2048,2050,205
     4,2062,2065,2075
2040 DISP "ENTER REFERENCE LEVEL
     ";@ T8=4
2041 GOSUB 8090 @ C1$[27,36]=T9$
2044 DISP "ENTER TRANSMITTER POW
     ER";@ T8=5
```

DARP (cont.)

```
2045 GOSUB 8090 @ C1$[37,46]=T9$
2046 DISP "ENTER TRANSMITTING AN
     TENNA";@ T8=6
2047 GOSUB 8090 @ C1$[47,56]=T9$
2048 DISP "ENTER RANGE";@ T8=7
2049 GOSUB 8090 @ C1$[57,66]=T9$
2050 DISP "ENTER PROJECT #";@ T8
     =8
2051 GOSUB 8090 @ C1$[67,76]=T9$
2052 IF NOT FNG1(4) THEN G1(6),G
     1(4)=0 @ G1(7),G1(5)=400 @
     GOTO 2075 ELSE CLEAR
2053 IF FNG1(5) THEN 2065
2054 DISP "ENTER FREQUENCY RANGE
     , THEN     PRESS APPROPRIAT
     E MULTIPLIER";@ T8=9
2055 INPUT G1(6),G1(7)
2056 IF G1(7)<G1(6) OR G1(6)<0 T
     HEN 2038 ELSE T6$="Khz   Mh
     z   Ghz   "
2057 H3=11
2058 ON FN0+1 GOTO 2054,2059,206
     0,2061
2059 T9=FNZ1(12)*FNZ1(13) @ GOTO
      2062
2060 T9=FNZ1(12)*FN01(13) @ GOTO
      2062
2061 T9=FN  1(13)*FNZ1(13)
2062 CLEAR @ DISP "ENTER TOTAL T
     IME REQUIRED FOR   SPECTRUM
      ANALYZER TO SCAN        SPE
     CIFIED RANGE";
2063 DISP "(IN SECONDS)";@ T8=10
      @ INPUT G1(3)
2064 IF G1(3)<1 OR G1(3)>100 THE
     N 2038 ELSE 2070
2065 DISP "ENTER DURATION OF TIM
     E-SCAN";@ T8=11
2066 INPUT G1(7)
2067 IF G1(7)<1 OR G1(7)>3600 TH
     EN 2038
2068 G1(6)=0 @ G1(3)=G1(7)
2070 G1(4)=G1(6) @ G1(5)=G1(7)
2075 DISP "ENTER COMMENTS";@ T8=
     12
2076 INPUT C1$[1,26]
2077 ON ERROR GOTO 9100
2078 T9$=T1$
2080 T1$=B1$
2090 T9=LEN(T9$)
2100 T1$[17-INT(T9/2)]=T9$
2105 IF ABS(G1(1))=2 THEN G1(1)=
     G1(1)/2 @ GOTO 1000
2109 IF NOT FNG1(4) THEN G1(4),G
     1(6)=0 @ G1(5),G1(7)=400
2110 T9=FNZ1(6) @ GOSUB 8200
2260 REMOTE 724
2270 LOCAL LOCKOUT 7
2280 IOBUFFER I0$
2290 CLEAR 7
```

DARP (cont.)

```
2300 CLEAR
2310 T6$="START PollinINC .1RETR
     Y SHORT FHSINT"
2311 IF FNG1(1) THEN T6$[7,12]="
     Pollin"
2312 IF FNG1(8) THEN T6$[31,36]=
     "FHSINT"
2314 IF FNG1(11) THEN T6$[18,18]
     ="2"
2315 IF FNG1(10) THEN T6$[18,18]
     ="4"
2316 GOTO 2344
2319 G1(10)=BINEOR(G1(10),2^8) @
      GOTO 2310
2320 G1(10)=BINEOR(G1(10),2^1) @
      GOSUB 8200 @ GOTO 2310
2330 IF FNG1(10) THEN T9=FNZ1(10
     ) @ GOTO 2310
2332 IF FNG1(11) THEN T9=FND1(10
     )*FNZ1(11) ELSE T9=FND1(11)
2334 GOTO 2310
2344 H3=2
2345 ON FN0+1 GOTO 2350,2400,232
     0,2330,2346,2460,2319
2346 OFF TIMER# 1
2347 ABORTIO 7 @ CLEAR 7 @ LOCAL
      7
2348 GOTO 2109
2350 OFF TIMER# 1
2355 ABORTIO 7 @ CLEAR 7 @ LOCAL
      7
2360 CLEAR @ DISP "DATA ACQUISIT
     ION"
2365 DISP "HAS BEEN ABORTED"
2370 WAIT 2000
2375 CLEAR
2380 GOTO 1000
2390 F1=2 @ RETURN
2395 F1=3 @ RETURN
2400 ON KEY# 4,"RETRY" GOSUB 239
     0 @ ON KEY# 8,"ABORT" GOSUB
      2395
2401 IF FNG1(4) THEN T9$=VAL$(G1
     (3)/4000)&"S,N4000" ELSE T9
     $="9S,N1"
2402 OUTPUT 724 ;"D"&T9$&"S,E2S,
     R2,T"&VAL$(2+FNG1(4)*FNG1(5
     ))&",F2"
2404 IF FNG1(6) THEN CONTROL I0$
     ,0 ; 2*INT(10*G1(4))+1,2*IN
     T(10*G1(4))
2405 T9=(2-FNG1(11)-1.5*FNG1(10)
     )*INT(FNG5-FNG4)*10
2406 T1=TIME @ D1=DATE @ PENUP
2407 F1=1 @ ON TIMER# 1,1000 GOS
     UB 9000 @ IF FNG1(4)*FNG1(5
     ) THEN LOCAL 7
2408 IF FNG1(8) THEN TRANSFER 72
     4 TO I0$ FHS ; COUNT T9 @ S
     TATUS 7,2 ; S7 ELSE TRANSFE
     R 724 TO I0$ INTR ; COUNT T
     S
```

DARP (cont.)

