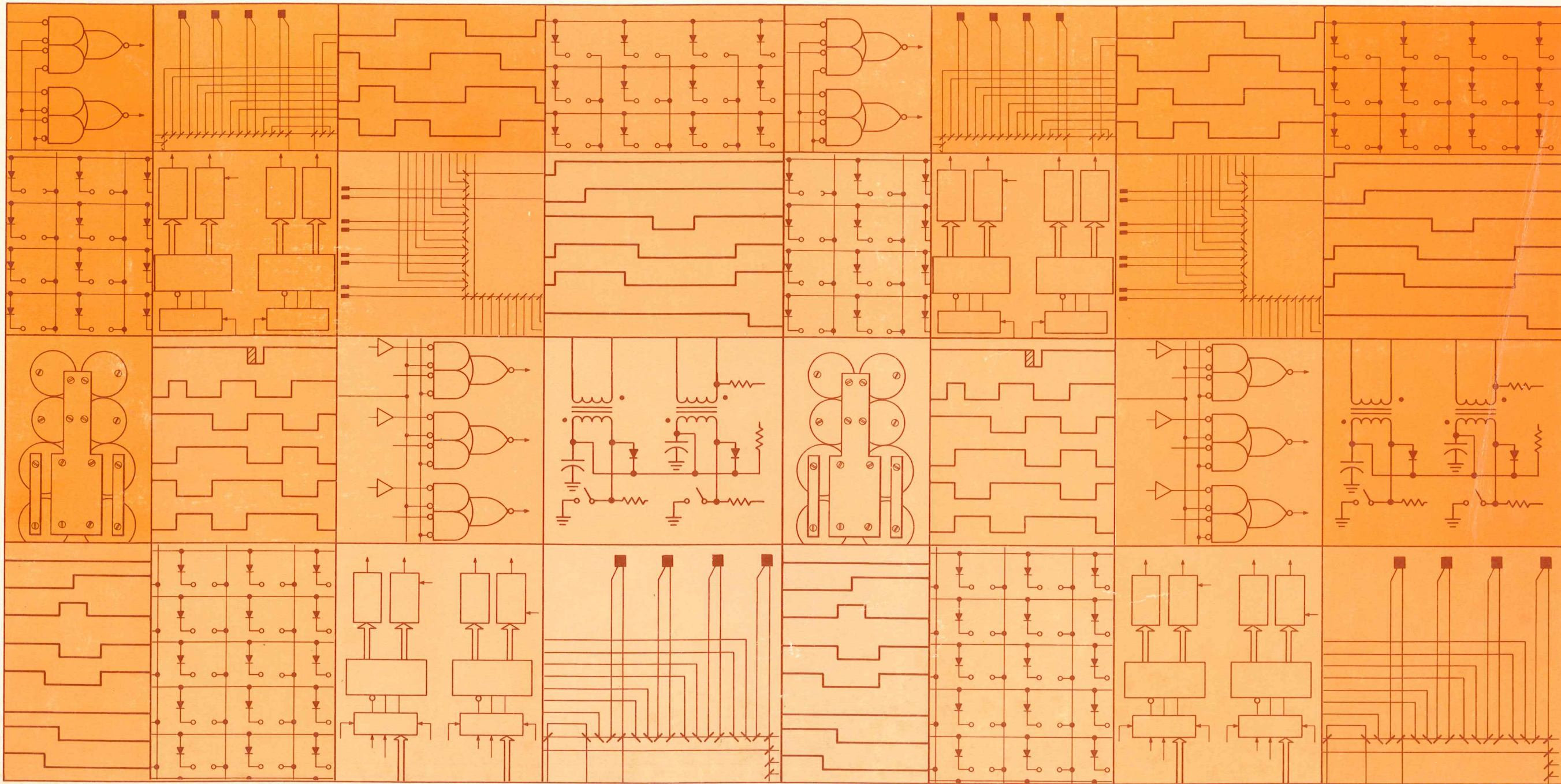
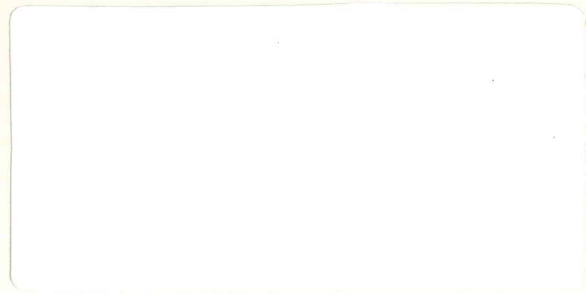


