



pdp11

KW11-L  
line time clock  
engineering drawings

digital



**KW11-L**  
**line time clock**  
**engineering drawings**

digital equipment corporation • maynard, massachusetts





| CUSTOMER<br>PRINT SET |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  | OPTION<br>NO. |
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|                       |  |  |  |  | DEPOT SET |  |  |  |  |  | FIND NO. |  |  |  |  |  | NO<br>OF<br>SHT |  |  |  |  |  |               |



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## PARTS REFERENCE

| ITEM NO. | DRAWING REFERENCE   | DESCRIPTION              | PART NUMBER | QUANTITY |
|----------|---------------------|--------------------------|-------------|----------|
| 1        | R1, P3              | 390 1/4 W 5% CC          | 1300309     | 2        |
| 2        | R2, R6 - R11        | 1K 1/4 W 5% CC           | 1300365     | 7        |
| 3        | P4, R5              | 180 1/4 W 5% CC          | 1301322     | 2        |
| 4        | R12                 | 2.4K 1/4 W 5% CC         | 1303177     | 1        |
| 5        | C1 - C15, C18, C19  | .01 MFD 100V 20% DISC    | 1001610     | 17       |
| 6        | C16, C17            | 560 MFD 100V 5% D.M.     | 1000025     | 2        |
| 7        | Q1, Q2              | TRANSISTOR DEC 3009 B.S. | 1503100     | 2        |
| 8        | E1, E5, E8, E9, E10 | 1 C. DEC 380             | 1908485     | 5        |
| 9        | E2                  | 1 C. DEC 7430            | 1905578     | 1        |
| 10       | E3                  | 1 C. DEC 8815            | 1908713     | 1        |
| 11       | E4                  | 1 C. DEC 7400            | 1905575     | 1        |
| 12       | E6, E7, E13         | 1 C. DEC 7474            | 1905547     | 3        |
| 13       | E11                 | 1 C. DEC 7404            | 1908686     | 1        |
| 14       | E12, E14, E15       | 1 C. DEC 8881            | 1909705     | 3        |

## INSTALLATION PROCEDURE

1. REMOVE JUMPER FROM B12V2 TO B12R2
2. INSTALL M787 LINE FREQUENCY CLOCK MODULE IN K11 SLOT B12
3. RUN MAINDEC DEC-11-D2DA LINE FREQUENCY CLOCK TEST