```
2409 T6=0
2410 FOR I=FNG4 TO FNG5 STEP 1-F
     NG1(10)*.2
2415 STATUS I0$,0 ; T9,T8,T7
2420 IF T7#0 AND T8-T9<20 THEN 2
     415
2430 Z9=FNA1(I)
2431 IF Z9>T6 THEN G1(2)=I @ T6=
     Z9
2435 IF FNG1(1) THEN PLOT Z9*SIN
     (I)/1000,Z9*COS(I)/1000 ELS
     E PLOT I,Z9/1000
2436 ON F1 GOTO 2437,2346,2350
2437 NEXT I
2438 G1(8)=G1(2)
2442 CLEAR 7 @ LOCAL 7
2447 G1(1)=1 @ T9=FNO1(7)
2449 IF S8=0 THEN 1300 ELSE WAIT
      1000
2450 GOTO 1300
2460 ON ERROR GOTO 2461
2461 DISP "ENTER LIMITS OF ROTAT
     ION";
2462 INPUT G1(4),G1(5)
2463 IF G1(4)>=G1(5) OR G1(4)<0
     OR G1(5)>360 OR G1(5)-G1(4)
     >360 THEN 2461
2464 ON ERROR GOTO 9100
2465 T9=FNO1(6)
2472 FOR I=1 TO 400
2474 I0$[20*I-19,20*I]="◀◀◀◀◀◀◀◀
     ◀◀◀◀◀◀◀◀◀◀"
2476 NEXT I
2477 G1(6)=G1(4) @ G1(7)=G1(5)
2478 T6$[25,29]="SHORI "
2479 GOSUB 8200
2480 CLEAR @ GOTO 2345
2500 CLEAR
2510 GOSUB 1800
2701 T6$="GRAPH→PolLinhdCopyOUTP
     UTGCopy!PapAdv"
2702 IF FNG1(0) THEN T6$[13,18]=
     "hdCopy"
2703 IF FNG1(1) THEN T6$[7,12]="
     PolLin"
2704 H3=3 @ ON FN0+1 GOTO 1000,2
     710,2705,2706,2791,2720,273
     0
2705 G1(10)=BINEOR(G1(10),2^1) @
      T9=FNZ1(7) @ GOTO 2701
2706 G1(10)=BINEOR(G1(10),2^0) @
      GOTO 2701
2710 IF FNG1(7) THEN GRAPH @ WAI
     T 10000 ELSE GOSUB 9110 @ T
     9=FNO1(7) @ WAIT 3000
2711 GOTO 2500
2720 GRAPH @ COPY @ ALPHA @ GOTO
      2500
2730 OUTPUT 2 @ IF H3=3 THEN 250
     0 ELSE 4000
```

DARP (cont.)

```
2791 IF FNG1(7) THEN GRAPH @ T9=
     FNZ1(7) ELSE GOSUB 8110
2792 IF FNG1(0) THEN COPY ELSE W
     AIT 10000
2793 GCLEAR @ SCALE 0,255,0,191
     @ GOSUB 2850
2796 IF FNG1(0) THEN 2500 ELSE W
     AIT 10000 @ GOTO 2500
2850 FOR I=1 TO 12
2855 G3(I)=G1(I) @ NEXT I
2857 G3(1)=0
2860 T3=T1 @ D3=D1 @ N3$=N1$ @ C
     3$=C1$ @ N4$=N2$ @ T3$=T1$
2904 MOVE 0,180
2906 LABEL T3$
2908 IF FNG3(2) THEN T9$="ELECTR
     IC" ELSE T9$="MAGNETIC"
2910 IF FNG3(2)*FNG3(3) THEN T9$
     ="VARIABLE"
2912 MOVE 24,144
2914 LABEL T9$&" POLARIZATION"
2916 MOVE 24,132
2918 LABEL "RECEIVED POWER LEVEL
     ."
2919 MOVE 16,120 @ GOSUB 8221
2920 LABEL T9$&"   RELATIVE   AB
     SOLUTE"
2921 IF G3(1)=0 THEN MOVE 24,108
      ELSE 2925
2922 LABEL VAL$(FNE4(G1(8)*(NOT
     FNG3(9)))+FNG3(9)*FNC3(G1(8
     ))
2923 MOVE 72,108
2924 T9$=VAL$(FNL5(G1(8))) @ LAB
     EL T9$[1,MIN(LEN(T9$),9)]
2925 MOVE 160,108
2926 LABEL C3$[27,36]
2934 MOVE 24,96
2936 LABEL "TRANS. POWER: "&C3$[
     37,46]
2938 MOVE 24,84
2940 LABEL "TRANS. ANTENNA: "&C3
     $[47,56]
2942 MOVE 24,72
2944 LABEL "RANGE: "&C3$[57,66]
2946 MOVE 24,60
2948 LABEL "DATA RECORDED:"
2950 MOVE 48,48
2952 LABEL "AT "&FNT1$(T3)&" ON
     "&FND1$(D3)
2954 MOVE 24,36
2956 IF G3(1)=0 AND G1(1)=1 THEN
      2970
2958 LABEL "DATA STORED:"
2960 MOVE 48,24
2962 LABEL "in "&N3$&" on "&N4$
2964 MOVE 24,12
2970 LABEL C3$[1,26]
2972 MOVE 24,168
2974 T9=FNG3(4)*2+FNG3(5)
```

DARP (cont)

```
2976 LABEL M$[15*T9+1,15*(T9+1)]
2978 MOVE 24,156
2980 LABEL "PROJECT #: "&C3$[67,
     74]
2998 IF FNG1(0) THEN COPY
2999 RETURN
3500 CLEAR
3505 T6$="ORIGINRANGE CENTERLs:M
     ayREF   ReSpec"
3510 IF FNG1(9) THEN T6$[13,18]=
     "CENTER"
3545 H3=8 @ ON FNQ+1 GOTO 1000,3
     550,3600,3700,3800,3900,395
     0
3550 G1(4)=G1(6) @ G1(5)=G1(7)
3560 T9=FNZ1(7)*FNZ1(9)
3570 GOTO 3500
3600 CLEAR
3602 ON ERROR GOTO 3604
3603 GOSUB 8655
3604 GOSUB 8221 @ DISP "ENTER WI
     NDOW SIZE TO BE USED -- CUR
     RENT SIZE IS";G1(5)-G1(4);"
     ("&T9$[2]&")"
3606 INPUT T8@ T9=FNZ1(7)
3607 IF FNG1(4) THEN T8=T8*400/(
     G1(7)-G1(6))
3610 IF T8>400 OR T8<=0 OR FNG1(.
     9) AND T8>360 THEN 3600
3614 ON ERROR GOTO 9100
3618 Z9=T8/2
3622 GOSUB 3650
3623 IF NOT FNG1(9) THEN 3629
3624 G1(5)=FLOOR((T9+Z9)*10)/10
3625 G1(4)=CEIL((T9-Z9)*10)/10
3626 GOTO 3631
3629 G1(5)=FNE4(FLOOR((T9+Z9)*10
     )/10)
3630 G1(4)=FNE4(CEIL((T9-Z9)*10)
     /10)
3631 IF (G1(5)>G1(7) OR G1(4)<G1
     (6)) AND NOT FNG1(9) OR (G1
     (4)<-180 OR G1(5)>360) AND
     FNG1(9) THEN 3600 ELSE 3500
3650 IF Z9<0 THEN T9$="REF" ELSE
      T9$="CENTER"
3652 DISP "DO YOU WISH TO POINT
     TO OR TYPE IN "&T9$&" OR KE
     EP OLD "&T9$
3654 T6$="POINT TypeInKEEP   "
3656 H3=9
3658 ON FNQ+1 GOTO 3690,3660,367
     0,3690
3660 IF FNG1(9) THEN G1(4)=-180
     @ G1(5)=180 ELSE G1(4)=G1(6
     ) @ G1(5)=G1(7)
3662 IF A9 THEN GOSUB 8110
3664 IF Z9>0 AND NOT FNG1(9) THE
     N T9=200 @ GOTO 3668
3666 IF Z9>=0 THEN T9=G1(2) ELSE
      T9=G1(8)
```

