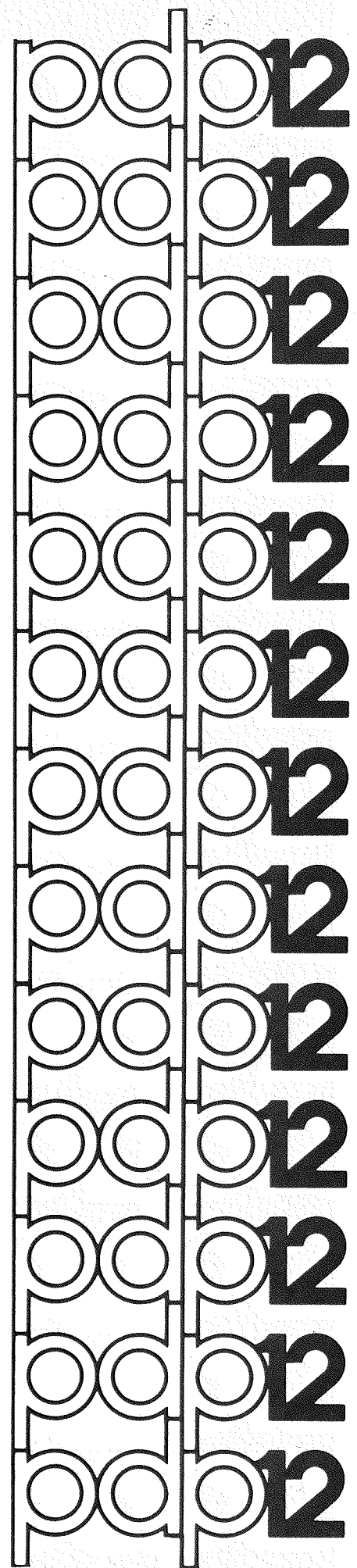


digital

DISPLAY



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DISPLAY

1. INTRODUCTION

DISPLAY enables a data display facility for those routines which do not require complex display processing or cannot sacrifice the core for such a display. The routine displays any contiguous section of core via a moving window, with a cursor and octal read out of cursor positions to facilitate operator interaction.

2. ENVIRONMENT

2.1 Hardware

A PDP-12A computer.

2.2 Core Allocation

Any two PDP-8 pages in field 0 except page 0 that are segment contained, beta registers 0, 1, and 2 of the segment, and any six page 0 locations are the core requirements. The actual binary output resides in one tape block.

3. CALLING PROCEDURE

There are two calls to DISPLAY: an initial call and a refresh call, both of which must be in the same PDP-8 field as DISPLAY (field 0). The function of the initial call is to set up arguments for the refresh subroutines:

JMS I KIDORA

FIELD

CORE LOCATION

FIELD

CORE LOCATION

Y OFFSET

Y SCALE FACTOR

.

.

.

.

KIDORA, IDORA

The first four words are two 15-bit addresses that specify the beginning and end of the data buffer to be displayed, respectively. Any contiguous section of core is legal input to IDORA as long as the buffer is at least 10000_8 points long. The first address must be less than the second. DISPLAY treats the data buffer as a core ring so that the initial and terminal points are contiguously displayed.

The purpose of words 5 and 6 is to allow the calling programs flexibility in displaying data.¹ The fifth word is a Y offset and specifies a 12 bit number to be added (2's compliment) to the data before it is displayed; the sixth word is a SCR K instruction and indicates the amount of scaling to be done prior to display. IDORA exits to the SCR K location in PDP-8 mode with the data field set to 0 and the AC = 0.

The refresh call is simply

JMS I KRDORA

.
. .
. . .

KRDORA, RDORA

The refresh call displays 1000_8 points, sets arguments for the next refresh and returns to the location following the call, in PDP-8 mode with the accumulator cleared and the data field DF and IF unchanged. Note that the initial call to DISPLAY must be to IDORA; RDORA always refreshes the buffer specified by the last call to IDORA

¹It should be noted that DISPLAY assumes the data to be in single word format.

4. FACTOR INTERACTION

The operator controls the position of the window with knob \emptyset : clockwise motion moves the window to the "right" or towards the end of the buffer; counter-clockwise, to the left. The midpoint reading on knob \emptyset causes the motion to stop.

Knobs 1 and 5 and Sense Switch (SSW) 5 control the cursor (an intensified dot). Depending on the setting of SSW 5, the cursor may either move along the curve or be displayed independently. When SSW 5 = \emptyset , the cursor moves along the curve and its position is controlled with Knob 1:

When Knob 1 is turned to its furthestmost clockwise position, the cursor sits upon the rightmost scope point; when Knob 1 is positioned to its furthestmost counter-clockwise position, the cursor sits on the leftmost scope point; intervening knob positions yield intervening cursor positions.

When SSW5 = 1, the cursor is displayed independently of the curve. For this case, Knob 1 controls the horizontal coordinate and Knob 5 the vertical coordinate. Horizontal displacement of the cursor via Knob 1 is identical to that described above. When Knob 5 is at its furthestmost clockwise position, the cursor is displayed at the top of the scope. When Knob 5 is at its furthestmost counter-clockwise position, the cursor is displayed at the bottom of the scope.

