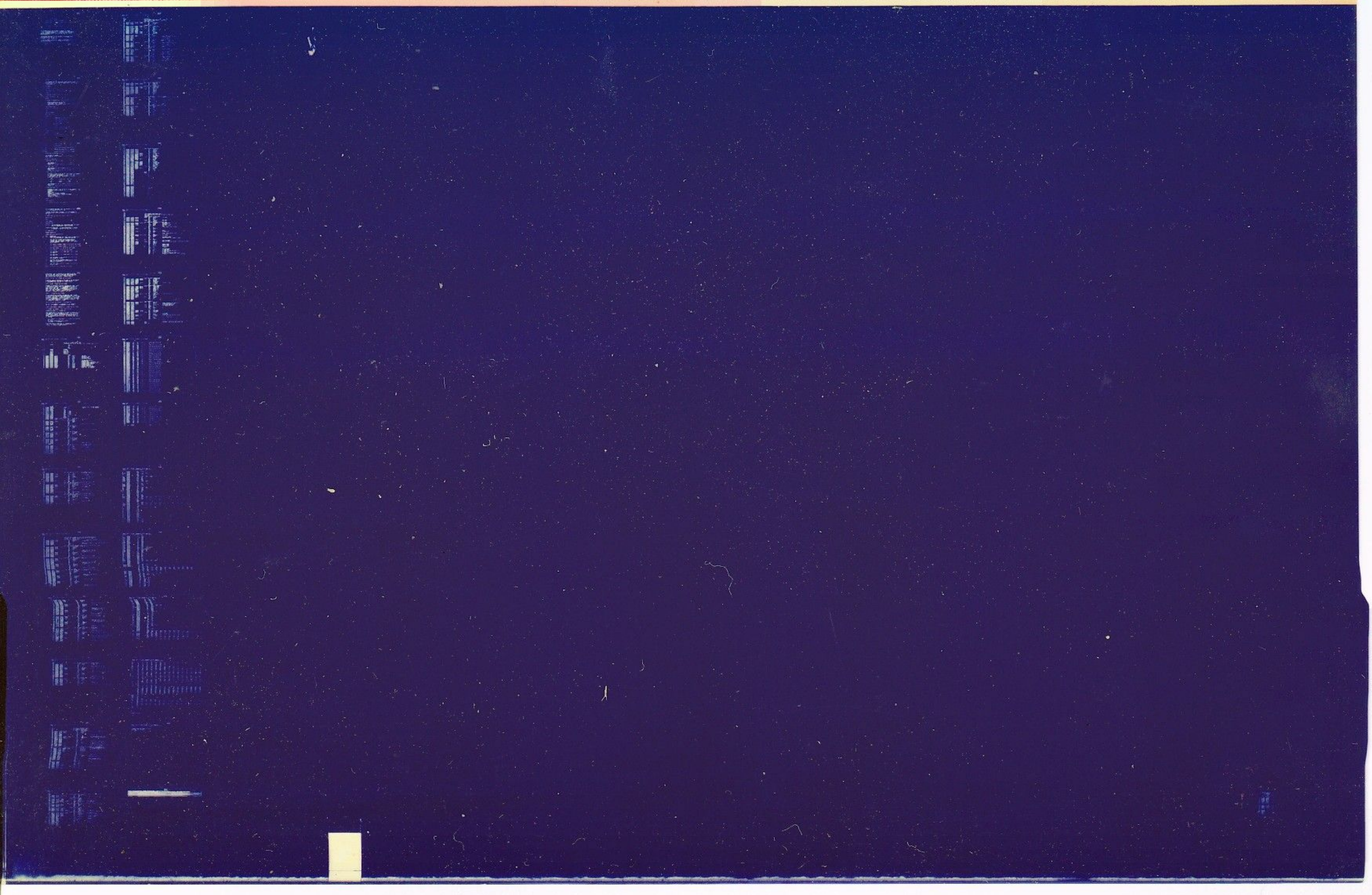
AA11A,B,C

SCOPE CONTROL
MD-11-DZAAB-A

EP-DZAAB-A-DL-A

FICHE 1 OF 1

NOV 1976
digital
MADE IN U.S.A.



IDENTIFICATION

PRODUCT CODE: MAINDEC-11-D2A0B-A

PRODUCT NAME: KA11-A,B,C SCOPE CONTROL TEST

DATE: MAY 21,1976

MAINTAINER: DIAGNOSTIC GROUP

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1. ABSTRACT

THIS PROGRAM TESTS THE AR11-A,B,C SCOPE CONTROL, X AND Y AXIS DAC'S AND EACH OF THE THREE AVAILABLE SCOPES (TEKTRONIX 611 STORAGE DISPLAY UNIT, TEKTRONIX RM503 OSCILLOSCOPE, OR VR12 POINT PLOT DISPLAY).

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11/20
AR11-C DAC CONTROL WITH AN AR11-A,B, OR C SCOPE CONTROL.

2.2 STORAGE

THE PROGRAM OCCUPIES MEMORY FROM 0 TO 4222.

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED.

1. ABSOLUTE LOADER MUST BE IN MEMORY.
2. PLACE BINARY TAPE IN READER.
3. LOAD ADDRESS 07500 (DETERMINED BY ADDRESS OF LOADER).
4. PRESS "START" (PROGRAM WILL LOAD).

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

NONE

4.2 STARTING ADDRESS

NON-STORE DISPLAYS

	ADDRESS	TEST
4.2.1	200	COMMAND AND STATUS REGISTER TEST
4.2.2	204	DISPLAY HORIZONTAL LINE
4.2.3	210	DISPLAY VERTICAL LINE
4.2.4	214	DISPLAY SQUARE
4.2.5	220	DISPLAY X
4.2.6	224	DISPLAY LOW AND HIGH INTENSITY
4.2.7	230	DISPLAY ALPHA-NUMERIC CHARACTER SET

STORAGE DISPLAY

	ADDRESS	TEST
4.2.8	234	DISPLAY HORIZONTAL LINE
4.2.9	240	DISPLAY VERTICAL LINE

4.2.10 244 DISPLAY SQUARE

4.2.11 250 DISPLAY X

4.2.12 254 DISPLAY ALPHA-NUMERIC CHARACTER SET

4.2.13 260 PHOSPHOR AND ERASE TEST (1ST QUADRANT)

4.2.14 264 PHOSPHOR AND ERASE TEST (3RD QUADRANT)

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY.
SELECT TEST BY LOADING APPROPRIATE STARTING ADDRESS.
PRESS "START"

5. OPERATING PROCEDURE

5.1 COMMAND AND STATUS REGISTER TEST

1. LOAD ADDRESS 200.
2. PRESS "START"
   PROGRAM WILL RING BELL AFTER EACH 100 PASSES THRU TEST.

5.2 NON-STORE DISPLAY TESTS

1. LOAD APPROPRIATE STARTING ADDRESS (204,210,214,220,224 OR 230).
2. PRESS "START"
   PROGRAM WILL DISPLAY SELECTED TEST ON SCOPE.

5.3 STORAGE DISPLAY TESTS

1. DETERMINE IF SCOPE IS SET UP FOR + DAC VALUES (1ST QUADRANT) OR - DAC VALUES (3RD QUADRANT). IF IT IS SET FOR + VALUES NO PROGRAM MODIFICATIONS ARE NECESSARY; GO TO STEP 3.
2. IF THE SCOPE IS SET FOR - DAC VALUES THE ADDRESSES IN MEMORY MUST BE MODIFIED:

ADDRESS	CHANGED FROM	NEW VALUE
1000	000000	174000
1002	003774	177774

3. LOAD APPROPRIATE STARTING ADDRESS (234,240,244,250 OR 254)
4. PRESS "START"
   PROGRAM WILL DISPLAY SELECTED TEST ON SCOPE.

5.4 PHOSPHOR AND ERASE TEST

1. DETERMINE IF SCOPE IS SET UP FOR 1ST OR 3RD QUADRANT. LOAD APPROPRIATE STARTING ADDRESS (260 - 1ST QUADRANT, 264 - 3RD QUADRANT)
2. PRESS "START"
   PROGRAM WILL INTENSIFY PHOSPHOR
3. OPERATOR SHOULD INSPECT PHOSPHOR FOR DAMAGE.
4. PRESS "CONTINUE" TO TEST INTENSIFY AND READY WITH STORE MODE SET AND ERASE.
   PROGRAM WILL THEN REPEAT TEST.

6. ERRORS

6.1 ERROR REPORTING

IF AN ERROR OCCURS DURING THE COMMAND AND STATUS REGISTER

TEST OR PHOSPHOR AND ERASE TEST, THE PROGRAM WILL HALT. REGISTER 0 WILL CONTAIN EXPECTED VALUE OF DAC.

TO RESUME TESTING PRESS "CONTINUE". IF IT IS DESIRED TO LOOP ON THE TEST THAT FAILS REPLACE THE HALT INSTRUCTION WITH A 240 (NOP).

NO ERROR CONDITIONS ARE GIVEN DURING OTHER TESTS.

7. RESTRICTIONS

NONE

8. MISCELLANEOUS

8.1 EXECUTION TIME

CSR TEST - THE TELETYPE BELL WILL RING AFTER EVERY 100 PASSES WHICH IS APPROXIMATELY EVERY 30 SECONDS.

PHOSPHOR AND ERASE TEST - IT TAKES APPROXIMATELY 2 MINUTES 15 SECONDS TO COMPLETE ONE PASS THRU THIS TEST

ALL OTHER TESTS - N/A.