```
3668 GOSUB 8380
3669 RETURN
3670 CLEAR
3672 DISP "ENTER "&I9$;
3673 INPUT T9@ IF FNG1(4) THEN T
     9=400*(T9-G1(6))/(G1(7)-G1(
     6))
3674 RETURN
3690 IF Z9>0 THEN T9=(FNG5+FNG4)
     /2 @ RETURN
3692 IF Z9=0 THEN T9=G1(2) ELSE
     T9=G1(8)
3694 RETURN
3700 Z9=0
3705 T9=FNZ1(9)
3710 GOSUB 8655
3715 GOSUB 3650
3720 IF T9>400 OR T9<0 THEN 3700
      ELSE G1(2)=T9
3725 T9=FNO1(9)
3730 IF G1(2)>200 THEN G1(3)=39
     ELSE G1(3)=1
3735 IF G1(9)<40 THEN G1(3)=1
3740 IF G1(8)>360 THEN G1(3)=39
3745 IF G1(2)<40 THEN G1(3)=1
3750 IF G1(2)>360 THEN G1(3)=39
3752 G1(4)=-180 @ G1(5)=180
3755 GOTO 3500
3800 ON KEY# 4,"LstMax" GOTO 381
     0 @ PRINTER IS 1
3805 WAIT 1000 @ GOTO 3816
3810 PRINTER IS 2
3816 OFF KEY# 4 @ ON KEY# 8,"ABO
     RT" GOSUB 2390 @ F1=1
3817 GOSUB 8221
3820 DISP "ENTER CUTOFF LEVEL (I
     N dBm) AND RESOLUTION (IN"&
     T9$&")"
3825 INPUT Z9,T8
3827 T8=400*T8/(G1(7)-G1(6))
3830 IF Z9>0 OR T8>40 OR T8<1 TH
     EN 3820
3840 PRINT "VALUE";TAB(20);"LOCA
     TION"
3842 PRINT "(dBm)";TAB(20);" ("&
     T9$[2]&")"
3845 G3(1),G3(2)=-INF
3847 T7=.1+.1*FNG1(11)+.3*FNG1(1
     0)
3850 FOR I=FNG4 TO FNG5 STEP T7
3855 G3(3)=G3(2) @ G3(2)=G3(1) @
      G3(1)=FNL5(I)
3862 IF G3(2)>=G3(3) AND G3(2)>G
     3(1) AND G3(2)>Z9 THEN 3863
      ELSE 3868
3863 FOR I2=MAX(FNG4,I-T7-T8) TO
      MIN(FNG5,I-T7+T8) STEP T7
3864 IF G3(2)<FNL5(I2) THEN 3868
3865 NEXT I2
3866 PRINT G3(2);TAB(20);FNE4(I-
     T7)
```

DARP (cont.)

```
3868 ON F1 GOTO 3870,3875
3870 NEXT I
3875 PRINTER IS 2
3880 GOTO 3500
3900 Z9=-EPS
3901 GOSUB 8655
3905 GOSUB 3650
3910 IF T9>400 OR T9<0 THEN 3900
      ELSE G1(8)=T9
3915 GOTO 3500
3950 G1(1)=2*G1(1)
3951 GOTO 405
4000 T6$="LCAT  LFILE LFILESPaPA
     dvhdCopy"
4001 IF FNG1(0) THEN T6$[25,30]=
     "hdCopy"
4002 CLEAR
4007 PRINTER IS FNG1(0)+1
4015 H3=5 @ ON FN0+1 GOTO 4030,4
     100,4200,4300,2730,4070
4030 PRINTER IS 2 @ GOTO 1300
4070 G1(10)=BINEOR(G1(10),2^0)
4075 PRINTER IS FNG1(0)+1
4080 GOTO 4000
4100 ASSIGN# 1 TO "MCAT"
4105 READ# 1,30 ; I3$
4110 PRINT "CATALOGUE OF TAPE: "
     &I3$[241,248]
4115 T9=0
4120 T9$=B1$
4125 FOR I=1 TO 24
4130 IF I3$[(I-1)*8+1,I*8]="NULL
          " THEN GOTO 4150
4135 T9$[T9 MOD 3*10+1,T9 MOD 3*
     10+8]=I3$[(I-1)*8+1,I*8]
4140 T9=T9+1
4145 IF T9 MOD 3=0 THEN PRINT T9
     $[1,30] @ T9$=B1$
4150 NEXT I
4155 IF T9 MOD 3#0 THEN PRINT T9
     $[1,30]
4160 IF T9=0 THEN PRINT "TAPE IS
      EMPTY"
4165 IF T9=24 THEN PRINT "TAPE I
     S FULL"
4170 IF T9 MOD 24#0 THEN PRINT 2
     4-T9;"FILES ARE EMPTY"
4175 GOTO 4015
4200 CLEAR
4204 ASSIGN# 1 TO "MCAT"
4208 READ# 1,30 ; I3$
4212 DISP "ENTER NAME OF FILE"
4216 N3$=FNT$
4220 T9=POS(I3$,N3$)
4224 IF T9=0 THEN DISP "FILE NOT
      FOUND" @ GOTO 4015
4228 READ# 1,T9^8+1 ; G3(),T3,D3
     ,N3$,C3$,T3$
4229 GCLEAR @ SCALE 0,255,0,191
     @ N4$=I3$[241,248] @ GOSUB
     2904
```

DARP (cont.)

