

TEMPORALANALYZER

C2280-60

SCHEMATIC DIAGRAM

**HAMAMATSU**

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## Preface

This Manual describes front panel SW operation, Back panel and connection with peripherals of C2280-60 series Temporal analyzer. This Manual includes cable connection and circuit diagram for maintenance.

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## SECTION 1

## GENERAL INFORMATION

C2280-60 series, Temporal analyzer is an instrument to measure various types of multi-dimensional image from streak camera, e.g. an image represents temporal decay of fluorescence light vs. its variance of wavelength in a ultra short time with through spectrometer. C2280-60 has 512(H) x 512(V) x 32bit frame memory. Digitized image data is accumulated into this frame memory up to 32bits with frame integration to improve the S/N ration. Additionally, C2280-60 contains powerful 16bit micro-processor for its data processing. User can perform various data analysis in stand-alone with C2280-60. The analyzed results can be displayed on monitor TV, plotted to X-Y plotter, saved to disk or output to Host computer etc. The most proper calibrations for image data from streak camera, for example dark, shading, linearity calibration, are able to be performed with C2280-60.

## Hardware Specification for C2280-60

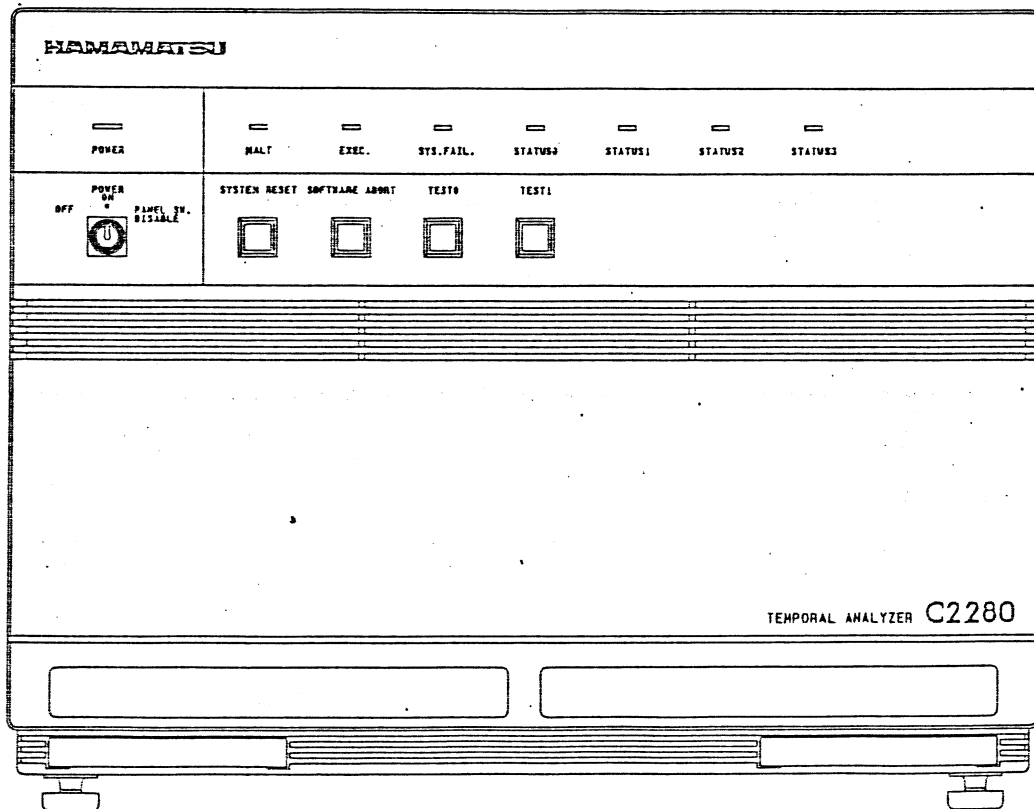
|                                                    |                                                                                                                                                   |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Image Data Memory                                  | 512 x 512 x 32bit x 4plane                                                                                                                        |
| Scan Converter frame memory                        | 512 x 512 x 8bit x 2plane                                                                                                                         |
| Overlay graphics Memory                            | 640 x 480 x 1 x 2plane                                                                                                                            |
| CPU                                                | MC68000/8MHz                                                                                                                                      |
| CPU RAM                                            | 1152KB<br>(includes 512KB RAM Disk (M-drive))                                                                                                     |
| CPU ROM                                            | 32KB                                                                                                                                              |
| Floppy & hard disk                                 | 8' 1MB x 1drive + 20MB                                                                                                                            |
| External trigger Input<br>(via C3140 C-CCD CAMERA) | 50ohm positive edge trigger TTL<br>level<br>Pulse width 1us min                                                                                   |
| Video Output<br>Conversion rate                    | 0~0.7V 75ohm<br>Composit Video Signal(EIA standard)<br>80ns/8bit                                                                                  |
| Streak Control<br>(via C3140 C-CCD CAMERA)         | Gate Close<br>TTL Open Collection<br>Reset<br>TTL positive pulse                                                                                  |
| Peripheral Interface                               | RS232C x 2<br>(includes Console I/F)<br>DR-11W DMA I/F(option)<br>IEEE-488 I/F(option)<br>Centronics I/F (option)<br>Additional RS232C x2(option) |
| Operating temperature<br>humidity                  | 0~40°C<br>60% max                                                                                                                                 |
| Storage temperature<br>humidity                    | -10~50°C<br>not condensed                                                                                                                         |
| Physical dimension(C2280)                          | 480(W) x 800(D) x 358(H)mm                                                                                                                        |
| WEIGHT(C2280)                                      | 48Kg                                                                                                                                              |
| Power Supply                                       | 117/220V 50/60Hz<br>580VA                                                                                                                         |

## SECTION 2      OPERATING INSTRUCTION

### \* Operating Environment

Use enough power supply for correct operation. And use clean power supply to avoid noise.

### \* Front panel Control



C2280 front panel

|                                                                                                                                                                                                                                                       |                                                                                                    |                                                                                                     |                                                                                                         |                                                                                                       |                                                                                                       |                                                                                                       |                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>POWER</p>                                                                                                                                                   | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>HALT</p> | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>EXEC.</p> | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>SYS.FAIL.</p> | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>STATUS0</p> | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>STATUS1</p> | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>STATUS2</p> | <div style="border: 1px solid black; width: 20px; height: 5px; margin: 0 auto;"></div> <p>STATUS3</p> |
| <p>POWER ON<br/>OFF</p> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;"> <div style="font-size: 1.5em;">U</div> </div> <p>PANEL SV.<br/>DISABLE</p> | SYSTEM RESET                                                                                       | SOFTWARE ABORT                                                                                      | TEST0                                                                                                   | TEST1                                                                                                 |                                                                                                       |                                                                                                       |                                                                                                       |

In the above figure each part has following function.

#### Power Switch :

Three position key switch controls power ON/OFF of C2280. In any position, user may pull out the key. (Don't lose this key.)

In the position of panel SW Disable, all of the panel push switches are disabled. If user want to inhibit an accidental system Reset from push switch, he must set the key to this position.

During the state of the power ON. power LED is lamped always.

#### SYSTEM RESET :

This push switch resets the C2280 System.

The reset procedure is also done automatically in power ON procedure.

#### SOFTWARE ABORT :

To push this switch causes non maskable interrupt to CPU. This will force CPU to enter ROM Monitor program in general system. In this case user must push the SYSTEM RESET switch or type ROM Monitor command "CPM", to Re-enter the CP/M-68K environment.

This switch is used to stop the current CPU process suddenly. But this occasional stop is not recommended to abort the normal CPU process, because this procedure may be harmful for Disk file system. (Not harmful for hardware.)

Normally on Operating System(CP/M-68K), typing of control-C must be used.

In the case of dead-lock by software, user may use this switch to abort procedure and press SYSTEM RESET Switch to Re-enter to CP/M.

#### TEST0, TEST1 :

These push switches status can be read from input port by CPU. These switch are not supported in temporal analyzer control software. These switches will be used in other diagnostics softwares.

#### HALT LAMP :

This LED indicates HALT state of CPU. This state is caused by following two causes. In the case of DMA access from other BUS master than CPU, STOP instruction of CPU is often used. This instruction execution will HALT CPU. This state can be escaped by interrupt Signal to CPU. Another is from intrinsic software or hardware error. This cause CPU HALT. In this case the restart operation cannot be done except for SYSTEM RESET switch or Power ON.

If SYS.FAIL LED is lamped simultaneously, this status sometimes indicate hardware error. In this case, call to service office.

EXEC lamp :

This LED indicates System BUS access of the CPU.  
Sometimes this lamp is not lamped because the CPU does not access system BUS. (CPU runs in internal BUS on CPU board.)

SYS. FAIL lamp :

This LED is controlled by a software output port or system fail hardware signal line in CPU board.  
In the RESET procedure, a program clears this output port, and turn off this lamp.  
If the ROM boot-strap routine was failed or if the hardware error in CPU board was occurred, this lamp is turn on.

STATUS 0 3 lamp :

These LEDs are controlled by an output port. In C2280 temporal analyzer software, these lamps are not supported. These LEDs will be used in other diagnostics softwares.

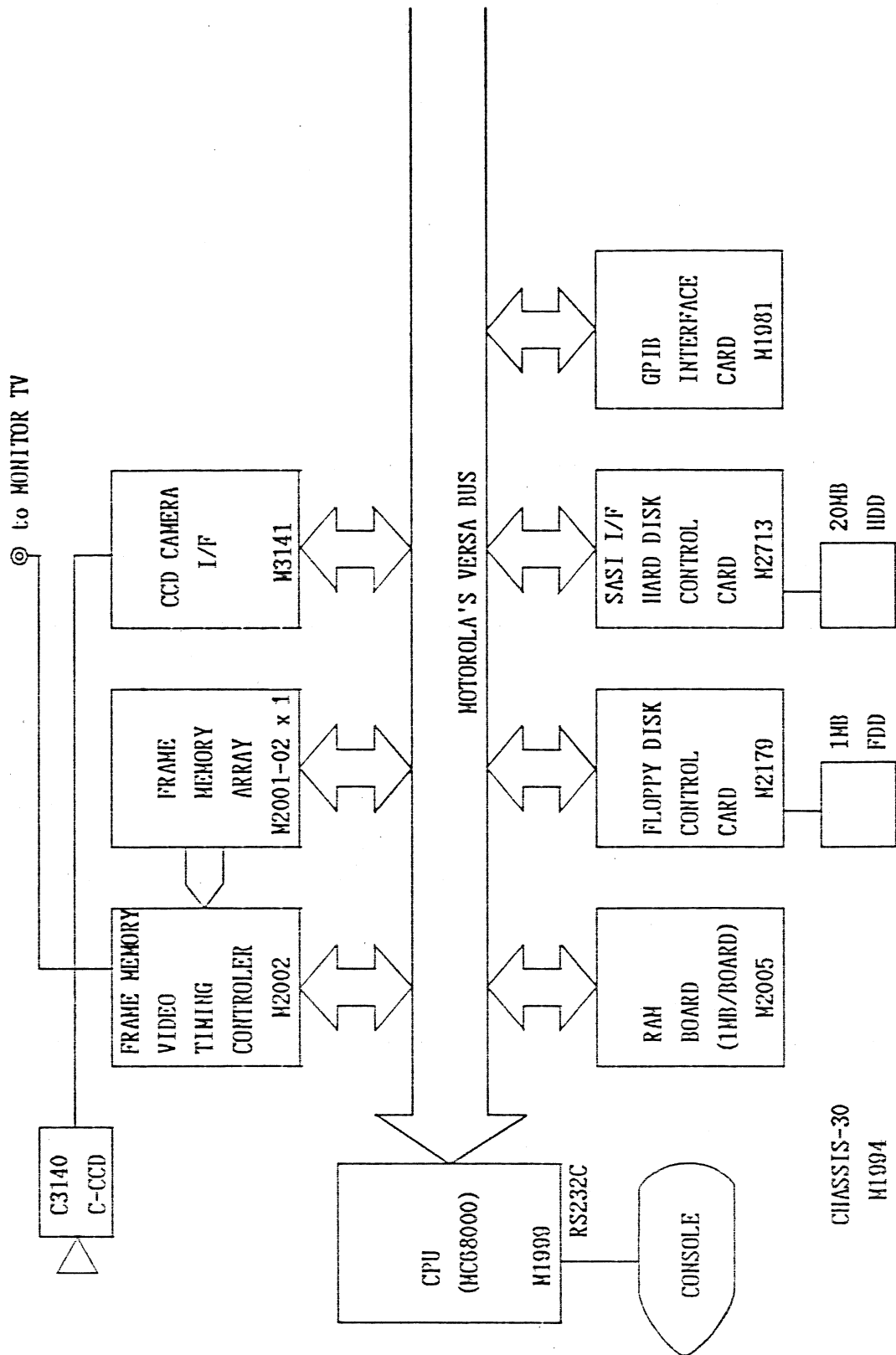
\* Operating Procedure

1. Power ON Console, C2280, C2712 floppy & hard disk drive.  
(Don't insert floppy media until the disk drive is powered on. If not, the inner edge of floppy media which contact to spindle of drive will be damaged.)
2. Insert media contains C2280 temporal analyzer control Software. (Normally, to drive A.)
3. For additional information, refer to software instruction manual.

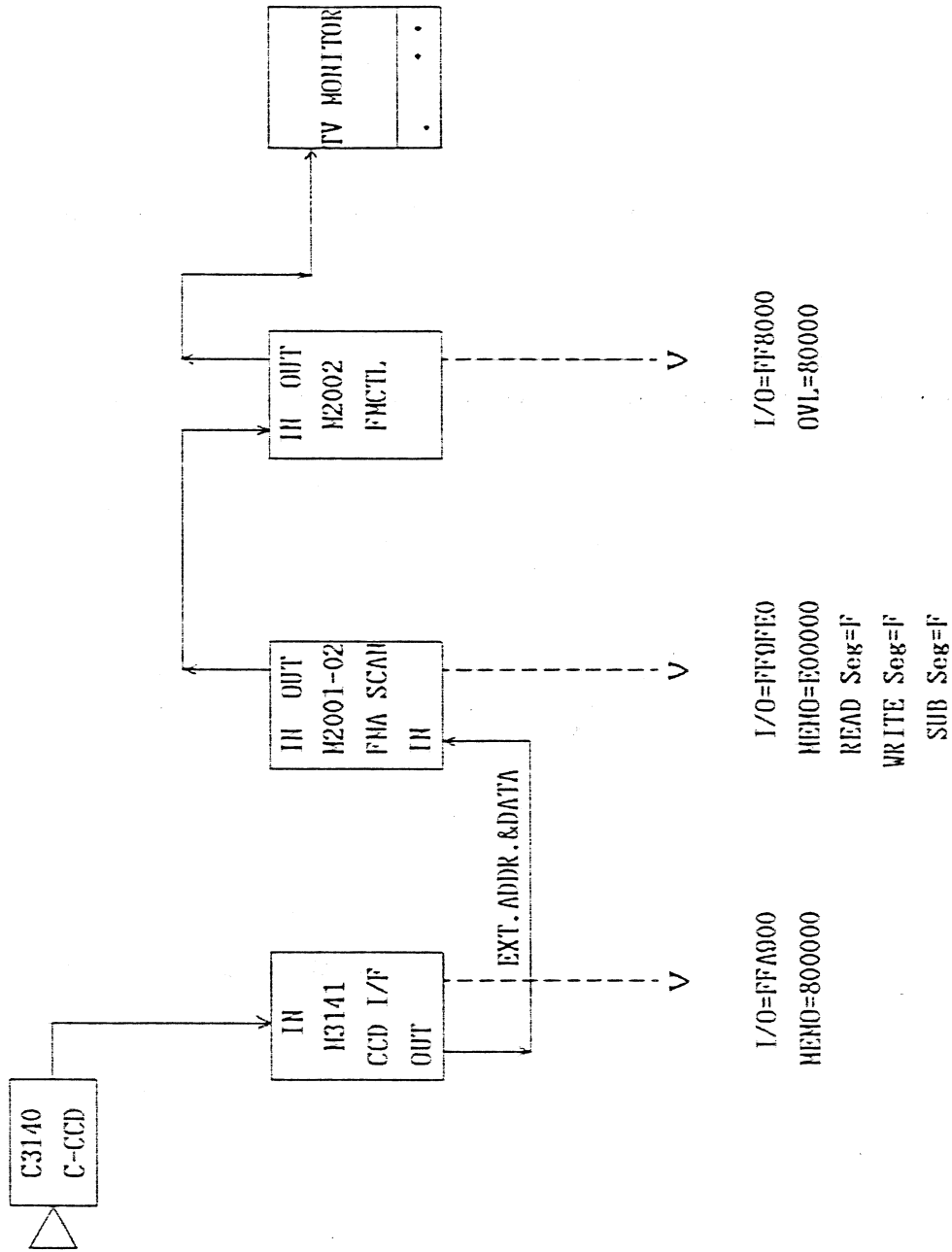
### SECTION 3 Hardware Description & Cable Connection



# C2280 TEMPORALANALYZER BLOCK DIAGRAM



# C2280-60 TA



C2280 system support following peripherals. Some of those are option.