9. PROGRAM DESCRIPTION

9.1 COMMAND AND STATUS REGISTER TEST

TEST	DESCRIPTION
T0-T7	THESE TESTS EXERCISES THE X AND Y DAC'S TO MAKE CERTAIN THAT ALL BITS MAY BE SET, CLEARED AND READ BACK.
T8	TEST THAT INIT CLEARED THE FOLLOWING CSR BITS: LIGHTPEN FLAG (15), DISPLAY INTERRUPT ENABLE (6), LIGHTPEN INTERRUPT ENABLE (5), MODE (4-3), INTENSITY (2) AND SET READY (7).
T9	TEST DISPLAY INTERRUPT ENABLE (6) MAY BE SET AND CLEARED.
T10	TEST LIGHTPEN INTERRUPT ENABLE (5) MAY BE SET AND CLEARED.
T11	TEST MODE CONTROL (4-3) MAY BE SET AND CLEARED.
T12	TEST INTENSITY (2) MAY BE SET AND CLEARED
T13	TEST THAT READY (7) IS CLEARED WHEN X DAC IS LOADED WITH MODE 01.
T14	TEST THAT READY (7) IS CLEARED WHEN Y DAC IS LOADED WITH MODE 10.
T15	TEST THAT READY (7) WILL RETURN (SET) AFTER IT HAD BEEN CLEARED BY INTENSIFY.
T16	TEST THAT DISPLAY INTERRUPT ENABLE (6) WILL ALLOW READY (7) TO INTERRUPT TO VECTOR ADDRESS 14C WITH PROCESSOR PRIORITY LEVEL 3.
T17	TEST THAT DISPLAY DOES NOT INTERRUPT WITH PROCESSOR PRIORITY LEVEL 4.

9.2 DISPLAY HORIZONTAL LINE (STORAGE AND NON-STORAGE)

A HORIZONTAL LINE IS DISPLAYED ON THE SCOPE BY INITIALLY SETTING THE X AND Y DAC'S TO ZERO AND THEN INCREMENTING THE X VALUE WHILE HOLDING THE Y VALUE AT ZERO. THE POINTS ARE DISPLAYED USING THE DISPLAY INTERRUPT ENABLED.

9.3 DISPLAY VERTICAL LINE (STORAGE AND NON-STORAGE)

A VERTICAL LINE IS DISPLAYED ON THE SCOPE IN THE SAME MANNER AS FOR A HORIZONTAL LINE (REF 9.2) EXCEPT NOW THE Y VALUE IS INCREMENTED WHILE HOLDING THE X VALUE AT ZERO.

9.4 DISPLAY SQUARE (STORAGE AND NON-STORAGE)

A SQUARE IS DISPLAYED BY INITIALLY SETTING THE X AND Y VALUES TO NEGATIVE FULL SCALE, THEN X IS INCREMENTED TO POSITIVE SCALE (BOTTOM LINE) THEY Y IS INCREMENTED TO POSITIVE FULL SCALE (RIGHT LINE) THEN X IS DECREMENTED TO NEGATIVE FULL SCALE (TOP LINE) AND FINALLY Y IS DECREMENTED TO NEGATIVE FULL SCALE (LEFT LINE). MODE 01 (INTENSIFY ON LOADING X) AND MODE 10 (INTENSIFY ON LOADING Y) ARE USED.

9.5 DISPLAY X (STORAGE AND NON-STORAGE)

AN X IS DISPLAYED BY INITIALLY SETTING THE X AND Y VALUES TO NEGATIVE FULL SCALE AND THEN INCREMENTING BOTH TO POSITIVE FULL SCALE (LOWER LEFT TO UPPER RIGHT DIAGONAL) THEN X IS RESET TO NEGATIVE FULL SCALE, Y REMAINS AT POSITIVE FULL SCALE AND THEN X IS INCREMENTED WHILE Y IS DECREMENTED UNTIL BOTH REACH FULL SCALE AGAIN (UPPER LEFT TO LOWER RIGHT DIAGONAL). MODE 01 (INTENSIFY ON LOADING X) IS USED.

9.6 DISPLAY LOW AND HIGH INTENSITY (NON-STORAGE ONLY)

THE TEXT "LOW INTENSITY" IS DISPLAYED IN LOW INTENSITY.
THE TEXT "HI INTENSITY" IS DISPLAYED IN HIGH INTENSITY.

9.7 DISPLAY ALPHA-NUMERIC CHARACTER SET (STORAGE AND NON STORAGE)

THE ALPHABET AND NUMBERS 1 THRU 0 ARE DISPLAYED.

9.8 PHOSPHOR AND ERASE TEST (STORAGE ONLY)

EVERY SECOND POINT ON THE FACE OF THE SCOPE IS INTENSIFIED IN STORE MODE AND THEN THE PROGRAM WILL HALT. THIS WILL ALLOW THE OPERATOR TO INSPECT THE PHOSPHOR COATING ON THE CRT FOR DAMAGE. AFTER BEING SATISFIED WITH THE PHOSPHOR CONDITION THE OPERATOR MUST PRESS "CONTINUE". NOW THE FOLLOWING TESTS WILL BE MADE:

1. WILL INTENSIFY (0) CAUSE READY (7) TO CLEAR WITH STORE MODE SET (2)?
2. WILL READY RETURN AFTER BEING CLEARED?
3. DOES ERASE (1) CLEAR READY (7)?

AFTER COMPLETION OF THESE TEST THE SEQUENCE WILL REPEAT ITSELF. THE OPERATOR IS RESPONSIBLE FOR DETERMINING IF ERASE (1) ACTUALLY ERASED THE SCOPE.