pdp8/e
pdp8/f & pdp8/m

MR8-E
read-only memory
engineering drawings

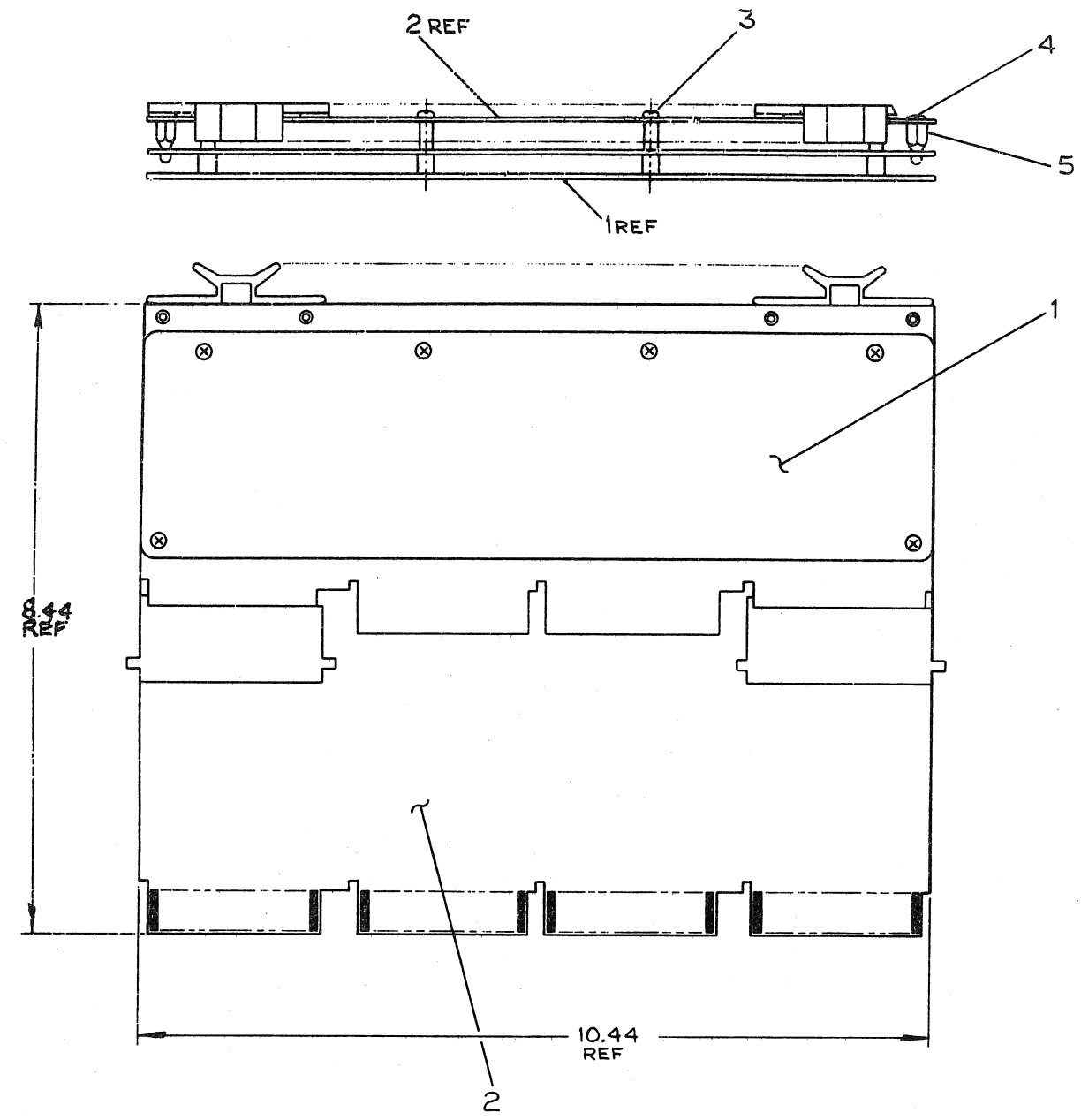


digital



**MR8-E
read-only memory
engineering drawings**

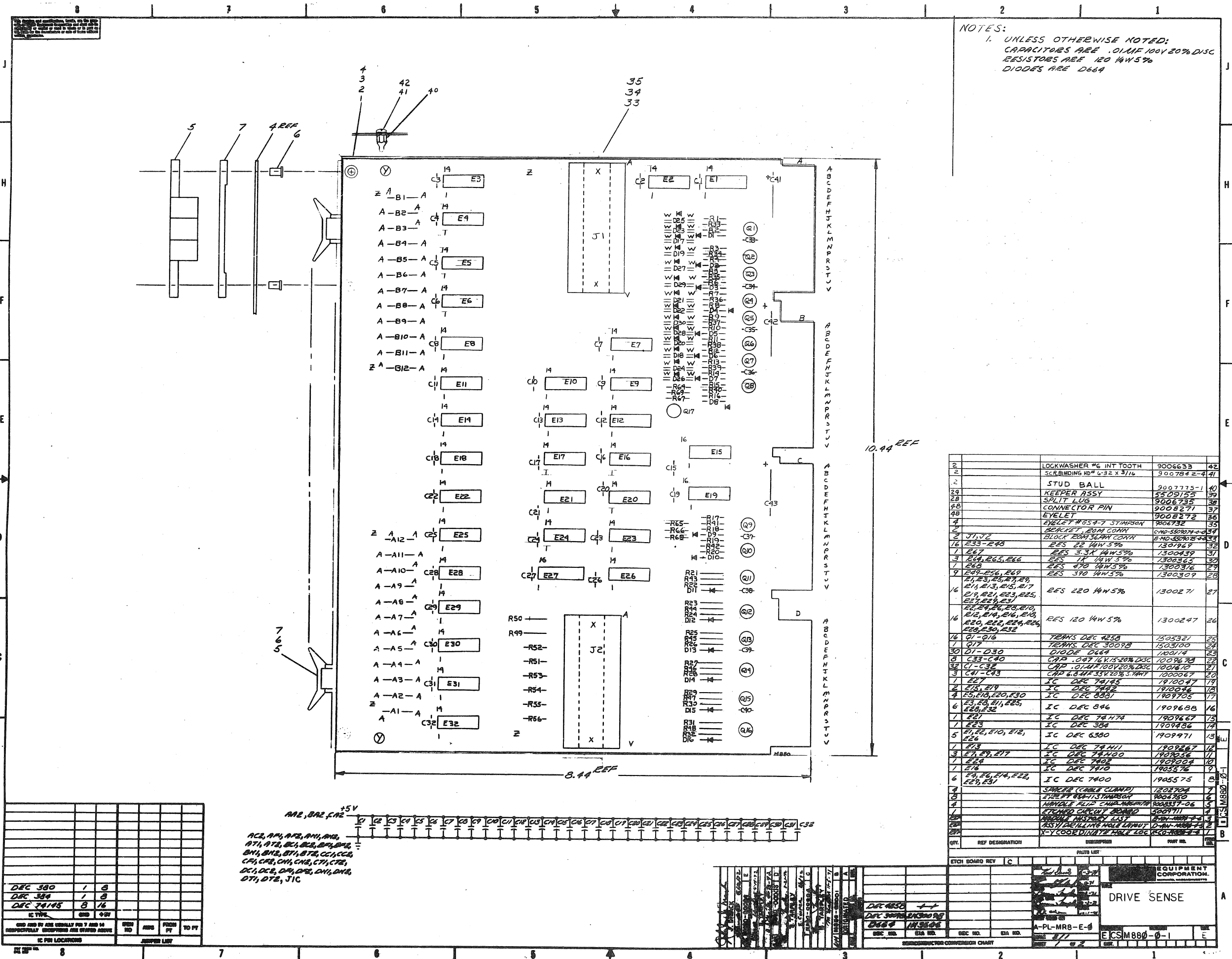
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| REVISIONS | CHANGE NO. | REV. |
|-------------------------|------------|------|
| CHK | MR8E-ØØØØ | A |
| B. TAPLEY | | |
| D.W.G. WAS. D-UA-MR8E-Ø | | |

