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REMOTE HARD COPY, VOLUME 2:
OPERATING MANUAL

by
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ABSTRACT

Procedures for operating the remote hard copy plotters are presented. Initializing the system, caring for the plotter, and interacting with the system are all covered. Descriptions of error conditions and how to operate diagnostics are presented.

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Introduction

Scan Converter/Plotter (SCP) hardware and software were developed to provide hard copy graphics at remote terminals to users of the Sandia Laboratories, Albuquerque (SLA), Central Computing Facility. An SCP consists of a Data General NOVA 3/D minicomputer with software to scan convert vector graphics to raster graphics and a Versatec 1110A plotter.

This operating manual covers SCP operating procedures and gives suggestions for what to do and whom to call if you should have trouble. Operating procedures for BART (the remote job entry terminal software) are covered in a separate document available from Ron Domres, Scientific Computing Systems Design Division 2635, 4-2858.

Comments are invited from readers of this manual who have corrections or other suggestions as to how to improve it. Direct comments to Randy Simons, Distributed Processing System Design Division 2644, 4-3080.

1. Operating Procedures

1.1 Initializing the SCP

1.1.1 Powering up the SCP

1. Depress power button on plotter (plotter should then automatically do a form feed).
2. Set front console switches on NOVA to 100007 octal.
3. Turn key on NOVA to LOCK position.

1.1.2 Loading SCP Software from Central Site

1. On the MODCOMP Terminal type OFF,PLT.
2. Be sure NOVA front console switches are set to 100007 octal. On MODCOMP terminal type LOAD,PLT.

(If the message "PLT STATUS MUST BE OFF" appears on the MODCOMP terminal, then turn the key on the NOVA to OFF, wait for the message "NOVA SYSTEM NOT RESPONDING," turn the key ON, and repeat this step. If this doesn't work, reload the MODCOMP.)
3. Wait for message "SCP XXXXXXXX" on plotter. (XXXXXXX is the date that version of the software was created.)
4. On MODCOMP terminal type ON,PLT

1.1.3 Loading SCP Software from Cards (this procedure should be used only when procedure 1.1.2 above fails)

1. On MODCOMP terminal type OFF,PLT and
OFF,CR
2. Place deck marked SCP into card reader, and press RESET button on card reader.
3. Be sure NOVA front console switches are set to 100007 octal. On MODCOMP terminal type LOADCR,PLT (cards should begin to move through reader).

(If the message "PLT STATUS MUST BE OFF" appears on the MODCOMP terminal, then turn the key on the NOVA to OFF, wait for the message "NOVA SYSTEM NOT RESPONDING," turn the key ON, and repeat this step. If this doesn't work, reload the MODCOMP.)

4. Wait for message "SCP XXXXXXX" on plotter.
(XXXXXXX is the date that version of the
software was created.)
5. On MODCOMP terminal type ON,PLT and
ON,CR.

1.2 Operating the Plotter

More information on the Versatec plotter is available in the "Versatec Operating and Maintenance Manual, 1100 Series."

1.2.1 Replacing Plotter Paper

Use Versatec 11-inch square fanfold paper, type 4111-F. This paper can be ordered from General Stores at SLA, Stock No. 695828.

- a. Remove the paper from its box and tear away the waterproof wrapping. Bend and fan the stack of paper from both ends to loosen it and unstick the paper.
- b. Facing the front of the plotter, swing the top cover up and back as far as it will go. Next, release the upper paper transport section by raising the black handle on the left side. Now, swing the upper paper transport section up and back.
- c. Orient the stack of paper with the leading edge of the top sheet toward the front of the plotter. The rectangular black mark should be at the front right-hand edge of the stack. (This may require tearing off one sheet of paper or flipping the stack.)
- d. Lift the flap of the paper-stacking insert and place the stack of paper in the paper compartment. The rear of the stack of paper should be higher than the front edge. The front edge of the stack should be as far forward as possible and under the hinge point of the paper stacking insert flap. (If you have difficulty fitting a full stack of paper in the plotter, try loading just half a stack.)
- e. Pull the first fanfold sheet back under then forward over the top of the black Teflon-coated tension roller. Now, fold the paper-stacking insert flap over the paper.
- f. Pull out about 2 feet of paper, lower the paper transport and make sure the paper is centered right to left on the roller. Then, lay the paper back onto the platen. At this point, it's a good idea to doublecheck the paper orientation. There should be a rectangular black mark on the underside of the upper righthand corner

of the sheet now resting on the platen. Close the paper transport and lock it in place by pushing the black handle on the left side all the way down.