```
4296 GOTO 4015
4300 CLEAR
4304 ASSIGN# 1 TO "MCAT"
4308 READ# 1,30 ; I3$
4309 N4$=I3$[241,248]
4311 I2=0 @ SCALE 0,255,0,191
4312 FOR I=0 TO 23
4316 IF I3$[I*8+1,(I+1)*8]="NULL
       " THEN 4328
4320 READ# 1,I+1 ; G3(),T3,D3,N3
     $,C3$,T3$
4323 GCLEAR @ GOSUB 2904
4328 NEXT I
4332 GOTO 4015
4500 CLEAR
4610 ASSIGN# 1 TO "MCAT"
4615 READ# 1,30 ; I3$
4617 IF POS(I3$,"NULL")>192 THEN
      DISP "TAPE IS FULL","STORE
      HAS BEEN ABORTED" @ ASSIGN
     # 1 TO * @ GOTO 1300
4620 DISP "ENTER FILE NAME"
4625 N3$=FNT$
4630 IF POS(I3$,N3$)=0 THEN 4700
4635 N1=POS(I3$,N3$)\8+1
4640 READ# 1,N1 ; G3(),T3,D3,N3$
     ,C3$,T3$
4645 IF T3#T1 OR D3#D1 THEN DISP
      "DUPLICATE FILE NAME" @ GO
     TO 1300
4650 PRINT# 1,N1 ; G1(),T1,D1,N3
     $,C1$,T1$
4652 N1$=N3$ @ N2$=I3$[241,248]
4655 ASSIGN# 1 TO *
4665 G1(1)=-1
4667 CLEAR
4670 DISP "MODIFICATION HAS BEEN
      STORED"
4675 GOTO 1300
4700 N1=POS(I3$,"NULL")\8+1
4710 PRINT# 1,N1 ; G1(),T1,D1,N3
     $,C1$,T1$
4715 T9=(N1-1)*8+1
4720 I3$[T9,T9+7]=N3$
4725 PRINT# 1,30 ; I3$
4728 ASSIGN# 1 TO * @ ASSIGN# 2
     TO "DARPDT"
4730 CONTROL I0$,0 ; 1,8000
4731 PRINT# 2,N1
4733 PRINT# 2 ; N3$,I0$[1,241]
4734 FOR I=0 TO 29
4736 PRINT# 2 ; I0$[253*I+240,25
     3*I+492]
4737 NEXT I
4739 PRINT# 2 ; I0$[7830,8000].
4750 G1(1)=-1
4752 ASSIGN# 2 TO *
4755 CLEAR
4760 DISP "DATA HAS BEEN STORED"
4762 N1$=N3$ @ N2$=I3$[241,248]
```

DARP (cont.)

```
4765 GOTO 1000
5000 CLEAR
5025 T6$="MEMORYFILE  TAPE  INIT
       RETAKEFILES "
5030 H3=6 @ ON FN0+1 GOTO 1300,5
     105,5200,5300,5375,2109,540
     0
5105 FOR I=1 TO 8
5110 G1(I)=0
5115 NEXT I
5116 G1(10)=BINAND(G1(10),50)
5120 GOSUB 8780
5121 DISP ,,,,@ T9$=FNC$("***MEM
     ORY HAS BEEN CLEARED***")
5125 GOTO 1000
5200 CLEAR @ ASSIGN# 1 TO "MCAT"
5205 READ# 1,30 ; I3$
5210 DISP "TAPE: "&I3$[241,248]
5215 DISP "ENTER FILE NAME TO BE
      DELETED:"
5220 N3$=FNT$
5225 T9=POS(I3$[1,240],N3$)
5230 IF T9=0 THEN DISP "FILE NAM
     E NOT FOUND" @ ASSIGN# 1 TO
      * @ GOTO 1300
5235 I3$[T9,T9+7]="NULL    "
5240 PRINT# 1,30 ; I3$
5245 ASSIGN# 1 TO *
5247 DISP N3$&" HAS BEEN PURGED"
5250 GOTO 1300
5300 GOSUB 7500
5310 IF NOT FN0 THEN 1300
5330 ASSIGN# 1 TO "MCAT"
5331 READ# 1,30 ; I3$
5332 N4$=I3$[241,248]
5335 GOSUB 7700
5355 I3$[241,248]=N4$
5360 PRINT# 1,30 ; I3$
5365 ASSIGN# 1 TO *
5370 DISP "TAPE "&N4$&" HAS BEEN
      CLEARED" @ GOTO 1300
5375 GOSUB 7500
5387 IF FN0 THEN 9232 ELSE 1300
5400 CLEAR @ ASSIGN# 1 TO "MCAT"
5405 READ# 1,30 ; I3$
5410 DISP "TAPE: "&I3$[241,248]
5415 DISP "TYPE NULL LINE TO RET
     URN TO     PROGRAM"
5420 DISP "ENTER FILE NAME TO BE
      DELETED"
5425 N3$=FNT$
5430 IF N3$[1,1]=" " THEN 5480
5435 T9=POS(I3$[1,240],N3$)
5440 IF T9=0 THEN CLEAR @ DISP "
     FILE "&N3$&"NOT FOUND" @ GO
     TO 5420
5445 I3$[T9,T9+7]="NULL    "
5450 GOTO 5420
5480 PRINT# 1,30 ; I3$
5485 ASSIGN# 1 TO *
```

```
5490 GOTO 1300
5500 CLEAR
5600 G1(1)=0
5605 DISP "ENTER FILE NAME"
5610 N1$=FNT$
5700 ASSIGN# 1 TO "MCAT"
5710 READ# 1,30 ; I3$
5715 IF POS(I3$,N1$)=0 THEN DISP
      "FILE NAME NOT FOUND" @ GO
     TO 1300
5720 N1=POS(I3$,N1$)^8+1
5724 CONTROL I0$,0 ; 1,8000
5725 READ# 1,N1 ; G1(),T1,D1,N1$
     ,C1$,T1$
5726 ASSIGN# 1 TO * @ ASSIGN# 2
     TO "DARPDT" @ READ# 2,N1
5727 READ# 2 ; N1$,I0$[1,241]
5729 FOR I=0 TO 29
5730 READ# 2 ; I0$[253*I+240,253
     *I+492]
5732 NEXT I
5733 READ# 2 ; I0$[7830,8000]
5740 ASSIGN# 2 TO *
5741 N2$=I3$[241,248] @ CLEAR
5770 G1(1)=-1
5775 T9=FNZ1(7)
5780 DISP "DATA HAS BEEN LOADED
     INTO MEMORY"
5785 GOTO 1300
6500 GOSUB 8780
6510 ABORTIO 7 @ CLEAR 7
6520 LOCAL 7
6530 DISP ,,,,
6540 T9$=FNC$("*** DARP ENDED **
     *")
6550 DISP
6560 T9$=FNC$("NORMAL TERMINATIO
     N")
6570 STOP
7500 CLEAR
7501 DISP "NOTE -- THIS PROCESS
     WILL ERASE EVERYTHING WHICH
      IS ON THIS TAPEHIT DELETE
     TO CONTINUE"
7505 DISP "HIT ABORT TO RETURN T
     O PROGRAM"
7510 H3=4
7515 T6$="DELETE"
7520 RETURN
7600 ON H3 GOTO 7610,7620,7630,7
     699,7699,7640,7699,7650,767
     0,7660,7699
7610 IF G1(1)=1 THEN OFF KEY# 1
     @ OFF KEY# 3
7611 IF G1(1)=0 THEN OFF KEY# 2
     @ OFF KEY# 4
7619 RETURN
7620 IF FNG1(4) THEN OFF KEY# 2
     @ OFF KEY# 6 @ OFF KEY# 7 @
      T9=FNZ1(1)*FNZ1(6) ELSE 76
     24
```

DARP (cont.)