DEC FORM NO. DRD 100-A

| | | | | |
|--|----------------------------------|------------------|---|-----------|
| FIRST USED ON OPTION/MODEL PDP-8/E | QTY. | DESCRIPTION | PART NO. | ITEM NO. |
| PARTS LIST | | | | |
| UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES. TOLERANCES | DRN <i>T. Quilley</i> | DATE 6-28-71 | digital EQUIPMENT CORPORATION <small>MAYNARD, MASSACHUSETTS</small> | |
| DECIMALS .XXX = .005 | CHK'D. <i>[Signature]</i> | DATE 7/1/71 | | |
| ANGLES .XX = .02 | ENG. <i>[Signature]</i> | DATE 8-1-71 | | |
| .X = .1 | PROJ. ENG. <i>[Signature]</i> | DATE 10-2-71 | | |
| REMOVE BURRS AND BREAK SHARP CORNERS SURFACE QUALITY ✓ | PROD. <i>[Signature]</i> | DATE 10-2-71 | TITLE READ ONLY MEMORY (256 x 12 BIT) | |
| MATERIAL // | NEXT HIGHER ASSY. // | SIZE CODE DUA | NUMBER MR8-E-Ø | REV. A |
| FINISH // | SCALE // | SHEET OF | DIST. | |



NOTES:
 1. UNLESS OTHERWISE NOTED:
 CAPACITORS ARE .01MUF 100V 20% DISC
 RESISTORS ARE 120 1/4W 5%
 DIODES ARE D664

| QTY. | REF DESIGNATION | DESCRIPTION | PART NO. | QTY. |
|------|--|---------------------------------------|-------------|------|
| 2 | | LOCKWASHER #6 INT TOOTH | 9006633 | 42 |
| 2 | | SCR BINDING ND# 6-32 x 3/16 | 9007842-4 | 41 |
| 2 | | STUD BALL | 9007775-1 | 40 |
| 24 | | KEEPER ASSY | 5509155 | 39 |
| 28 | | SPLIT LUG | 9006735 | 38 |
| 48 | | CONNECTOR PIN | 9008271 | 37 |
| 4 | | EYELET #6547 SIMPSON | 9008272 | 36 |
| 4 | | EYELET #6547 SIMPSON | 900732 | 35 |
| 2 | | BRACKET 204 CONN | 640-35004-4 | 34 |
| 2 | J1, J2 | BLOCK EDG 30 PIN CONN | 840-38078-4 | 33 |
| 16 | E33-E48 | RES 22 1/4W 5% | 1301929 | 32 |
| 1 | E67 | RES 3.3K 1/4W 5% | 1300439 | 31 |
| 3 | E64, E65, E66 | RES 1K 1/4W 5% | 1300365 | 30 |
| 1 | E68 | RES 470 1/4W 5% | 1300316 | 29 |
| 9 | E49-E56, E69 | RES 390 1/4W 5% | 1300309 | 28 |
| 16 | E1, E13, E15, E17, E19, E21, E23, E25, E27, E29, E31 | RES 220 1/4W 5% | 1300271 | 27 |
| 16 | E2, E4, E6, E8, E10, E12, E14, E16, E18, E20, E22, E24, E26, E28, E30, E32 | RES 120 1/4W 5% | 1300247 | 26 |
| 16 | D1-D16 | TEANS DEC 425B | 1505321 | 25 |
| 1 | Q17 | TEANS DEC 3009B | 1503100 | 24 |
| 30 | D1-D30 | DIODE D664 | 100114 | 23 |
| 8 | C33-C40 | CAP .047 16V 15-20% DISC | 1009678 | 22 |
| 32 | C1-C32 | CAP .01MUF 100V 20% DISC | 1001610 | 21 |
| 3 | C41-C43 | CAP 6.8MUF 35V 10% S.MNT | 1000067 | 20 |
| 1 | E27 | IC DEC 74145 | 1910047 | 19 |
| 2 | E28, E29 | IC DEC 7442 | 1910076 | 18 |
| 4 | E3, E10, E20, E30 | IC DEC 0081 | 1909705 | 17 |
| 6 | E3, E4, E11, E23, E28, E32 | IC DEC 846 | 1909688 | 16 |
| 1 | E21 | IC DEC 74174 | 1909667 | 15 |
| 1 | E23 | IC DEC 308 | 1909486 | 14 |
| 5 | E1, E2, E10, E12, E26 | IC DEC 6380 | 1909471 | 13 |
| 1 | E18 | IC DEC 74111 | 1909267 | 12 |
| 3 | E7, E9, E17 | IC DEC 74100 | 1909256 | 11 |
| 1 | E24 | IC DEC 7409 | 1909204 | 10 |
| 1 | E16 | IC DEC 7410 | 1905576 | 9 |
| 6 | E4, E6, E14, E22, E29, E31 | IC DEC 7400 | 1905575 | 8 |
| 4 | | SPACER (CABLE CLAMP) | 1202704 | 7 |
| 2 | | STRET #64-113 SIMPSON | 9004750 | 6 |
| 4 | | WASHER #27 CHAS MORGAN | 900337-06 | 5 |
| 1 | | FRONT COVER LENS | 800111 | 4 |
| 1 | | FRONT MOUNTING LENS | 800111 | 3 |
| 2 | | ASSY DRILLING HOLD LAYOUT D-41-M880-1 | | 2 |
| 1 | | X-COORDINATE HOLD LOC RCO-1000-3 | | 1 |

| IC TYPE | QTY | REF | QTY | REF |
|-----------|-----|-----|-----|-----|
| DEC 380 | 1 | B | | |
| DEC 380 | 1 | B | | |
| DEC 74145 | 8 | 16 | | |

IC PIN LOCATIONS

JUMPER LIST

+5V
 R52, R52, R52

ACE, AF4, AF2, AN1, AN2,
 AT1, AT2, BC1, BC2, BN3, BN4,
 BN1, BN2, BT1, BT2, CC1, CC2,
 CF1, CF2, CH1, CH2, CT1, CT2,
 DL1, DL2, DM1, DM2, DN1, DN2,
 DT1, DT2, J1C

DRIVE SENSE

ECSM880-0-1


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NOTES:
1. REFERENCE D-CS-G643-0-1