- g. Close the top cover. If the plotter is powered up, it should automatically do a form feed.
- h. When plots begin coming out, feed the paper under the paper guide spring on the basket behind the plotter, and see that paper begins stacking properly in the basket.

1.2.2 Replacing Plotter Toner

Use Versatec Type S Toner Pre-mix and Concentrate. These supplies are available from General Stores at SLA, Stock Nos. 693 652 and 693 650. Use caution when handling toner as it can stain clothing and carpeting. It is advisable to have paper towels available to catch drips when changing toner.

- a. Turn the plotter off to avoid accidental pumping of toner.
- b. Open the front door of the plotter and unscrew the caps from the old concentrate and toner pre-mix bottles.
- c. Remove caps and aluminum seals from new bottles of concentrate and toner pre-mix.
- d. Swap the new bottles with the old ones, moving caps and tubes to the new bottles. Screw the caps on tightly.

1.2.3 Adjusting for Maximum Output Quality

Adjustments need to be made while output is going to the plotter so that results can be observed.

- a. Open the front door of the plotter and locate the knob marked DARK.
- b. Turn the DARK knob slowly clockwise until a light gray background becomes visible on the output. Then turn the DARK knob counter clockwise until the gray background disappears. (This normally takes less than 1/8 of a turn).
- c. If the above adjustment results in the output being too light, try the following:

- d. Depress the concentrate injector three times to inject a small amount of concentrate to the toner pre-mix. Output data for one minute to allow the concentrate to thoroughly mix with the toner, then examine output quality.
- e. If darker output is still required, repeat step d. Be careful not to add too much concentrate or you will then have to add clear dispersant to dilute the toner pre-mix.

1.2.4 Plotter Control Buttons

On the top of the Versatec plotter are several buttons which can be used to control the plotter. They are discussed individually below.

POWER--Used to power the plotter on and off. The plotter should be powered on before loading (see Section 1.1.2). This button can be used to stop the plotter while it is plotting, e.g., to clear a paper jam. Once the plotter is powered on again, plots should continue from where they left off, possibly repeating the plot that was interrupted by powering off.

ADVANCE--Advances the paper as long as the button is held down. When the button is first pressed, there may be a 5-second delay to let the pumps get toner flowing before the paper moves. This button should not be pressed while plots are coming out on the plotter, or the plots may be garbled.

FORM FEED--Advances the paper to the next top-of-form. The button may have to be held down for about 5 seconds to let the pumps get toner flowing before the paper moves. This button should not be pressed while plots are coming out on the plotter, or the plots may be garbled.

PAPER--This button can't be pushed, but lights up when the plotter is out of paper, or paper is misaligned or jammed.

1.2.5 Plotter Supplies

All supplies for the Versatec plotters are available from General Stores at Sandia Laboratories, Albuquerque.

- a. Versatec 11-inch square fanfold paper, type 4111-F, General Stores stock no. 695 828.

- b. Versatec Type S Toner Pre-mix, General Stores stock no. 693 652.
- c. Versated Type S Concentrate, General Stores stock no. 693 650.
- d. Versatec Clear Dispersant, General Stores stock no. 693 624.

1.3 BART Commands Affecting the SCP

1.3.1 Setting Graphics File Priority Limits

A priority from 0 to 7777 (octal) is assigned to each graphics file. This priority is inversely proportional to the length of the file so that the shortest files are assigned the highest priority. Besides determining the order in which graphics files will be plotted, the priority allows users to determine that certain size files will not be plotted at the remote site. The correspondence between file size and priority is as follows:

<u>sectors (octal)</u>	<u>priority</u>
1- 37	7000
40- 177	6000
200- 377	5000
400- 777	4000
1000-1777	3000
2000-3777	2000
4000-	1000

It is recommended that graphics files greater than 4000 (octal) sectors in length be disallowed during busy times since plotting them at remote sites would normally take at least 15 minutes. This limit can be set by typing the following statement on the MODCOMP terminal:

```
LIMITS,PLT,7777,2000
```

Note that the NEXT command can be used to override limits without having to change them.