Associated with the cursor are four octal words displayed in the top left corner of the scope, one beneath the other¹. The first two words are the absolute 15-bit core address of the cursor point. The third word is the contents of the displayed core address, i.e., the actual 12-bit value in the data buffer of the data word that corresponds to the cursor point. The fourth word is the scope Y coordinate of the cursor point. The fourth word is a relative value and depends upon the Y scale factor and Y offset. If the data had been scaled to nine bits prior to display, the fourth word or Y coordinate would range from 0001 to 1000₈, where 0001 corresponds to the bottom of the scope and 1000 corresponds to the top.

To facilitate interaction with the calling program the four displayed words described above are maintained in page 0 and may be accessed after the refresh return.

| <u>TAG</u> | <u>CONTENTS</u> |
|------------|-----------------------------------|
| XCURHI | Fifteen bit address of the point |
| XCURLO | in memory reference by the cursor |
| CORVAL | Contents of memory |
| YCUR | Relative Y display coordinate |

¹The character size of the display depends upon the setting of the special functions register at the time the display is refreshed.

Standard Parameters

The six locations on page 0 can be anywhere and they do not have to be contiguous. The standard version of DISPLAY assumes locations 20 - 25; the locations are defined via direct assignment statements at the end of the DISPLAY source.

```
YSHFT = 20           CONTAINS Y OFFSET
XCURHI = YSHFT + 1
XCURLO = XCURHI + 1
CORVAL = XCURLO + 1
YCUR = CORVAL + 1
COUNT = YCUR + 1
```

} SEE ABOVE

The following symbols (also defined at the end of the DISPLAY source) may be redefined if the user wishes to use Knobs other than 0, 1, and 5:

```
WINSAM = SAM 0
CURSAM = SAM 1
FRESAM = SAM 5
```

As coded, DISPLAY occupies locations 5400 through 5777, with IDORA = 5400 and RDORA = 5544. The origin statement at line 10 and/or the PAGE pseudo-op at line 223 may be altered to relocate part or all of DISPLAY. (N.B. if using the page of the segment containing the beta registers, place the origin at the fourth location of the page since DISPLAY uses beta registers 0, 1, and 2; i.e. * 2003; or * 4003; or * 6003).

Example

If Segments 4 and 5 contain 12 bit, unsigned data, the following would display 512 points (as controlled by knob 0) until a keyboard input is detected:

```
JMS I KIDORA      /N.B.  PDP-8 MODE
  1                /LOCATION 10,000.
  0                /START OF BUFFER
  1                /LOCATION 13,777 IS
3777              /END OF BUFFER
4000              /VERTICAL COORDINATOR
                  /377      1000
SCALE 3           /  0 TO   400
JMS I KR DORA    /400      1
KSF              /FROM 12 BITS TO 9
JMP LOOP         /REFRESH SCOPE
.                /KEY STRUCK ?
.                /NO, CONTINUE DISPLAY
.
.
.                The program might now do some-
                  thing with the datum indicated
                  by the cursor  exit, or .....

KIDORA, IDORA    /INITIALIZE POINTER
KR DORA, RDORA   /REFRESH POINTER
```