1. C2712 hard disk drive with one floppy disk drive

The C2712 hard disk drive with floppy disk drive(HDD&FDD) are used for loading the software, and to store/load the image data or processing data.

The disk drive names assigned in CP/M-68K is "E:" for hard disk drive, and "A:" for the floppy disk drive. So a file, ABC.ST in drive A, is denoted by "A: ABC.ST". If the user is already logged to drive A, meaning that the default drive is A, it is not necessary to use "A:" to indicate the drive. For example, if the user is in drive A, (accessed by "A:[cr]"command in CP/M)the user may simply enter filename ABC.ST to access that file.

The user must insert diskette with the label facing to the right hand side of the disk drive slot. The disk will not be accessed if inserted incorrectly. The ready status is indicated by a half bright LED lamp.

This drive, C2712, and is connected by two cables of 50pin I/F cable with Floppy disk controller, M2179, hard disk controller M2713, from the back of the C2280 system with M1994 Chassis-30.

2. The DEC VT-220 console and its key board

The console which controls the TA system is connected by gray or black colored RS232C cable from the RS232C channel 0 connector at the back of the C2280.

This console must be set as follows : (For the detailed setup methode, please refer to the manual with the console.)

Input/Output transmission baud rate = both 9600 baud.

XON/XOFF control is ON.

Newline is Line-Feed character.

Supports ANSI standard cursor control.

8-bit No parity, 1 stop bit.

In this manual, the character control-C means character from the console which is output by typing C while Pressing the Control key. Similarly other control-xx keys, where xx is an arbitrary key.

If you want to type with upper case characters as default, type Lock key on the key board. This Lock key toggles between upper and lower case, so pressing again will return the default to lower case characters.

### 3. C1846 TV monitor (or PM127 TV monitor)

C1846 is a TV monitor to display the image data from the C2280 system. One coaxial cable with BNC and M connectors for respective sides is used to connect from the back of the C2280 system (video out) to the monitor for TV's video input. Please set the termination switch to ON at the back of the monitor TV set. The C2280 system outputs standard TV sync., as follows:

|               |  |                          |
|---------------|--|--------------------------|
| * TV scanning |  | CCIR system M            |
| and composite |  | (H 15.734 KHz            |
| video out     |  | V 29.97 Hz 2:1 Interlace |
|               |  | 525 rasters)             |

### 4. C3140 Cooled CCD Camera

The C3140 is a slow scan (frame rate: 1Hz) CCD camera developed to record images at low-light levels which a conventional video cameras can not detect.

Unlike video cameras using image pick-up tubes, the C3140 accumulates signals in a CCD chip; therefore, extremely long exposures are possible. In conventional video cameras, however, there is normally considerable image deterioration at room temperature due to dark current and noise when exposures are long. To overcome this situation, the C3140 uses a thermoelectric cooling system to cool the CCD and thus decrease dark noise to such a low level that it can be ignored, even for long exposures in dark ranges.

Sharp, clear, high-quality images impossible even a with high-sensitivity video camera (SIT camera) can now be taken at extremely low-light levels.

### 5. C1990-03 160MB winchester Hard Disk Drive (option)

C1990-03 is 160M byte (unformatted size) hard disk drive which is used for CP/M-68K operation or mass data storage. This drive is assigned as drive "E:".

If the user has secondary hard disk, the second hard disk drive is assigned as drive "F:". The C1990-03 needs the M1997 DISKCTL board hardware option to interface with the C2280 system.

### 6. EPSON RP-80 (or RX-80 for USA or Europe) Terminal Printer (option)

The printer RP-80 must be interfaced by using the CENTRONICS parallel interface on the back panel of C2280 hardware. It needs the M1998 Universal Interface board hardware option.

7. Hewlett Packard HP-7440A pen plotter (option)

The plotter HP-7440A needs M1998 Universal Interface board hardware option or M1981 GPIB interface card. This plotter is interfaced with HPIB (IEEE-488) interface line. This plotter has better slewput controlled with than following MP-2000 plotter.

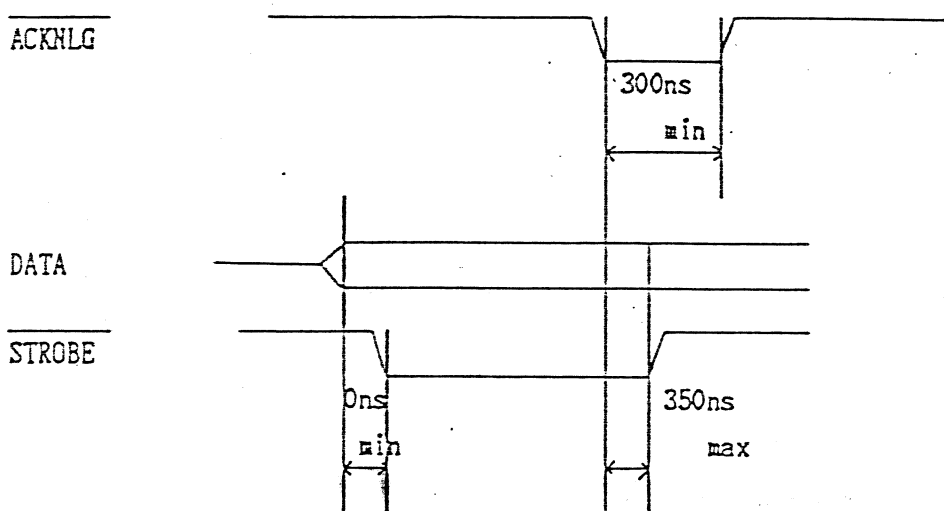
8. GRAPHTEC MP-2000 Pen Plotter (option)

The plotter MP-2000 needs no additional hardware board to be interfaced. This plotter must be connected to RS232C channel-1 on the back panel of C2280 systems. The setting of the plotter interface must be as follows:

Input/Output transmission baud rate = both 9600 baud.  
Hard Hand-shake. Always control ON.  
7-bit Even parity, 2 stop bits.

\* Block diagram and theory of operation

CENTRONICS I/F TIMING CHART



For printer, one CENTRONICS I/F port, CENTRONICS 0 connector in back panel of C2280 is supported on CP/M-68K. With this port, the the printer must be communicated with the above timing sequence.

The function of each block is as follows:

- . C3140 C-CCD camera :  
Cooled CCD camera which obtains the image.
- . C1846-03 Monitor TV :  
Displays the image processed by C2280.
- . M1999 CPU :  
Contains MC68000 microprocessor.  
Controls the C2280 system.  
Execute OS (CP/M-68K), TA control system software and  
HBASIC, etc.  
Execute image processing by software.
- . M2001-02 SCV FMA :  
Scan conversion frame memory.  
Converts the TV scanning sync. Timing from slow scan to  
2:1 interlaced TV scan for display by the Monitor TV.
- . M2002 FMCTL :  
Frame memory timing controller and generator.  
With D/A converter, converts digital video data to  
analog video signals for the monitor TV.  
Includes two pages of 640(X) x 480(Y) overlay dot plane  
memory for the purpose of displaying overlay characters  
and graphics on the image on the monitor TV.
- . M3141 CCD I/F :  
Control C3140 C-CCD CAMERA & STREAK CAMERA.  
32bit depth Frame memory (512x512x32bitx4plane) on this  
board.

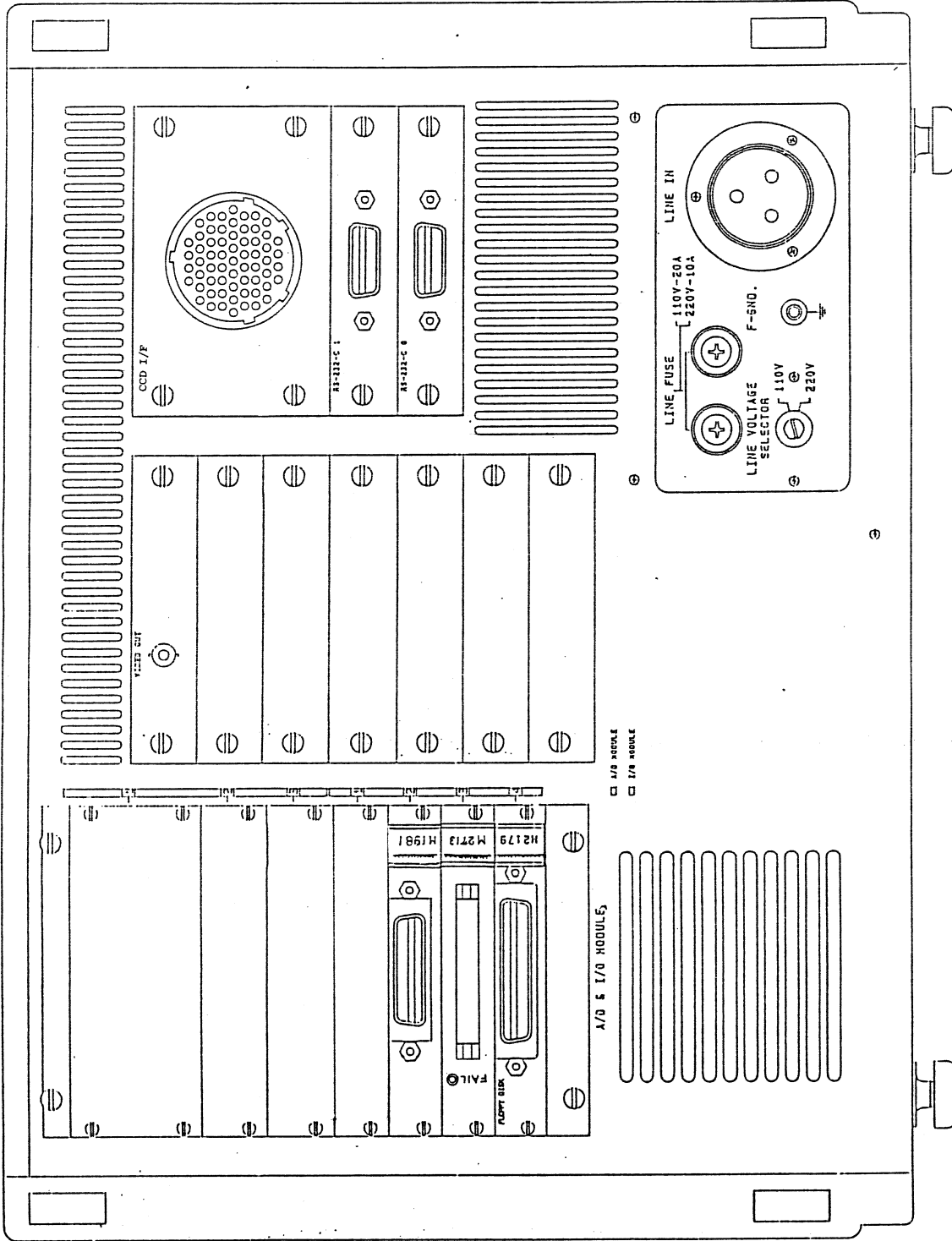
The flow of image data acquisition is as follows:

1. Waits for the external trigger or is started by internal software trigger, and skips to step 3.
2. External trigger arrives. Integration of image is started.
3. Obtains the image of C-CCD camera.
4. Converts to digital signal by A/D converter on C3140 C-CCD CAMERA.
5. Input to M3141. At the same time, loads the corresponding pixel data from the frame memory on M3141 CCD I/F.
6. Stores (writes) the result into the FRAME MEMORY.

Whenever the above procedures are executed, the SCV FMA converts the TV scan from slow scan.

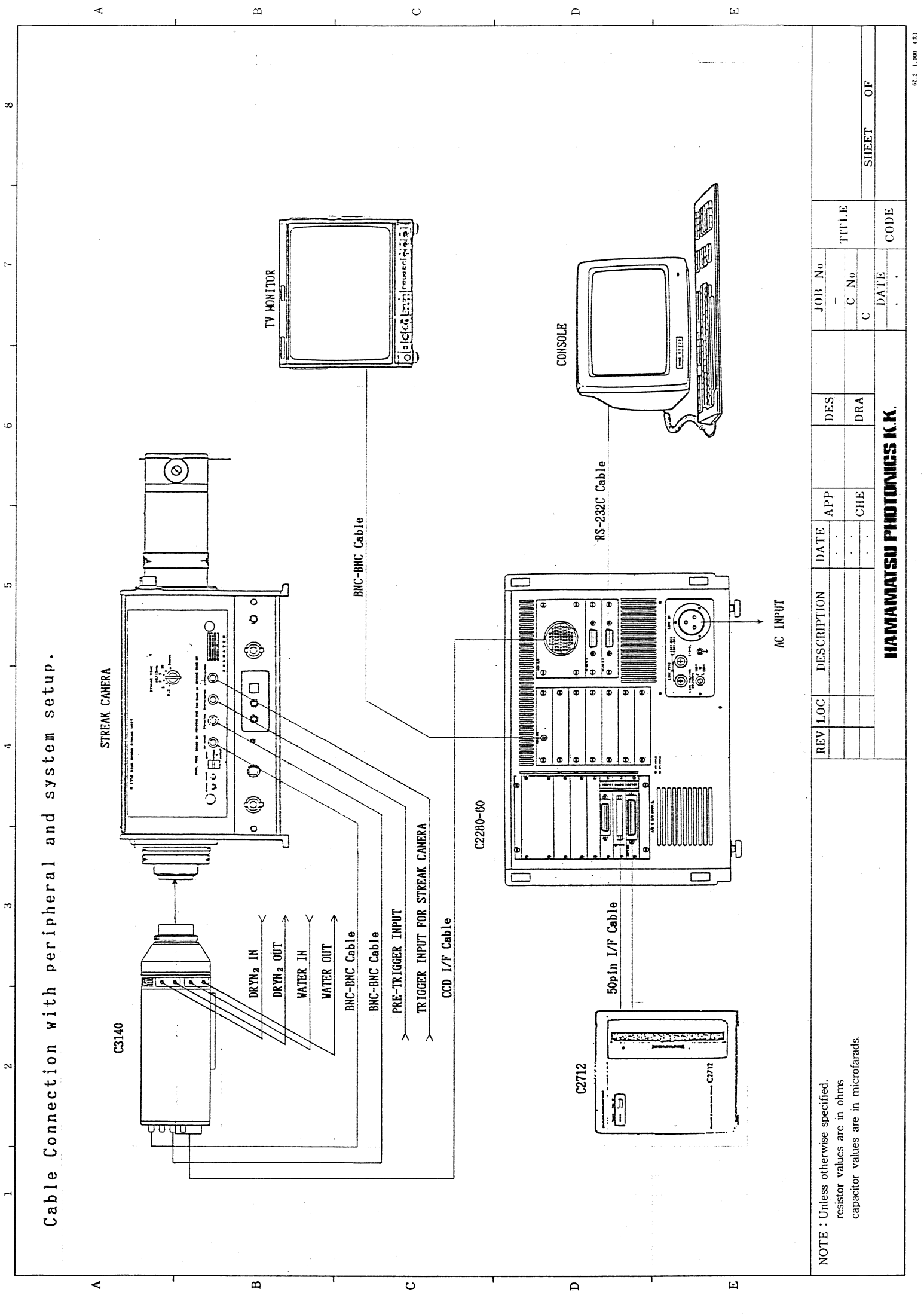
After the image data was frozen, CPU will analyze the data.





| REV | LOC | DESCRIPTION | DATE | APP | DES | Tanabe | JOB No       | TITLE           | SHEET | OF |
|-----|-----|-------------|------|-----|-----|--------|--------------|-----------------|-------|----|
|     |     |             |      |     |     |        | -            | C2280 Back View |       |    |
|     |     |             |      |     |     |        | C No         |                 |       |    |
|     |     |             |      |     |     |        | C 2280       |                 |       |    |
|     |     |             |      |     |     |        | DATE         |                 |       |    |
|     |     |             |      |     |     |        | 86. 2. 14    |                 |       |    |
|     |     |             |      |     |     |        | CODE         |                 |       |    |
|     |     |             |      |     |     |        | PPCH-ZBF5208 |                 |       |    |

HALLABAUER PROTECTOR, INC.