1.3.2 Diverting Graphics Files to the Central Site

Graphics files originally destined for a remote site can be diverted to the central site in three ways. If the graphics file is already in the plot output queue, a user can type the following statement on the MODCOMP terminal:

```
DIVERT,lfn,S
```

where lfn is the name of the graphics file to be diverted. Alternately, the auto-divert facility can be activated by typing:

```
AUTO,ON
```

Then all output files (including print and plot files) that fall below the auto-divert priority will

be diverted to the central site. Finally, operators at the central site can divert plot files from a remote site to the central site. Plot files diverted to the central site will be output on microfiche by the DICOMED D48 COM Recorder and returned to the user's box.

1.3.3 Repositioning Graphics Files

Certain BART commands entered on the MODCOMP terminal can be used to reposition graphics files. Commands which position to the beginning of a file (RETURN, REWIND) are safe in that there's no chance of the SCP getting lost. Other commands which reposition within a file (FORWARD, BACKSPACE) may yield unexpected results. This is due to the fact that graphics commands in graphics files are of varying lengths, and the beginning of a sector is not necessarily the beginning of a graphics command. There are three possible outcomes when jumping around inside a graphics file:

- a. You may jump to the beginning of a valid command and continue plotting with no errors. Note, however, that the next plot output will be the first part of the plot jumped out of overlapped by the last part of the plot jumped into.
- b. You may jump to the middle of a command and the SCP will recognize it as bad data. A BADOP error message will be output on the plotter followed by the first part of the plot jumped out of. Then it will skip to the beginning of the next plot and continue plotting from there.
- c. You may jump to the middle of a command and the SCP will mistake the bad data as a valid command. Since this "fake" command could be virtually anything, results are undefined. In the worst case, it could cause the graphics file to be discarded or the SCP to halt. While this should be a rare occurrence, it emphasizes that users using FORWARD or BACKSPACE commands are taking a risk.

The individual commands are discussed below:

RETURN,PLT--Causes the graphics file being plotted to be returned to the plot queue. If PLT is ON, the highest priority graphics file in the queue (which could be the one just returned) will begin plotting.

REWIND,PLT--Causes the graphics file being plotted to be rewound to the beginning. Output of the graphics file starts all over with the first plot in the file.

BACK,PLT,n--causes the graphics file being plotted to be backspaced n sectors. Note that if you backspace to the beginning of the file, the first plot in the file may not be output correctly or at all due to considerations discussed above. It is not equivalent to REWIND.

FWD,PLT,n--Causes the graphics file being plotted to be spaced forward n sectors. Note that if you space forward to the end of the file, no more plots will be output from that file. It is equivalent to KILL or TERM.

2. Troubleshooting

2.1 Where to Go for Help

At each of the remote job entry terminals, there is a responsible employee who should be able to handle most of your questions and problems with the SCPs. Their duties include:

Ordering plotter supplies (paper, toner pre-mix, toner concentrate, and clear dispersant) as needed.

Periodically checking plot quality and adjusting it as needed.

Instructing and consulting with users on plotter operating procedures.

The following is a current list of these people:

<u>Station Code</u>	<u>Building/ Room</u>	<u>Responsible Employee (Org.)</u>	<u>Employee Phone</u>
R0	806/159	Wynona Sexson (5531)	4-4358
R1	836/232	Fred Schkade (5521)	4-5385
R2	880/X32	Manny Chavez (2631)	4-7090
R4	980/51 (Area IV)	Lessie Lee (4241)	4-1151
R5	6588/41 (Area V)	Jeffrey Philbin (4452)	4-6896
R7	634/123	Gene Meyer (5636)	4-1077

If these people can't solve the problem, one of the following can be contacted:

For Hardware Problems: Dave Salas (2611) 4-3091

For Software and
Operational Problems: Randy Simons (2644) 4-3080

2.2 Error Messages

SCP error messages may be reported in either of two ways. MODCOMP-NOVA interface driver errors are reported on the plotter. Other NOVA software errors are reported on the MODCOMP terminal.