5. INTERNAL DESCRIPTION

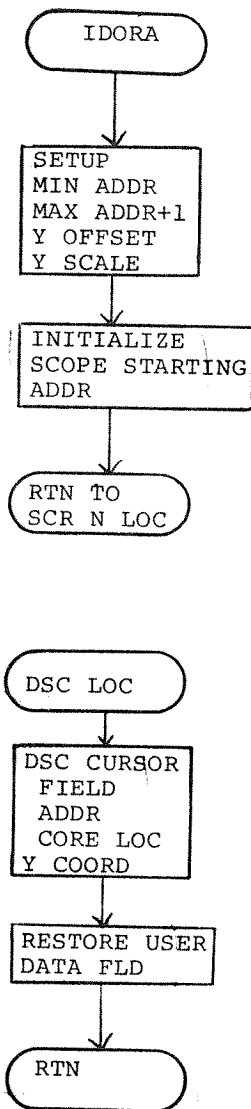
5.1 IDORA

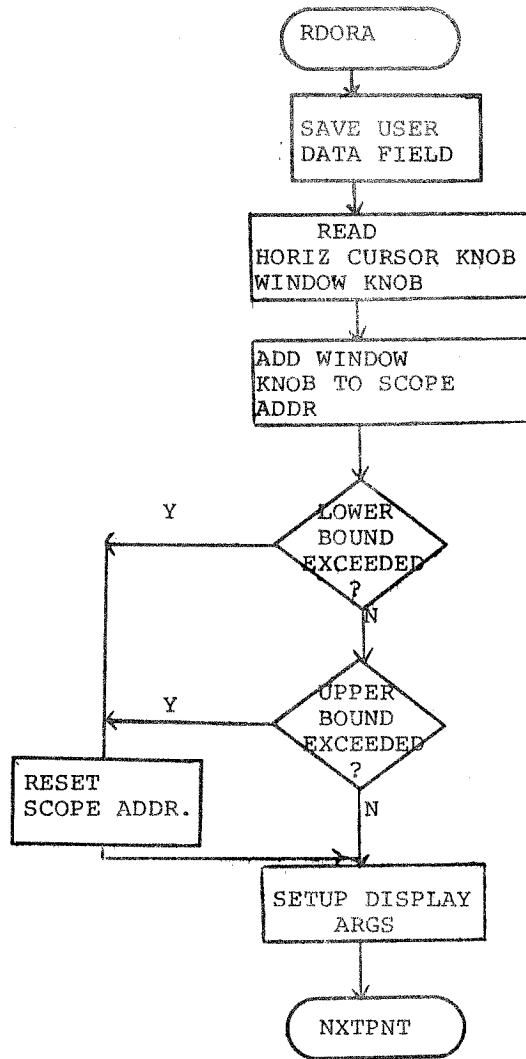
The function of IDORA is to retrieve the arguments from the initial call and set them up for RDORA. The lower bound is stored at MINFLD. MINADR, the upper bound + 1, is stored at MAXFLD, MAXADR. The Y offset is stored at YSHFT (page 0) and the scale factor is stored at YSCAL.

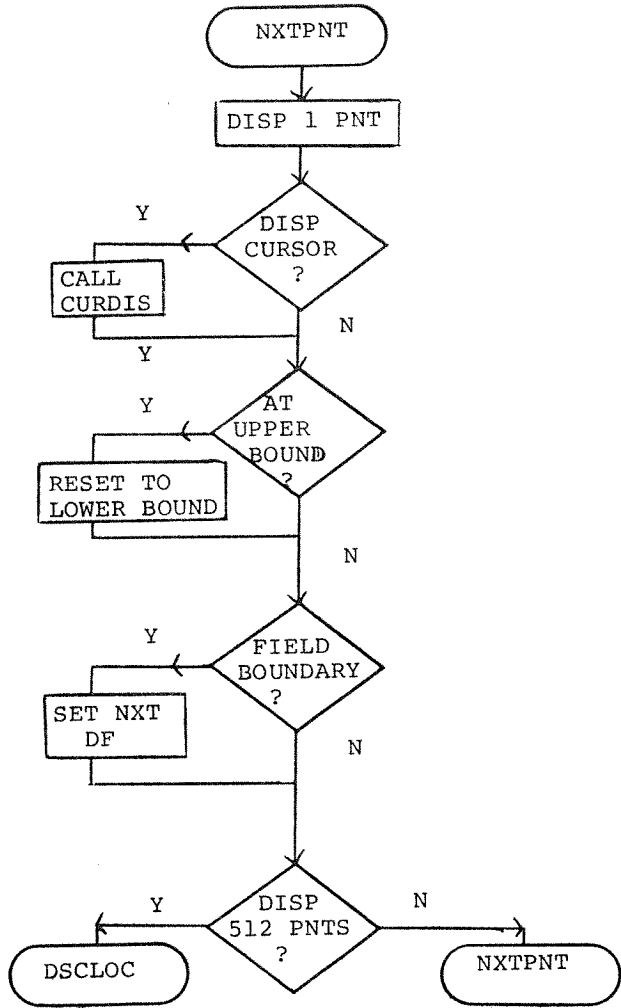
5.2 RDORA

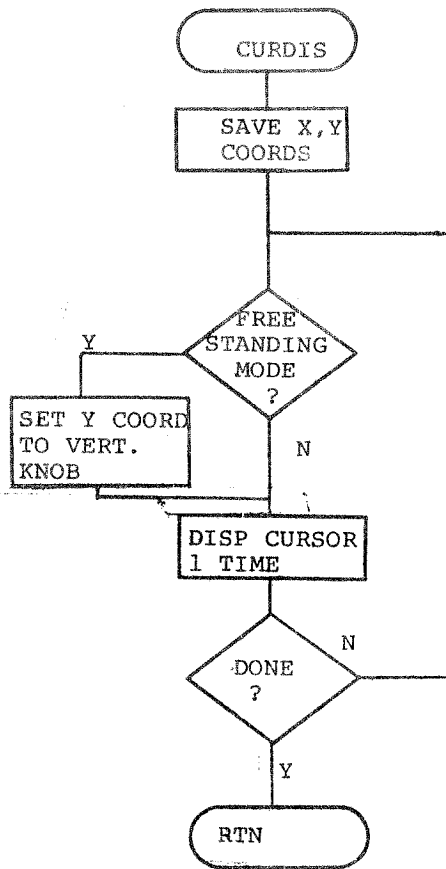
The function of RDORA is to display 1000_8 points relative to the window knob and a scope starting address and return. RDORA first reads the horizontal cursor knob and sets it to a value between -1 and -1000_8 ; this is the cursor count. RDORA then reads the window knob and updates the initial scope address (BUFHI, BUFLO) maintaining that address modulo the upper and lower bounds. RDORA then displays the buffer one point at a time. After each point is displayed, RDORA checks (ISZ) the cursor count; when it goes to 0, the cursor is displayed. RDORA also checks for the end of the display buffer and the end of a field, resetting to the start of the display buffer or to the next field respectively, as the case may be. After all points have been displayed, the routine DSCLOC is called to display the four words in the upper left corner of the scope. RDORA then restores the user's data field and returns.