```
7621 IF G1(3)<150 THEN T9=FNO1(8
     ) ELSE T9=FNZ1(8)
7624 IF FNG1(6) OR FNG1(4) THEN
     OFF KEY# 3 @ T9=FNZ1(10)*FN
     Z1(11)
7626 IF FNG1(10) OR FNG1(11) THE
     N OFF KEY# 6
7629 RETURN
7630 IF FNG1(4) THEN T9=FNZ1(1)
     @ OFF KEY# 2
7639 RETURN
7640 IF G1(1)=0 THEN OFF KEY# 6
7649 RETURN
7650 IF FNG1(4) OR FNG1(6) THEN
     OFF KEY# 3
7653 IF FNG1(9) THEN OFF KEY# 4
7659 RETURN
7660 IF G1(1)=0 THEN OFF KEY# 2
7661 IF G1(1)=1 THEN OFF KEY# 4
7669 RETURN
7670 IF FNG1(6) THEN OFF KEY# 1
7699 RETURN
7700 ASSIGN# 1 TO * @ T9$="NULL
          "
7710 I3$=T9$&T9$&T9$&T9$
7720 I3$=I3$&I3$&I3$&I3$
7730 I3$=I3$&I3$[1,125]
7740 ASSIGN# 1 TO "MCAT" @ CLEAR
      @ RETURN
8000 DEF FNC$(C$[32])
8005 T9=LEN(C$)
8007 T9$=B1$[1,32]
8010 T9$[17-INT(T9/2)]=C$
8015 DISP T9$[1,32]
8016 T9$="
                    "
8020 FNC$=""
8030 FN END
8040 DEF FNC3(X)
8043 C9=(X-G1(2)+7200) MOD 360+F
     LOOR(G1(4)/360)*360
8046 FNC3=C9+(C9<G1(4))*360
8049 FN END
8090 INPUT T9$@ IF LEN(T9$)=0 OR
      LEN(T9$)>10 THEN T9=1/0 @
     RETURN ELSE RETURN
8110 GOSUB 8200
8115 PEN 1 @ PENUP
8120 I2=1
8125 T9=FNG5-FNG4
8126 IF NOT (FNG1(10) OR FNG1(11
     )) THEN 8134
8127 IF FNG1(10) THEN 8131
8128 IF T9<200 THEN I2=.4
8129 IF T9<100 THEN I2=.2
8130 GOTO 8145
8131 IF T9<200 THEN I2=.4 ELSE I
     2=.8
8132 GOTO 8145
8134 IF T9>200 THEN 8145
```

```
8135 IF T9>100 THEN I2=.5 @ GOTO
      9145
8140 IF T9>40 THEN I2=.2 ELSE I2
     =.1
8145 IF FNG1(9) THEN 8170
8150 FOR I=FNG4 TO FNG5 STEP I2
8155 IF FNG1(1) THEN T6=I @ GOSU
     B 8878 ELSE PLOT I,FNA1(I)/
     1000
8160 NEXT I
8165 RETURN
8170 T8=FNC3(G1(3))
8174 FOR I=G1(3) TO G1(3)+359 ST
     EP I2
8178 T6=FNC3(I)
8182 IF T6<G1(4) OR T6>G1(5) THE
     N 8194
8186 IF T8>T6 THEN PENUP
8188 T8=T6
8190 IF FNG1(1) THEN GOSUB 8878
     ELSE PLOT T6,FNA1(I)/1000
8194 NEXT I
8198 RETURN
8200 PEN 1 @ IF FNG1(1) THEN GOS
     UB 8800 @ RETURN
8202 GCLEAR
8205 SCALE 0,255,0,191
8210 MOVE 0,182
8215 LABEL T1$
8220 MOVE 0,0 @ GOSUB 8221 @ GOT
     O 8226
8221 IF NOT FNG1(4) THEN T9$=" d
     eg" @ RETURN
8222 IF FNG1(5) THEN T9$=" sec"
     @ RETURN ELSE T9$=" Khz"
8223 IF FNG1(12) THEN T9$=" Ghz"
8224 IF FNG1(13) THEN T9$=" Mhz"
8225 RETURN
8226 LABEL VAL$(G1(4))&T9$
8230 MOVE 255-8*LEN(VAL$(G1(5)))
     ,0
8235 LABEL VAL$(G1(5))
8240 T8=(G1(5)+G1(4))/2
8241 MOVE 129-4*LEN(VAL$(T8)),0
8245 LABEL VAL$(T8)
8250 MOVE 117,172
8251 LABEL "0.0"
8252 MOVE 125-8*LEN(VAL$(G1(12))
     ),14
8253 LABEL VAL$(G1(12))&" dBm"
8254 T9=(G1(5)-G1(4))/30
8255 T7=CEIL(LGT(T9))-1
8256 T9=T9*.1^T7
8260 SCALE G1(4),G1(5),-.75,11 S
8261 IF T9>7 THEN T9=10 @ GOTO 8
     264
8262 IF T9>3 THEN T9=5 ELSE T9=2
8264 T8=(G1(4)+G1(5))/2 @ T9=T9*
     10^T7
8265 XAXIS 0,T9,T8,G1(5)
```

DARP (cont.)