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                              ;AA11-A, B, C SCOPE CONTROL TEST
                              ;COPYRIGHT 1976, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
              000000                  .=0
                                      .REPT 40
                                      .+2
                                      HALT
                                      .ENDR
              000240          NOP=240
              177776          CC=177776
              000776          STACK=776
              177570          SREG=177570
              000011          SCALE1=11
              000022          SCALE2=22
              000200                  .=200
000200  000167  000624                JMP     CSRTST          ;CSR TEST
000204  000167  002110                JMP     PIC0            ;HORIZONTAL LINE
000210  000167  002116                JMP     PIC0A           ;VERTICAL LINE
000214  000167  [illegible]           JMP     PIC3            ;PINCUSHION SQUARE
000220  000167  [illegible]           JMP     PIC4            ;X
[illegible]  000167  [illegible]      JMP     PIC5            ;LOW AND HIGH INTENSITY
[illegible]  000167  [illegible]      JMP     PIC6            ;CHARACTER SET
[illegible]  000167  002120           JMP     PIC1            ;STORAGE DISPLAY HORIZONTAL LINE
[illegible]  000167  002126           JMP     PIC1A           ;STORAGE DISPLAY VERTICAL LINE
[illegible]  000167  [illegible]      JMP     PIC3A           ;STORAGE DISPLAY SQUARE
[illegible]  000167  [illegible]      JMP     PIC4A           ;STORAGE DISPLAY X
[illegible]  000167  [illegible]      JMP     PIC6A           ;STORAGE CHARACTER SET
000260  000167  [illegible]           JMP     ERASE           ;ERASE TEST (1ST QUADRANT)
000264  000167  003026                JMP     ERASE1          ;ERASE TEST (3RD QUADRANT)
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        001000                          .=1000
001000  000000                  LOWLMT: 0                       ;CONTAINS 174000 FOR 3RD QUADRANT
001002  003774                  HILMT:  3774                    ;CONTAINS 177774 FOR 3RD QUADRANT
001004  000000                  LOW:    0
001006  000000                  HIGH:   0
001010  177564                  TCSR:   177564
001012  177566                  TDBR:   177566
001014  176756                  SCSR:   176756
001016  176760                  XREG:   176760
001020  176762                  YREG:   176762
001022  000140                  SVEC:   140
001024  000144                  LPVEC:  144
001026  000000                  BELCNT: 0
001030  012767  177634  177770  CSRTST: MOV     #-100.,BELCNT
001036  012767  000340  176732          MOV     #340,CC         ;SET PRIORITY 7
                                ;TEST XREG CAN BE SET = 0
001044  005077  177746          T0:     CLR     @XREG
001050  017700  177742                  MOV     @XREG,%0
001054  001402                          BEQ     T1
001056  000000                          HALT                    ;ERROR, XREG NOT CLEARED
001060  000771                          BR      T0
                                ;TEST THAT YREG CAN BE SET = 0
001062  005077  177732          T1:     CLR     @YREG
001066  017700  177726                  MOV     @YREG,%0
001072  001402                          BEQ     T2
001074  000000                          HALT                    ;ERROR, Y REG NOT CLEARED
001076  000771                          BR      T1
                                ;TEST THAT XREG CAN BE SET = -1
001100  012777  177777  177710  T2:     MOV     #-1,@XREG
001106  017700  177704                  MOV     @XREG,%0
001112  022700  177777                  CMP     #-1,%0
001116  001402                          BEQ     T3
001120  000000                          HALT                    ;ERROR, XREG NOT = -1
001122  000766                          BR      T2
                                ;TEST THAT YREG CAN BE SET = -1
001124  012777  177777  177666  T3:     MOV     #-1,@YREG
001132  017700  177662                  MOV     @YREG,%0
001136  022700  177777                  CMP     #-1,%0
001142  001402                          BEQ     T4
001144  000000                          HALT                    ;ERROR, YREG NOT = -1
001146  000766                          BR      T3
                                ;TEST THAT XREG WILL ACCEPT A COUNT PATTERN (0-3777)
001150  005000                  T4:     CLR     %0              ;INITIALIZE COUNT PATTERN
001152  005077  177640                  CLR     @XREG
001156  005200                  T4A:    INC     %0              ;+1 TO PATTERN
001160  005277  177632                  INC     @XREG
001164  020077  177626                  CMP     %0,@XREG                ;DID XREG COUNT?
001170  001402                          BEQ     T4B
001172  000000                          HALT                    ;ERROR, XREG NOT = %0
001174  000765                          BR      T4
001176  022700  003777          T4B:    CMP     #3777,%0
001202  001365                          BNE     T4A
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                                        ;TEST THAT YREG WILL ACCEPT A COUNT PATTERN (0-3777)
001204 005000                   T5:     CLR     R0                      ;INITIALIZE COUNT PATTERN
001206 005077 177606                    CLR     @YREG
001212 005200                   T5A:    INC     R0                      ;+1 TO PATTERN
001214 005277 177600                    INC     @YREG
001220 020077 177574                    CMP     R0,@YREG                        ;DID YREG COUNT
001224 001402                           BEQ     T5B
001226 000000                           HALT                            ;ERROR, YREG NOT = R0
001230 000765                   T5B:    BR      T5
001232 022700 003777            T5C:    CMP     #3777,R0
001236 001365                           BNE     T5A
                                        ;TEST THAT XREG WILL ACCEPT A COUNT PATTERN (4000-7777)
                                        ;BIT 11 SHOULD SET BITS 12-15
001240 012700 173777            T6:     MOV     #173777,R0              ;INITIALIZE COUNT PATTERN
001244 012777 003777 177544             MOV     #3777,@XREG
001252 005277 177540            T6A:    INC     @XREG                   ;+1 TO XREG
001256 005200                           INC     R0                      ;+1 TO PATTERN
001260 020077 177532                    CMP     R0,@XREG
001264 001402                           BEQ     T6B
001266 000000                           HALT                            ;ERROR, XREG NOT = R0
001270 000763                           BR      T6
001272 022777 177777 177516     T6B:    CMP     #177777,@XREG
001300 001364                           BNE     T6A
                                        ;TEST THAT YREG WILL ACCEPT A COUNT PATTERN (4000-7777)
                                        ;BIT 11 SHOULD SET BITS 12-15
001302 012700 173777            T7:     MOV     #173777,R0              ;INITIALIZE COUNT PATTERN
001306 012777 003777 177504             MOV     #3777,@YREG
001314 005277 177500            T7A:    INC     @YREG                   ;+1 TO YREG
001320 005200                           INC     R0                      ;+1 TO PATTERN
001322 020077 177472                    CMP     R0,@YREG
001326 001402                           BEQ     T7B
001330 000000                           HALT                            ;ERROR, YREG NOT = R0
001332 000763                           BR      T7
001334 022777 177777 177456     T7B:    CMP     #177777,@YREG
001342 001364                           BNE     T7A
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                                        ;TEST THAT INIT CLEARED THE FOLLOWING STATUS REGISTER BITS:
                                        ;LP FLAG (15), DISPLAY INT EN (6), LP INT EN (5), MODE (4-3),
                                        ;INTENSITY (2), AND SET READY (7).
001344  017700  177444        T8:     MOV     @SCSR,R0                ;MOVE STATUS REGISTER TO R0
001350  022700  000200                CMP     #200,R0         ;IS READY SET?
001354  001403                        BEQ     T9
001356  000000                        HALT                    ;ERROR, BIT 7 (READY) IS ONLY ONE THAT SHOULD BE SET.
001360  000005                        RESET                   ;TRY AGAIN
001362  000770                        BR      T8
                                        ;TEST THAT DISPLAY INTERRUPT ENABLE (BIT 6) MAY BE SET AND CLEARED.
001364  052777  000100  177422  T9:    BIS     #100,@SCSR              ;SET BIT 6
001372  017700  177416                MOV     @SCSR,R0
001376  022700  000300                CMP     #300,R0
002002  001402                        BEQ     T9A
002004  000000                        HALT                    ;ERROR, BIT 6 OR 7 NOT SET
002006  000766                        BR      T9              ;OR OTHER BITS PICKED UP
002010  042777  000100  177376  T9A:   BIC     #100,@SCSR              ;CLEAR BIT 6
002016  017700  177372                MOV     @SCSR,R0
002022  022700  000200                CMP     #200,R0
002026  001402                        BEQ     T10
002030  000000                        HALT                    ;ERROR, BIT 6 NOT CLEARED
002032  000766                        BR      T9A
                                        ;TEST THAT LIGHT PEN INTERRUPT ENABLE (BIT 5) MAY BE SET AND CLEARED
002034  052777  000040  177352  T10:   BIS     #40,@SCSR               ;SET BIT 5
002042  017700  177346                MOV     @SCSR,R0
002046  022700  000240                CMP     #240,R0
002052  001402                        BEQ     T10A
002054  000000                        HALT                    ;ERROR BIT 5 OR 7 NOT SET
002056  000766                        BR      T10             ;OR OTHER BITS PICKED UP
002060  042777  000040  177326  T10A:  BIC     #40,@SCSR               ;CLEAR BIT 5
002066  017700  177322                MOV     @SCSR,R0
002072  022700  000200                CMP     #200,R0
002076  001402                        BEQ     T11
002100  000000                        HALT                    ;ERROR BIT 5 NOT CLEARED
002102  000766                        BR      T10A
                                        ;TEST THAT MODE CONTROL (BITS 4-3) CAN BE SET AND CLEARED
002104  052777  000010  177302  T11:   BIS     #10,@SCSR               ;SET BIT 3
002112  017700  177276                MOV     @SCSR,R0
002116  022700  000210                CMP     #210,R0
002122  001402                        BEQ     T11A
002124  000000                        HALT                    ;ERROR, BIT 3 OR 7 NOT SET
002126  000766                        BR      T11             ;OR OTHER BITS PICKED UP
002130  042777  000010  177256  T11A:  BIC     #10,@SCSR               ;CLEAR BIT 3
002136  017700  177252                MOV     @SCSR,R0
002142  022700  000200                CMP     #200,R0
002146  001402                        BEQ     T11B
002150  000000                        HALT                    ;ERROR BIT 3 NOT CLEARED
002152  000766                        BR      T11A
002154  052777  000020  177232  T11B:  BIS     #20,@SCSR
002162  017700  177226                MOV     @SCSR,R0
002166  022700  000220                CMP     #220,R0
002172  001402                        BEQ     T11C
002174  000000                        HALT                    ;ERROR BIT 4 OR 7 NOT SET
002176  000766                        BR      T11B            ;OR OTHER BITS PICKED UP
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	001600	042777	000020	177206	T11C:	BIC	#20,@SCSR	;CCLEAR BIT 4
	001606	017700	177202			MOV	@SCSR,%0
	001612	022700	000200			CMP	#200,%0
	001616	001402				BEQ	T11D
	001620	000000				HALT		;ERROR BIT 4 NOT CLEARED
	001622	000766				BR	T11C
	001624	052777	000030	177162	T11D:	BIS	#30,@SCSR	;SET BITS 4-3
	001632	017700	177156			MOV	@SCSR,%0
	001636	022700	000230			CMP	#230,%0
	001642	001402				BEQ	T11E
	001644	000000				HALT		;ERROR BITS 4,3, OR 7 NOT SET
	001646	000766				BR	T11D	;OR OTHER BITS PICKED UP
	001650	042777	000030	177136	T11E:	BIC	#30,@SCSR	;CLEAR BITS 4,3.
	001656	017700	177132			MOV	@SCSR,%0
	001662	022700	000200			CMP	#200,%0
	001666	001402				BEQ	T12
	001670	000000				HALT		;ERROR BITS 4, 3 NOT CLEARED
	001672	000766				BR	T11E
					;TEST THAT INTENSITY (BIT 2) MAY BE SET OR CLEARED
	001674	052777	000004	177112	T12:	BIS	#4,@SCSR		;SET BIT 2
	001702	017700	177106			MOV	@SCSR,%0
	001706	022700	000204			CMP	#204,%0
	001712	001402				BEQ	T12A
	001714	000000				HALT		;ERROR BIT 2 OR 7 NOT SET
	001716	000766				BR	T12	;OR OTHER BITS PICKED UP
	001720	042777	000004	177066	T12A:	BIC	#4,@SCSR		;CLEAR BIT 2
	001726	017700	177062			MOV	@SCSR,%0
	001732	022700	000200			CMP	#200,%0
	001736	001402				BEQ	T13
	001740	000000				HALT		;ERROR BIT 2 NOT CLEARED
	001742	000766				BR	T12A
					;TEST THAT READY IS CLEARED BY LOADING XREG
	001744	105777	177044		T13:	TSTB	@SCSR	;IS READY SET
	001750	100402				BMI	T13A
	001752	000000				HALT		;ERROR, READY NOT SET
	001754	000773				BR	T13
	001756	012777	000010	177030	T13A:	MOV	#10,@SCSR	;ENABLE INTENSIFY ON LOADING X REG.
	001764	005077	177030			CLR	@YREG
	001770	105777	177020			TSTB	@SCSR
	001774	100402				BMI	T13B
	001776	000000				HALT		;ERROR, LOAD YREG SHOULDN'T CLEAR READY
	002000	000761				BR	T13
	002002	005077	177010		T13B:	CLR	@XREG	;LOAD XREG, SHOULD CLEAR READY
	002006	105777	177002			TSTB	@SCSR
	002012	100030				BPL	T15
	002014	000000				HALT		;ERROR READY NOT CLEARED
	002016	000752				BR	T13
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                                        ;TEST THAT READY IS CLEARED BY LOADING Y REGISTER.
002020  105777  176770          T14:    TSTB    @#SCSR          ;IS READY SET
002024  100402                          BMI     T14A
002026  000000                          HALT                    ;ERROR, READY NOT SET
002030  000773                          BR      T14
002032  012777  000020  176754  T14A:   MOV     #20,@#SCSR      ;ENABLE INTENSITY ON LOADING Y REG.
002040  005077  176742                  CLR     @#XREG
002044  105777  176744                  TSTB    @#SCSR
002050  100402                          BMI     T14B
002052  000000                          HALT                    ;ERROR, LOAD X REG SHOULDN'T CLEAR READY
002054  000761                          BR      T14
002056  005077  176736          T14B:   CLR     @#YREG
002062  105777  176726                  TSTB    @#SCSR
002066  100002                          BPL     T15
002070  000000                          HALT                    ;ERROR, READY NOT CLEARED
002072  000752                          BR      T14
                                        ;READY SHOULD RETURN AFTER INTENSIFY SET
002074  005277  176714          T15:    INC     @#SCSR          ;ENABLE INTENSIFY
002100  012700  177600                  MOV     #-200,R0
002104  005200                          INC     R0
002106  001376                          BNE     .-2             ;DELAY
002110  105777  176700                  TSTB    @#SCSR          ;IS READY SET
002114  100402                          BMI     T16
002116  000000                          HALT                    ;ERROR READY FAILED TO SET AFTER INTENSIFY
002120  000765                          BR      T15
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                                        ;TEST DISPLAY INTERRUPT ENABLE
                                        ;TEST PROPER VECTOR RETURN
                                        ;TEST READY TO CAUSE INTERRUPT
002122  012777  002176  176672  T16:    MOV     #T16B,@#VEC     ;INITIALIZE INTERRUPT RETURN
002130  012706  000776                  MOV     #STACK,%6
002134  105777  176654                  TSTB    @#SCSR
002140  100402                          BMI     T16A
002142  000000                          HALT                    ;READY NOT SET
002144  000766                          BR      T16
002146  012767  000140  175622  T16A:   MOV     #140,CC         ;SET PROCESSOR PRIORITY LEVEL 3
002154  012777  000101  176632          MOV     #101,@#SCSR     ;ENABLE INTERRUPT AND INTENSIFY
002162  012700  177600                  MOV     #-200,%0
002166  005200                          INC     %0
002170  001376                          BNE     .-2
002172  000000                          HALT                    ;ERROR, DIDN'T FIND INTERRUPT
002174  000752                          BR      T16
002176  105777  176612          T16B:   TSTB    @#SCSR          ;RETURN HERE AFTER INTERRUPT
002202  100402                          BMI     T17
002204  000000                          HALT                    ;ERROR, RECEIVED INTERRUPT BIT READY NOT SET
002206  000745                          BR      T16
                                        ;TEST THAT DISPLAY DOES NOT INTERRUPT WITH PROCESSOR PRIORITY 4
002210  012767  000200  175560  T17:    MOV     #200,CC         ;SET PROCESSOR PRIORITY LEVEL 4
002216  012777  002250  176576          MOV     #T17A,@#VEC     ;INITIALIZE INTERRUPT RETURN
002224  012706  000776                  MOV     #STACK,%6
002230  012777  000101  176556          MOV     #101,@#SCSR     ;INITIALIZE DISPLAY
002236  012700  177600                  MOV     #-200,%0
002242  005200                          INC     %0
002244  001376                          BNE     .-2
002246  105777  176542                  TSTB    @#SCSR          ;IS READY SET?
002252  100404                          BMI     T18
002254  000000                          HALT                    ;ERROR READY NOT SET
002256  000754                          BR      T17
002260  000000          T17A:           HALT                    ;ERROR INTERRUPT SHOULDN'T OCCUR
002262  000752                          BR      T17             ;WITH PROCESSOR PRIORITY 4.
                                        ;END OF BASIC TEST
002264  000005          T18:            RESET
002266  005267  176534                  INC     BELCNT
002272  001402                          BEQ     BELL
002274  000167  176644                  JMP     T0
002300  105777  176504          BELL:   TSTB    @TCSR           ;RING BELL EVERY 100 PASSES
002304  100375                          BPL     .-4
002306  012777  000207  176476          MOV     #207,@TDBR
002314  000167  176510                  JMP     CSRTST
```

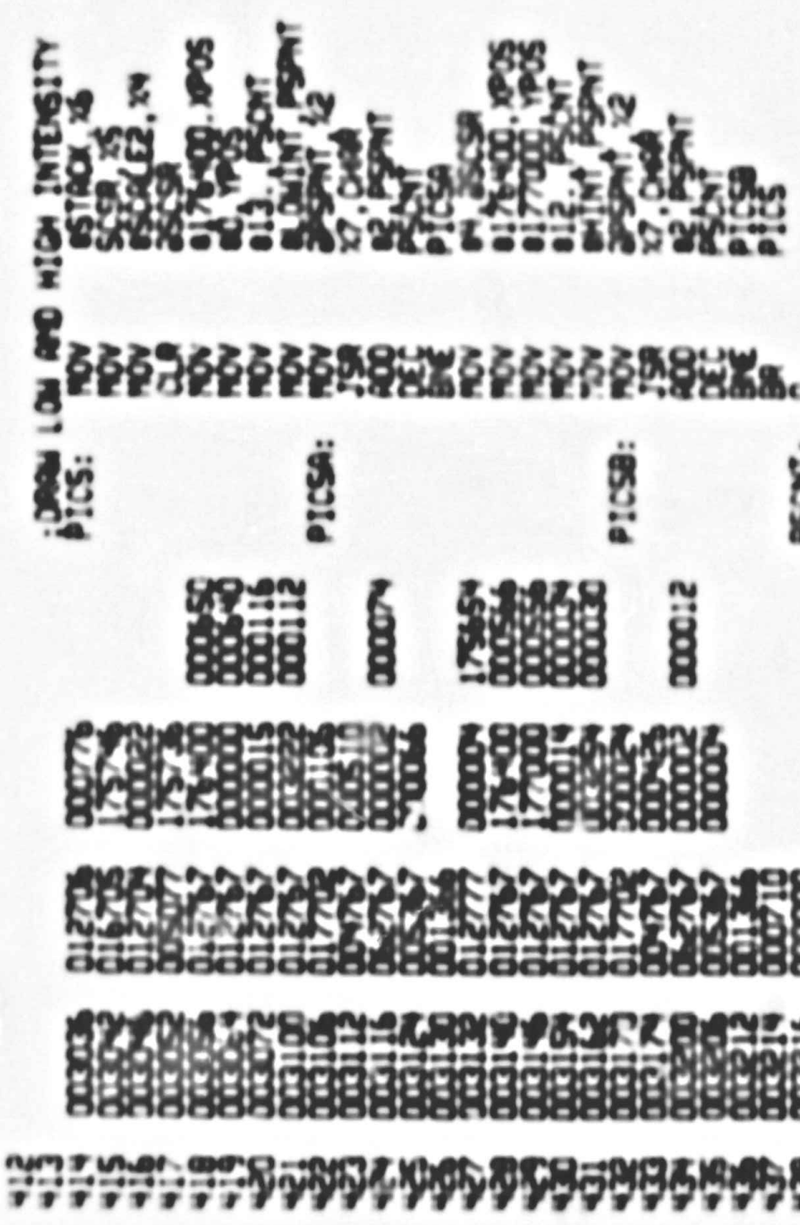
```
                                        ;DISPLAY HORIZONTAL LINE USING INTERRUPT, NON STORE DISPLAY.
002320  016700  176476          PICO:   MOV     XREG,X0
002324  016701  176470                  MOV     YREG,X1
002330  000404                          BR      PB
                                        ;DISPLAY VERTICAL LINE
002332  016700  176462          PICOA:  MOV     YREG,X0
002336  016701  176454                  MOV     XREG,X1
002342  012767  003774  176436  PB:     MOV     #3774,HIGH      ;SET HIGH LIMIT
002350  012767  004000  176426          MOV     #4000,LOW       ;SET LOW LIMIT
002356  000417                          BR      PD
                                        ;DISPLAY HORIZONTAL LINE USING INTERRUPT, STORAGE DISPLAY
002360  016700  176432          PIC1:   MOV     XREG,X0
002364  016701  176430                  MOV     YREG,X1
002370  000404                          BR      PF
                                        ;DISPLAY VERTICAL LINE
002372  016700  176422          PICIA:  MOV     YREG,X0
002376  016701  176414                  MOV     XREG,X1
002402  016767  176372  176374  PF:     MOV     LOWLMT,LOW      ;SET LOW LIMIT
002410  016767  176366  176370          MOV     HILMT,HIGH      ;SET HIGH LIMIT
                                        ;COMMON SECTION FOR ALL LINES
002416  012767  000140  175352  PD:     MOV     #140,@#      ;SET PRIORITY 3
002424  012777  002474  176370          MOV     #PORET,@#VEC    ;INITIALIZE INTERRUPT VECTOR
002432  016703  176350                  MOV     HIGH,X3
002436  012702  000004                  MOV     #4,X2           ;INITIALIZE INCREMENTS BETWEEN POINTS
002442  052777  000100  176344          BIS     #100,@#SCSR     ;INTERRUPT ENABLE
002450  005011                          CLR     (1)
002452  062210          PE:     ADD     X2,(0)          ;INCREMENT
002454  005277  176334                  INC     @#SCSR          ;INTENSIFY
002460  000001                          WAIT
002462  021003                          CMP     (0),X3          ;DONE ALL POINTS?
002464  001372                          BNE     PE              ;NO
002466  016710  176312                  MOV     LOW,(0)         ;YES RE-INITIALIZE
002472  000770                          BR      PE+2
002474  000002          PORET:  RTI
```

B02