5.3 FLOW DIAGRAM









5.4 LISTING

```

0000 *20
0001 /DISPLAY (MINI MAGSPY )
0002 /COPYRIGHT 1970
0003 /DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS.
0004 /MOVING WINDOW DISPLAY SUBROUTINE
0005 /CURSOR READ OUT
0006 /CORE OR TAPE FILE
0007 PMODE
0010 *5400
0011
0012
0013 /INITIAL CALL GET PARAM LIST
0014 /SET ARGS FOR RDORA
0015
0016
0017 5400 0000 IDORA, 0 /GET BOUNDS
0020 5401 7300 CLA CLL
0021 5402 0201 ACDF0, CDF 0
0022 5403 1600 TAD I IDORA /DATA BUFFER
0023 5404 3635 DCA I KMNFLD /15 BIT
0024 5405 2200 ISZ IDORA /LOWER BOUND
0025 5406 1600 TAD I IDORA /AT P+1, P+2
0026 5407 3636 DCA I KMNADR /MINFLD, MINADR
0027 5410 2200 ISZ IDORA
0030 5411 1600 TAD I IDORA /UPPER BOUND
0031 5412 3637 DCA I KMXFLD /AT P+3, P+4
0032 5413 2200 ISZ IDORA
0033 5414 7001 IAC /RDORA USES
0034 5415 1600 TAD I IDORA /MAX+1
0035 5416 3640 DCA I KMXADR
0036 5417 7004 RAL
0037 5420 1637 TAD I KMXFLD
0040 5421 3637 DCA I KMXFLD
0041 5422 2200 ISZ IDORA
0042 5423 1600 TAD I IDORA /Y SHIFT
0043 5424 3020 DCA YSHFT
0044 5425 2200 ISZ IDORA
0045 5426 1600 TAD I IDORA /Y SCALE
0046 5427 3643 DCA I KYSCAL
0047 5430 1635 TAD I KMNFLD /INITIALIZE
0050 5431 3641 DCA I KBUFHI /WINDOW
0051 5432 1636 TAD I KMNADR /STARTING ADDR
0052 5433 3642 DCA I KBUFLO
0053 5434 5600 JMP I IDORA /RTN TO SCR N
0054 5435 5615 KMNFLD, MINFLD
0055 5436 5616 KMNADR, MINADR
0056 5437 5674 KMXFLD, MAXFLD
0057 5440 5675 KMXADR, MAXADR
0060 5441 5774 KBUFHI, BUFHI
0061 5442 5775 KBUFLO, BUFLO
0062 5443 5644 KYSCAL, YSCAL
0063 5444 0401 P401, 401