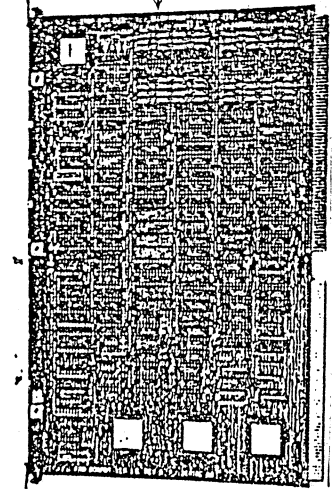


Cable Connection with peripheral and system setup.

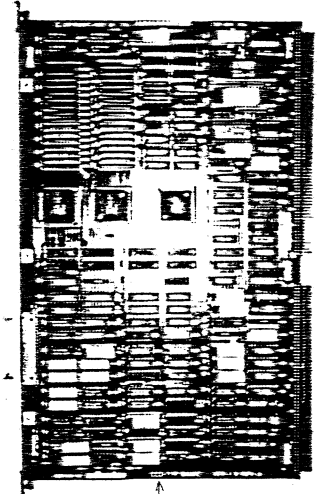
NOTE : Unless otherwise specified,  
resistor values are in ohms  
capacitor values are in microfarads.

|                                                                                                           |     |             |      |     |     |        |          |
|-----------------------------------------------------------------------------------------------------------|-----|-------------|------|-----|-----|--------|----------|
| NOTE : Unless otherwise specified,<br>resistor values are in ohms<br>capacitor values are in microfarads. |     |             |      |     |     |        |          |
| REV                                                                                                       | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE    |
|                                                                                                           |     |             | . .  |     |     | -      |          |
|                                                                                                           |     |             | . .  | CHE | DRA | C No   |          |
|                                                                                                           |     |             | . .  |     |     | C      |          |
| HAMAMATSU PHOTONICS K.K.                                                                                  |     |             |      |     |     |        | DATE     |
|                                                                                                           |     |             |      |     |     |        | . .      |
|                                                                                                           |     |             |      |     |     |        | CODE     |
|                                                                                                           |     |             |      |     |     |        | SHEET OF |

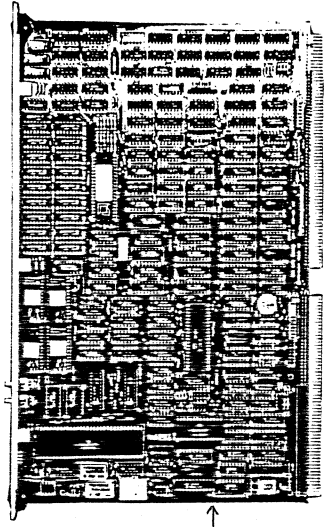
TEMPORALANALYZ C2280 Boards



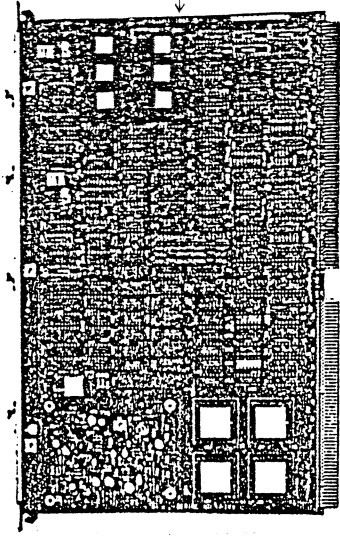
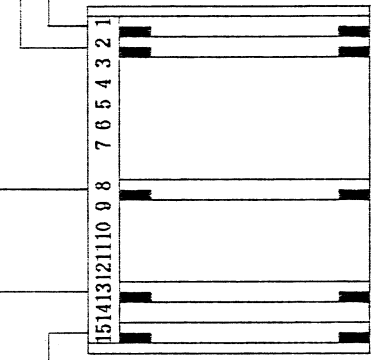
SLOT No.13 M2001-02 FRAME MEMORY ARRAY Board



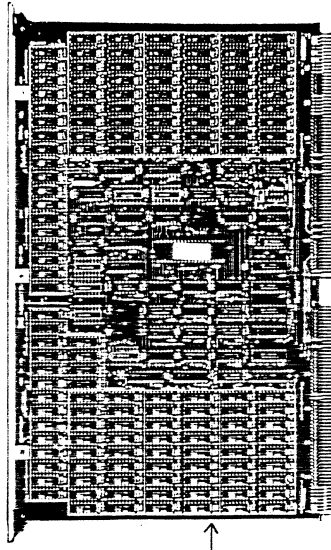
SLOT No.8 M3141 CCD I/F Board



SLOT No.1 M1999 CPU Board



SLOT No.15 M2002  
FRAME MEMORY ARRAY CONTROL Board



SLOT No.2 M2005 1K-MASS MEMORY Board

CHASSIS-30  
TOP VIEW, FLATCABLE CONNECTION

NOTE : Unless otherwise specified,  
resistor values are in ohms  
capacitor values are in microfarads.

| REV                      | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE |
|--------------------------|-----|-------------|------|-----|-----|--------|-------|
|                          |     |             |      |     |     | -      |       |
|                          |     |             |      | CHE | DRA | C      | C No  |
|                          |     |             |      |     |     | DATE   | OF    |
| HAMAMATSU PHOTONICS K.K. |     |             |      |     |     | CODE   |       |

This appendix identifies the VERSAbus backplane connector P1 pin assignments. The following table lists the pin assignments by pin number order.

P1 pin Assignments

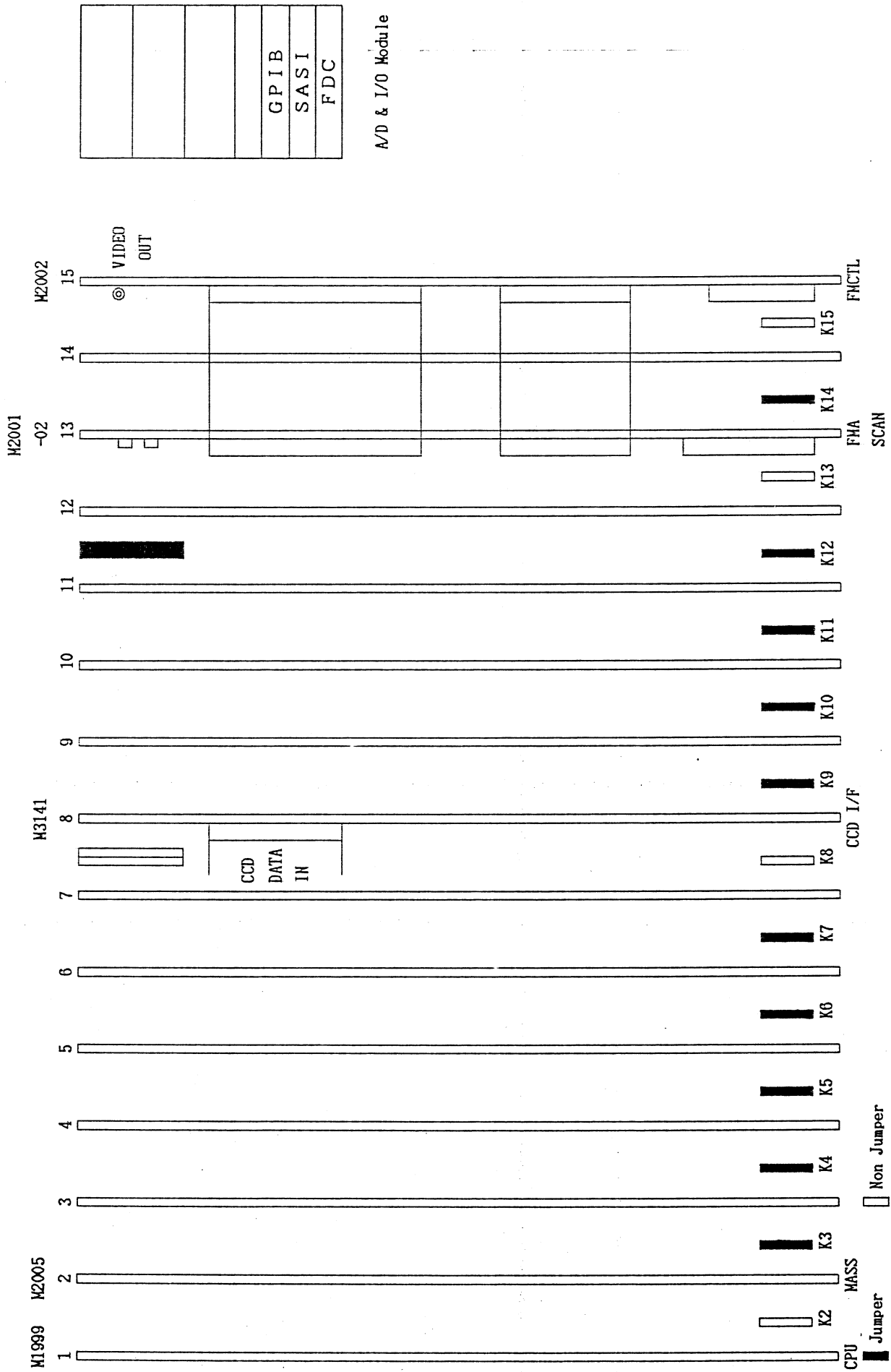
| ODD PIN<br>NUMBER<br>(P1 COMPONENT SIDE) | SIGNAL<br>Mnemonic | EVEN PIN<br>NUMBER<br>(P1 SOLDER SIDE) | SIGNAL<br>Mnemonic |
|------------------------------------------|--------------------|----------------------------------------|--------------------|
| 1                                        | +5V                | 2                                      | +5V                |
| 3                                        | GND                | 4                                      | GND                |
| 5                                        | /D00               | 6                                      | /D01               |
| 7                                        | /D02               | 8                                      | /D03               |
| 9                                        | /D04               | 10                                     | /D05               |
| 11                                       | /D06               | 12                                     | /D07               |
| 13                                       | /D08               | 14                                     | /D09               |
| 15                                       | /D10               | 16                                     | /D11               |
| 17                                       | /D12               | 18                                     | /D13               |
| 19                                       | /D14               | 20                                     | /D15               |
| 21                                       | /DPARITY0          | 22                                     | /DPARITY1          |
| 23                                       | GND                | 24                                     | GND                |
| 25                                       | /DS0               | 26                                     | /DS1               |
| 27                                       | GND                | 28                                     | GND                |
| 29                                       | /DTACK             | 30                                     | /AS                |
| 31                                       | GND                | 32                                     | GND                |
| 33                                       | /APARITY0          | 34                                     | /WRITE             |
| 35                                       | /LWORD             | 36                                     | /A01               |
| 37                                       | /A02               | 38                                     | /A03               |
| 39                                       | /A04               | 40                                     | /A05               |
| 41                                       | /A06               | 42                                     | /A07               |
| 43                                       | /A08               | 44                                     | /A09               |
| 45                                       | /A10               | 46                                     | /A11               |
| 47                                       | /A12               | 48                                     | /A13               |
| 49                                       | /A14               | 50                                     | /A15               |
| 51                                       | /A16               | 52                                     | /A17               |
| 53                                       | /A18               | 54                                     | /A19               |
| 55                                       | /A20               | 56                                     | /A21               |
| 57                                       | /A22               | 58                                     | /A23               |
| 59                                       | /AH4               | 60                                     | /AH7               |
| 61                                       | GND                | 62                                     | GND                |
| 63                                       | /AH3               | 64                                     | [RESERVED]         |
| 65                                       | /TEST0             | 66                                     | [RESERVED]         |
| 67                                       | GND                | 68                                     | GND                |
| 69                                       | ACCLK              | 70                                     | SYSCLK             |
| 71                                       | GND                | 72                                     | GND                |
| 73                                       | [RESERVED]         | 74                                     | /SYSRESET          |
| 75                                       | [RESERVED]         | 76                                     | [RESERVED]         |
| 77                                       | [RESERVED]         | 78                                     | /ACFAIL            |
| 79                                       | /TEST1             | 80                                     | /SYSFAIL           |
| 81                                       | /BERR              | 82                                     | [RESERVED]         |
| 83                                       | /AH0               | 84                                     | /AH1               |
| 85                                       | /AH2               | 86                                     | /AH6               |
| 87                                       | /IRQ1              | 88                                     | /IRQ2              |
| 89                                       | /IRQ3              | 90                                     | /IRQ4              |
| 91                                       | /IRQ5              | 92                                     | /IRQ6              |
| 93                                       | /IRQ7              | 94                                     | /AH5               |
| 95                                       | /ACKIN             | 96                                     | /ACKOUT            |
| 97                                       | /BG0IN             | 98                                     | /BG0OUT            |
| 99                                       | /BG1IN             | 100                                    | /BG1OUT            |
| 101                                      | /BG2IN             | 102                                    | /BG2OUT            |
| 103                                      | /BG3IN             | 104                                    | /BG3OUT            |
| 105                                      | /BG4IN             | 106                                    | /BG4OUT            |
| 107                                      | /BR0               | 108                                    | /BR1               |
| 109                                      | /BR2               | 110                                    | /BR3               |
| 111                                      | /BR4               | 112                                    | /BBSY              |
| 113                                      | /BCLR              | 114                                    | /BREL              |
| 115                                      | [RESERVED]         | 116                                    | [RESERVED]         |
| 117                                      | /APVAL             | 118                                    | /DPVAL             |
| 119                                      | GND                | 120                                    | GND                |
| 121                                      | -12V               | 122                                    | -12V               |
| 123                                      | GND                | 124                                    | GND                |
| 125                                      | +12V               | 126                                    | +12V               |
| 127                                      | +12V               | 128                                    | +12V               |
| 129                                      | +5V                | 130                                    | +5V                |
| 131                                      | +5V                | 132                                    | +5V                |
| 133                                      | +5V STDBY          | 134                                    | +5V STDBY          |
| 135                                      | GND                | 136                                    | GND                |
| 137                                      | GND                | 138                                    | GND                |
| 139                                      | GND                | 140                                    | GND                |

This appendix identifies the VERSAbus backplane edge connector P2 pin assignments. The following table lists the pin assignments by number order.