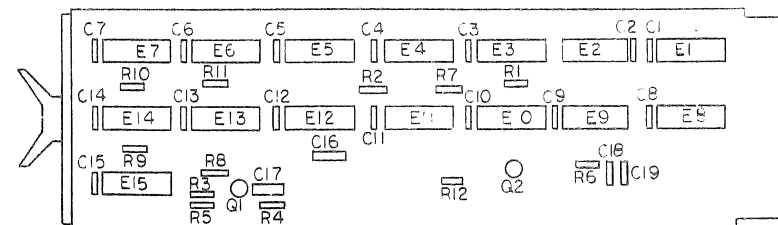
## NOTES

1. PIN NOTATION THROUGHOUT IS ORDERED UPON MODULE PLACEMENT IN THE K11 PROCESSOR. MODULE REFERENCE ALONE IS OBTAINED BY DELETING THE NUMBER (SLOT LOCATION) AFTER THE FIRST LETTER, AND CONVERTING THE FIRST LETTER ACCORDING TO THE PIN NOMENCLATURE CHART AT RIGHT.
2. ALL SIGNALS THAT HAVE MODULE PINS ARE SO NOTED: MULTIPLE NOTATIONS OF THE SAME SIGNALS WITHIN A MODULE HAVE THE PIN NOTED ON EACH. AN INPUT SIGNAL IS NOTED ONLY ONCE PER SHEET UNLESS SEPERATE PINS ARE USED: MULTIPLE INPUTS ARE CONNECTED. MODULE OUTPUT SIGNALS ARE BROUGHT TO THE EXTREME RIGHT OF EACH SHEET.
3. PROCESSOR SIGNAL SOURCE NOTATION (K10-2, FOR EXAMPLE) IDENTIFIES THE SIGNAL SOURCE (PRINT AND MODULE). THE FIRST NUMBER AFTER THE K INDICATES THE MODULE PRINT SET. WHILE THE SECOND INDICATES THE SHEET WITHIN THE SET. IF ON A PRINT, THE FIRST NUMBER OF THE K PREFIXES COINCIDE FOR A SIGNAL NAME AND THE PRINT (SEE TITLE BLOCK). THE SIGNAL IS GENERATED ON THE MODULE. A DIFFERENCE IN THE FIRST NUMBER OF THE K PREFIXES INDICATES A SIGNAL GENERATED OFF THE MODULE. SIGNALS WITH A "BUS" PREFIX REPRESENT A "WIRED OR" SITUATIONS AND MULTIPLE SOURCES FOR THE SIGNAL CAN EXIST.
4. DETAILS ON COMPONENTS ARE NOTED IN THE PARTS REFERENCE, PLACEMENT IS NOTED IN THE COMPONENT PLACEMENT DIAGRAM.
5. GND AND +5V ARE USUALLY PIN 7 AND PIN 14, RESPECTIVELY. EXCEPTIONS ARE:

| IC TYPE  | GND    | +5V    |
|----------|--------|--------|
| DEC 7401 | PIN 10 | PIN 4  |
| DEC 7402 | PIN 11 | PIN 4  |
| DEC 8251 | PIN 8  | PIN 16 |
| DEC 8271 | PIN 8  | PIN 16 |
| DEC 380  | PIN 1  | PIN 8  |
| DEC 384  | PIN 1  | PIN 8  |

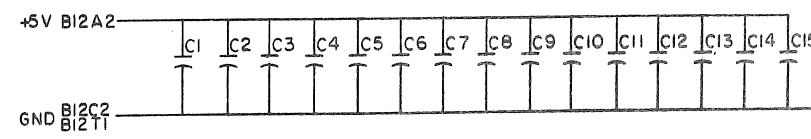
6. UNLESS OTHERWISE NOTED-RESISTANCE IS IN OHMS; CAPACITANCE IS IN MICRO MICRO FARADS, CAPACITORS WITHOUT ANY NOTED VALUES ARE .01 MFD.

## COMPONENT PLACEMENT



## PIN NOMENCLATURE

MODULE PROCESSOR



| REV. | CHANGE NO. | DATE    |
|------|------------|---------|
| 1    | 1          | 10-1-70 |
| 2    | 2          | 10-1-70 |
| 3    | 3          | 10-1-70 |
| 4    | 4          | 10-1-70 |
| 5    | 5          | 10-1-70 |
| 6    | 6          | 10-1-70 |
| 7    | 7          | 10-1-70 |
| 8    | 8          | 10-1-70 |

DEC FORM NO. 100

FIRST USED ON OPTION/MODEL  
KW11-L

DO NOT SCALE DRAWING  
UNLESS OTHERWISE SPECIFIED  
DIMENSIONS IN INCHES  
TOLERANCES  
DECIMALS FRACTIONS ANGLES  
± .005 ± 1/64 ± 0°30'  
FINAL SURFACE QUALITY  
REMOVE BURRS AND BREAK SHARP CORNERS  
MATERIAL  
FINISH

| QTY. | DESCRIPTION                   | PART NO.    | ITEM NO. |
|------|-------------------------------|-------------|----------|
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |
| 1    | LINE FREQUENCY INTERVAL CLOCK | A-ML-KW11-L | 1        |