```

| | | | | | |
|------|------|------|---------|-------------|-----------------|
| 0064 | 5445 | 1244 | DSCLOC, | TAD P401 | /DSC X,Y COORD |
| 0065 | 5446 | 3275 | | DCA VCOORD | |
| 0066 | 5447 | 1031 | | TAD XCURHI | /FIELD |
| 0067 | 5450 | 4262 | | JMS DSCWD | |
| 0070 | 5451 | 1022 | | TAD XCURLO | /ADDRESS |
| 0071 | 5452 | 4262 | | JMS DSCWD | |
| 0072 | 5453 | 1023 | | TAD CORVAL | /CONTENTS OF |
| 0073 | 5454 | 4262 | | JMS DSCWD | /CURSR CORE LOC |
| 0074 | 5455 | 1024 | | TAD YCUR | /Y COORD OF |
| 0075 | 5456 | 1244 | | TAD P401 | |
| 0076 | 5457 | 4262 | | JMS DSCWD | /CURSOR POINT |
| 0077 | 5460 | 0000 | RTNCF, | 0 | /RESTORE USER |
| 0100 | | | | | /DATA FLD |
| 0101 | 5461 | 5744 | | JMP I RDORA | /RTN |
| 0102 | 5462 | 0000 | DSCWD, | 0 | /DSC C(AC) |
| 0103 | 5463 | 0141 | | LINC | |
| 0104 | | | | LNODE | |
| 0105 | 1464 | 5477 | | STC TEMP | /SAVE VALUE |
| 0106 | 1465 | 4001 | | STC XCORD | /CHAN 1 |
| 0107 | 1466 | 0024 | | SPA | /VC FOR FULL |
| 0110 | 1467 | 0265 | | ROL I 5 | /SIZE IS -40 |
| 0111 | 1470 | 1020 | | LDA I | /-20 FOR HALF |
| 0112 | 1471 | 7757 | | -20 | |
| 0113 | 1472 | 0452 | | LZE | /FULL CHARS ? |
| 0114 | 1473 | 0241 | | ROL 1 | /NO VC=40 |
| 0115 | 1474 | 1160 | | ADM I | /UPDATE VC |
| 0116 | 1475 | 0000 | VCOORD, | 0 | |
| 0117 | 1476 | 1020 | DSCLOC, | LDA I | |
| 0120 | 1477 | 0000 | TEMP, | 0 | |
| 0121 | 1500 | 0243 | | ROL 3 | /1 DIGIT |
| 0122 | 1501 | 1040 | | STA | /AT A TIME |
| 0123 | 1502 | 1477 | | TEMP | /UPDATE |
| 0124 | 1503 | 1560 | | BCL I | /LOW 3 BITS |
| 0125 | 1504 | 7770 | | 7770 | /ONLY |
| 0126 | 1505 | 0241 | | ROL 1 | /+2 AND REL |
| 0127 | 1506 | 1120 | | ADA I | /TO GRID TAB |
| 0130 | 1507 | 1524 | | TAB61777 | |
| 0131 | 1510 | 4002 | | STC 2 | |
| 0132 | 1511 | 3475 | | ADD VCOORD | |
| 0133 | 1512 | 1742 | | DSC 2 | |
| 0134 | 1513 | 1762 | | DSC I 2 | |
| 0135 | 1514 | 0221 | | XSK I 1 | /MAKE GAP |
| 0136 | 1515 | 0221 | | XSK I 1 | /BETWEEN CHARS |
| 0137 | 1516 | 1520 | | SRO I | /DSC 4 CHARS ? |
| 0140 | 1517 | 3567 | | 3567 | |
| 0141 | 1520 | 7470 | | JMP DSCLOC | /NO CONT |
| 0142 | 1521 | 0002 | | PDP | |
| 0143 | | | | PMODE | |
| 0144 | 5522 | 7300 | | CLA CLL | |
| 0145 | 5523 | 5662 | | JMP I DSCWD | /RTN |
| 0146 | 5524 | 4536 | TAB, | 4536 /60,0 | |
| 0147 | 5525 | 3651 | | 3651 | |
| 0150 | 5526 | 2101 | | 2101 /61,1 | |

| | | | | |
|------|------|------|-----------------|------------------|
| 0151 | 5527 | 0177 | 0177 | |
| 0152 | 5530 | 4523 | 4523 | /62,2 |
| 0153 | 5531 | 2151 | 2151 | |
| 0154 | 5532 | 4122 | 4122 | /63,3 |
| 0155 | 5533 | 2651 | 2651 | |
| 0156 | 5534 | 2414 | 2414 | /64,4 |
| 0157 | 5535 | 0477 | 0477 | |
| 0160 | 5536 | 5172 | 5172 | /65,5 |
| 0161 | 5537 | 0651 | 0651 | |
| 0162 | 5540 | 1506 | 1506 | /66,6 |
| 0163 | 5541 | 4225 | 4225 | |
| 0164 | 5542 | 4443 | 4443 | /67,7 |
| 0165 | 5543 | 6050 | 6050 | |
| 0166 | 5544 | 0000 | RDORA, 0 | |
| 0167 | 5545 | 7300 | CLA CLL | /SAVE USER DF |
| 0170 | 5546 | 6214 | RDF | |
| 0171 | 5547 | 1202 | TAD ACDF0 | |
| 0172 | 5550 | 3260 | DCA RTNCF | |
| 0173 | 5551 | 6141 | LINC | |
| 0174 | | | LMODE | |
| 0175 | 1552 | 0101 | CURSAM | /CURSOR |
| 0176 | 1553 | 0341 | SCR 1 | /9 BITS COVERS |
| 0177 | 1554 | 0002 | POP | /SCOPE |
| 0200 | | | PMODE | /MAKE RANGE |
| 0201 | 5555 | 1244 | TAD P401 | /-1 TO -1000 |
| 0202 | 5556 | 7141 | CIA CLL | |
| 0203 | 5557 | 6141 | LINC | |
| 0204 | | | LMODE | |
| 0205 | 1560 | 5773 | STC CURCNT&1777 | |
| 0206 | 1561 | 0100 | WSAM, WINSAM | /WINDOW |
| 0207 | 1562 | 0344 | SCR 4 | /75 CENTS WORTH |
| 0210 | 1563 | 0061 | SET I XCORD | |
| 0211 | 1564 | 6777 | -1000 | /512 PNTS |
| 0212 | 1565 | 7600 | JMP CONT&1777 | |
| 0213 | 1566 | 0105 | FREE, PRESAM | |
| 0214 | 1567 | 0341 | SCR 1 | |
| 0215 | 1570 | 0002 | POP | |
| 0216 | | | PMODE | |
| 0217 | 5571 | 3024 | DCA YCUR | |
| 0220 | 5572 | 1024 | TAD YCUR | |
| 0221 | 5573 | 6141 | LINC | |
| 0222 | 5574 | 6000 | 6000 | /JMP 0 |
| 0223 | | | PAGE | |
| 0224 | 5600 | 0002 | CONT, 2 | |
| 0225 | 5601 | 6201 | CPF 0 | |
| 0226 | 5602 | 3347 | DCA DBLLO | /PUT KNOB VAL |
| 0227 | 5603 | 1347 | TAD DBLLO | /IN DAC |
| 0230 | 5604 | 7710 | SPA CLA | /PROPAGATE SIGN |
| 0231 | 5605 | 7040 | CMA | /BIT HI ORD |
| 0232 | 5606 | 3341 | DCA DBLHI | |
| 0233 | 5607 | 4304 | JMS DADD | |
| 0234 | 5610 | 1347 | TAD DBLLO | /UPDATE WIN ADDR |
| 0235 | 5611 | 3375 | DCA BUFLO | |