MR8-EA
CUSTOM BUILT
CUSTOMER PROVIDES
2 TAPES

MR8-EC
TDB-E HANDLER
CONTAINS
MAINDEC-8E-D1KA-PB

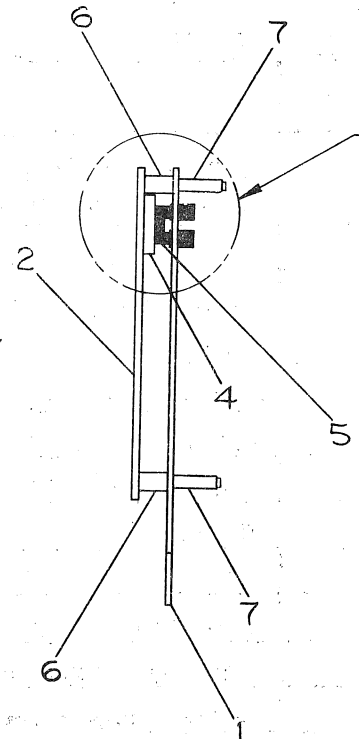
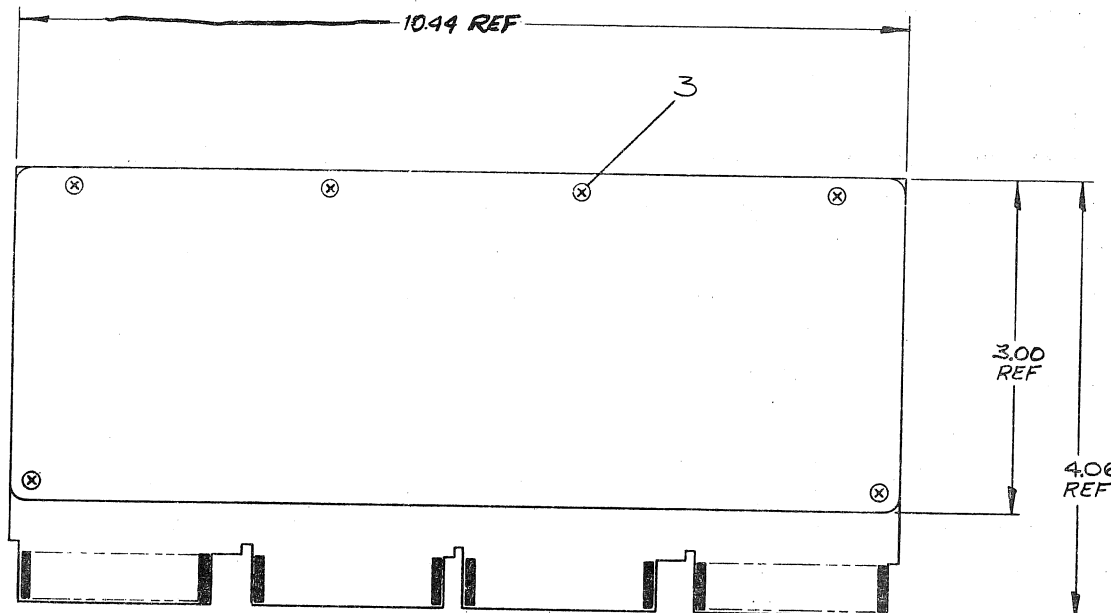
| QTY. | DESCRIPTION | PART NO. | ITEM NO. |
|---|-------------|--|-----------|
| PARTS LIST | | | |
| UNLESS OTHERWISE SPECIFIED | |  digital EQUIPMENT CORPORATION <small>MAYNARD, MASSACHUSETTS</small> | |
| UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES | | | |
| DRN. | DATE | BRAID BOARD ASSY | |
| CH'D. | DATE | | |
| ENG. | DATE | | |
| PROJ. ENG. | DATE | | |
| PROD. | DATE | | |
| MATERIAL | | SIZE CODE | NUMBER |
| FINISH | | B CS | H241-0-01 |
| FIRST USED ON | | DIST. | REV. |
| MR8-E | | | A |
| SCALE | | SHEET 1 OF 1 | |
| | | | |

| | | |
|--|-----------|---------|
| UNLESS OTHERWISE SPECIFIED | | |
| UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES | | |
| TOLERANCES | | |
| DECIMALS | FRACTIONS | ANGLES |
| ± .005 | ± 1/64 | ± 0°30' |
| FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS | | |
| MATERIAL | | |
| FINISH | | |

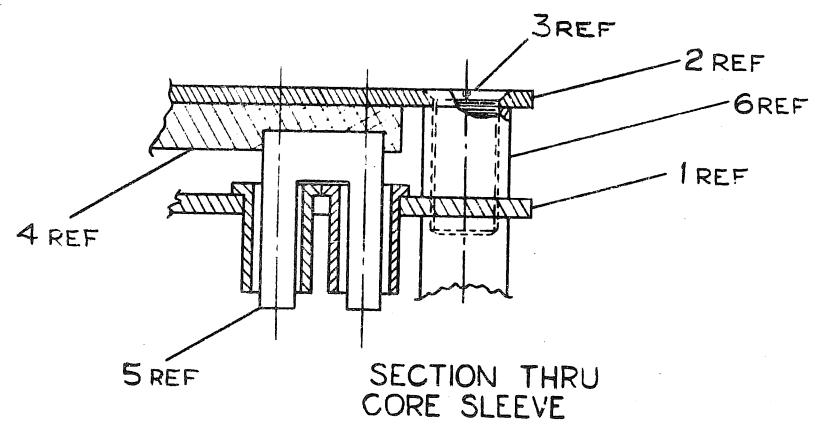
| REVISIONS | | REV. |
|-------------------|------------|------|
| CHK | CHANGE NO. | A |
| | MR8E-00002 | |
| M. Gainer 5-15-72 | | |
| B. TARPLEY | | |
| 5-17-72 | | |