```
8266 XAXIS 0,-T9,G1(4),T9
8267 SCALE FNG4,FNG5,-.75,11.5
8268 T9=(FNG4+FNG5)/2
8270 YAXIS T9,50/G1(12),0,10
8275 RETURN
8300 CLEAR @ GOSUB 1800
8315 ON KEY# 3,"ENTER" GOSUB 835
     0
8316 ON KEY# 5,"HELP12" GOSUB 83
     54
8318 ON KEY# 2,"LEFT" GOSUB 8356
8324 ON KEY# 4,"RIGHT" GOSUB 835
     9
8325 IF FNG1(1) THEN ON KEY# 2,"
     CCW" GOSUB 8356 @ ON KEY# 4
     ,"CW" GOSUB 8359
8327 ON KEY# 6,"REPEAT" GOSUB 83
     62
8330 ON KEY# 8,"REPEAT" GOSUB 83
     65
8331 KEY LABEL
8332 WAIT 5000 @ IF FNG1(1) THEN
      PEN -1 @ GOSUB 8850 @ PEN
     1 @ GOSUB 8870 @ GOTO 8370
8333 SCALE 0,255,0,191 @ MOVE 0,
     182
8334 PEN -1 @ LABEL T1$ @ PEN 1
8335 MOVE 0,182
8336 LABEL "'KEY LABEL' SHOWS KE
     Y FUNCTIONS"
8337 SCALE FNG4,FNG5,-.75,11.5
8339 GOTO 8370
8350 T8=5000
8353 RETURN
8354 T8=0 @ RETURN
8356 T8=-1 @ RETURN
8359 T8=1 @ RETURN
8362 T8=-2 @ RETURN
8365 T8=2 @ RETURN
8370 I=T9
8371 T9$="▲«>⊢«««««á"
8372 T8=0
8373 IF T8>=5000 THEN T9=I*(NOT
     FNG1(9) OR Z9(0)+(Z9>=0 AND
      FNG1(9))*FNC3(I) @ RETURN
     ELSE I=I+T8
8374 IF FNG1(9) THEN 8378
8375 IF I+Z9>FNG5 THEN I=CEIL(FN
     G4+Z9)
8376 IF I-Z9<FNG4 THEN I=FLOOR(F
     NG5-Z9)
8377 GOTO 8381
8378 IF I<G1(3) THEN I=G1(3)+360
8379 IF I>G1(3)+360 THEN I=G1(3)
8381 T8=(ABS(T8)-1)*T8
8382 PENUP @ PEN -1
8383 IF FNG1(1) THEN GOTO 8880
8384 IF FNG1(9) THEN PLOT FNC3(I
     ),FNA1(I)/1000 ELSE PLOT I,
     FNA1(I)/1000
```

DARP (cont.)

```
8386 PEN 1
8387 IDRAW 0,0
8388 IF I<10 THEN IMOVE 0,-.25 E
     LSE IMOVE -4,-.25
8389 IF I>390 THEN IMOVE -4,0
8390 BPLOT T9$,1
8391 IMOVE 0,0 @ BPLOT T9$,1
8399 GOTO 8373
8400 DEF FNT$
8405 INPUT T9$
8410 IF LEN(T9$)<4 THEN 8430
8415 IF T9$[1,4]="NULL" THEN 845
     0
8420 IF LEN(T9$)>8 THEN 8450
8430 T9$[1,8]=T9$&B1$
8435 FNT$=T9$
8440 GOTO 8470
8450 DISP "ENTER NAME OR NUMBER"
8455 DISP "(MAX 8 CHARACTERS)"
8460 GOTO 8405
8470 FN END
8500 DEF FNQ
8505 GOSUB 1800
8507 T9=LEN(T6$)
8510 IF T9>0 THEN ON KEY# 1,T6$[
     1,6] GOTO 8550
8515 IF T9>6 THEN ON KEY# 2,T6$[
     7,12] GOTO 8555
8520 IF T9>12 THEN ON KEY# 3,T6$
     [13,18] GOTO 8560
8525 IF T9>18 THEN ON KEY# 4,T6$
     [19,24] GOTO 8565
8530 IF T9>24 THEN ON KEY# 6,T6$
     [25,30] GOTO 8570
8531 IF T9>30 THEN ON KEY# 7,T6$
     [31,36] GOTO 8575
8532 GOSUB 7600
8540 ON KEY# 8,"ABORT" GOTO 8580
8541 ON KEY# 5,"HELP"&VAL$(H3) G
     OTO 8547
8545 KEY LABEL
8547 GOTO 8547
8550 T9=1 @ GOTO 8585
8555 T9=2 @ GOTO 8585
8560 T9=3 @ GOTO 8585
8565 T9=4 @ GOTO 8585
8570 T9=5 @ GOTO 8585
8575 T9=6 @ GOTO 8585
8580 IF H3=1 OR H3=10 THEN BEEP
     @ GOTO 8547 ELSE CLEAR @ T9
     =0 @ GOTO 8585
8585 GOSUB 1800
8590 FNQ=T9
8595 FN END
8600 DEF FNT1$(X)
8603 T9=X\60
8606 T9=T9 MOD 60
8609 T9=T9\60
8612 T9$=B1$
8615 IF T9=0 AND T8=0 THEN T9$="
     MIDNIGHT"
```

DARP (cont.)

```
8618 IF T9=12 AND T6=0 THEN T9$=
     "NOON    "
8621 IF T9$#B1$ THEN 8650
8624 IF T8<10 THEN T9$[4,5]="0"&
     VAL$(T8) ELSE T9$[4,5]=VAL$
     (T8)
8630 IF T9>11 THEN T9$[7,8]="PM"
      ELSE T9$[7,8]="AM"
8632 IF T9=0 THEN T9=24
8633 IF T9>12 THEN T9=T9-12
8636 IF T9<10 THEN T9$[2,2]=VAL$
     (T9) ELSE T9$[1,2]=VAL$(T9)
8639 T9$[3,3]=":"
8640 IF T9$[1,1]=" " THEN T9$=T9
     $[2]
8650 FNT1$=T9$[1,8]
8657 FN END
8655 IF FNG1(7) AND G1(4)=G1(6)
     AND G1(5)=G1(7) THEN A9=0 E
     LSE A9=1
8656 T9=FNZ1(7) @ RETURN
8660 DEF FND1$(X)
8662 T7=X\1000
8664 X=X MOD 1000
8666 T9=X\32
8668 T8=X MOD 32
8675 T9$=VAL$(T9)&"/"&VAL$(T8)&"
     /"&VAL$(T7)&"       "
8678 FND1$=T9$[1,8]
8681 FN END
8690 DEF FNO1(T9)
8691 G1(10)=BINIOR(G1(10),2^T9)
8692 FNO1=T9
8693 FN END
8694 DEF FNZ1(T9)
8695 G1(10)=BINAND(G1(10),BINCMP
     (2^T9))
8696 FNZ1=T9
8697 FN END
8780 CLEAR
8790 DISP
8792 IF DATE#0 THEN T9$=FNC$(FNT
     1$(TIME)&"   "&FND1$(DATE))
      @ DISP
8794 RETURN
8800 PEN 1 @ GCLEAR @ DEG
8802 SCALE 0,255,0,191
8804 MOVE 90,182
8806 LABEL "0"
8812 MOVE 94-8*LEN(VAL$(G1(12)))
     ,100
8814 LABEL VAL$(G1(12))&" dBm"
8832 SCALE -10,16.667,-10,10
8834 PENUP
8836 FOR I=0 TO 360 STEP 5
8937 PENUP
8838 PLOT 10*SIN(I),10*COS(I)
8839 NEXT I
8840 T9=50/G1(12) @ XAXIS 0,T9,0
     ,10 @ XAXIS 0,-T9,-10,0
```