| | | | | | |
|------|------|------|-----------|--------------|----------------|
| 0236 | 5612 | 1341 | | TAD DBLHI | |
| 0237 | 5613 | 3374 | | DCA BUFHI | |
| 0240 | | | | | /MUST CHK |
| 0241 | | | | | /WINDOW SA |
| 0242 | | | | | /WITH BOUNDS |
| 0243 | | | | | /TO MAINTAIN |
| 0244 | | | | | /BUFFER RING |
| 0245 | | | | | |
| 0246 | 5614 | 4316 | | JMS BOUND | /LOWER BOUND |
| 0247 | 5615 | 0001 | MINFLD, 1 | | |
| 0250 | 5616 | 0000 | MINADR, 0 | | |
| 0251 | 5617 | 7700 | | SMA CLA | /LOW END WRAP? |
| 0252 | 5620 | 5273 | | JMP CHKHI | /NO |
| 0253 | 5621 | 1274 | | TAD MAXFLD | /RESET TO |
| 0254 | 5622 | 3374 | | DCA BUFHI | /UPPER BOUND |
| 0255 | 5623 | 1275 | | TAD MAXADR | |
| 0256 | 5624 | 3375 | WRAP, | DCA BUFLO | |
| 0257 | 5625 | 4304 | | JMS DADD | /CORRECT WRAP |
| 0260 | 5626 | 1347 | | TAD DBLLO | /CORRECTED |
| 0261 | 5627 | 3375 | | DCA BUFLO | /WINDOW SA |
| 0262 | 5630 | 1341 | | TAD DBLHI | |
| 0263 | 5631 | 3374 | | DCA BUFHI | |
| 0264 | 5632 | 1375 | SETFLD, | TAD BUFLO | /SET DISPLAY |
| 0265 | 5633 | 3304 | | DCA BUFPTR | /ARGS |
| 0266 | 5634 | 1327 | | TAD M1000 | |
| 0267 | 5635 | 3025 | | DCA COUNT | |
| 0270 | 5636 | 1374 | | TAD BUFHI | |
| 0271 | 5637 | 3316 | | DCA BOUND | |
| 0272 | 5640 | 4341 | | JMS SETDF | |
| 0273 | 5641 | 1704 | NXTPNT, | TAD I BUFPTR | |
| 0274 | 5642 | 1020 | | TAD YSHFT | /OFF SET |
| 0275 | 5643 | 6141 | | LINC | |
| 0276 | | | | LMODE | |
| 0277 | 1644 | 0341 | YSCAL, | SCR 1 | /SCALE FACTOR |
| 0300 | 1645 | 0161 | | DIS I XCORD | |
| 0301 | 1646 | 0002 | | PDP | |
| 0302 | | | | PMODE | |
| 0303 | 5647 | 2373 | | ISZ CURCNT | /READY TO DIS |
| 0304 | | | | | /CURSOR ? |
| 0305 | 5650 | 7610 | CURRTN, | SKP CLA | /NO |
| 0306 | 5651 | 5351 | | JMP CURDIS | |
| 0307 | 5652 | 2376 | | ISZ ENDLO | /CHK FOR HI |
| 0310 | 5653 | 5263 | | JMP OKEND | /END WRAP |
| 0311 | 5654 | 2377 | | ISZ ENDHI | |
| 0312 | 5655 | 5263 | | JMP OKEND | |
| 0313 | 5656 | 1216 | | TAD MINADR | /RESET TO |
| 0314 | 5657 | 3304 | | DCA BUFPTR | /LOWER BOUND |
| 0315 | 5660 | 1215 | | TAD MINFLD | |
| 0316 | 5661 | 3316 | | DCA BOUND | |
| 0317 | 5662 | 5266 | | JMP NXTDF | |
| 0320 | 5663 | 2304 | OKEND, | ISZ BUFPTR | /CHK FOR FIELD |
| 0321 | | | | | /BOUNDARY |
| 0322 | 5664 | 5267 | | JMP OKFLD | /ITS OK |