P2 pin Assignments

| ODD PIN<br>NUMBER<br>(P2 COMPONENT SIDE) | SIGNAL<br>MHEMONTIC | EVEN PIN<br>NUMBER<br>(P2 SOLDER SIDE) | SIGNAL<br>MHEMONTIC | ODD PIN<br>NUMBER<br>(P2 COMPONENT SIDE) | SIGNAL<br>MHEMONTIC | EVEN PIN<br>NUMBER<br>(P2 SOLDER SIDE) | SIGNAL<br>MHEMONTIC |
|------------------------------------------|---------------------|----------------------------------------|---------------------|------------------------------------------|---------------------|----------------------------------------|---------------------|
| 1                                        | GND                 | 2                                      | GND                 | 63                                       | /EXT_A23            | 64                                     | (/H_BLK)            |
| 3                                        | GND                 | 4                                      | GND                 | 65                                       | NC.                 | 66                                     | (/SYNC)             |
| 5                                        | GND                 | 6                                      | GND                 | 67                                       | -15V                | 68                                     | -15V                |
| 7                                        | +5V STDBY           | 8                                      | +5V STDBY           | 69                                       | +15V                | 70                                     | +15V                |
| 9                                        | +5V                 | 10                                     | +5V                 | 71                                       | /First frame        | 72                                     | NC.                 |
| 11                                       | +5V                 | 12                                     | +5V                 | 73                                       | /Config 0           | 74                                     | /EXT_D0             |
| 13                                       | +12V                | 14                                     | +12V                | 75                                       | /Config 1           | 76                                     | /EXT_D1             |
| 15                                       | +12V                | 16                                     | +12V                | 77                                       | /Config 2           | 78                                     | /EXT_D2             |
| 17                                       | NC.                 | 18                                     | NC.                 | 79                                       | /Config 3           | 80                                     | /EXT_D3             |
| 19                                       | /EXT_A1             | 20                                     | NC.                 | 81                                       | /SV_Trig            | 82                                     | /EXT_D4             |
| 21                                       | /EXT_A2             | 22                                     | NC.                 | 83                                       | /Frame start        | 84                                     | /EXT_D5             |
| 23                                       | /EXT_A3             | 24                                     | NC.                 | 85                                       | /X_init             | 86                                     | /EXT_D6             |
| 25                                       | /EXT_A4             | 26                                     | NC.                 | 87                                       | /Y_init             | 88                                     | /EXT_D7             |
| 27                                       | /EXT_A5             | 28                                     | NC.                 | 89                                       | /Sub valid          | 90                                     | /EXT_D8             |
| 29                                       | /EXT_A6             | 30                                     | NC.                 | 91                                       | NC.                 | 92                                     | /EXT_D9             |
| 31                                       | /EXT_A7             | 32                                     | NC.                 | 93                                       | /EVEN               | 94                                     | /EXT_D10            |
| 33                                       | /EXT_A8             | 34                                     | NC.                 | 95                                       | /EVEN2              | 96                                     | /EXT_D11            |
| 35                                       | /EXT_A9             | 36                                     | NC.                 | 97                                       | NC.                 | 98                                     | NC.                 |
| 37                                       | /EXT_A10            | 38                                     | NC.                 | 99                                       | /YCLK               | 100                                    | /EXT_D12            |
| 39                                       | /EXT_A11            | 40                                     | NC.                 | 101                                      | NC.                 | 102                                    | NC.                 |
| 41                                       | /EXT_A12            | 42                                     | NC.                 | 103                                      | /GHV                | 104                                    | /EXT_D13            |
| 43                                       | /EXT_A13            | 44                                     | NC.                 | 105                                      | /GVV                | 106                                    | /EXT_D14            |
| 45                                       | /EXT_A14            | 46                                     | NC.                 | 107                                      | /LHV                | 108                                    | /EXT_D15            |
| 47                                       | /EXT_A15            | 48                                     | NC.                 | 109                                      | /LVV                | 110                                    | /EXT_Regist         |
| 49                                       | /EXT_A16            | 50                                     | NC.                 | 111                                      | /Video_WE0          | 112                                    | /EXT_R/V            |
| 51                                       | /EXT_A17            | 52                                     | NC.                 | 113                                      | /Video_WE1          | 114                                    | /EXT_DTACK          |
| 53                                       | /EXT_A18            | 54                                     | NC.                 | 115                                      | /Video_WE2          | 116                                    | NC.                 |
| 55                                       | /EXT_A19            | 56                                     | NC.                 | 117                                      | /CLK_SYNC           | 118                                    | NC.                 |
| 57                                       | /EXT_A20            | 58                                     | (/OVLP2)            | 119                                      | ECLK                | 120                                    | NC.                 |
| 59                                       | /EXT_A21            | 60                                     | (/OVLP3)            |                                          |                     |                                        |                     |
| 61                                       | /EXT_A22            | 62                                     | (/V_BLK)            |                                          |                     |                                        |                     |

# FLATCABLE CONNECTION (C2280-60)



# 60PIN ASSIGNMENTS

| ODD PIN NUMBER | SIGNAL MNEMONIC | EVEN PIN NUMBER | SIGNAL MNEMONIC |
|----------------|-----------------|-----------------|-----------------|
| 1              | /WR PAGE        | 2               | GND             |
| 3              | /WR SEG0        | 4               | GND             |
| 5              | /WR SEG1        | 6               | GND             |
| 7              | /WR SEG2        | 8               | GND             |
| 9              | /WR SEG3        | 10              | GND             |
| 11             | /RD PAGE        | 12              | GND             |
| 13             | /RD SEG0        | 14              | GND             |
| 15             | /RD SEG1        | 16              | GND             |
| 17             | /RD SEG2        | 18              | GND             |
| 19             | /RD SEG3        | 20              | GND             |
| 21             | /X3             | 22              | GND             |
| 23             | /X4             | 24              | GND             |
| 25             | /X5             | 26              | GND             |
| 27             | /X6             | 28              | GND             |
| 29             | /X7             | 30              | GND             |
| 31             | /X8             | 32              | GND             |
| 33             | /X9             | 34              | GND             |
| 35             | /Y0             | 36              | GND             |
| 37             | /Y1             | 38              | GND             |
| 39             | /Y2             | 40              | GND             |
| 41             | /Y3             | 42              | GND             |
| 43             | /Y4             | 44              | GND             |
| 45             | /Y5             | 46              | GND             |
| 47             | /Y6             | 48              | GND             |
| 49             | /Y7             | 50              | GND             |
| 51             | /Y8             | 52              | GND             |
| 53             | /Y9             | 54              | GND             |
| 55             | /Y10            | 56              | GND             |
| 57             | [RESERVED]      | 58              | GND             |
| 59             | [RESERVED]      | 60              | GND             |

# 34PIN ASSIGNMENTS

| ODD PIN NUMBER | SIGNAL MNEMONIC | EVEN PIN NUMBER | SIGNAL MNEMONIC |
|----------------|-----------------|-----------------|-----------------|
| 1              | /VALID          | 2               | GND             |
| 3              | /D0             | 4               | GND             |
| 5              | /D1             | 6               | GND             |
| 7              | /D2             | 8               | GND             |
| 9              | /D3             | 10              | GND             |
| 11             | /D4             | 12              | GND             |
| 13             | /D5             | 14              | GND             |
| 15             | /D6             | 16              | GND             |
| 17             | /D7             | 18              | GND             |
| 19             | /D8             | 20              | GND             |
| 21             | /D9             | 22              | GND             |
| 23             | /D10            | 24              | GND             |
| 25             | /D11            | 26              | GND             |
| 27             | /D12            | 28              | GND             |
| 29             | /D13            | 30              | GND             |
| 31             | /D14            | 32              | GND             |
| 33             | /D15            | 34              | GND             |

# M2001 FMA MASTER/SLAVE SELECTOR MOLEX4PIN

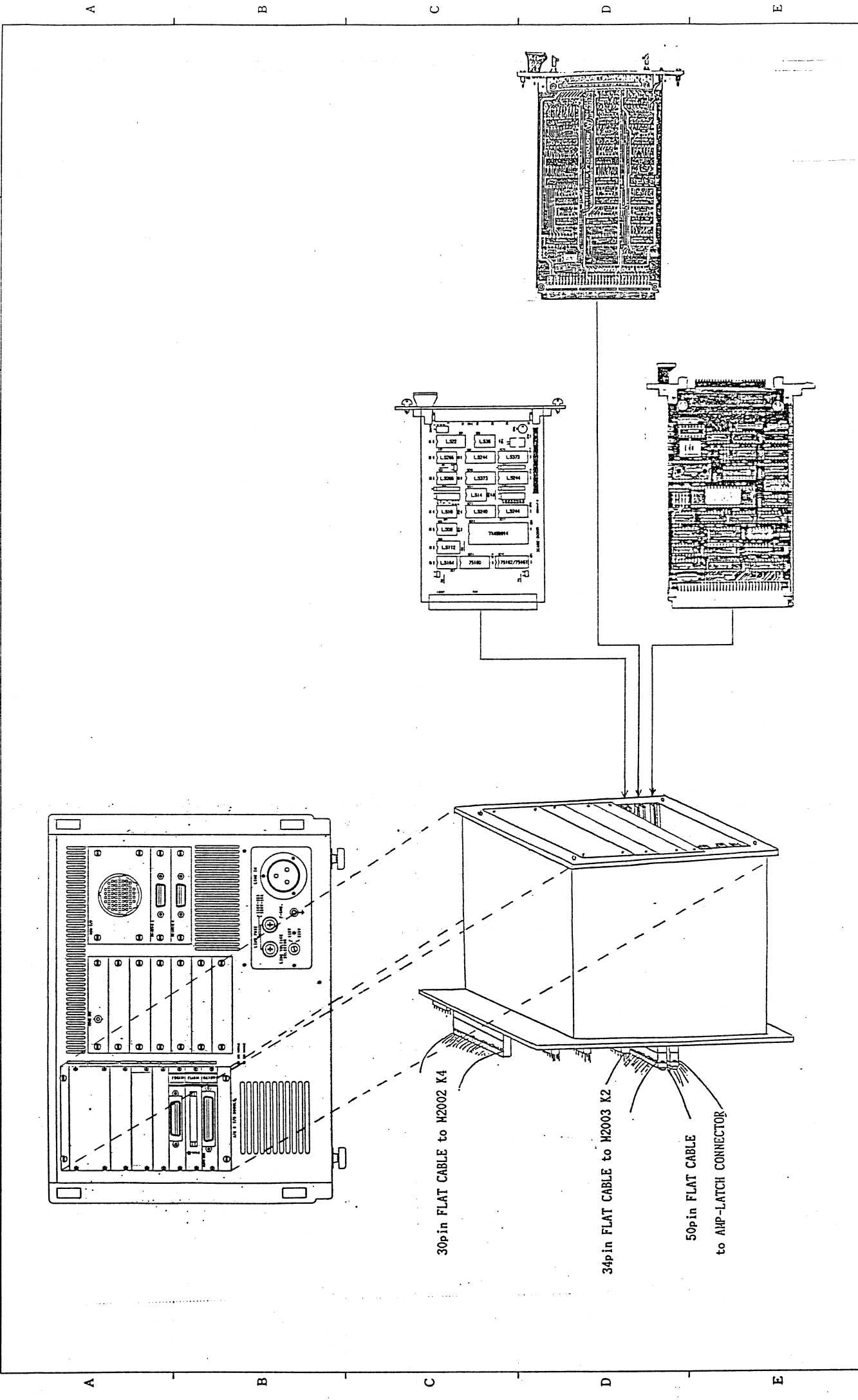
| MOLEX PIN NUMBER | SIGNAL MNEMONIC |
|------------------|-----------------|
| 1                | M12             |
| 2                | M02             |
| 3                | M11             |
| 4                | M01             |

# TV sync line 30pin connector pin assignments

| ODD PIN NUMBER | SIGNAL MNEMONIC | EVEN PIN NUMBER | SIGNAL MNEMONIC |
|----------------|-----------------|-----------------|-----------------|
| 1              | /AD OE          | 2               | GND             |
| 3              | /OPTI           | 4               | GND             |
| 5              | /VALID          | 6               | GND             |
| 7              | /H_BLK          | 8               | GND             |
| 9              | /V_BLK          | 10              | GND             |
| 11             | /HD.            | 12              | GND             |
| 13             | /VD.            | 14              | GND             |
| 15             | /SYNC           | 16              | GND             |
| 17             | [RESERVED]      | 18              | GND             |
| 19             | /PLL_HD.        | 20              | GND             |
| 21             | /SEPA_VD.       | 22              | GND             |
| 23             | EXT.CLK         | 24              | GND             |
| 25             | /EXT_H RESET    | 26              | GND             |
| 27             | /CLK SYNC       | 28              | GND             |
| 29             | ECLK            | 30              | GND             |

# M2180 TRIG WR TRIG INPUT MOLEX4PIN

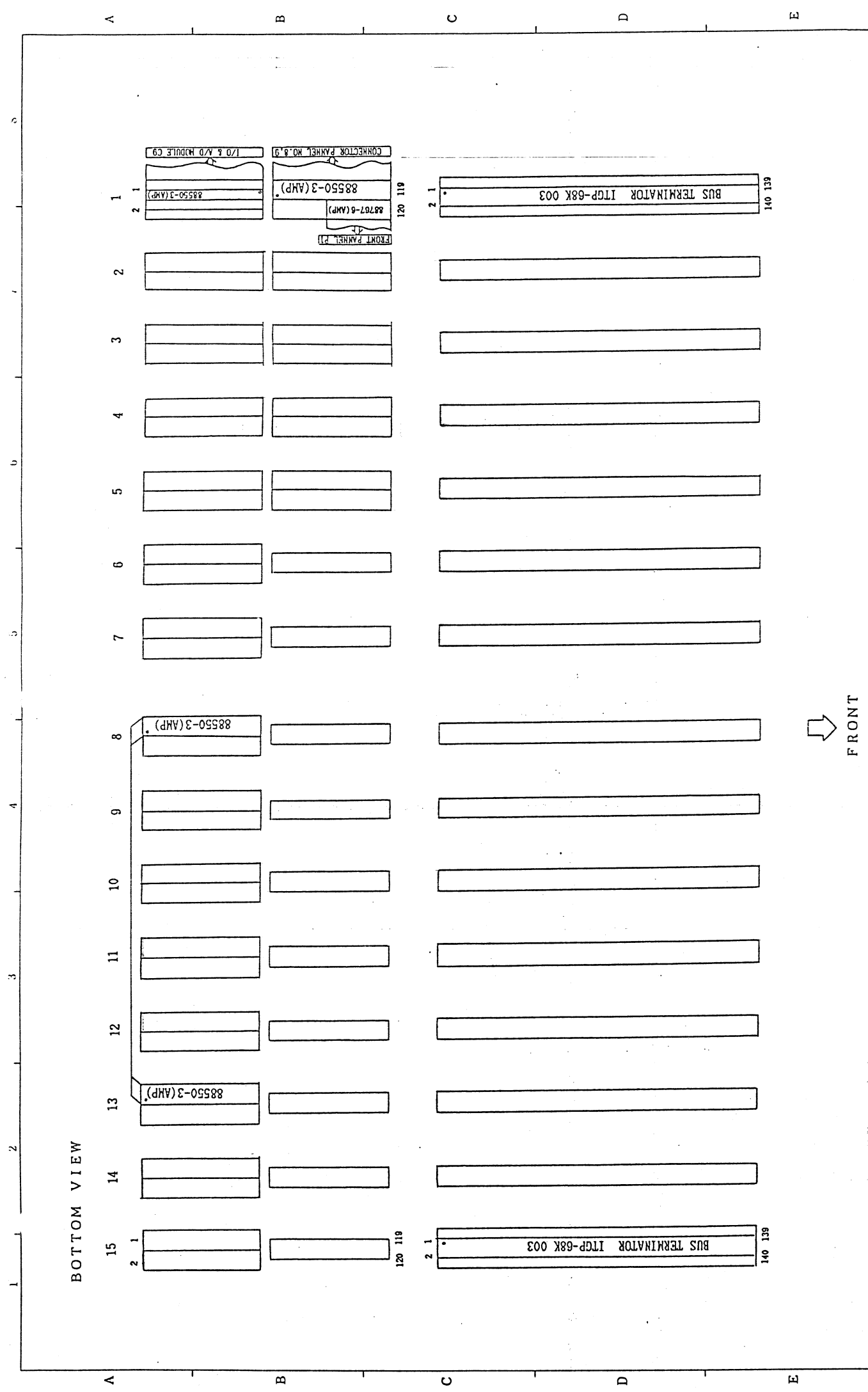
| MOLEX PIN NUMBER | SIGNAL MNEMONIC |
|------------------|-----------------|
| 1                | GND             |
| 2                | TRIGGER         |
| 3                | NC.             |
| 4                | NC.             |