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0 0-0-122H 2



SEE SECTION THRU CORE SLEEVE



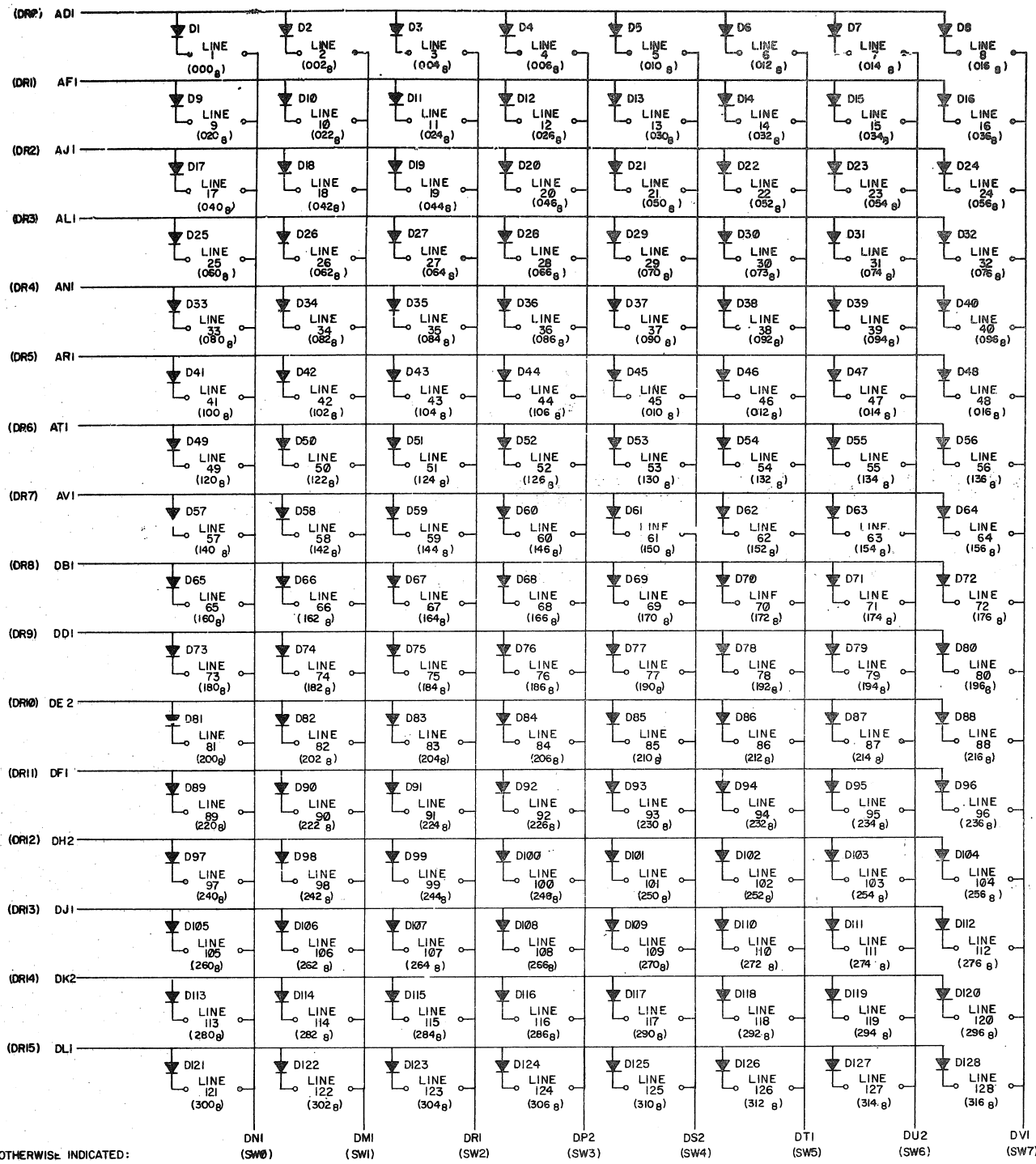
SECTION THRU CORE SLEEVE
ROTATED 90° CLOCKWISE
SCALE 4/1

| CHK | CHANGE NO. | REV. |
|-----|------------|------|
| | H241-00001 | A |
| | TARPLEY | |
| | M88A-00002 | B |
| | TARPLEY | |
| | M88B-00002 | C |
| | TARPLEY | |

| FIRST USED ON OPTION/MODEL | QTY. | DESCRIPTION | PART NO. | ITEM NO. |
|--|-----------------------------------|------------------------------|---|-----------|
| PDP-8/E | | | | |
| PARTS LIST | | | | |
| UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES. TOLERANCES | DRN <i>T. Quillen</i> | DATE 6-24-71 | digital EQUIPMENT CORPORATION MAYNARD MASSACHUSETTS | |
| DECIMALS .XXX = .005 .XX = .02 .X = .1 | CHK'D <i>Henry J. ...</i> | DATE 6-28-71 | | |
| ANGLES ±0° 30' | ENG. <i>Henry J. ...</i> | DATE 10-1-71 | TITLE BRAID BOARD ASSY | |
| REMOVE BURRS AND BREAK SHARP CORNERS SURFACE QUALITY ✓ | PROJ. ENG. <i>Henry J. ...</i> | DATE 10-1-71 | | |
| MATERIAL | NEXT HIGHER ASSY. | PROD. <i>Henry J. ...</i> | DATE 10-1-71 | |
| FINISH | D-UA-MR8-E-0 | | | |
| SCALE 1/1 | SHEET 1 OF 1 | SIZE CODE DUA | NUMBER H241-0-0 | REV. C |

REV. C
H241-0-0
DUA

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UNLESS OTHERWISE INDICATED:
DIODES ARE D664

LINE 1 THRU LINE 128 ARE CUSTOMER OPTION - DO NOT INSERT
ITEMS IN PARENTHESES ARE OCTAL EQUIVALENTS
EACH LINE CONTAINS 2 SEQUENTIAL ADDRESSES
I.e. LINE 121 CONTAINS ADDRESS 300 & 301.
REFER TO E-CS-M880-0-1 WHICH SHOWS WHERE G643 CONNECTS TO
DRIVE BOARD M880.

| | | | | | | |
|-------------------------|---------|-------------------------------------|------------|--------------------|-----------|---|
| REVISIONS DATE BY | DATE | TRANSISTOR & DIODE CONVERSION CHART | | | | TITLE BRAID BOARD |
| | | DEC | EIA | DEC | EIA | |
| 1/1/71 | 11/1/71 | D664 | IN3606 | | | EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS |
| | | | | | | |
| PART NUMBER G643-0-1 | | SIZE D | CODE CS | NUMBER G643-0-1 | REV. D | PRINTED CIRCUIT REV. |

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 9/22/71

TITLE MR8-E PROCEDURE FOR ALTERING ROM CONTENTS

REVISIONS

| REV | DESCRIPTION | CHG NO | ORIG | DATE | APPD BY | DATE |
|-----|-------------|-------------|------------|----------|---------|--------|
| A | ECO CHANGE | MR8EA-00002 | B. TARPLEY | 12-28-71 | BT | 1-3-72 |

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| | | | | | | | | | | | |
|-----|---------------|------|----------------------|------|---|------|----|--------|----------|-----|---|
| ENG | Bruce Tarpley | APPD | <i>Bruce Tarpley</i> | SIZE | A | CODE | SP | NUMBER | MR8-E -2 | REV | A |
|-----|---------------|------|----------------------|------|---|------|----|--------|----------|-----|---|

ENGINEERING SPECIFICATION



CONTINUATION SHEET

TITLE MR8-E PROCEDURE FOR ALTERING ROM CONTENTS

1. Remove the H241 with cover and standoffs from MM80.
2. With Side 2 of the G643 up, find the line which corresponds to the address of the word to be changed. Each line contains two words, so the 128 lines contain 256 addresses (see Table 1). Cut the line to be changed.
3. Solder the new wire to the lug.