```
8841 YAXIS 0,T9,0,10 @ YAXIS 0,-
     T9,-10,0
8843 PENUP @ T9=10-10/T9^2*T9
8844 FOR I=0 TO 360 STEP 10
8845 PENUP
8846 PLOT T9*SIN(I),T9*COS(I)
8848 NEXT I
8849 GOSUB 8850 @ RETURN
8850 SCALE 0,255,0,191
8851 MOVE 154,179
8852 T9$=T1$
8853 IF T9$[1,1]=" " THEN T9$[1]
     =T9$[2] @ GOTO 8853
8854 I=POS(T9$,"at")-2
8856 LABEL T9$[1,I]
8858 MOVE 166,167
8860 LABEL "at"
8861 MOVE 178,155
8862 LABEL T9$[I+5]
8863 SCALE -10,16.667,-10,10
8869 RETURN
8870 SCALE 0,255,0,191
8871 MOVE 154,179
8872 LABEL "'KEY LABEL'"
8873 MOVE 166,167 @ LABEL "SHOWS
      KEY"
8874 MOVE 178,155
8875 LABEL "FUNCTIONS"
8876 SCALE -10,16.667,-10,10
8877 RETURN
8878 PLOT FNA1(I)*SIN(T6)/1000,F
     NA1(I)*COS(T6)/1000 @ RETUR
     N
8880 IF FNG1(9) THEN T6=FNC3(I)
     ELSE T6=I
8881 PLOT FNA1(I)*SIN(T6)/1000,F
     NA1(I)*COS(T6)/1000
8882 IMOVE -.27,-.4
8883 PEN 1
8884 BPLOT T9$,1
8885 IMOVE .27,.4
8886 IDRAW 0,0
8887 IMOVE -.27,-.4
8888 BPLOT T9$,1
8889 GOTO 8373
8900 DEF FNA1(A1)
8903 IF A1<=0 OR A1<=G1(6) AND F
     NG1(6) THEN A1=A1+.1+FNG1(1
     0)*.3+FNG1(11)*.1
8906 A9=CEIL(A1*10)
8909 IF FNG1(11) THEN A9=CEIL(A9
     /2)
8910 IF FNG1(10) THEN A9=CEIL(A9
     /4)
8912 CONTROL I0$,0 , A9*2-1
8915 ENTER I0# USING "#,B,B" , A
     7,N;
8918 A9=(BIT(A7,4)*1000+A7 MOD 1
     6*100+N;^16*10+N; MOD 15)*(
     2*BIT(A7,5)-1)*5-5000*G1(9)
```

DARP (cont.)