2.2.1 Error Messages on the Plotter

Possible interface driver errors are:

- I1: Word count not equal 0 on interrupt
- I2: Got data interrupt when expected service interrupt
- I4: Invalid address or word count for transmitting data
- I5: Invalid address or word count for receiving control block
- I6: Invalid address or word count for receiving data
- I7: Block sequence error
- I8: Requested buffer when none available
- I10: No command bit set on service interrupt

Other error messages reported on the plotter are:

"BADOP = XXX AT YYY"

Bad data has been encountered by the SCP in processing the current graphics file. XXX is the bad op code (in decimal) encountered, and YYY is the approximate number of 16-bit words (in decimal) between the beginning of the current plot and the location of the bad op code. If NOVA switch #3 is not set, the portion of the plot that has already been processed will be output after the error message, then the rest of the plot will be skipped, and processing will resume with the following plot. If NOVA switch #3 is set (see section 2.3.4), NOVA memory will be dumped after the error message.

"BAD FILE ID, NO OUTPUT CAN BE GENERATED, FILE DISCARDED."

Every graphics file to be plotted must have as its first command a file identifier. This gives the name of the file, the user's name, the time, the date, etc. If a file is received which does not begin with a file ID, the SCP cannot tell anything about the file, so all it can do is give this error message and throw out the file.

2.2.2 Error Messages on the MODCOMP Terminal

Possible NOVA software errors are:

- 1: First command in file is not FILID
- 2: Unable to initialize MODCOMP-NOVA interface driver (.MDEF)
- 3: Unable to initialize plotter driver (.VDEF)
- 6: Not used (.VMEM)
- 7: Not enough memory blocks available
- 8: Unable to define window and window map (.MAPDF)
- 9: Not used (.GTOD)
- 10: Unable to activate a logical window transfer (.REMAP)
- 11: Unable to issue control information to plotter (.VCTR)
- 13: Unable to activate a logical window transfer (.REMAP)
- 14: Unable to plot raster data (.VPLW)
- 18: Unable to activate logical window transfer (.REMAP)
- 19: Unable to activate logical window transfer (.REMAP)
- 23: Unable to print data (.VPRW)

The names in parentheses above are the routines that return these errors. More information can be found on these routines in the following references:

"MODCOMP-NOVA Interface Programming Reference Manual"-.MDEF
"Versatec Controller Operating Manual"-.VDEF,
.VCTR,.VPLW,.VPRW
"RDOS Reference Manual"-all others

Other error messages reported on the MODCOMP terminal are:

"NOVA SYSTEM NOT RESPONDING"

Communications between the MODCOMP and the SCP NOVA has been lost. The SCP will have to be reloaded (see section 1.1.2) before further plotting can be done.

"VERSATEC PLOTTER POWERED OFF"

The Versatec plotter is not operational for one of the following reasons: it is powered off, the top is not closed, or the interface is not connected. Once the problem is corrected, plots should continue from where they left off, possibly repeating the plot that was interrupted by the error.

"PLOTTER OUT-OF-PAPER"

The Versatec plotter has either run out of paper or the paper has become misaligned or jammed. Once the problem is corrected, plots should continue from where they left off, possibly repeating the plot that was interrupted by the error.

"BLOCK SEQUENCE ERROR DETECTED BY NOVA"

An error in communications between the MODCOMP and the SCP NOVA has occurred. Recovery will be attempted, but some data may be lost.

"UNSPECIFIED PLOTTER ERROR DETECTED"

A dump of the NOVA (see section 2.3.1) should be taken to provide more information for analyzing this error.

2.3 Diagnostics

2.3.1 Memory Dump

At any time after the plotter has been loaded, NOVA memory can be dumped on the plotter by the following procedure:

- a. Type on MODCOMP console: OFF,PLT
- b. Turn key on NOVA to ON (not LOCK)
- c. Press NOVA switches: STOP
RESET
- d. Set NOVA switches to: 011000g
- e. Press NOVA switch: START

A dump (in octal) of NOVA memory should be output on the plotter.