If you are placing new words in these addresses, string the wire through all 24 cores using all the tie down jumpers. The 24 cores correspond to the two 12-bit words of the line (see Figure 1). For a logical one, string the wire inside the "U" core and for a zero, string the wire outside the core. Terminate the wire on the proper switch. (See Table 1 or the Circuit Schmetic).

If you are correcting an error in the MR8-E, the Diagnostic Program will provide all the information needed. A typical typeout would be

| ADDR | GOOD | BAD | DRIVER | LINE | DIODE | INSERT | TERM. |
|------|------|------|--------|------|-------|---------------------------|-------|
| 7010 | 3635 | 3637 | 00 | 05 | 05 | 011110011101 010101010100 | SW4 |

For this error, cut line 5, replace it, and string the wire through the codes as shown in the insert portion of the typeout. The 24 bits shown correspond one to one with the 24 cores on the board, from left to right. The line should be terminated on SW4. If an error occurs in the field, check the diode before replacing the line.

Check electrical continutiy.

| | | | | | | | |
|------|---|------|----|--------|----------|-----|---|
| SIZE | A | CODE | SP | NUMBER | MR8-E -2 | REV | A |
|------|---|------|----|--------|----------|-----|---|

ENGINEERING SPECIFICATION

CONTINUATION SHEET

TITLE MR8-E PROCEDURE FOR ALTERING ROM CONTENTS

| Line Number | Addresses* | Sw. Term. | Line Number | Addresses* | Sw. Term. |
|-------------|------------|-----------|-------------|------------|-----------|
| 1 | 000,001 | 0 | 36 | 106,107 | 3 |
| 2 | 002,003 | 1 | 37 | 110,111 | 4 |
| 3 | 004,005 | 2 | 38 | 112,113 | 5 |
| 4 | 006,007 | 3 | 39 | 114,115 | 6 |
| 5 | 010,011 | 4 | 40 | 116,117 | 7 |
| 6 | 012,013 | 5 | 41 | 120,121 | 0 |
| 7 | 014,015 | 6 | 42 | 122,123 | 1 |
| 8 | 016,017 | 7 | 43 | 124,125 | 2 |
| 9 | 020,021 | 0 | 44 | 126,127 | 3 |
| 10 | 022,023 | 1 | 45 | 130,131 | 4 |
| 11 | 024,025 | 2 | 46 | 132,133 | 5 |
| 12 | 026,027 | 3 | 47 | 134,135 | 6 |
| 13 | 030,031 | 4 | 48 | 136,137 | 7 |
| 14 | 032,033 | 5 | 49 | 140,141 | 0 |
| 15 | 034,035 | 6 | 50 | 142,143 | 1 |
| 16 | 036,037 | 7 | 51 | 144,145 | 2 |
| 17 | 040,041 | 0 | 52 | 146,147 | 3 |
| 18 | 042,043 | 1 | 53 | 150,151 | 4 |
| 19 | 044,045 | 2 | 54 | 152,153 | 5 |
| 20 | 046,047 | 3 | 55 | 154,155 | 6 |
| 21 | 050,051 | 4 | 56 | 156,157 | 7 |
| 22 | 052,053 | 5 | 57 | 160,161 | 0 |
| 23 | 054,055 | 6 | 58 | 162,163 | 1 |
| 24 | 056,057 | 7 | 59 | 164,165 | 2 |
| 25 | 060,061 | 0 | 60 | 166,167 | 3 |
| 26 | 062,063 | 1 | 61 | 170,171 | 4 |
| 27 | 064,065 | 2 | 62 | 172,173 | 5 |
| 28 | 066,067 | 3 | 63 | 174,175 | 6 |
| 29 | 070,071 | 4 | 64 | 176,177 | 7 |
| 30 | 072,073 | 5 | 65 | 200,201 | 0 |
| 31 | 074,075 | 6 | 66 | 202,203 | 1 |
| 32 | 076,077 | 7 | 67 | 204,205 | 2 |
| 33 | 100,101 | 0 | 68 | 206,207 | 3 |
| 34 | 102,103 | 1 | 69 | 210,211 | 4 |
| 35 | 104,105 | 2 | 70 | 212,213 | 5 |