```
8924 FNA1=MAX(0,MIN(10000,A9*(
     (I1)-G1(9))*2))
8929 FN END
9000 STATUS 7,2 ; N@ STATUS I0#,
     2 ; S8@ OFF TIMER# 1
9001 IF NOT FNG1(8) AND S8=0 THE
     N 9007
9002 IF FNG1(8) THEN N=S7
9003 IF BIT(N,5) THEN BEEP @ PRI
     NT "**** > WARNING ** WARNI
     NG    ******** < DATA HAS BE
     EN LOST < ****"
9004 IF BIT(N,5) THEN RETURN
9005 IF S8=0 THEN DISP "DATA HAS
      BEEN SUCCESSFULLY       REC
     ORDED" @ RETURN
9008 ON TIMER# 1,1000 GOSUB 9000
      @ RETURN
9100 IF ERRL=8915 THEN CONTROL I
     0#,0 ; 1,8000@ GOTO 8912
9104 I=ERRN-59
9105 IF I<1 OR I>14 THEN 9295
9107 CLEAR @ DISP "PROBLEM WITH
     USE" @ BEEP
9110 ON I GOTO 9120,9295,9130,92
     95,9295,9295,1300,9200,9205
     ,9295,9200,9295,9295,9300
9120 DISP "TAPE IS WRITE PROTECT
     ED" @ ASSIGN# 1 TO *
9125 GOTO 1300
9130 DISP "TAPE DRIVE IS EMPTY"
9155 GOTO 1300
9200 DISP "THIS TAPE HAS NOT BEE
     N"
9205 DISP "PREVIOUSLY USED TO ST
     OR: DARP   DATA FILES -- OK
     TO CONDITION   AND ERASE T
     APE?"
9210 GOSUB 7501
9220 IF NOT FNA THEN 1300
9232 PRINT "THIS WILL TAKE ABOUT
      7 MIN."
9235 CTAPE @ ERASETAPE
9240 CREATE "MCAT",30,256
9245 CREATE "DARPDT",24,8192
9250 ASSIGN# 1 TO "MCAT"
9255 GOSUB 7700
9280 DISP "ENTER TAPE NAME"
9283 I3$[241,248]=FNT$
9286 PRINT# 1,30 ; I3$
9289 ASSIGN# 1 TO *
9292 GOTO 1300
9295 BEEP @ DISP "ERROR #";ERRN;
     "AT LINE";ERRL,"PROGRAM HAL
     TED" @ PAUSE
```

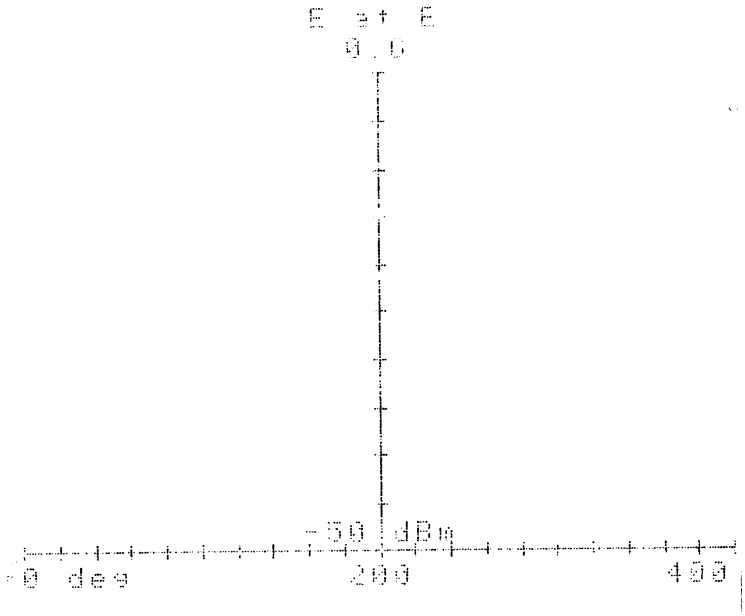


Figure 1

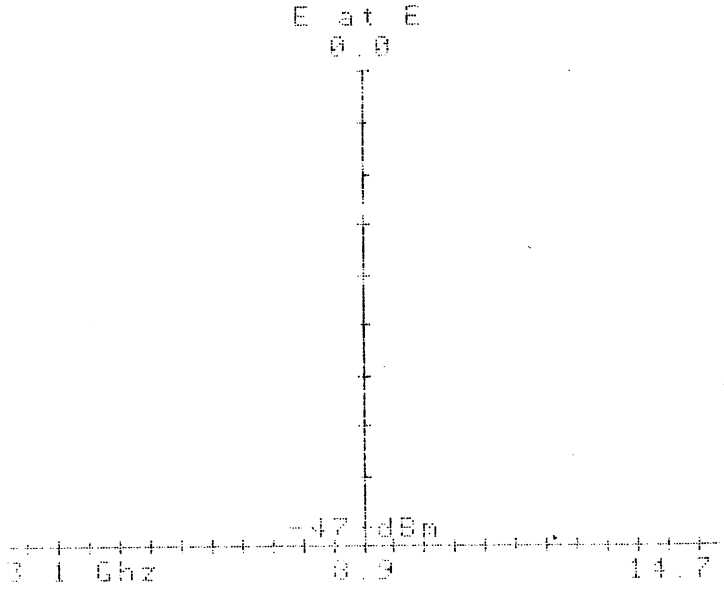


Figure 2

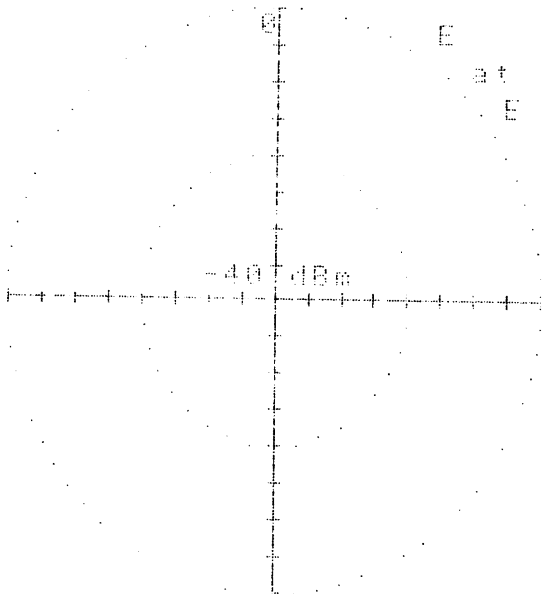


Figure 3

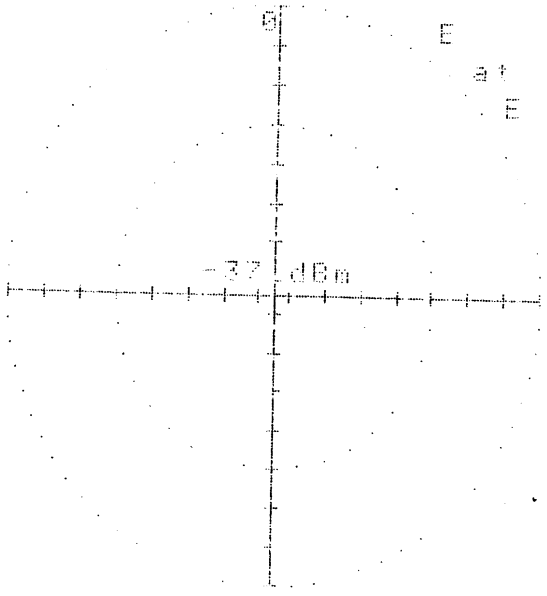
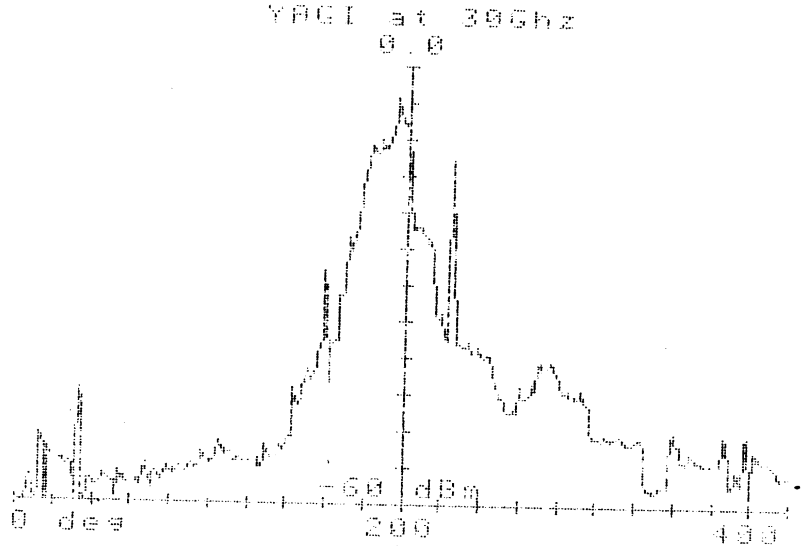


Figure 4




```
          YAGI at 30Ghz
ANTENNA PATTERN
PROJECT #: 77234A
VARIABLE POLARIZATION
RECEIVED POWER LEVEL:
deg    RELATIVE     ABSOLUTE
195    107          5 WATTS
TRANS. POWER: 30 WATTS
TRANS. ANTENNA: HORN
RANGE: 5.3 METERS
DATA RECORDED:
    AT 9:41 AM   ON 7/23/81
DATA STORED:
    in YAGI-J    on TEST
UP TO 26 CHARACTERS
```

Figure 5