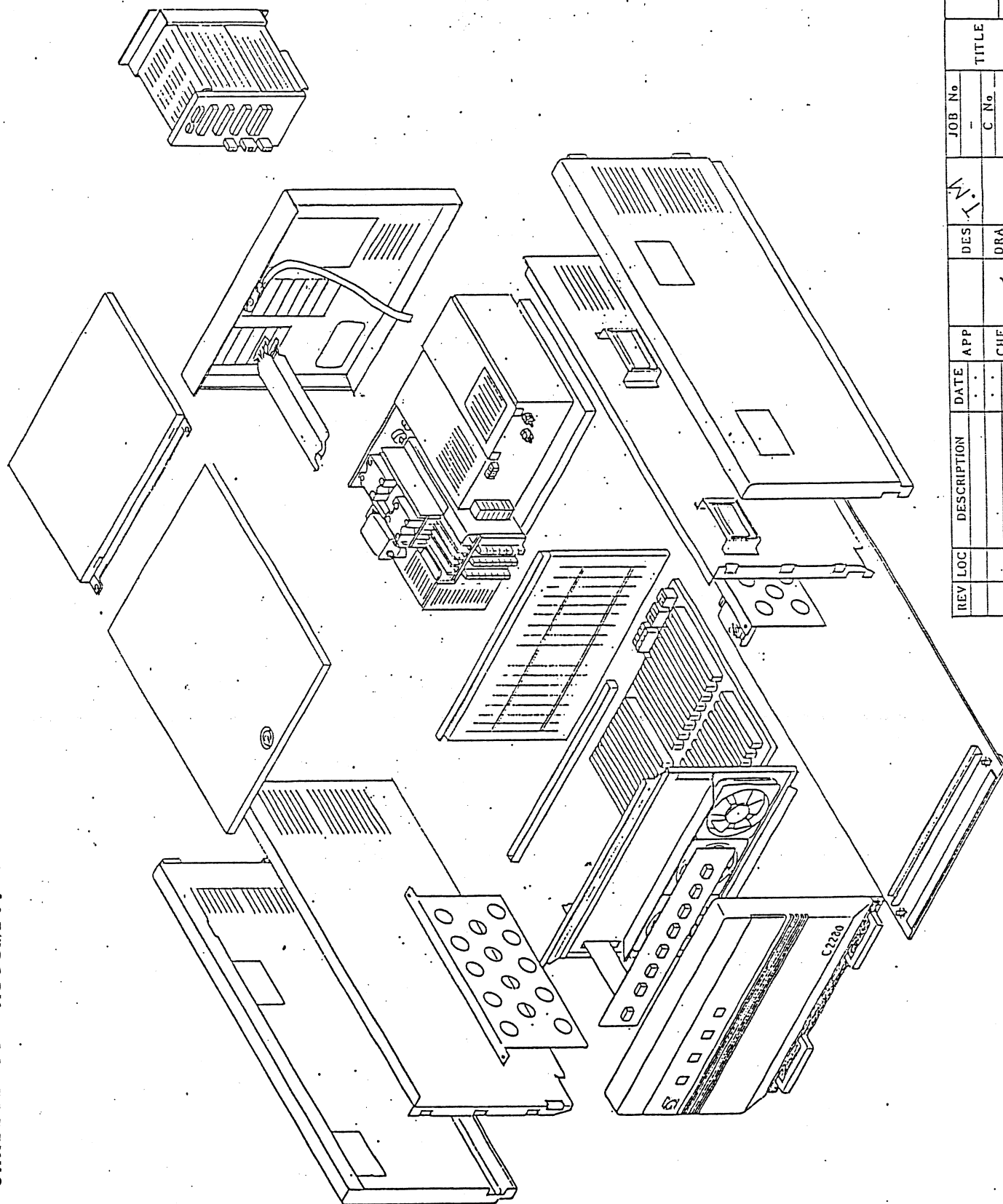
|  |  |  |  |        |     |                          |  |
|--|--|--|--|--------|-----|--------------------------|--|
|  |  |  |  | JOB No |     | TITLE                    |  |
|  |  |  |  | C No   |     | SHEET OF                 |  |
|  |  |  |  | DATE   |     | CODE                     |  |
|  |  |  |  |        |     |                          |  |
|  |  |  |  | DES    | APP | HAMAMATSU PHOTONICS K.K. |  |
|  |  |  |  | DRA    | CHE |                          |  |
|  |  |  |  |        |     |                          |  |
|  |  |  |  |        |     |                          |  |

NOTE : Unless otherwise specified,  
resistor values are in ohms  
capacitor values are in microfarads.



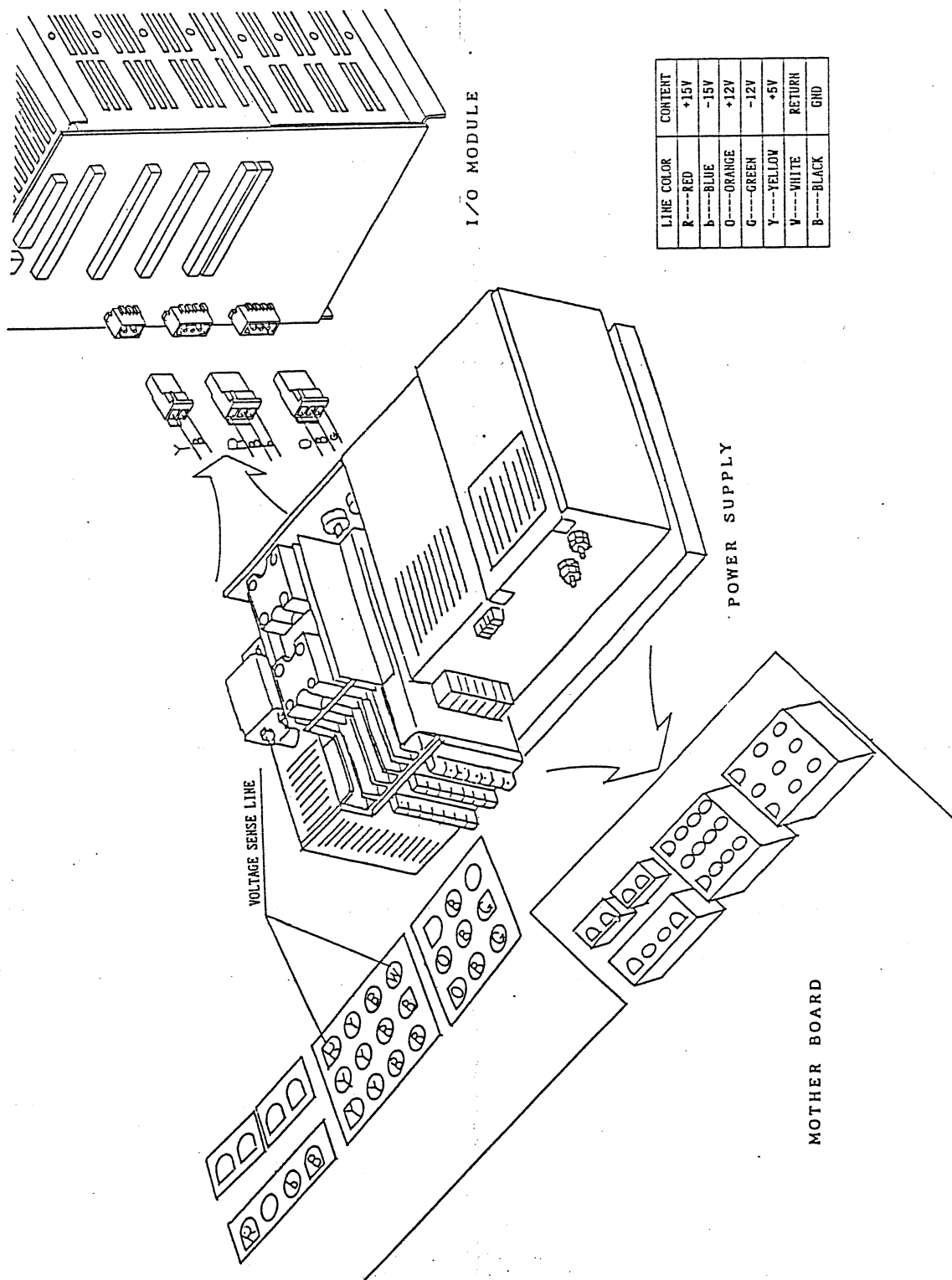


|                                                                                                           |     |     |             |      |     |     |        |       |                     |              |
|-----------------------------------------------------------------------------------------------------------|-----|-----|-------------|------|-----|-----|--------|-------|---------------------|--------------|
| NOTE : Unless otherwise specified,<br>resistor values are in ohms<br>capacitor values are in microfarads. | REV | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE | CONNECTOR<br>BEHIND |              |
|                                                                                                           |     |     |             |      |     |     | -      |       |                     |              |
|                                                                                                           |     |     |             |      |     |     | C No   |       |                     |              |
|                                                                                                           |     |     |             |      |     |     | C      |       |                     |              |
| HAMAMATSU PHOTOENICS K.K.                                                                                 |     |     |             |      |     |     | DATE   | CODE  | SHEET OF            | MOTHER BOARD |



| REV | LOC | DESCRIPTION | DATE | APP | DES | JOB No. | TITLE    |
|-----|-----|-------------|------|-----|-----|---------|----------|
|     |     |             | .    |     |     | -       |          |
|     |     |             | .    | CHE | DRA | C No.   |          |
|     |     |             | .    |     |     | DATE    | SHEET OF |
|     |     |             | .    |     |     |         | CODE     |

HAMAMATSU PHOTOONICS K.K.



NOTE : Unless otherwise specified,  
resistor values are in ohms  
capacitor values are in microfarads.

| REV | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE | INTERNAL POWER SUPPLY<br>CABLE CONNECTION<br>SHEET OF |
|-----|-----|-------------|------|-----|-----|--------|-------|-------------------------------------------------------|
|     |     |             | ..   |     |     | -      |       |                                                       |
|     |     |             | ..   | CHE | DRA | C No   |       |                                                       |
|     |     |             | ..   |     |     | C      |       |                                                       |
|     |     |             |      |     |     | DATE   | CODE  |                                                       |