LINE FREQUENCY  
INTERVAL CLOCK

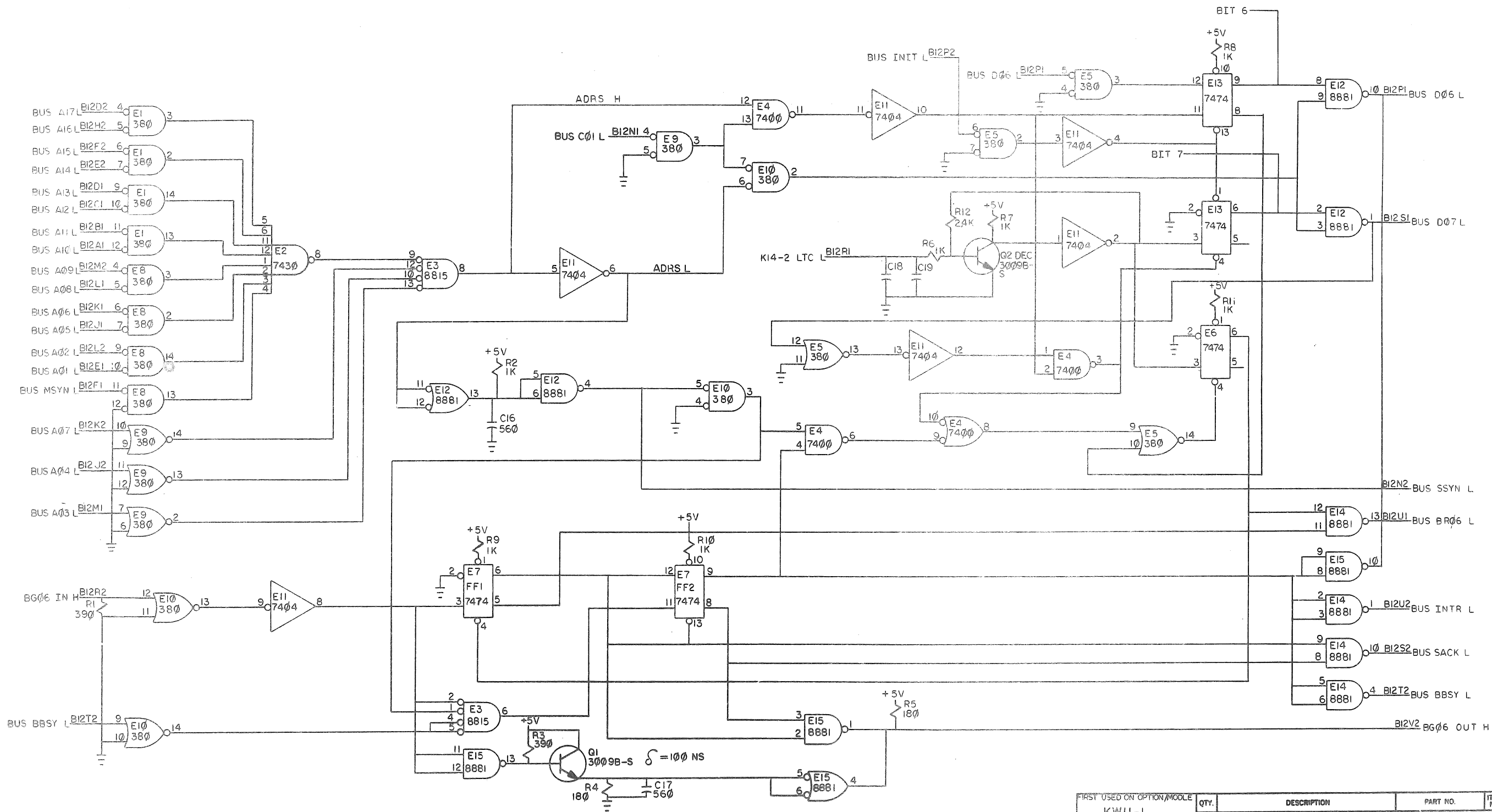
D BSKW11-L-01

REV. A  
NUMBER  
D BSKW11-L-01  
SIZE CODE

B

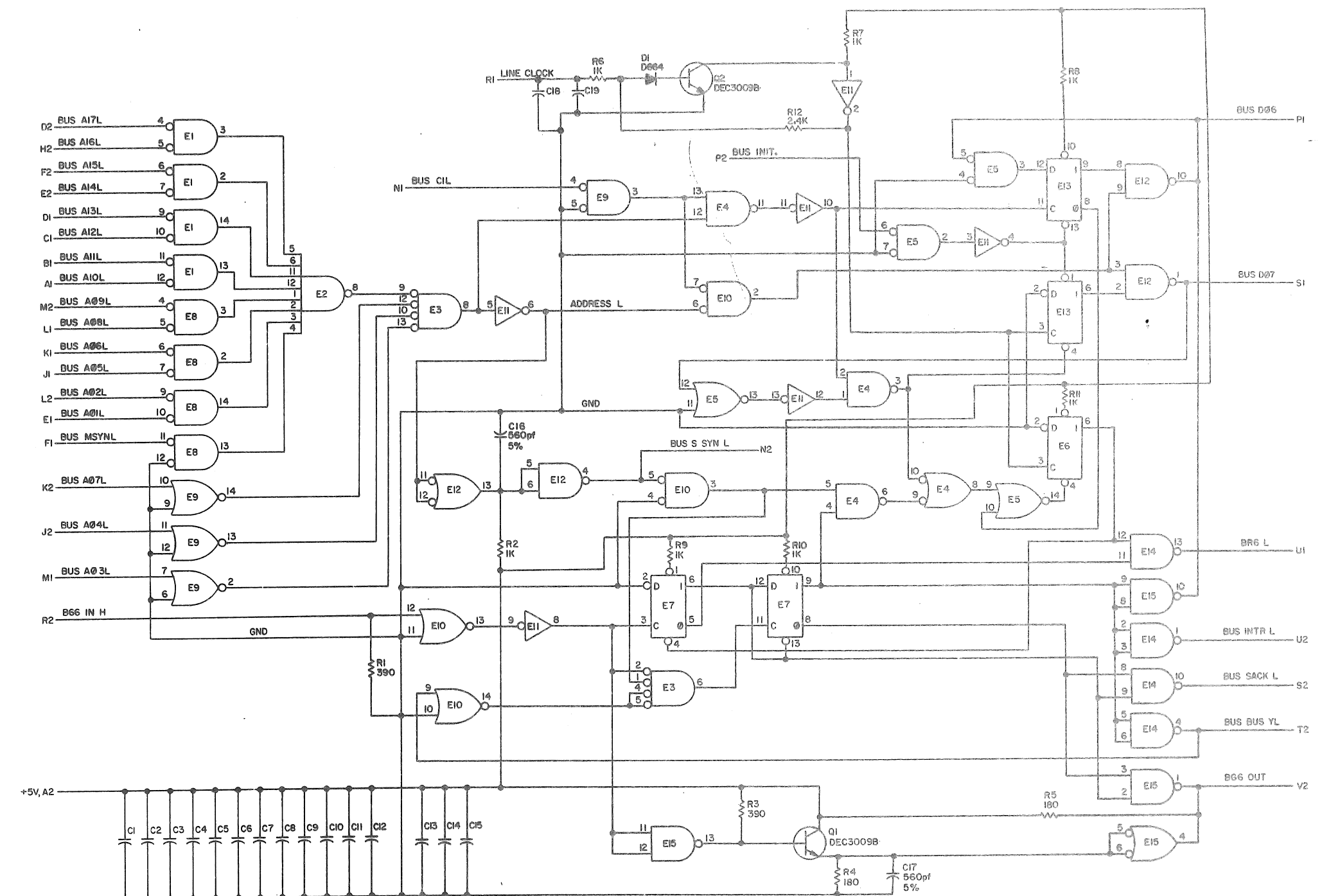
A

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| FIRST USED ON OPTION/MODULE          |  | QTY.             | DESCRIPTION | PART NO.                                        | ITEM NO. |
|--------------------------------------|--|------------------|-------------|-------------------------------------------------|----------|
| KW11-L                               |  |                  |             |                                                 |          |
| UNLESS OTHERWISE SPECIFIED           |  | DRN.             | DATE        | EQUIPMENT CORPORATION<br>MAYNARD, MASSACHUSETTS |          |
| UNLESS OTHERWISE SPECIFIED           |  | CHK'D            | DATE        |                                                 |          |
| DIMENSION IN INCHES                  |  | ENG.             | DATE        | TITLE<br>LINE FREQUENCY<br>INTERVAL CLOCK       |          |
| TOLERANCES                           |  | FRG.             | DATE        |                                                 |          |
| DECIMALS FRACTIONS ANGLES            |  | PROJ. ENG.       | DATE        | A-ML-KW11-L                                     |          |
| ± .005 ± 1/64 ± 0°30'                |  | DATE             |             |                                                 |          |