```
                                        ;PINCUSHION
                                        ;PLOT A SQUARE FROM LOWER LEFT TO LOWER RIGHT TO
                                        ;UPPER RIGHT TO UPPER LEFT TO LOWER LEFT.
                                        ;NON STORE DISPLAY
002476  012767  063774  176302          PIC3:   MOV     #3774,HIGH
002504  012767  174000  176272                  MOV     #174000,LOW
002512  000406                                  BR      PIC3B
                                        ;STORAGE DISPLAY
002514  016767  176260  176262          PIC3A:  MOV     LOWLMT,LOW
002522  016767  176254  176256                  MOV     HILMT,HIGH
002530  016701  176242                  PIC3B:  MOV     XREG,%1
002534  016702  [illegible]                     MOV     YREG,%2
002540  016703  [illegible]                     MOV     SCSR,%3
002544  012704  000004                          MOV     #4,%4
002550  012767  000340  175220                  MOV     #340,CC
002556  016777  176222  176232          P3:     MOV     LOW,@XREG
002564  016777  176214  176226                  MOV     LOW,@YREG
                                        ;DRAW BOTTOM LINE
002572  016700  176210                          MOV     HIGH,%0
002576  012713  000010                          MOV     #10,(3)         ;ENABLE INTENSIFY ON LOADING X
002602  105713                          P3A:    TSTB    (3)
002604  100376                                  BPL     .-2             ;WAIT FOR READY
002606  060411                                  ADD     %4,(1)
002610  020011                                  CMP     %0,(1)          ;DONE ALL POINTS?
002612  001373                                  BNE     P3A             ;NO
                                        ;DRAW RIGHT LINE
002614  012713  000020                          MOV     #20,(3)         ;ENABLE INTENSIFY ON LOADING Y
002620  105713                          P3B:    TSTB    (3)
002622  100376                                  BPL     .-2             ;WAIT FOR READY
002624  060412                                  ADD     %4,(2)
002626  020012                                  CMP     %0,(2)          ;DONE ALL POINTS?
002630  001373                                  BNE     P3B             ;NO
                                        ;DRAW TOP LINE
002632  012713  000010                          MOV     #10,(3)         ;ENABLE INTENSIFY ON LOADING X
002636  016700  176142                          MOV     LOW,%0
002642  105713                          P3C:    TSTB    (3)
002644  100376                                  BPL     .-2             ;WAIT FOR READY
002646  160411                                  SUB     %4,(1)
002650  020011                                  CMP     %0,(1)          ;DONE ALL POINTS?
002652  001373                                  BNE     P3C             ;NO
                                        ;DRAW LEFT LINE
002654  012713  000020                          MOV     #20,(3)         ;ENABLE INTENSIFY LOADING Y
002660  105713                          P3D:    TSTB    (3)
002662  100376                                  BPL     .-2             ;WAIT FOR READY
002664  160412                                  SUB     %4,(2)
002666  020012                                  CMP     %0,(2)          ;DONE ALL POINTS?
002670  001373                                  BNE     P3D             ;NO
002672  000731                                  BR      P3
```