SIZE A CODE SP NUMBER MR8-E -2 REV A

ENGINEERING SPECIFICATION

CONTINUATION SHEET

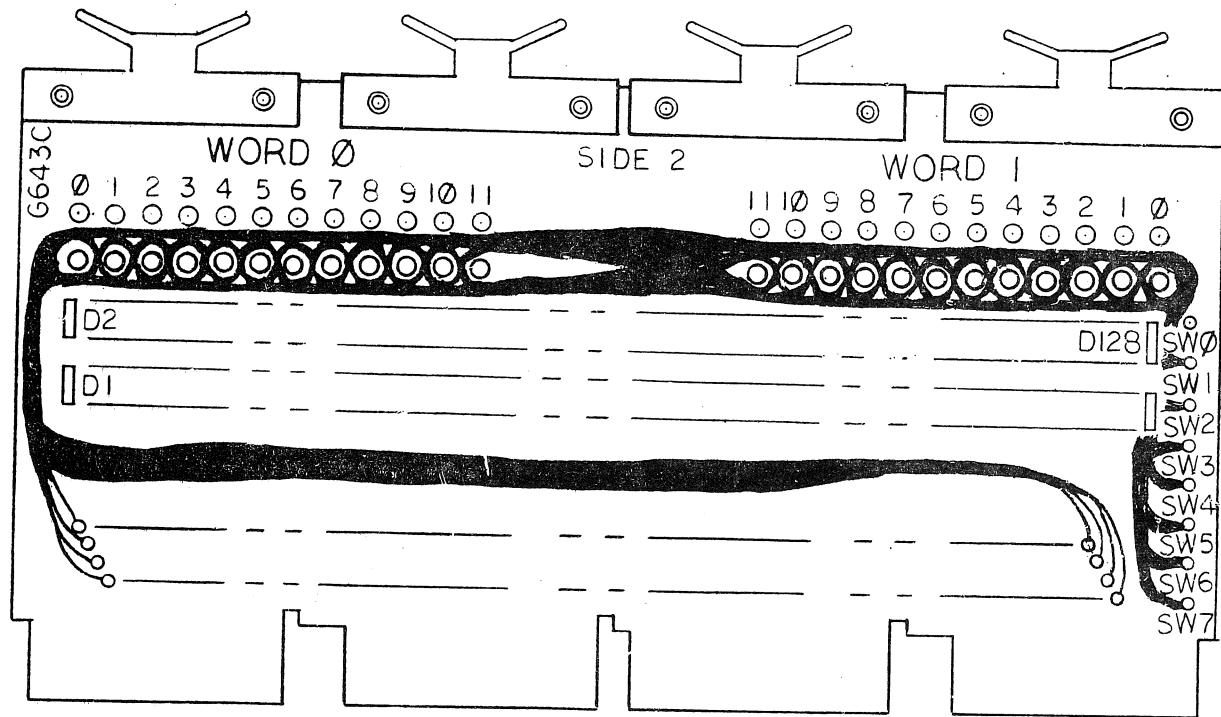
TITLE MR8-E PROCEDURE FOR ALTERING ROM CONTENTS

| Line Number | Addresses* | Sw. Term. | Line Number | Addresses* | Sw. Term. |
|-------------|------------|-----------|-------------|------------|-----------|
| 71 | 214,215 | 6 | 99 | 304,305 | 2 |
| 72 | 216,217 | 7 | 100 | 306,307 | 3 |
| 73 | 220,221 | 0 | 101 | 310,311 | 4 |
| 74 | 222,223 | 1 | 102 | 312,313 | 5 |
| 75 | 224,225 | 2 | 103 | 314,315 | 6 |
| 76 | 226,227 | 3 | 104 | 316,317 | 7 |
| 77 | 230,231 | 4 | 105 | 320,321 | 0 |
| 78 | 232,233 | 5 | 106 | 322,323 | 1 |
| 79 | 234,235 | 6 | 107 | 324,325 | 2 |
| 80 | 236,237 | 7 | 108 | 326,327 | 3 |
| 81 | 240,241 | 0 | 109 | 330,331 | 4 |
| 82 | 242,243 | 1 | 110 | 332,333 | 5 |
| 83 | 244,245 | 2 | 111 | 334,335 | 6 |
| 84 | 246,247 | 3 | 112 | 336,337 | 7 |
| 85 | 250,251 | 4 | 113 | 340,341 | 0 |
| 86 | 252,253 | 5 | 114 | 342,343 | 1 |
| 87 | 254,255 | 6 | 115 | 344,345 | 2 |
| 88 | 256,257 | 7 | 116 | 346,347 | 3 |
| 89 | 260,261 | 0 | 117 | 350,351 | 4 |
| 90 | 262,263 | 1 | 118 | 352,353 | 5 |
| 91 | 264,265 | 2 | 119 | 354,355 | 6 |
| 92 | 266,267 | 3 | 120 | 356,357 | 7 |
| 93 | 270,271 | 4 | 121 | 360,361 | 0 |
| 94 | 272,273 | 5 | 122 | 362,363 | 1 |
| 95 | 274,275 | 6 | 123 | 364,365 | 2 |
| 96 | 276,277 | 7 | 124 | 366,367 | 3 |
| 97 | 300,301 | 0 | 125 | 370,371 | 4 |
| 98 | 302,303 | 1 | 126 | 372,373 | 5 |
| | | | 127 | 374,375 | 6 |
| | | | 128 | 376,377 | 7 |

*These addresses are within the MR8-E. To get the absolute address, add the starting address of the MR8-E to the MR8-E addresses. i.e., MR8-E starts at 4400, line 123 contains absolute addresses 4764 and 4765. 4764 is word 0 and 4765 is word 1.

SIZE A CODE SP NUMBER MR8-E -2 REV A

TITLE MR8-E PROCEDURE FOR ALTERING ROM CONTENTS



DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 10/26/71

TITLE MR8-E ENGINEERING SPECIFICATION

REVISIONS

| REV | DESCRIPTION | CHG NO | ORIG | DATE | APPD BY | DATE |
|-----|-------------|----------------|---------|---------|---------|---------|
| A | ECO CHANGE | MR8EA 00002 | TARPLEY | 2/28/71 | BT | 1-3-72 |
| B | ECO CHANGE | M880- 00002 | TARPLEY | 2/15/72 | BT | 2-7-72 |
| C | ECO CHANGE | MR8E- 00002 | R.ALLEN | 5/72 | BT | 5-17-72 |

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ENGINEERING SPECIFICATION

CONTINUATION SHEET

TITLE MR8-E Engineering Specification

General Description:

The MR8-E is a 256 word Read Only Memory, designed for use as an internal memory option for the PDP8/E. This memory takes up two pages (400g locations) of the 32 pages (7777g location) in each field. The MR8-E may be located starting at any even numbered page in any field, i.e. location 00000g, 00400g, 64400g, etc.

Principle of Operation:

The MR8-E is addressed in the same way as core memory, and if placed in the same field with a 4K core memory, the two pages of core with the same addresses as the ROM (Read Only Memory) may not be accessed. If one tries to write into the ROM, the new information will be lost and the contents of the location unchanged. When the MR8-E detects an address within itself, it pulls the ROM Address line on the Omnibus which disables all core memories.

The MR8-E's 400g words are organized as 200g lines each containing two words. The 200g lines each run through or around 24₁₀ ferrite cores (two 12₁₀ bit words) and are terminated by a diode at one end, and in groups of 16₁₀ at the outputs of a BCD decoder at the other. The MR8-E contains 16₁₀ drivers, so each of the 16₁₀ lines at a given decoder output are tied to a different driver. (See Drawing ECS M880-Ø-1.)