| FINAL SURFACE QUALITY                |  |                  |             | D/BS KW11-L-01                                  |          |
| REMOVE BURRS AND BREAK SHARP CORNERS |  |                  |             |                                                 |          |
| MATERIAL                             |  | NEXT HIGHER ASSY |             | REV. A                                          |          |
| FINISH                               |  | SCALE            |             | SHEET 2 OF 2                                    |          |

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UNLESS OTHERWISE INDICATED:  
RESISTORS ARE 1/4W, 5%  
CAPACITORS ARE .01uf, 100V, 20%  
DEC390 = E1, E5, E8, E10, E9  
DEC7430 = E2  
DEC8815 = E3  
DEC7400 = E4  
DEC7404 = E11  
DEC8801 = E12, E14  
DEC7474 = E6, E7, E13

PIN 1 = GND  
PIN 8 = +5V ON E1, E8, E9, E10, E5

PIN 7 = GND ON E2, E3, E4, E11, E12, E14, E13, E7, E15, E6  
PIN 14 = +5V

| REV | DATE    | BY     | CHKD | APPD |
|-----|---------|--------|------|------|
| 1   | 10-2-70 | OUTLER |      |      |
| 2   | 1-23-71 | OUTLER |      |      |
| 3   | 7-2-71  | OUTLER |      |      |
| 4   | 7-2-71  | OUTLER |      |      |

| TRANSISTOR & DIODE CONVERSION CHART |        |        |        |
|-------------------------------------|--------|--------|--------|
| DEC                                 | SA     | DEC    | SA     |
| DEC3008                             | 2N3008 | 2N3008 | 2N3008 |
| DEC3009                             | 2N3009 | 2N3009 | 2N3009 |