```
                                    ;PLOT AN X WITH NON STORE DISPLAY
  002674  012767  004000  176102    PIC4:   MOV     #4000,LOW
  002702  012767  003774  176076            MOV     #3774,HIGH
  002710  000406                            BR      PIC4B
                                    ;PLOT AN X WITH STORAGE DISPLAY
  002712  016767  176062  176064    PIC4A:  MOV     LOWLMT,LOW
  002720  016767  176056  176060            MOV     HILMT,HIGH
  002726  016701  176064            PIC4B:  MOV     XREG,%1
  002732  016702  176062                    MOV     YREG,%2
  002736  016703  176052                    MOV     SCSR,%3
  002742  016700  176040                    MOV     HIGH,%0
  002746  012704  000004                    MOV     #4,%4
  002752  016712  176026            P4:     MOV     LOW,(2)
  002756  011211                            MOV     (2),(1)

                                    ;PLOT LINE BEGINNING IN LOWER LEFT CORNER
  002760  012713  000010                    MOV     #10,(3)         ;ENABLE INTENSIFY ON LOADING X
  002764  105713                    P4A:    TSTB    (3)
  002766  100376                            BPL     .-2
  002770  060412                            ADD     %4,(2)          ;+4 TO Y
  002772  060411                            ADD     %4,(1)          ;+4 TO X
  002774  105713                            TSTB(3)
  002776  100376                            BPL     .-2
  003000  021100                            CMP     (1),%0          ;DONE?
  003002  001370                            BNE     P4A             ;NO
                                    ;PLOT LINE BEGINNING IN UPPER LEFT CORNER
  003004  016712  175776                    MOV     HIGH,(2)
  003010  016711  175770                    MOV     LOW,(1)
  003014  105713                    P4B:    TSTB    (3)
  003016  100376                            BPL     .-2
  003020  160412                            SUB     %4,(2)          ;-4 TO Y
  003022  060411                            ADD     %4,(1)          ;+4 TO X
  003024  105713                            TSTB    (3)
  003026  100376                            BPL     .-2
  003030  021100                            CMP     (1),%0          ;DONE?
  003032  001370                            BNE     P4B             ;NO
  003034  000746                            BR      P4
```



```
                                        ;DRAW LOW AND HIGH INTENSITY
003036  012706  000776           PICS:  MOV     #STACK,%6
003042  016705  175746                  MOV     SCSR,%5
003046  012704  000022                  MOV     #SCALE2,%4
003052  005077  175736                  CLR     @SCSR
003056  012767  176400  000650          MOV     #176400,XPOS
003064  012767  000000  000640          MOV     #0,YPOS
003072  012767  000015  000116          MOV     #13.,PSCNT
003100  012767  003222  000112          MOV     #LOWINT,PSPNT
003106  017702  000106           PICSA: MOV     @PSPNT,%2
003112  004767  000510                  JSR     %7,CHAR
003116  062767  000002  000074          ADD     #2,PSPNT
003124  005367  000066                  DEC     PSCNT
003130  001366                          BNE     PICSA
003132  012777  000004  175654          MOV     #4,@SCSR
003140  012767  176400  000566          MOV     #176400,XPOS
003146  012767  177000  000556          MOV     #177000,YPOS
003154  012767  000014  000034          MOV     #12.,PSCNT
003162  012767  003254  000030          MOV     #HINT,PSPNT
003170  017702  000024           PICSB: MOV     @PSPNT,%2
003174  004767  000426                  JSR     %7,CHAR
003200  062767  000002  000012          ADD     #2,PSPNT
003206  005367  000004                  DEC     PSCNT
003212  001366                          BNE     PICSB
003214  000710                          BR      PICS
003216  000000                   PSCNT: 0
003220  000000                   PSPNT: 0
003222  004031                   LOWINT: L
003224  004050                          O
003226  004120                          W
003230  [illegible]                     SPACE
003232  004012                          I
003234  004043                          N
003236  004101                          T
003240  003766                          E
003242  004043                          N
003244  004074                          S
003246  004012                          I
003250  004101                          T
003252  004132                          Y

003254  004005                   HINT:  H
003256  004012                          I
003260  [illegible]                     SPACE
003262  004012                          I
003264  004043                          N
003266  004101                          T
003270  003766                          E
003272  004043                          N
003274  004074                          S
003276  004012                          I
003300  004101                          T
003302  004132                          Y
```