2.3.2 Plotter Test Pattern (NOVA Switch 1)

A test pattern of lines of print can be output continuously to the plotter by the following procedures:

- a. Set NOVA switches to: 140007g
(Note that this differs from the regular setting in that switch #1 is set.)
- b. Type on MODCOMP console: LOAD,PLT

To temporarily halt output of the pattern:

press NOVA switch: STOP

To resume output after halting:

press NOVA switch: CONT

To allow the plotter to accept plot data, you will have to reload the plotter. (See section 1.1.2.)

2.3.3 Output Plot Data with Plots (NOVA Switch 2)

To output all data (in octal) received by the NOVA interspersed with the plots specified by the data:

set NOVA switch #2

This output can be turned on or off, as desired, at any time with the switch setting that is in effect at the end of a plot remaining in effect for the entire next plot. To get output on the first plot after a LOAD,PLT, set switch #2 before doing the load (i.e., switch setting would be 120007g).

2.3.4 Dump on BADOP (NOVA Switch 3)

To cause a dump of NOVA memory on the plotter when bad data is encountered (i.e., BADOP error):

set NOVA switch #3

This option should not be used when doing BACK or FWD commands, as these commands often generate BADOP errors.

2.3.5 Loading Diagnostics From Cards

Diagnostic routines can be loaded into the NOVA from cards as follows:

- a. On MODCOMP terminal type OFF,PLT and
OFF,CR.
- b. Place deck marked MDIAG (for MODCOMP-NOVA interface diagnostics) or VDIAG (for Versatec plotter diagnostics) into card reader. Press reset button on card reader.
- c. On MODCOMP terminal type LOADCR,PLT.
- d. Should get message "NOVA SYSTEM NOT RESPONDING" on MODCOMP terminal.
- e. On MODCOMP terminal type ON,CR.
- f. Instructions for running diagnostics can be found in "Remote Hard Copy Volume 4, MODCOMP-NOVA Interface Programming Manual" for MDIAG or "Versatec Controller Operating Manual" for VDIAG.

2.3.6 Loading Diagnostics from Diskette

A Data General Diskette Subsystem (Model 6031) is available for running diagnostics on the NOVA when they can't be loaded as in 2.3.5 above. A Texas Instruments Silent 700 alphanumeric terminal is also available to interact with the diagnostic programs. (VDIAG requires this terminal.) To install the disk on a NOVA, do the following:

- a. You'll need the disk drive, disk controller board, cable to connect the two, and diskettes marked MDIAG and VDIAG.
- b. Power down the NOVA.

- c. Pull out the CPU rack. Insert the disk controller board in slot 10. Remove the jumpers on the backplane that pass the priority chain over slot 10. (Be sure to replace these jumpers when removing the disk controller board.)
- d. Plug the cable onto the paddleboard connector that corresponds to slot 10 and is located at the rear of the backplane.
- e. Plug the other end of the cable into the back of the disk drive which can be located either on top of the cabinet or nearby. Plug the power cord of the disk drive into any available standard power outlet.

To install the alphanumeric terminal on a NOVA, do the following:

- a. You will need the terminal, its power cord, and its cable.
- b. Power down the NOVA.
- c. Pull out the CPU rack. Attach the cable to the backplane on slot 4. The right end of the connector goes over the two gold pins in the middle of slot 4.
- d. Plug the other end of the cable into the back of the terminal. Plug the power cord of the terminal into any available standard power outlet.

To run diagnostics from the diskette, do the following:

- a. Power up the NOVA, the diskette drive, and the terminal.
- b. Insert a diskette marked MDIAG (for MODCOMP-NOVA diagnostics) or VDIAG (for Versatec plotter diagnostics) into the diskette drive.
- c. Set the NOVA front panel switches to 100073 (octal) and press STOP, RESET and PR LOAD switches.
- d. The terminal should type "FILENAME:", and you reply either "DP4:MDIAG" or "DP4:VDIAG."
- e. Instructions for running diagnostics can be found in "Remote Hard Copy Volume 4, MODCOMP-NOVA Interface Programming Manual" for MDIAG or "Versatec Controller Operating Manual" for VDIAG.

Distribution:

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