| DEC3010                             | 2N3010 | 2N3010 | 2N3010 |
| DEC3011                             | 2N3011 | 2N3011 | 2N3011 |

| EQUIPMENT CORPORATION |         | LINE TIME CLOCK INTERRUPT M787 |         |
|-----------------------|---------|--------------------------------|---------|
| REV                   | DATE    | REV                            | DATE    |
| 1                     | 10-2-70 | 1                              | 10-2-70 |
| 2                     | 1-23-71 | 2                              | 1-23-71 |
| 3                     | 7-2-71  | 3                              | 7-2-71  |
| 4                     | 7-2-71  | 4                              | 7-2-71  |

PIN 1

## PARTS LIST

|         |                    |
|---------|--------------------|
| CHECKED | <i>[Signature]</i> |
| DATE    | <i>1/25/72</i>     |
| PROD    | <i>1250 High</i>   |
| DATE    | <i>6/10/72</i>     |

|              |
|--------------|
| SECTION      |
| ISSUED SECT. |

## QUANTITY / VARIATION

### DESCRIPTION

|   |      |                           |
|---|------|---------------------------|
| 1 | M787 | LINE TIME CLOCK INTERRUPT |
|---|------|---------------------------|

9  
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LX

ASSY NO.

SHEET 1 OF 1

|      |      |
|------|------|
| SIZE | CODE |
| A    | PL   |

DIST.

NUMBER  
KW77-L-0

|           |         |
|-----------|---------|
| REV.<br>★ | ECO NO. |
|-----------|---------|





digital

DIGITAL EQUIPMENT CORPORATION  
MAYNARD, MASSACHUSETTS 01754