```
                                        ;TEST STORAGE SCOPE ERASE (BIT 1)
                                        ;PLOT EVERY 2ND POINT ON FACE OF SCOPE IN STORE MODE
                                        ;THEN HALT.
                                        ;PRESS CONTINUE TO TEST ERASE.
000000 012704 003776            ERASE:  MOV     #3776,X4        ;1ST QUAD
000004 012702 000002                    MOV     #2,X2
000010 000000                           HALT
000012 012704 004000            ERASE1: MOV     #4000,X4        ;3RD QUAD
000016 012703 177776                    MOV     #-2,X3
                                        ;TEST READY AND INTENSIFY WITH STORE MODE
000022 012777 000004 175460     E0:     MOV     #4,@#SCSR       ;SET STORE MODE
000030 005277 175454                    INC     @#SCSR          ;INTENSIFY
000034 105777 175450                    TSTB    @#SCSR          ;DID READY CLEAR
000040 100002                           BPL     E0A             ;YES
000042 000000                           HALT                    ;ERROR, READY DIDN'T CLEAR
000044 000405                           BR      E0
000046 012700 177600            E0A:    MOV     #-200,X0
000052 005200                           INC     X0
000054 001377                           BNE     .-2             ;DELAY
000056 105777 175426                    TSTB    @#SCSR          ;IS READY SET
000062 100002                           BPL     E0B
000064 000000                           HALT                    ;ERROR, READY FAILED TO SET
000066 000405                           BR      E0
000070 050477 000302 175412     E0B:    BIS     R4,@#SCSR       ;TEST ERASE
000076 105777 175406                    TSTB    @#SCSR
000102 100002                           BPL     E0C             ;DID READY CLEAR?
000104 000000                           HALT                    ;ERROR, READY NOT CLEARED BY ERASE
000106 000405                           BR      E0
000110 105777 175374            E0C:    TSTB    @#SCSR
000114 100375                           BPL     .-4             ;WAIT FOR READY
000116 016500 175370            ERASE2: MOV     @#XREG,R0       ;MOVE ALL PRINCIPAL VALUES TO REGISTERS FOR SPEED
000122 016501 175366                    MOV     @#YREG,R1
000126 016502 175364                    MOV     @#SCSR,R2
000132 012712 000004                    MOV     #4,(R2)         ;ENABLE STORE
000136 011211                           MOV     (R2),(R1)       ;Y TO YREG
000140 011210                   E1:     MOV     (R2),(R0)       ;X TO XREG
000142 005212                   E2:     INC     (R2)            ;INTENSIFY
000144 105712                           TSTB    (R2)            ;WAIT FOR READY
000146 100376                           BPL     E2
000150 160010                           SUB     (R0),(R0)       ;-2 FROM XREG
001373                                  BNE     E1              ;DO AGAIN IF XREG NOT EQUAL TO 0
000154 160111                           SUB     (R1),(R1)       ;-2 FROM YREG
001370                                  BNE     E1              ;DO AGAIN IF YREG NOT EQUAL TO 0.
000000                                  HALT                    ;STOP SO THAT OPERATOR MAY INSPECT PHOSPHOR
000717                                  BR      E0              ;DO AGAIN
```

F02

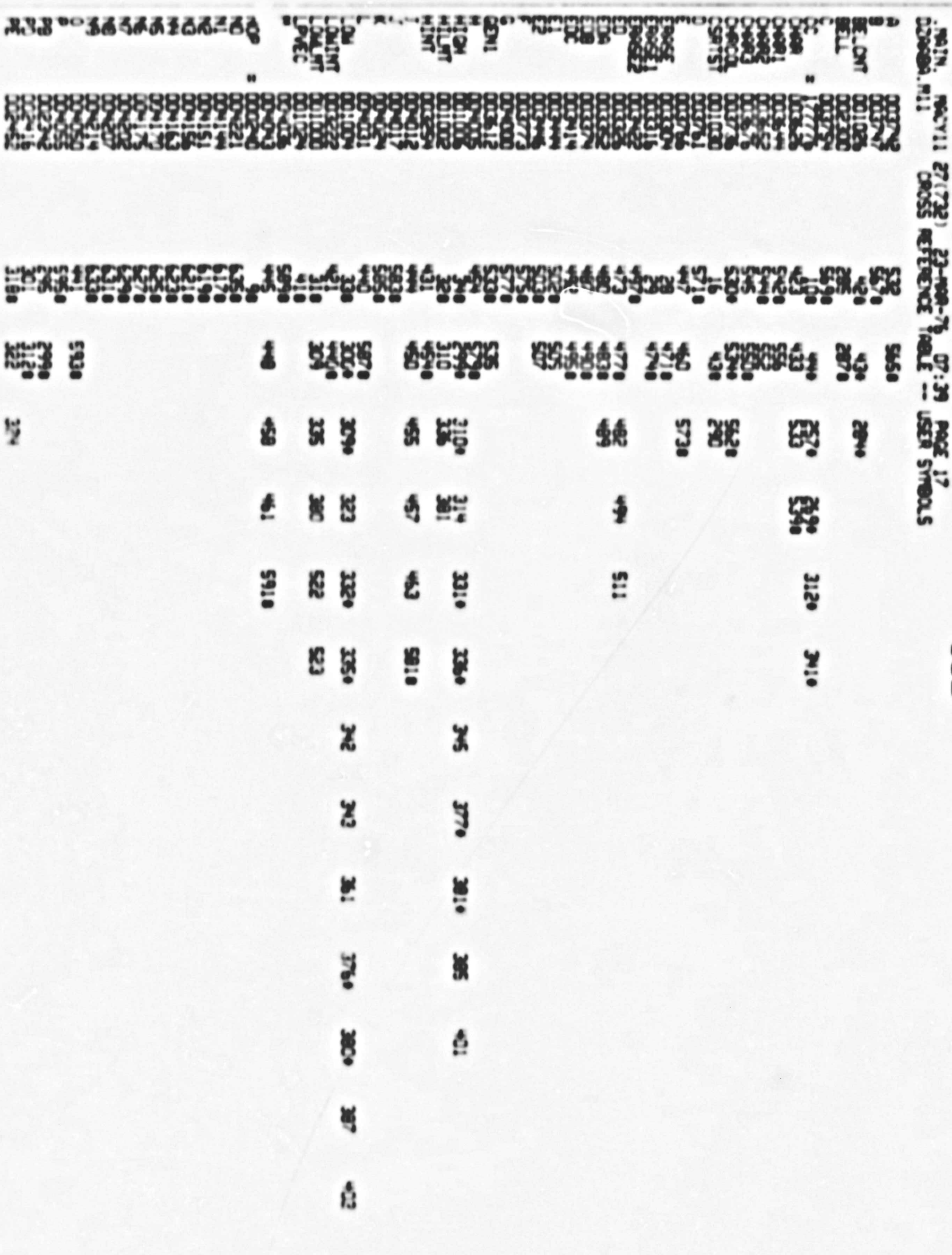

```
                                      ;PLOT NON STORE CHARACTER SET
003470  012737  174000  000236  PIC6:    MOV     #174000,XPOS
003476  012737  000000  000226           MOV     #0,YPOS
003504  012704  000022                   MOV     #SCALE2,%4
003510  012706  000776                   MOV     #STACK,%6
003514  052737  000004  175272           BIS     #4,@#SCSR           ;INTENSITY HIGH
003522  004767  000046                   JSR     %7,PIC6B
003526  000760                           BR      PIC6
                                      ;PLOT STORAGE DISPLAY CHARACTER SET
003530  016767  [illegible]  000176  PIC6A:  MOV     LOWLMT,XPOS
[illegible]  016767  [illegible]  000166     MOV     LOWLMT,YPOS
[illegible]  062767  002000  00016[illegible]  ADD  #2000,YPOS
[illegible]  012704  000011              MOV     #SCALE1,%4
[illegible]  012706  [illegible]         MOV     #STACK,%6
[illegible]  005037  [illegible]         CLR     @#SCSR
[illegible]  004767  [illegible]         JSR     %7,PIC6B
[illegible]  [illegible]                 BR      PIC6A
[illegible]  012767  177734  000134  PIC6B:  MOV     #-36.,CHRCOL     ;CHARACTERS PER ROW
[illegible]  016705  175206              MOV     SCSR,%5
[illegible]  012702  003742              MOV     #A,%2
[illegible]  004767  000010     GEN1:    JSR     %7,CHAR
[illegible]  005267  000114              INC     CHRCOL              ;
[illegible]  001373                      BNE     GEN1
[illegible]  000207                      RTS     %7
                                      ;PLOT CHARACTER
[illegible]  016767  000100  000104  CHAR:   MOV     YPOS,YPT
[illegible]  052715  000020              BIS     #20,(5)             ;ENABLE INTENSIFY ON LOADING Y
[illegible]  012700  177773              MOV     #-5,%0              ;INITIALIZE COLUMN COUNT
[illegible]  012701  177771     CHAR1:   MOV     #-7,%1              ;INITIALIZE ROW COUNT
[illegible]  112203                      MOVB    (2)+,%3             ;PUT CHARACTER POINTS IN %3
[illegible]  106103             CHAR2:   ROLB    %3
[illegible]  100010                      BPL     CHAR3               ;NO
[illegible]  105715                      TSTB    (5)
[illegible]  100376                      BPL     .-2
[illegible]  016777  000046  175126      MOV     XPOS,@XREG
[illegible]  016777  000036  175122      MOV     YPOS,@YREG
[illegible]  [illegible]  000000  CHAR3:  ADD     %4,YPOS
[illegible]  005201                      INC     %1                  ;+1 TO ROW
[illegible]  [illegible]                 BNE     CHAR2               ;FINISH ROW
[illegible]  016767  000026  000016      MOV     YPT,YPOS            ;REINITIALIZE ROW FOR NEXT COLUMN
003714  [illegible]  000014              ADD     %4,XPOS
003720  005200                           INC     %0                  ;+1 TO COLUMN COUNT
003722  001350                           BNE     CHAR1
[illegible]  [illegible]  000004         ADD     %4,XPOS
003730  000207                           RTS     %7                  ;EXIT

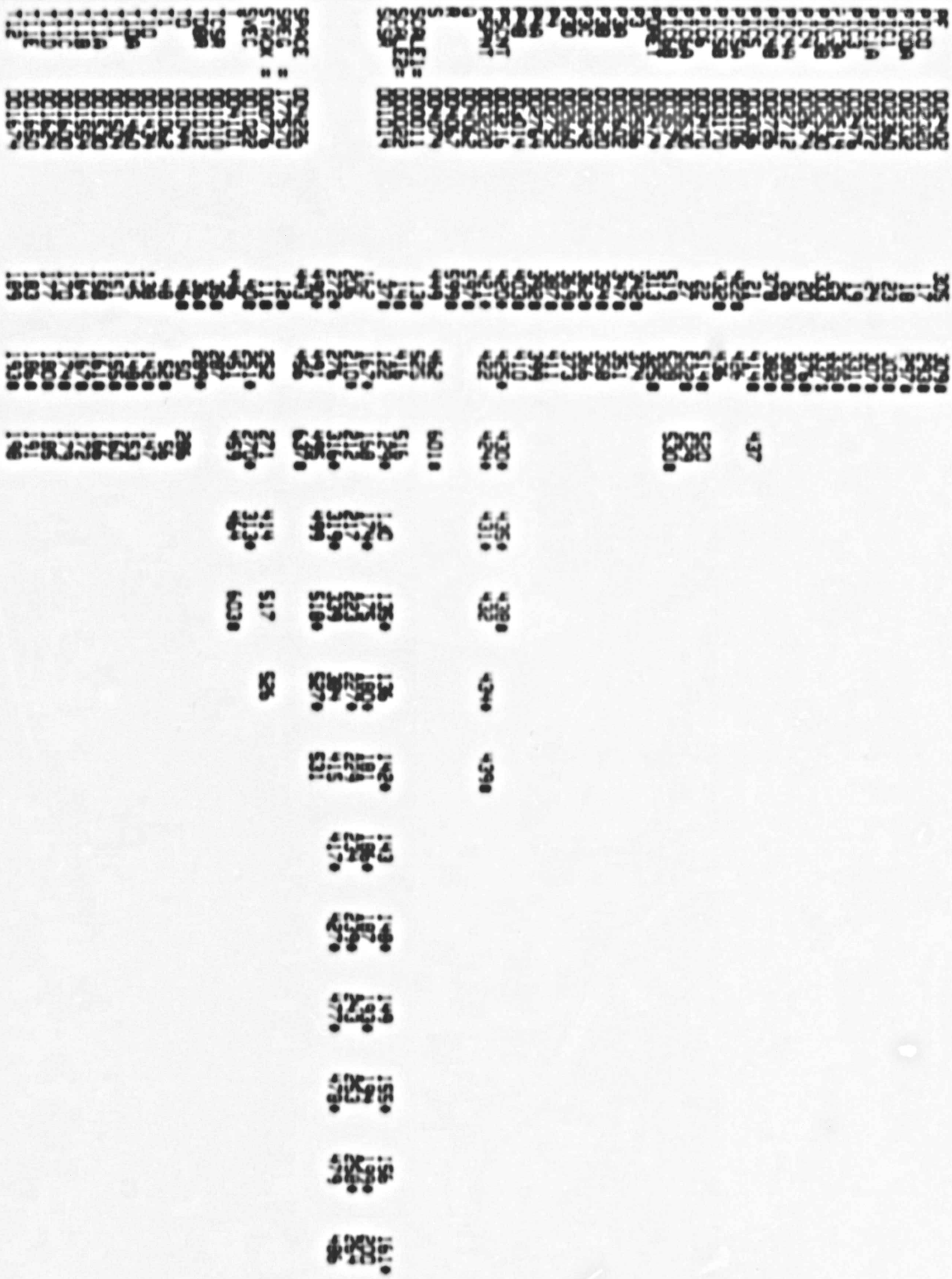
003732  000000                  YPOS:    0                           ;CONTAINS Y POSITION AT ANY GIVEN TIME
[illegible]  000000             XPOS:    0                           ;CONTAINS X POSITION AT ANY GIVEN TIME
[illegible]  000000             CHRCOL:  0
003740  000000                  YPT:     0
```