Addressing of the 400g locations is accomplished as follows:

1. Using removable diodes and the 3 EMA lines and the 4 most significant MA lines, it is determined if the selected address is within the ROM. If so, ROM Address is pulled to disable all core memories and the remaining addressing is enabled.
2. Next, 1 of 20g drivers is selected using the next 4 most significant MA lines. Each of these drivers is connected to 10g diodes.
3. The next 3 most significant MA lines are used to select one output of a BCD decoder. Whichever of the 10g outputs is selected, biases the diode so that current may flow through the selected line.

| | | | | | |
|---------------------------|-----------------------------|-----------|------------|--------------------|----------|
| ENG <i>[Signature]</i> | APPD. <i>[Signature]</i> | SIZE A | CODE SP | NUMBER MR8-E -4 | REV C |
|---------------------------|-----------------------------|-----------|------------|--------------------|----------|

| | | | |
|-----------|------------|--------------------|----------|
| SIZE A | CODE SP | NUMBER MR8-E -4 | REV C |
|-----------|------------|--------------------|----------|

TITLE MR8-E Engineering Specification

4. The selected line contains two words. The addressed word is chosen using the least significant MA line as an enable for the words data outputs.

Data is taken from the MR8-E using high permeability ferrite "U" and "I" cores, mated together to form a closed magnetic path. The 200g lines run through or around the 24₁₀ "U" cores and the 24 "I" cores are wound with a 50 turn sense winding. When current is driven through the selected line, if the line passes through the mated core, a 2.5 TO +3.0V signal is magnetically induced in the sense winding and is fed to a DTL type gate and clocked with a strobe pulse. If the line runs outside or around the mated core, no signal will be induced in the sense winding. DTL is used for detection because of its high threshold and noise immunity. The outputs of the DTL gates are fed into a 12₁₀ bit register which places the data of the addressed line on the Omnibus MD lines at the proper time.

Adjustment Procedures:

The only adjustment on the MR8-E is the address diode. Seven of the fourteen diodes will be left in to determine the starting address for the MR8-E, per the circuit schematic.

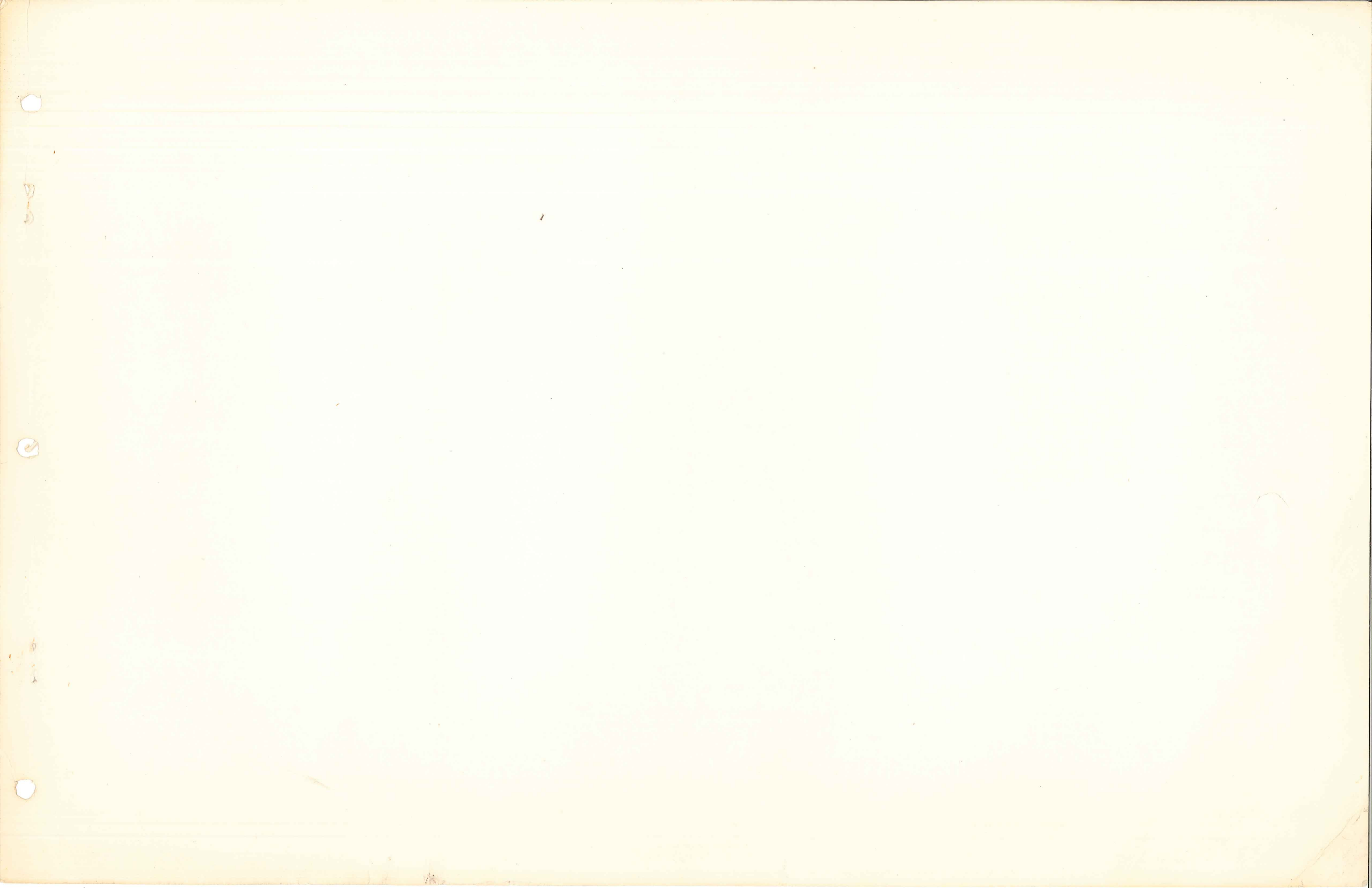
System Variations:

| | |
|--------|--|
| MR8-EA | Custom Built |
| MR8-EC | TD8-E ROM Handler Ref: Maindec-8E-D1KA-PB |

| | |
|------|------|
| SIZE | CODE |
| A | SP |

| |
|----------|
| NUMBER |
| MR8-E -4 |

| |
|-----|
| REV |
| C |



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