| | | | | |
|------|------|------|---------------------------------------|-----------------|
| 0323 | 5665 | 2316 | ISZ BOUND | /SET NXT FLD |
| 0324 | 5666 | 4341 | NXTDF, JMS SETDF | |
| 0325 | 5667 | 2025 | OKFLD, ISZ COUNT | /512 PNTS ? |
| 0326 | 5670 | 5241 | JMP NXTPNT | /NO |
| 0327 | 5671 | 5672 | JMP I ,+1 | /DSC READ OUT |
| 0330 | 5672 | 5445 | DSCLOC | |
| 0331 | 5673 | 4316 | CHKHI, JMS BOUND | /CHK UPR BOUND |
| 0332 | 5674 | 0002 | MAXFLD, 2 | |
| 0333 | 5675 | 0000 | MAXADR, 0 | |
| 0334 | 5676 | 7710 | M70, SPA CLA | /HI WRAP ? |
| 0335 | 5677 | 5232 | JMP SETFLD | |
| 0336 | 5700 | 1215 | TAD MINFLD | /YES |
| 0337 | 5701 | 3374 | DCA BUFHI | /RESET TO |
| 0340 | 5702 | 1216 | TAD MINADR | /LOWER BOUND |
| 0341 | 5703 | 5224 | JMP WRAP | |
| 0342 | | | /DOUBLE PRECISION ADD | |
| 0343 | | | /(DBLHI, DBLLO)+(BUFHI, BUFLO) | |
| 0344 | | | /RESULT IN (DBLHI, DBLLO) | |
| 0345 | | | /(BUFHI, BUFLO)=INITIAL SCORE ADDRESS | |
| 0346 | | | | |
| 0347 | 5704 | 0000 | DADD, 0 | |
| 0350 | 5705 | 7300 | CLA CLL | |
| 0351 | 5706 | 1347 | TAD DBLLO | |
| 0352 | 5707 | 1375 | TAD BUFLO | |
| 0353 | 5710 | 3347 | DCA DBLLO | |
| 0354 | 5711 | 7004 | RAL | |
| 0355 | 5712 | 1341 | TAD DBLHI | |
| 0356 | 5713 | 1374 | TAD BUFHI | |
| 0357 | 5714 | 3341 | DCA DBLHI | |
| 0360 | 5715 | 5704 | JMP I DADD | |
| 0361 | | | | |
| 0362 | | | /ADD =UPPER OR =LOWER BOUND | |
| 0363 | | | /TO (BUFHI, BUFLO) | |
| 0364 | | | /BOUND IS AT P+1, P+2 OF CALL | |
| 0365 | | | | |
| 0366 | 5716 | 0000 | BOUND, 0 | |
| 0367 | 5717 | 1716 | TAD I BOUND | /2S COM OF ARG |
| 0370 | 5720 | 7140 | CMA CLL | /TO DAC |
| 0371 | 5721 | 3341 | DCA DBLHI | |
| 0372 | 5722 | 2316 | ISZ BOUND | |
| 0373 | 5723 | 1716 | TAD I BOUND | |
| 0374 | 5724 | 7041 | CIA | |
| 0375 | 5725 | 7430 | SZL | |
| 0376 | 5726 | 2341 | ISZ DBLHI | |
| 0377 | 5727 | 7000 | M1000, NOP | |
| 0400 | 5730 | 3347 | DCA DBLLO | |
| 0401 | 5731 | 4304 | JMS DADD | |
| 0402 | 5732 | 1341 | TAD DBLHI | |
| 0403 | 5733 | 3377 | DCA ENDHI | /DAC HOLDS =NUM |
| 0404 | 5734 | 1347 | TAD DBLLO | /TO END OF BUF |
| 0405 | 5735 | 3376 | DCA ENDLO | /NO MATTER FOR |
| 0406 | | | | /LOW END WRAP |
| 0407 | 5736 | 1341 | TAD DBLHI | /TO CHK FOR |