```
021  A:    .BYTE 176,21,21,21,176
111  B:    .BYTE 177,111,111,111,66
101  C:    .BYTE 76,101,101,101,42
101  D:    .BYTE 177,101,101,101,76
111  E:    .BYTE 177,111,111,111,101
011  F:    .BYTE 177,11,11,11,1
121  G:    .BYTE 76,101,121,121,62
010  H:    .BYTE 177,10,10,10,177
177  I:    .BYTE 0,101,177,101,0
100  J:    .BYTE 60,100,100,100,77
024  K:    .BYTE 177,10,24,42,101
100  L:    .BYTE 177,100,100,100,100
010  M:    .BYTE 177,4,10,4,177
010  N:    .BYTE 177,4,10,20,177
101  O:    .BYTE 76,101,101,101,76
011  P:    .BYTE 177,1[illegible],11[illegible]
121  Q:    .BYTE 76,101,1[illegible],[illegible]41,176
031  R:    .BYTE 177,11,31,51,106
111  S:    .BYTE 46,111,111,111,62
177  T:    .BYTE 1,1,177,1,1
100  U:    .BYTE 77,100,100,100,77
100  V:    .BYTE 37,40,100,40,37
010  W:    .BYTE 177,20,10,20,177
010  X:    .BYTE 143,24,10,24,143
170  Y:    .BYTE 3,4,170,4,3
111  Z:    .BYTE 141,121,111,105,103
177  N1:   .BYTE 0,102,177,100,0
111  N2:   .BYTE 142,121,111,105,102
```

H02

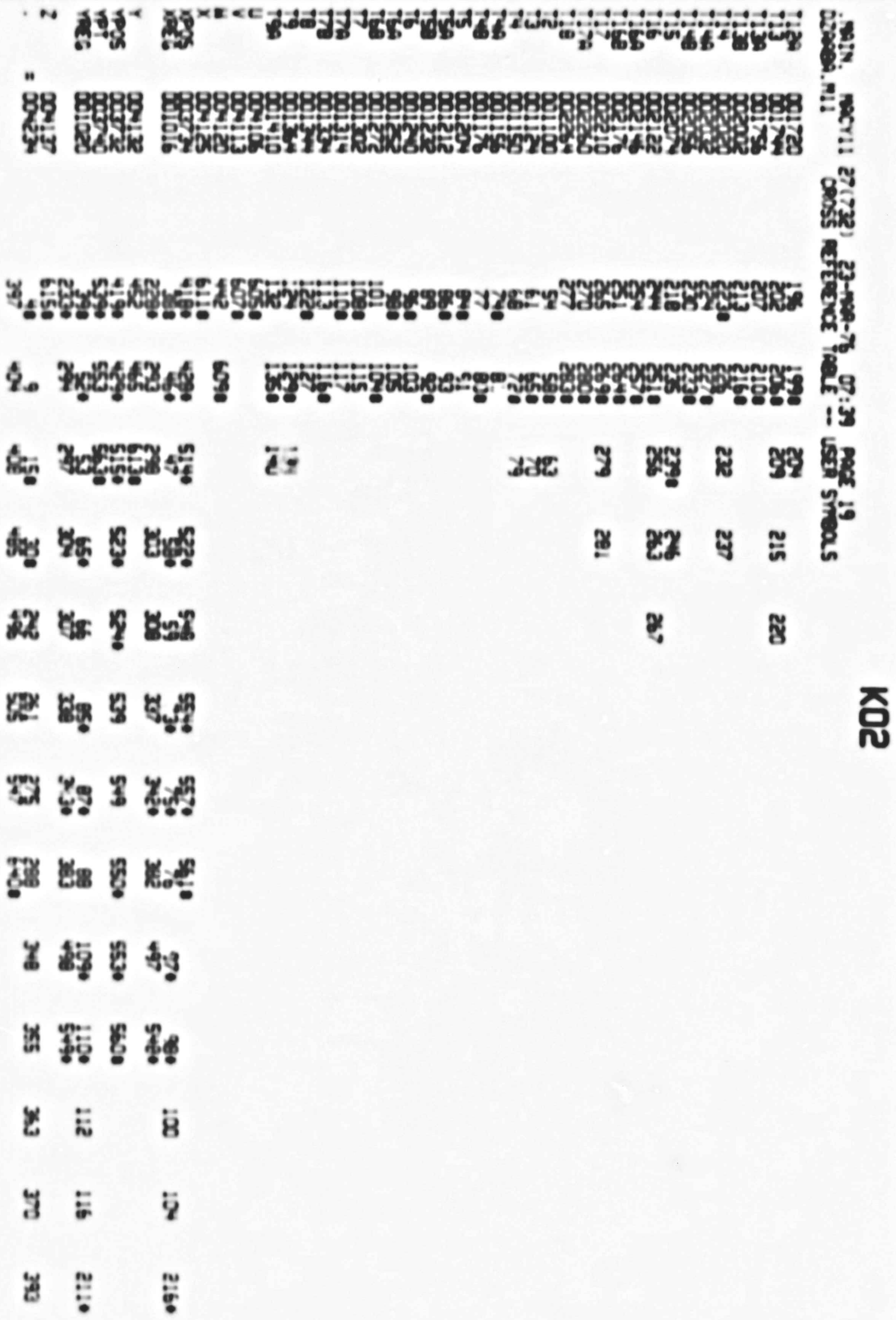