**HAMAMATSU PHOTOONICS K.K.**

SECTION 4

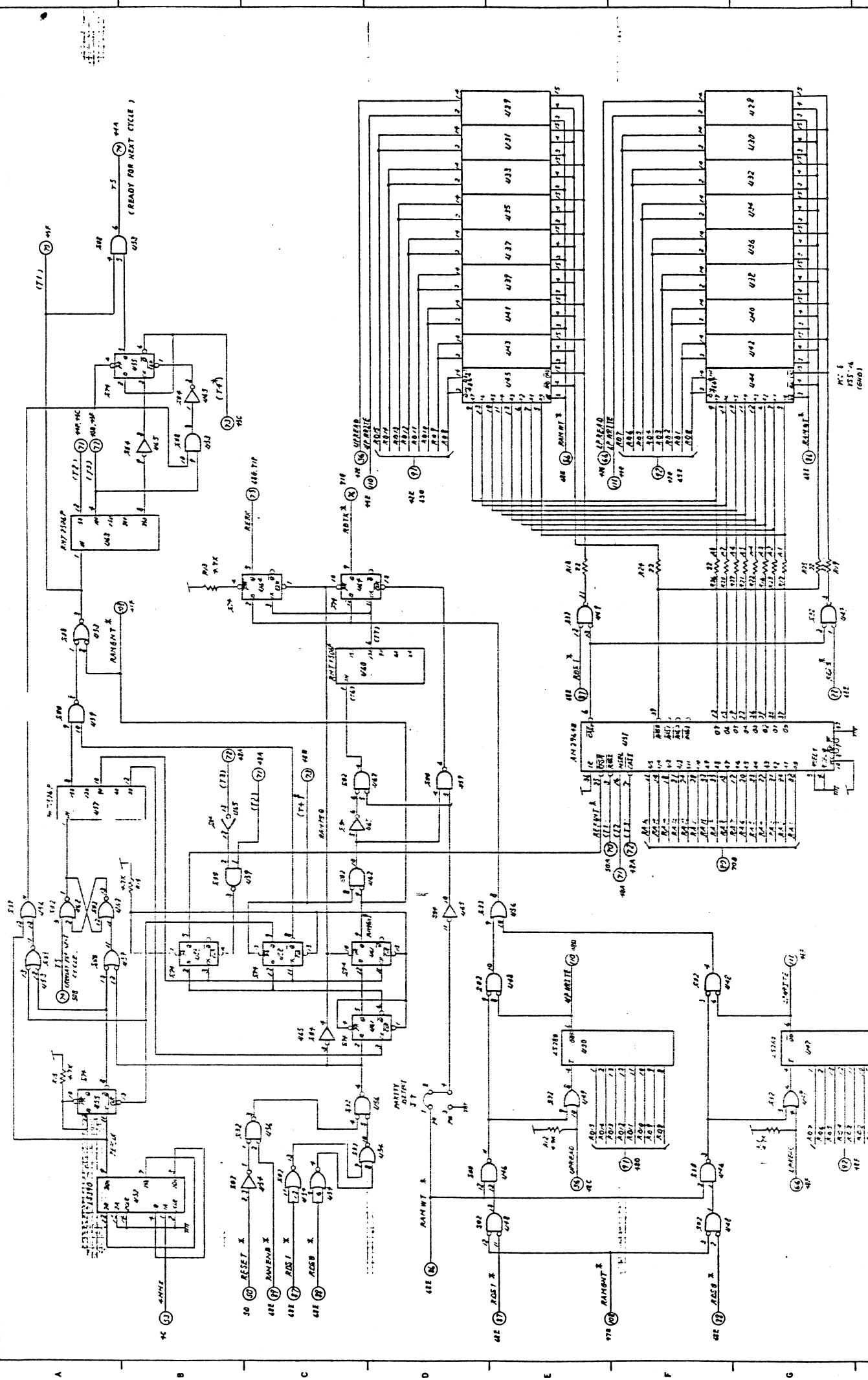
Circuit Diagram

M1999

MC68000 CPU BOARD

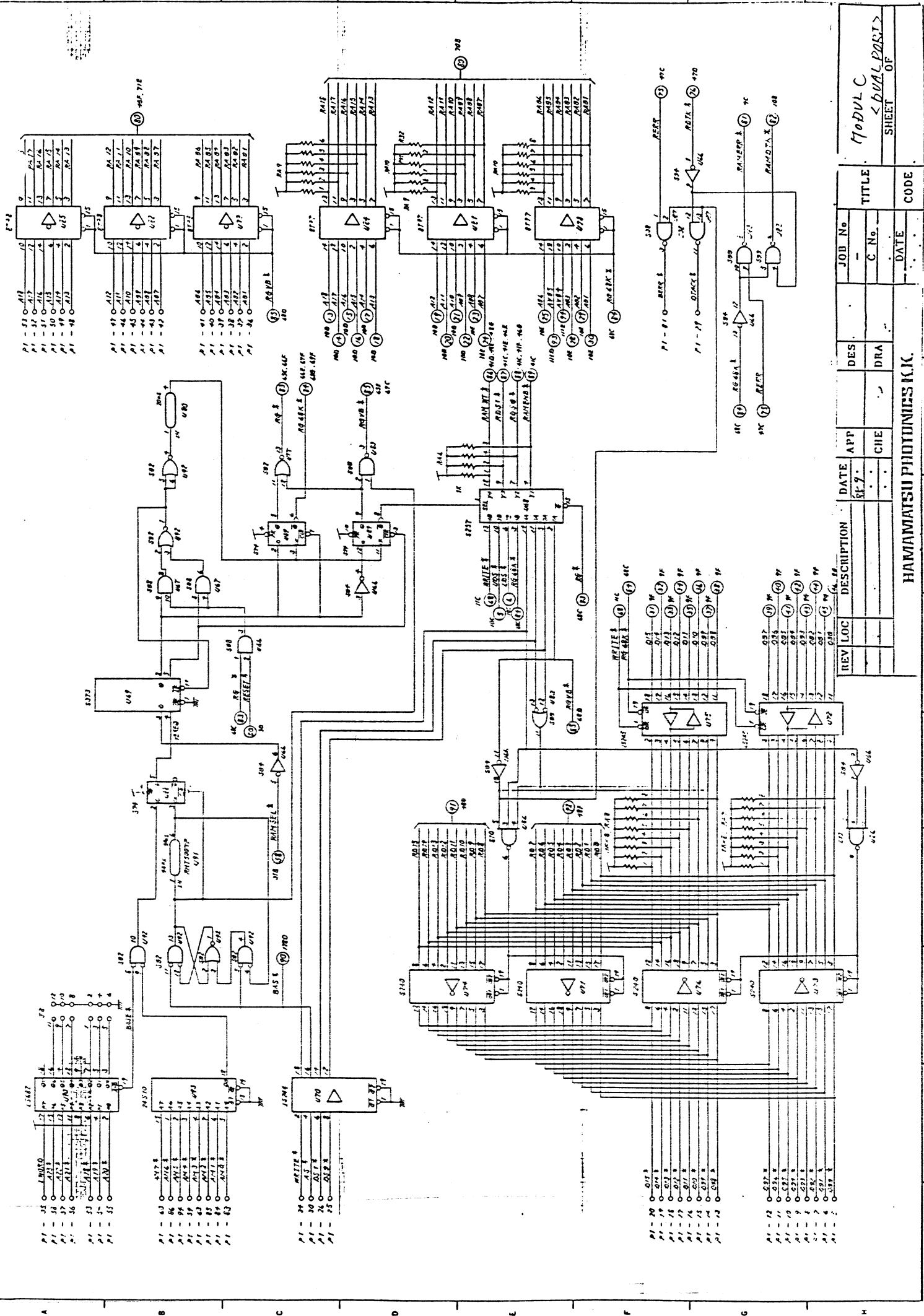






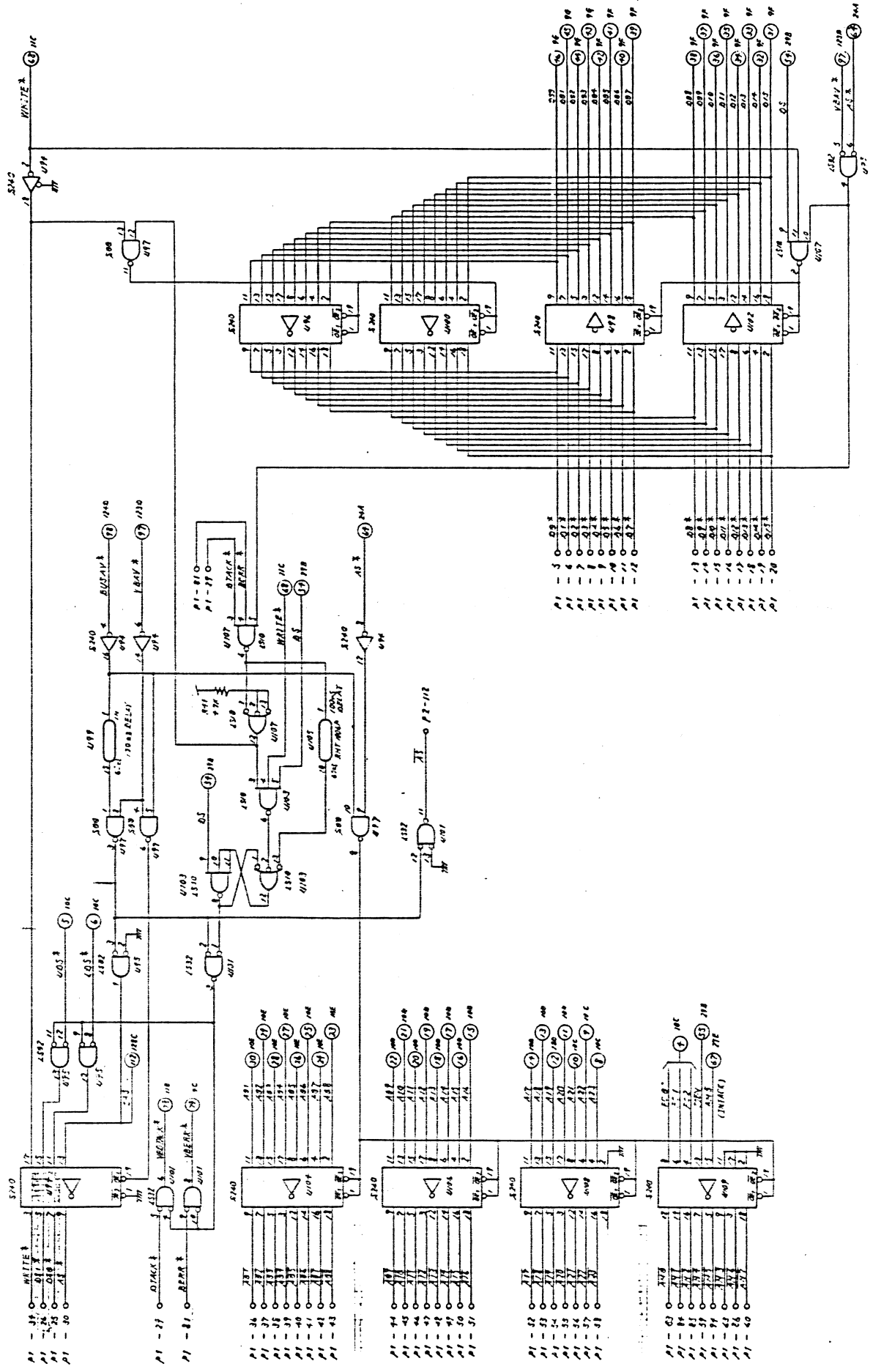
| REV | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE           | CODE |
|-----|-----|-------------|------|-----|-----|--------|-----------------|------|
| 1   |     |             | 1/70 |     |     |        | MODUL-B <D-RAM> |      |
|     |     |             |      |     |     |        | SHEET OF        |      |

HAMAMATSU PHOTOINICS K.K.



| HAMAMATSU PHOTONICS K.K. |     |             |      | TITLE |     | CODE   |  |
|--------------------------|-----|-------------|------|-------|-----|--------|--|
| REV                      | LOC | DESCRIPTION | DATE | APP   | DES | JOB No |  |
| 1                        |     |             | 8/7  |       |     |        |  |
| 2                        |     |             |      |       |     |        |  |
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| HAMAMATSU PHOTONICS K.K. |     |             |      | TITLE |     | CODE   |  |
|--------------------------|-----|-------------|------|-------|-----|--------|--|
| REV                      | LOC | DESCRIPTION | DATE | APP   | DES | JOB No |  |
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| 84                       |     |             |      |       |     |        |  |
| 85                       |     |             |      |       |     |        |  |
| 86                       |     |             |      |       |     |        |  |
| 87                       |     |             |      |       |     |        |  |
| 88                       |     |             |      |       |     |        |  |
| 89                       |     |             |      |       |     |        |  |
| 90                       |     |             |      |       |     |        |  |
| 91                       |     |             |      |       |     |        |  |
| 92                       |     |             |      |       |     |        |  |
| 93                       |     |             |      |       |     |        |  |
| 94                       |     |             |      |       |     |        |  |
| 95                       |     |             |      |       |     |        |  |
| 96                       |     |             |      |       |     |        |  |
| 97                       |     |             |      |       |     |        |  |
| 98                       |     |             |      |       |     |        |  |
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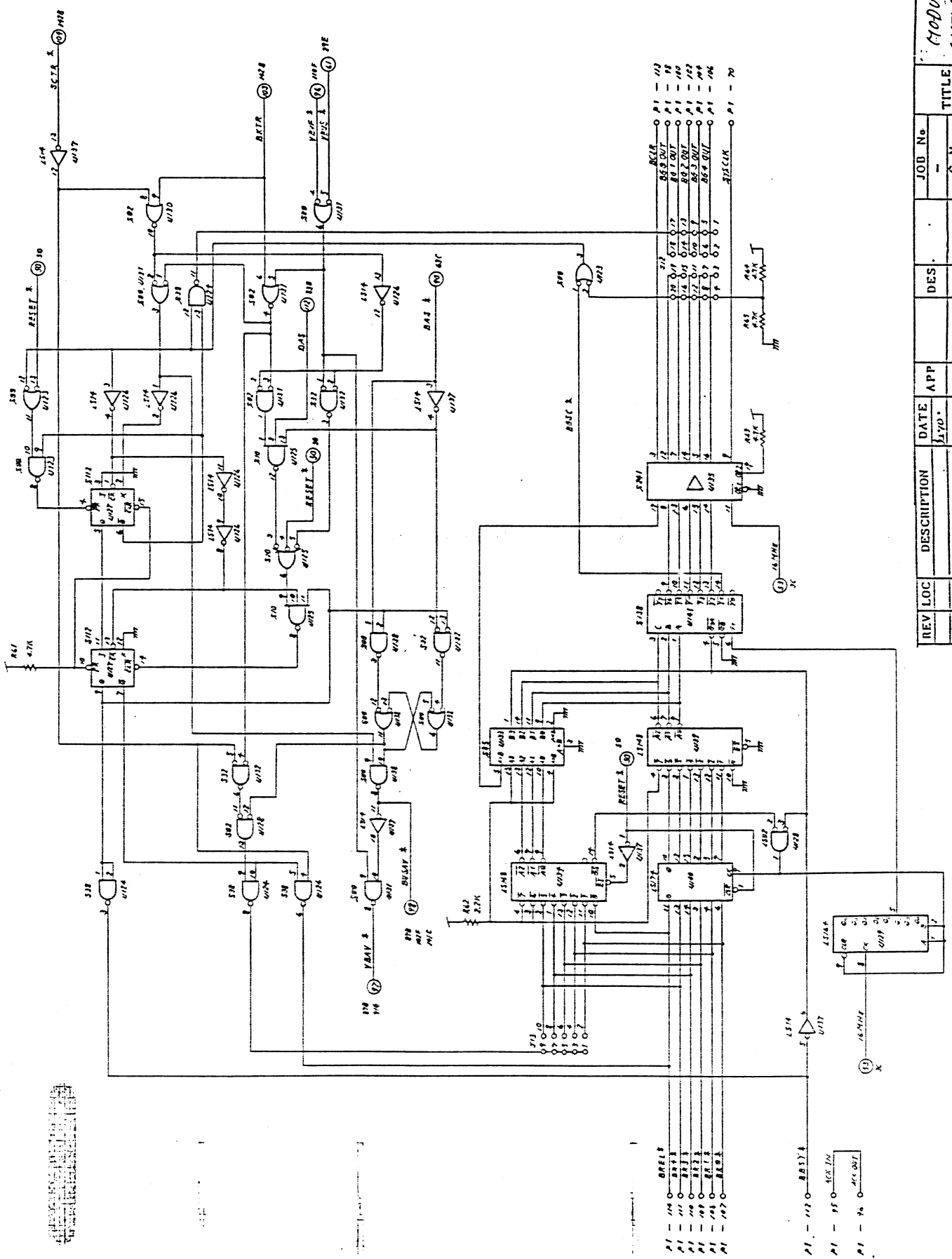


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|-----|-----|-------------|------|-----|-----|
| REV | LOC | DESCRIPTION | DATE | APP | DES |
|     |     |             | 1/10 |     |     |
|     |     |             |      | CHE | DRA |
|     |     |             |      |     |     |

**HAMAMATSU PHOTONICS K.K.**

|        |                    |      |
|--------|--------------------|------|
| JOB No | TITLE              | CODE |
| -      | MODULAR            |      |
| C No   | VERSARIS INTERFACE |      |
| DATE   | SHEET              | OF   |
|        |                    |      |

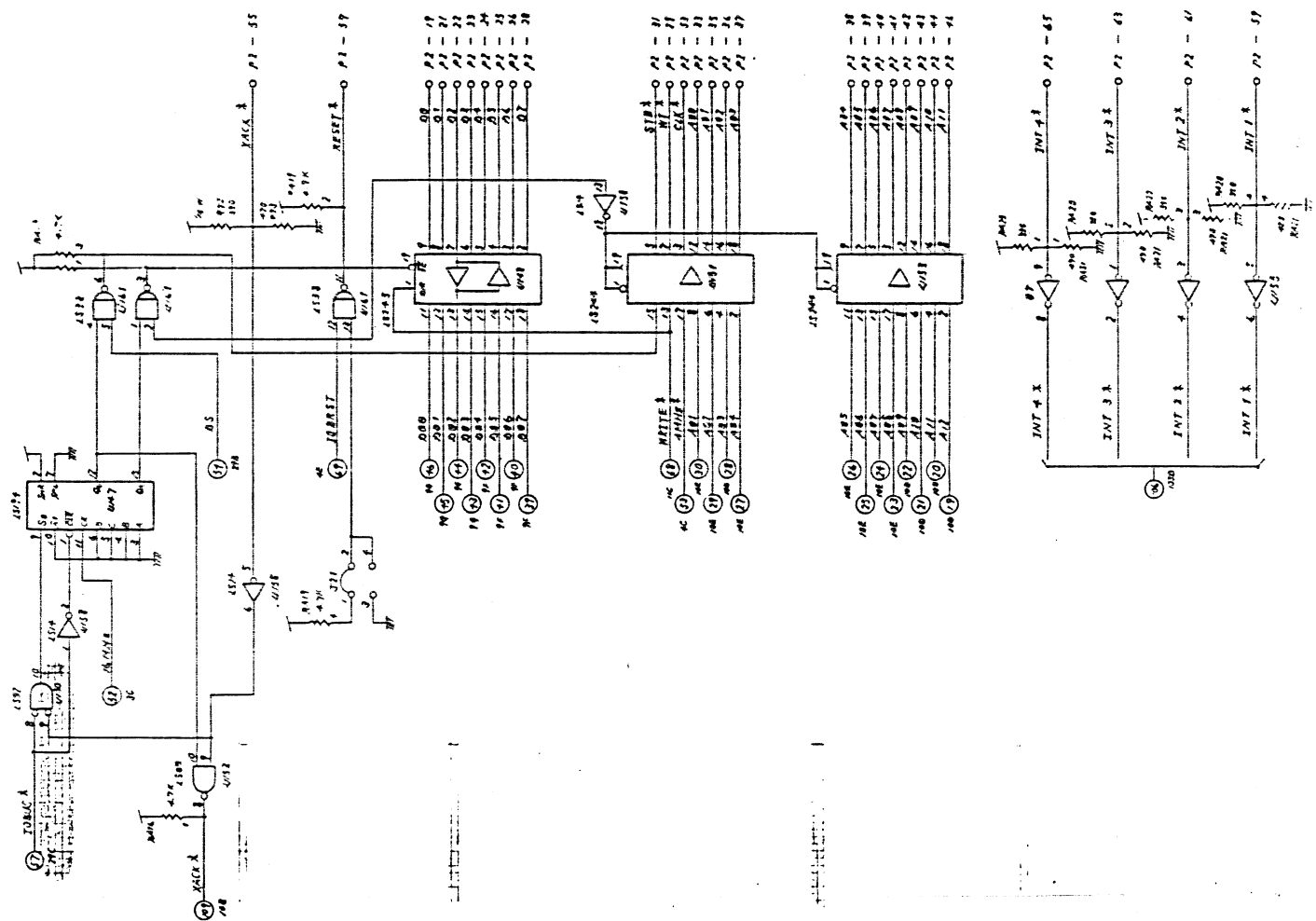




| REV | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE                           | CODE |
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|     |     |             | 1/70 |     | DRA |        | MODUL F<br>< VERSABUS ARBITER > |      |
|     |     |             |      |     |     |        | SHEET OF                        |      |

HAWAIIAN PHOTONICS K.K.