| | | | | |
|------|------|------|--------------------------------------|------------------|
| 0410 | 5737 | 2316 | ISZ BOUND | /UPON RYN |
| 0411 | 5740 | 5716 | JMP I BOUND | |
| 0412 | 5741 | 0000 | SETDF, 0 | /SET 0 FIELD |
| 0413 | 5742 | 1316 | TAD BOUND | /REL TO BOUND |
| 0414 | 5743 | 7106 | CLL RTL | |
| 0415 | 5744 | 7004 | RAL | |
| 0416 | 5745 | 1201 | TAD CDF0 | |
| 0417 | 5746 | 3347 | DCA ,+1 | |
| 0420 | 5747 | 0000 | DBLLO, 0 | |
| 0421 | 5750 | 5741 | JMP I SETDF | |
| 0422 | 5751 | 3024 | CURDIS, DCA YCUR | /DISP CURSOR |
| 0423 | 5752 | 1316 | TAD BOUND | /SAVE X,Y |
| 0424 | 5753 | 3021 | DCA XCURHI | /COORDINATES |
| 0425 | 5754 | 1304 | TAD BUPPTR | |
| 0426 | 5755 | 3022 | DCA XCURLO | |
| 0427 | 5756 | 1704 | TAD I BUPPTR | |
| 0430 | 5757 | 3023 | DCA CORVAL | |
| 0431 | 5760 | 1276 | TAD M70 | |
| 0432 | 5761 | 3347 | DCA DBLLO | |
| 0433 | 5762 | 1024 | TAD YCUR | |
| 0434 | 5763 | 6141 | CURLOP, LINC | |
| 0435 | | | LMODE | |
| 0436 | 1704 | 0468 | SNS I 5 | |
| 0437 | 1705 | 7566 | JMP FREE | /FREE CURSOR |
| 0440 | 1766 | 0141 | DIS XCORD | |
| 0441 | 1767 | 0002 | PDP | |
| 0442 | | | PHODE | |
| 0443 | 5770 | 2347 | ISZ DBLLO | |
| 0444 | 5771 | 5363 | JMP CURLOP | |
| 0445 | 5772 | 5250 | JMP CURRTN | |
| 0446 | 5773 | 0000 | CURCNT, 0 | |
| 0447 | | | /THESE 5 GUYS MAY BE PAGE 0 | |
| 0450 | 5774 | 0001 | BUPHI, 1 | |
| 0451 | 5775 | 0000 | BUPLO, 0 | |
| 0452 | 5776 | 0000 | ENDLO, 0 | |
| 0453 | 5777 | 0000 | ENDHI, 0 | |
| 0454 | | | DBLHI=SETDF | |
| 0455 | | | BUPPTR=DADD | |
| 0456 | | | XCORD=1 | |
| 0457 | | | LMODE | |
| 0460 | | | CURSAM=SAM 1 | /CURSOR KNOB |
| 0461 | | | WINSAM=SAM 0 | /WINDOW KNOB |
| 0462 | | | FRESAM=SAM 5 | /FREE CURSOR |
| 0463 | | | SCALE=SCR | |
| 0464 | | | SC12BU=SCR 3 | /SCALE FACTOR |
| 0465 | | | | /12 BIT UNSIGNED |
| 0466 | | | OF12BU=4000 | /Y OFFSET FOR |
| 0467 | | | | /12 BIT UNSIGNED |
| 0470 | | | /THESE 6 GUYS MUST BE PAGE 0 | |
| 0471 | | | /THEY ARE ALL CONTIGUOUS AND DEFINED | |
| 0472 | | | /RELATIVE TO YSHPT BUT THIS IS NOT | |
| 0473 | | | /A REQUIREMENT | |
| 0474 | | | YSHPT=20 | |

```

0475 /THE 4 SCOPE READ OUT VALUES
0476 XCURHI=YSHFT+1
0477 XCURLO=XCURHI+1
0500 CORVAL=XCURLO+1
0501 YCUR=CORVAL+1
0502 COUNT=YCUR+1
0503 /AN EXAMPLE TO DISPLAY ALL OF FIELD 1
0504 /12 BIT UNSIGNED DATA
0505 /PMODE
0506 /*SOMEWHERE
0507 /JMS I KIDORA /INITIAL CALL
0510 /1 /FLD
0511 /0000 /ADDR
0512 /1 /FLD
0513 /7777 /ADDR
0514 /OF12BU /Y OFF SET
0515 /SC12BU /Y SCALE FAC
0516 /JMS I KR DORA /REFRESH CALL
0517 /JMP ,=1
0520 /KIDORA, IDORA
0521 /KR DORA, RDORA
0522
0523 /DISPLAY 3 AUG 70

```

NO ERRORS

ACDF0 5402
BOUND 5716
BUFHI 5774
BUFLO 5775
BUFPTR 5704
CDF0 5601
CHKHI 5673
CONT 5600
CORVAL 0023
COUNT 0025
CSAM 5552
CURCNT 5773
CURDIS 5751
CURL0P 5763
CURRTN 5650
CURSAM 0101
DADD 5704
DBLHI 5741
DBLLO 5747
DSCLOC 5445
DSCLOP 5476
DSCWD 5462
ENDHI 5777
ENDLO 5776
FREE 5566
FRESAM 0105
IDORA 5400
KBUFHI 5441
KBUFLO 5442
KMNADR 5436
KMNFLD 5435
KMXADR 5440
KMXFLD 5437
KYSCAL 5443

ACDF0 5402
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BUFPTR 5704
CDF0 5601
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CURCNT 5773
CURDIS 5751
CURL0P 5763
CURRTN 5650
CURSAM 0101
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DBLHI 5741
DBLLO 5747
DSCLOC 5445
DSCLOP 5476
DSCWD 5462
ENDHI 5777
ENDLO 5776
FREE 5566
FRESAM 0105
IDORA 5400
KBUFHI 5441
KBUFLO 5442
KMNADR 5436
KMNFLD 5435
KMXADR 5440
KMXFLD 5437
KYSICAL 5443