```
    620  002154     105  102
    621  002156     042  101  111   N3:     .BYTE 42,101,111,111,66
    622  002161     111  066
    623  002163     030  024  022   N4:     .BYTE 30,24,22,177,20
    624  002166     177  020
    625  002170     047  105  105   N5:     .BYTE 47,105,105,105,71
    626  002173     105  071
    627  002175     076  111  111   N6:     .BYTE 76,111,111,111,62
    628  002200     111  062
    629  002202     101  041  021   N7:     .BYTE 101,41,21,11,7
    630  002205     011  007
    631  002207     066  111  111   N8:     .BYTE 66,111,111,111,66
    632  002212     111  066
    633  002214     046  111  111   N9:     .BYTE 46,111,111,111,76
    634  002217     111  076
    635  002221     076  121  111   N0:     .BYTE 76,121,111,105,76
    636  002224     105  076
    637  002226     000  000  000   SPACE:  .BYTE 0,0,0,0,0
    638  002231     000  000
    639
    640         002234                      .EVEN
    641         000001                      .END
```





.MAIN. MACY11 27(732) 23-MAR-76 07:39 PAGE 18
DZAABA.M11 CROSS REFERENCE TABLE -- USER SYMBOLS

PF	002402	305	309#											
PIC0	002320	17	293#											
PIC0A	002332	18	297#											
PIC1	002360	23	303#											
PIC1A	002372	[illegible]	307#											
PIC13	[illegible]	19	331#											
[illegible]	[illegible]	[illegible]	[illegible]											
[illegible]	[illegible]	333	[illegible]											
[illegible]	[illegible]	20	376#											
PIC24A	002712	[illegible]	380#											
PIC24B	002726	378	382#											
PIC5	[illegible]	21	414#	437										
PIC5A	[illegible]	422#	[illegible]											
PIC5B	003170	432#	436											
PIC6	[illegible]	22	514#	520										
PIC6A	[illegible]	27	[illegible]	[illegible]										
PIC6B	[illegible]	519	[illegible]	530#										
PORET	[illegible]	313	[illegible]											
P3	[illegible]	342#	[illegible]											
P3A	[illegible]	347#	351											
P3B	[illegible]	354#	358											
P3C	[illegible]	362#	366											
P3D	[illegible]	369#	373											
[illegible]	[illegible]	387#	411											
[illegible]	[illegible]	392#	[illegible]											
[illegible]	001014	403#	410											
RSCNT	003216	420#	425#	430#	435#	438#								
RSPNT	003220	421#	422	424#	431#	432	434#	439#						
Q	[illegible]	597#												
R	004067	599#												
S	004074	449	462	601#										
SCALE1=	000011	13#	525											
SCALE2=	000022	14#	416	516										
SCSR	001014	37#	122	124#	1?C	135#	136	142#	143	148#	149	155#	156	161#
		152	167#	168	174#	175	180#	181	186#	187	193#	[illegible]	[illegible]	[illegible]
		[illegible]	210#	212	217	223	227#	229	234	239#	[illegible]	[illegible]	256#	[illegible]
		272#	276	316#	319#	339	384	415	417#	427#	477#	478#	479	486
		449#	451	495	499	518#	527#	531						
SPACE	004226	43	56	637#										
SREG =	177570	12#												
STACK =	000776	11#	262	271	414	517	526							
SVEC	001022	40#	251#	270#	313#									
T	004101	[illegible]	[illegible]	459	464	603#								
TCSR	001010	[illegible]	287											
TDBR	001012	[illegible]	289#											
T0	[illegible]	[illegible]	[illegible]	286										
T1	[illegible]	[illegible]	[illegible]	[illegible]										
T10	[illegible]	[illegible]	[illegible]	[illegible]										
T10A	[illegible]	[illegible]	[illegible]	[illegible]										
T11	[illegible]	[illegible]	[illegible]	[illegible]										
T11A	[illegible]	[illegible]	[illegible]	[illegible]										
T11B	[illegible]	[illegible]	[illegible]	[illegible]										
T11C	[illegible]	[illegible]	[illegible]	[illegible]										
T11D	[illegible]	177	180#	185										
T11E	001650	183	186#	191										
T12	001674	199	193#	198										



K02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T12A    001720          196     199#    204
T13     001744          202     206#    209     215     220
T13A    001756          207     210#
T13B    002002          213     216#
T14     002020          223#    [illegible]     232     237
T14A    [illegible]     [illegible]     227#
T14B    002056          230     233#
T15     002072          218     235     239#    246
T16     002122          [illegible]     251#    256     263     267
T16A    002146          [illegible]     257#
T16B    002176          261     264#
T17     002210          265     269#    279     281
T17A    002250          270     280#
T18     002264          277     283#
T2      001100          54      58#     63
T3      001124          61      65#     70
T4      001150          68      72#     79
T4A     001166          74#     8[illegible]
T4B     001176          77      83#
T5      001204          84#     91
T5A     001212          86#     93
T5B     001230          89      92#
T6      001240          96#     103
T6A     001252          98#     105
T6B     001272          101     104#
T7      001302          108#    115
T7A     001314          110#    117
T7B     001324          113     116#
T8      001344          122#    127
T9      001363          126     129#    134
T9A     001410          132     135#    140
U       004106          605#
V       004113          607#
W       004120          442     609#
X       004125          611#
XPOS    003734          418#    420#    514#    522#    548     554#    557#    561#
XREG    001016          38#     46#     47      58#     59      73#     75#     76      97#     98#     100     104     216#
                        228#    293     298     303     308     337     342#    382     497     548#
Y       004132          452     465     613#
YPOS    003732          419#    429#    515#    523#    524#    539     549     550#    553#    560#
YPT     003740          529#    553     563#
YREG    001020          39#     42#     53      65#     66      85#     87#     88      109#    110#    112     116     211#
                        233#    294     297     304     307     338     343#    383     498     549#
Z       004137          615#
.     = 004234          4#      9       15#     30#     242     261     275     288     348     355     363     370     393
                        397     404     408     485     496     505     547     640#
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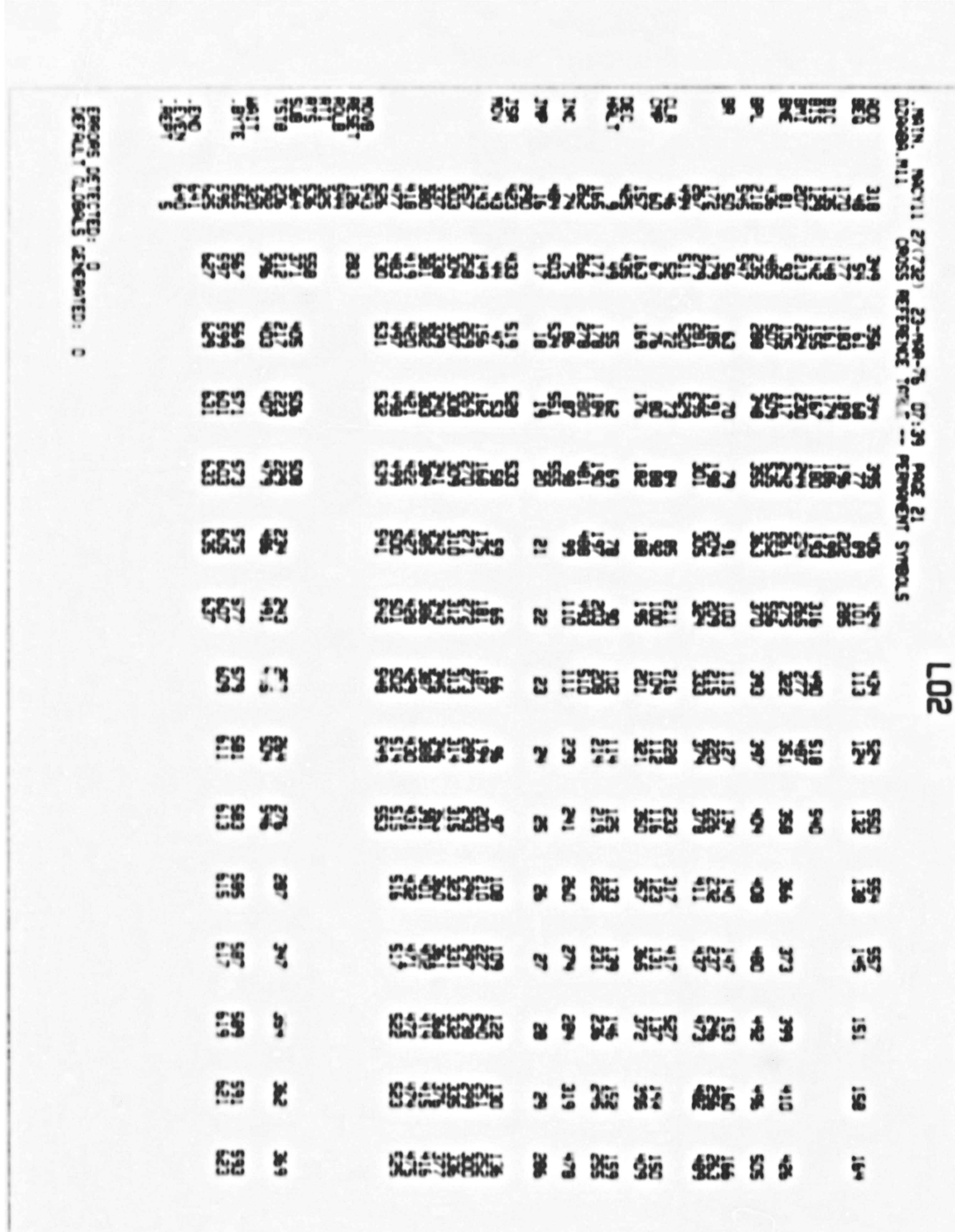

L02

.MAIN. MACY11 27(732) 23-MAR-76 07:39 PAGE 21
DZAABA.M11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

ADD	318	349	356	394	395	406	424	434	524	550	554	557			
BEG	[illegible]	54	61	[illegible]	77	89	101	113	124	132	138	145	151	158	164
	[illegible]	177	183	[illegible]	196	202	205								
BIC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
BIS	[illegible]	[illegible]	155	167	[illegible]	[illegible]	316	490	518	540					
BMI	[illegible]	213	224	230	[illegible]	[illegible]	265	277	487						
BNE	81	[illegible]	105	117	[illegible]	[illegible]	275	322	351	358	366	373	399	410	426
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
BPL	[illegible]	[illegible]	288	[illegible]	355	363	370	393	397	404	408	480	492	496	505
BR	50	56	63	70	79	91	103	115	127	134	140	147	153	160	166
	[illegible]	[illegible]	185	191	198	[illegible]	[illegible]	215	220	226	232	237	[illegible]	[illegible]	263
	[illegible]	[illegible]	[illegible]	[illegible]	301	305	[illegible]	333	374	378	411	437	473	482	489
	[illegible]	511	[illegible]	[illegible]											
CLR	[illegible]	[illegible]	72	73	[illegible]	85	211	216	228	233	317	417	527		
CMP	[illegible]	67	76	[illegible]	88	[illegible]	100	104	112	116	123	131	137	144	150
	157	163	169	176	182	188	195	201	321	350	357	365	372	356	409
DEC	[illegible]	[illegible]													
HALT	[illegible]	[illegible]	55	[illegible]	69	78	90	102	114	126	133	139	146	152	159
	165	171	178	[illegible]	[illegible]	197	[illegible]	208	214	219	225	231	236	245	255
	[illegible]	266	278	280	401	488	493	510							
INC	[illegible]	75	86	87	98	99	110	111	239	241	260	274	284	319	478
	[illegible]	503	534	551	555										
JMP	16	17	18	19	20	21	22	23	24	25	26	27	28	29	286
	[illegible]														
JSR	423	433	519	528	533										
MOV	43	[illegible]	47	53	58	59	65	66	96	97	108	109	122	130	136
	[illegible]	[illegible]	156	[illegible]	[illegible]	175	181	[illegible]	194	200	210	227	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	310	312	313	314	315	323	331	332	335	336
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	419	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	430	431	432	471	472	474	475
	477	483	497	498	499	500	501	502	514	515	516	517	522	523	525
	[illegible]	530	531	532	539	541	542	548	549	553					
MOVB	[illegible]														
RESET	126	283													
ROLB	[illegible]														
RTI	[illegible]														
RTS	[illegible]	558													
SUB	[illegible]	371	405	506	508										
TSTB	[illegible]	212	217	223	229	234	243	257	264	276	287	347	354	362	369
	[illegible]	396	403	407	479	486	491	[illegible]	504	546					
WAIT	[illegible]														
.BYTE	[illegible]	567	569	571	573	575	577	579	581	583	585	587	589	591	593
	[illegible]	597	599	601	603	605	607	609	611	613	615	617	619	621	623
	[illegible]	627	629	631	633	635	637								
.END	[illegible]														
.EVEN	[illegible]														
.REPT	5														

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-D2A0B-A

PRODUCT NAME: A911-A,B,C SCOPE CONTROL TEST

DATE: MAY 21,1976

MAINTAINER: DIAGNOSTIC GROUP