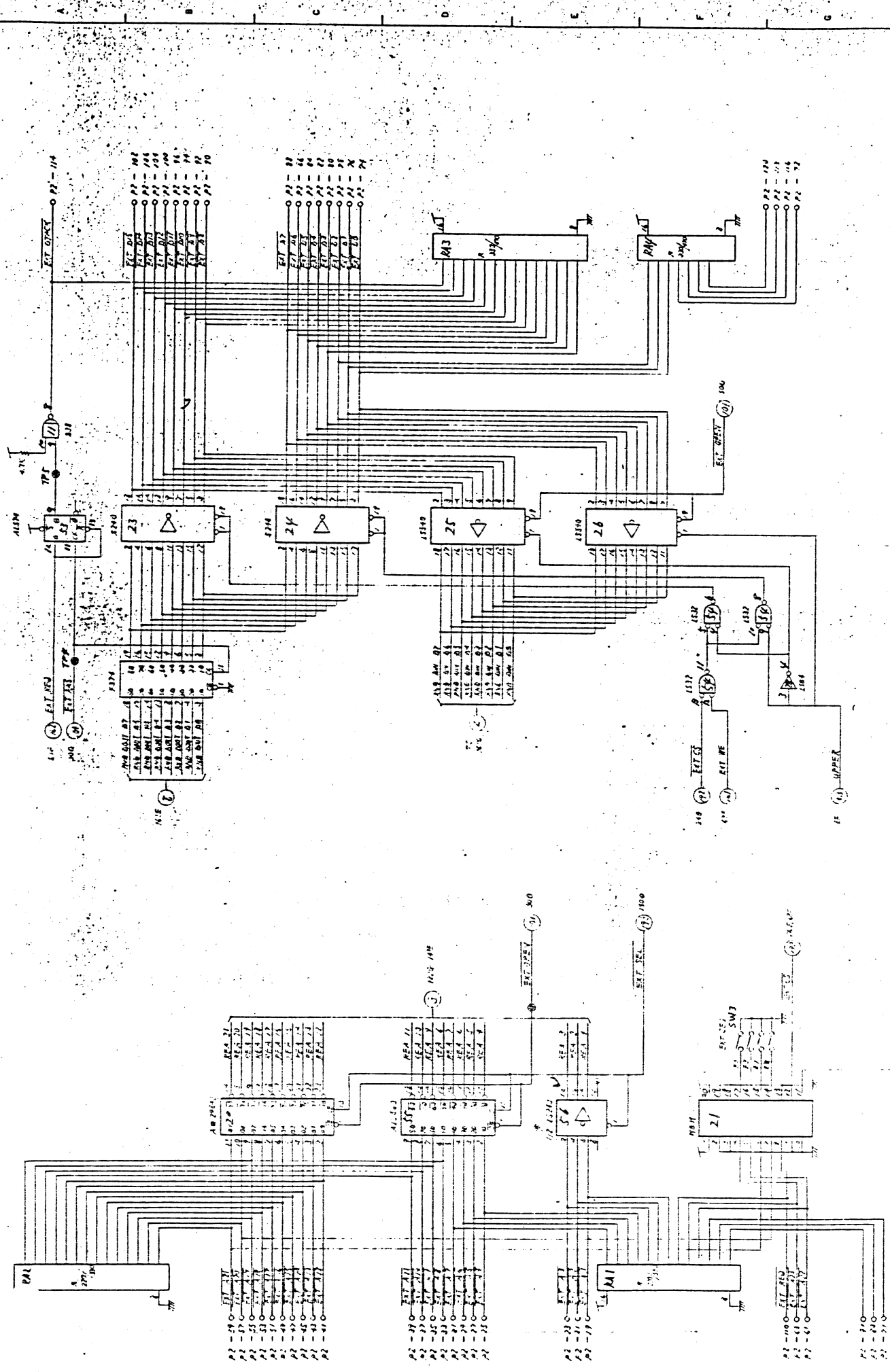




M2001-02

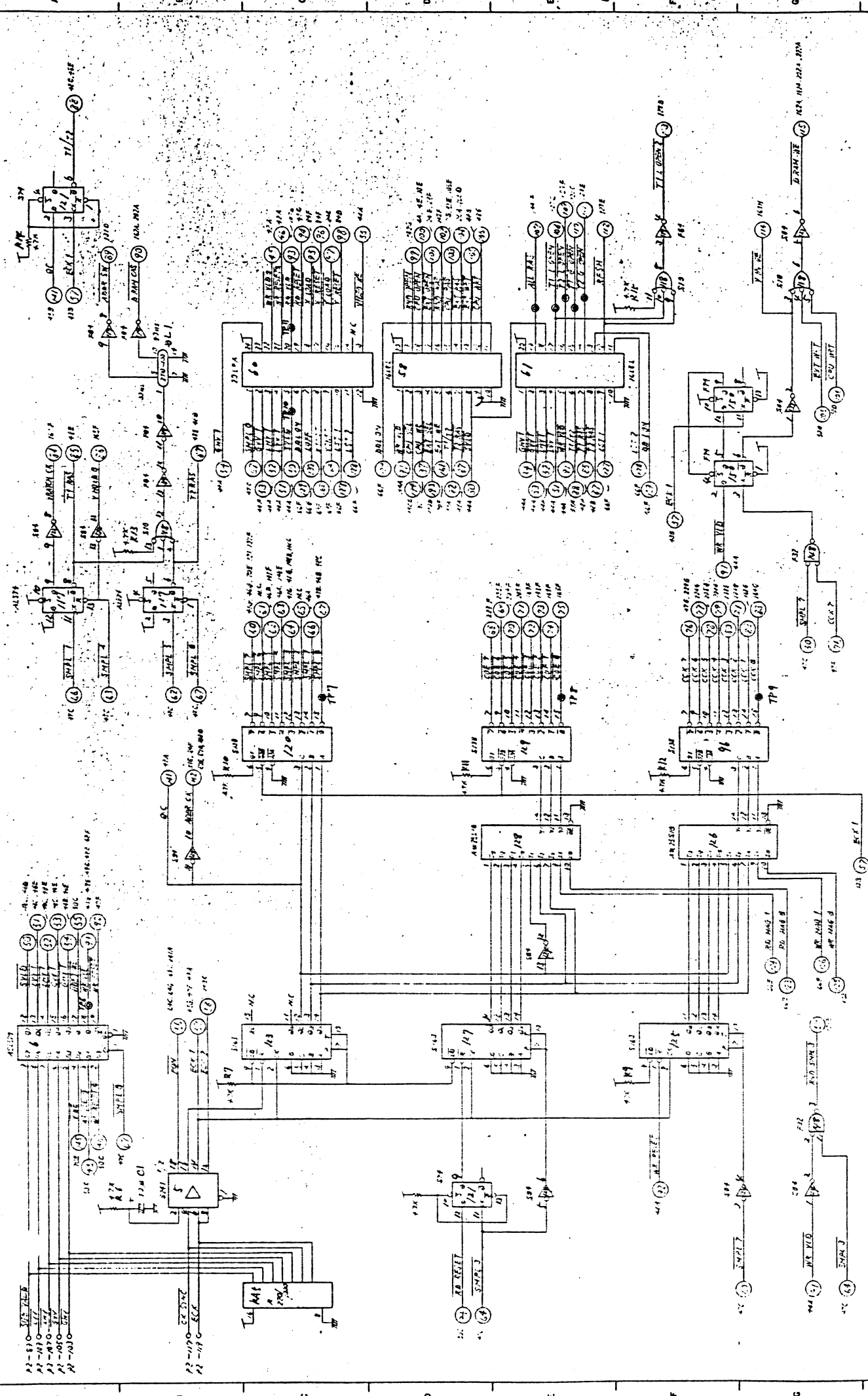
FRAME MEMORY ARRAY  
BOARD

|            |    |     |       |    |    |    |    |    |                  |
|------------|----|-----|-------|----|----|----|----|----|------------------|
| 訂正記号       | 記事 | 年月日 | 作成    | 承認 | 検査 | 設計 | 図面 | 品名 | FMA (1/2)        |
|            |    |     | 1964年 | 月  | 日  | 図録 |    |    |                  |
|            |    |     |       |    |    |    |    |    | FMA (VER. 1.5)   |
|            |    |     |       |    |    |    |    |    | ITGC - 68C - 012 |
| 有限会社エーエスエス |    |     |       |    |    |    |    |    |                  |



|      |  |    |  |     |  |           |  |    |  |    |  |    |  |    |  |    |  |            |  |              |  |
|------|--|----|--|-----|--|-----------|--|----|--|----|--|----|--|----|--|----|--|------------|--|--------------|--|
| 訂正記号 |  | 記号 |  | 年月日 |  | 1954年 月 日 |  | 作成 |  | 検閲 |  | 設計 |  | 製図 |  | 品名 |  | FMA (2/12) |  | I76C-60K-022 |  |
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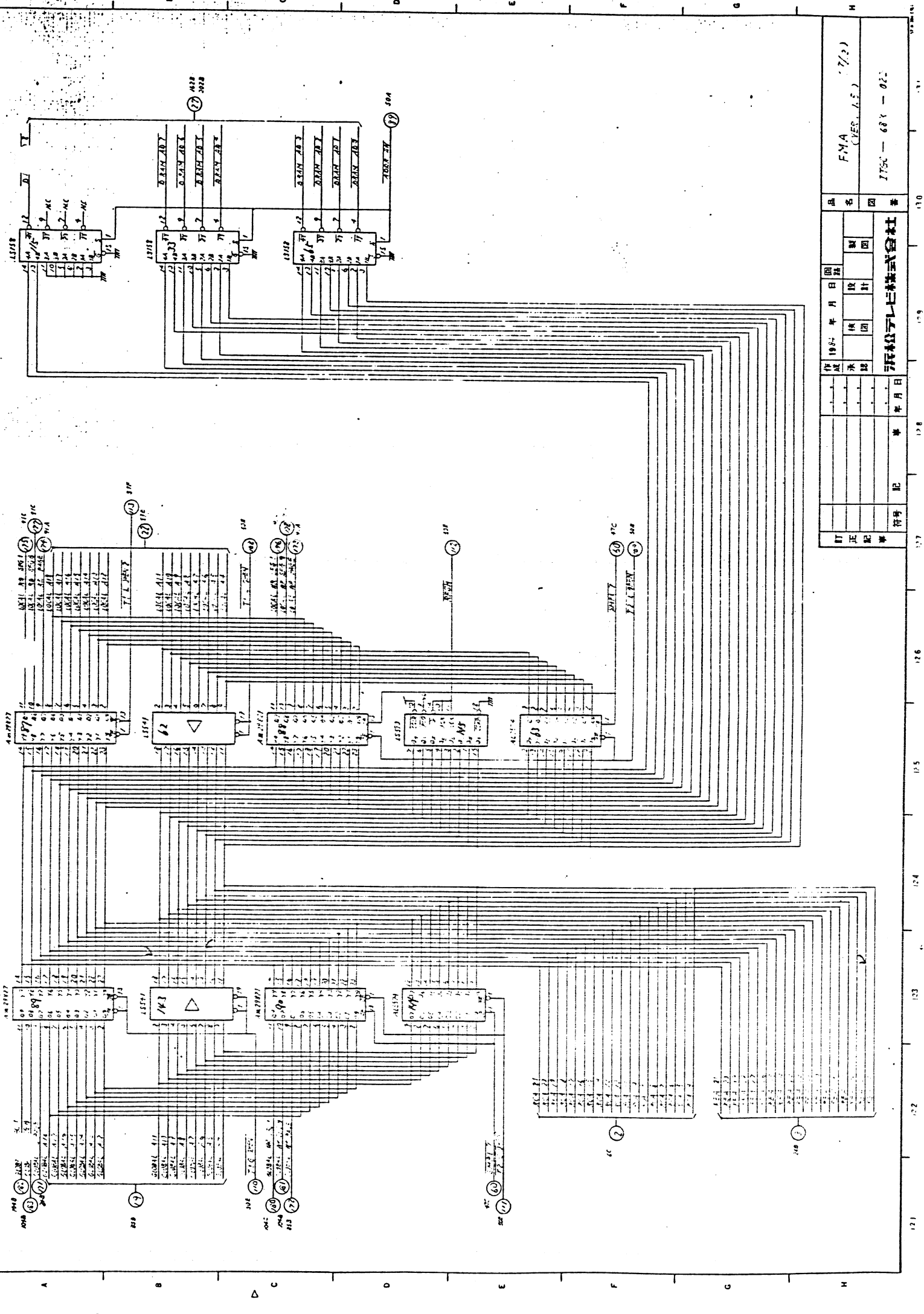
株式会社

[illegible]





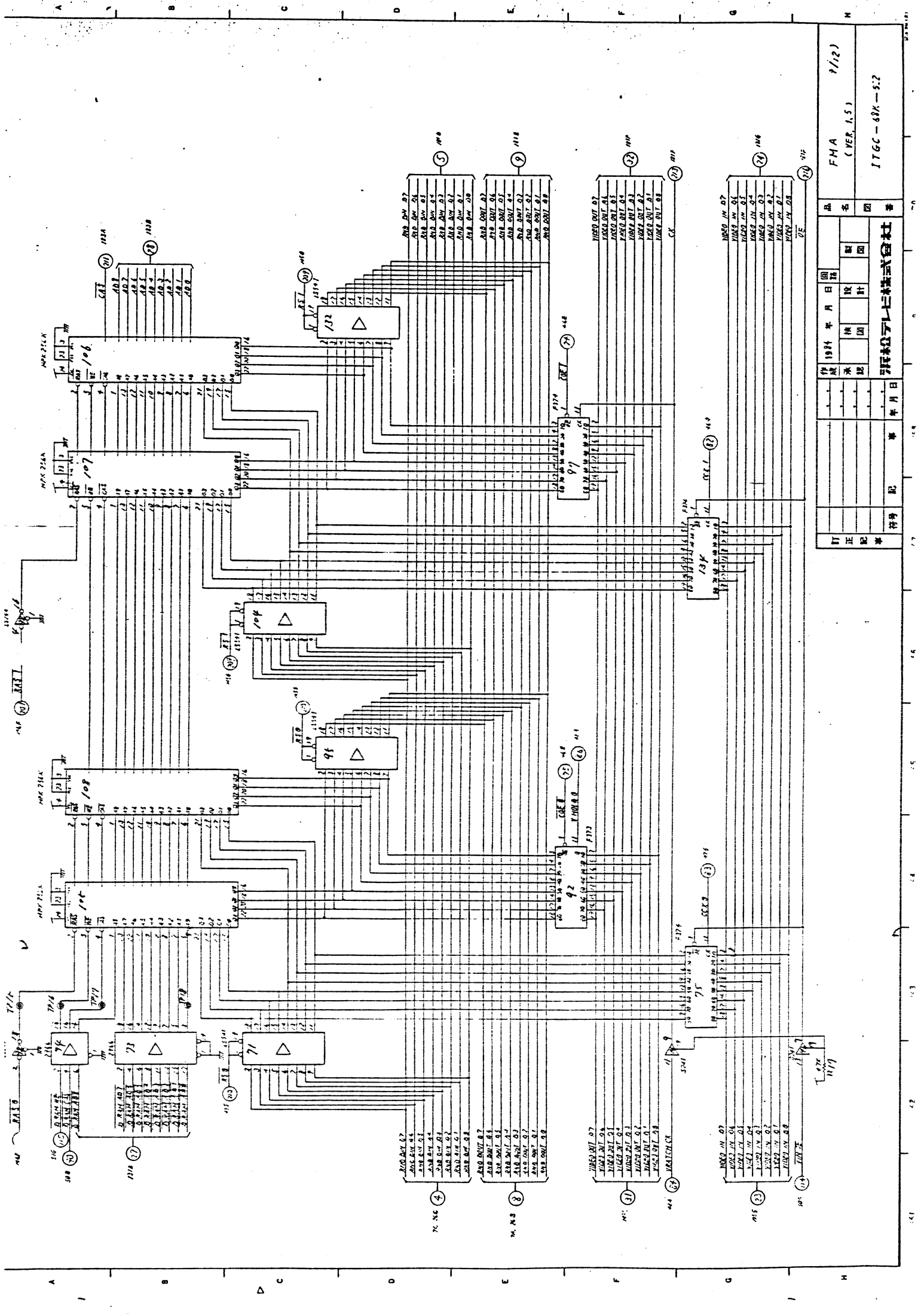




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|---------------------|---|---|---|---|---|---|---|
| 訂正                  | 記 | 記 | 年 | 月 | 日 | 番 | 号 |
| 作成                  | 承 | 候 | 年 | 月 | 日 | 製 | 図 |
| 品                   | 名 | 目 | 番 | 号 | 製 | 図 | 番 |
| FMA (VER. 1.5) 7/2) |   |   |   |   |   |   |   |
| 175C - 68X - 022    |   |   |   |   |   |   |   |

浜松テレビ株式会社





|    |  |   |  |   |  |     |  |   |  |       |  |   |  |   |  |   |  |   |  |   |  |                |  |      |  |
|----|--|---|--|---|--|-----|--|---|--|-------|--|---|--|---|--|---|--|---|--|---|--|----------------|--|------|--|
| 訂正 |  | 記 |  | 事 |  | 年月日 |  | 作 |  | 1984年 |  | 月 |  | 日 |  | 図 |  | 製 |  | 品 |  | FMA (VER. 1.5) |  | 7/12 |  |
| 特  |  | 記 |  | 事 |  | 年月日 |  | 作 |  | 1984年 |  | 月 |  | 日 |  | 図 |  | 製 |  | 品 |  | FMA (VER. 1.5) |  | 7/12 |  |

17GC-68K-5.2

17GC-68K-5.2

17GC-68K-5.2

17GC-68K-5.2

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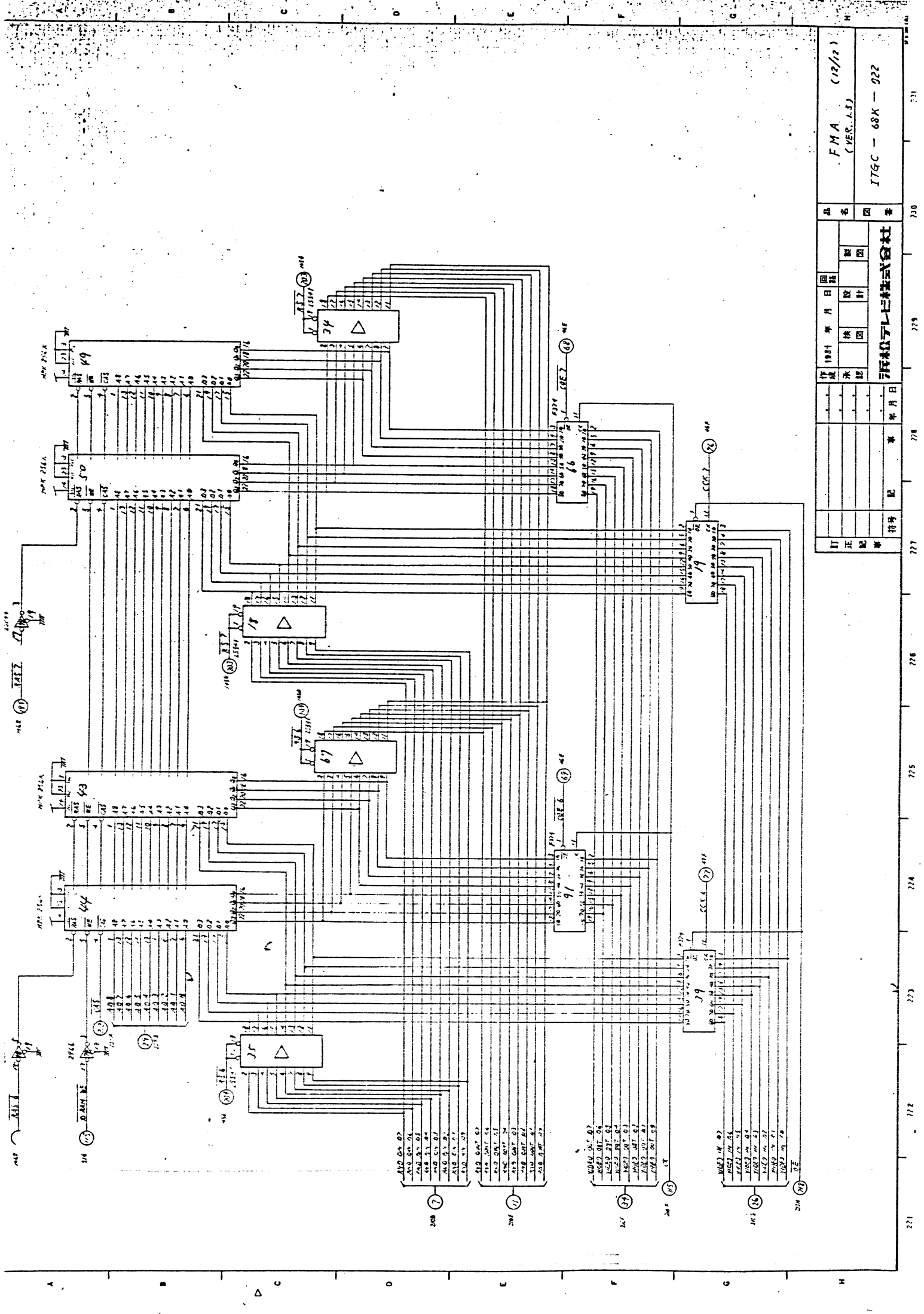
17GC-68K-5.2

17GC-68K-5.2

17GC-68K-5.2







|     |     |     |     |     |     |     |      |
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| 訂正  | 記   | 符   | 記   | 事   | 年   | 月   | 日    |
| 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8    |
| 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16   |
| 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24   |
| 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32   |
| 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40   |
| 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48   |
| 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56   |
| 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64   |
| 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72   |
| 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80   |
| 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88   |
| 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96   |
| 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104  |
| 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112  |
| 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120  |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128  |
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| 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160  |
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| 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200  |
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| 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320  |
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| 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392  |
| 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400  |
| 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408  |
| 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416  |
| 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424  |
| 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432  |
| 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440  |
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| 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472  |
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| 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504  |
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| 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528  |
| 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536  |
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| 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584  |
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| 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600  |
| 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608  |
| 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616  |
| 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624  |
| 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632  |
| 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640  |
| 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648  |
| 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656  |
| 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664  |
| 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672  |
| 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680  |
| 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688  |
| 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696  |
| 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704  |
| 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712  |
| 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720  |
| 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728  |
| 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736  |
| 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744  |
| 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752  |
| 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760  |
| 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768  |
| 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776  |
| 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784  |
| 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792  |
| 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800  |
| 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808  |
| 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816  |
| 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824  |
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| 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848  |
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| 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864  |
| 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872  |
| 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880  |
| 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888  |
| 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896  |
| 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904  |
| 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912  |
| 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920  |
| 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928  |
| 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936  |
| 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944  |
| 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952  |
| 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960  |
| 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968  |
| 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976  |
| 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984  |
| 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992  |
| 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |

訂正 記 符 記 事 年 月 日

作成 承認 設計 製 圖

1984 年 月 日

品 名

FMA (12/12)

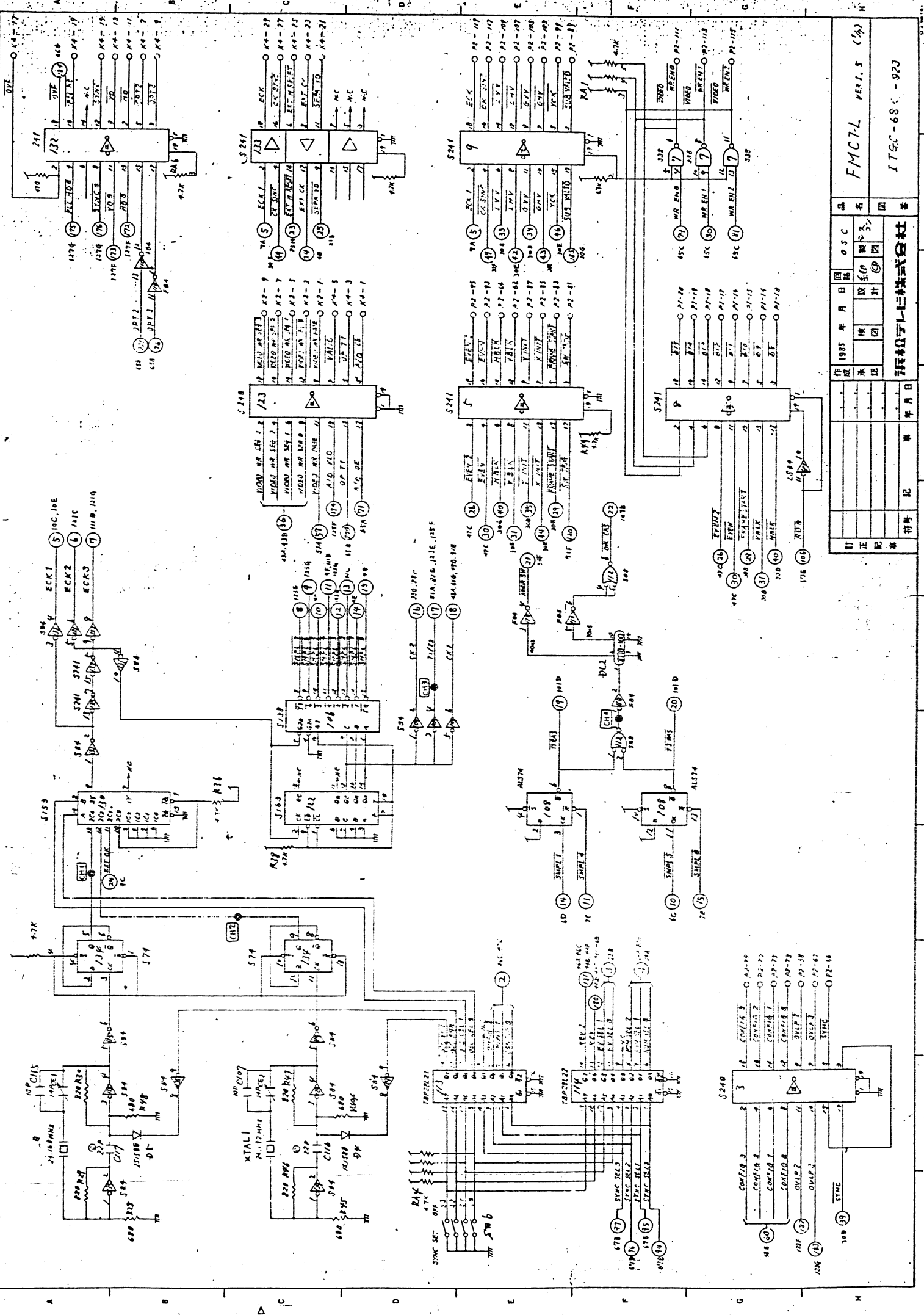
(VER. 1.5)

ITGC - 68K - 022

日本電子株式会社

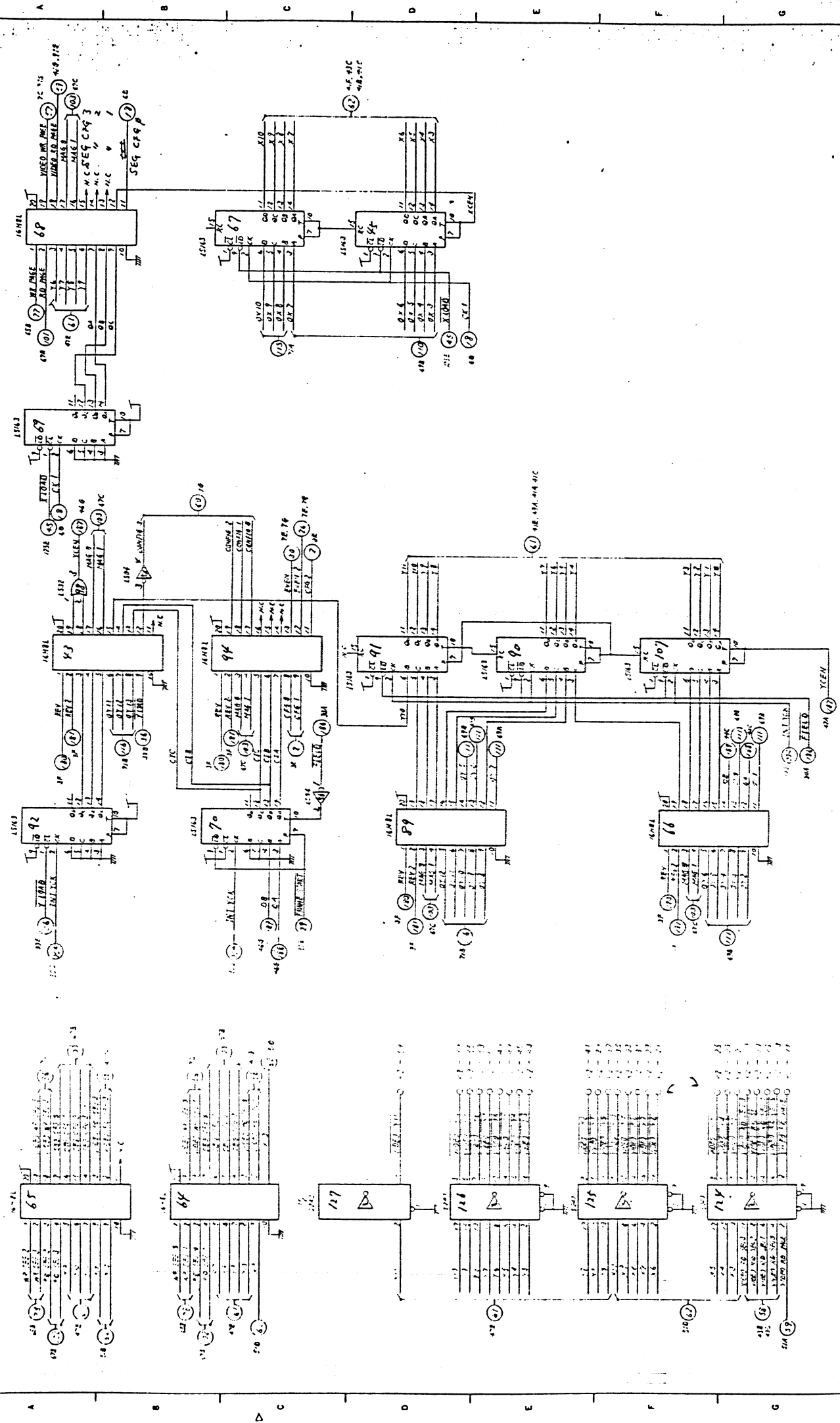
M2002

FRAME MEMORY ARRAY  
CONTROL BORAD



|                     |    |              |     |    |    |    |    |
|---------------------|----|--------------|-----|----|----|----|----|
| 訂正記号                |    | 年月日          |     | 事項 |    | 備考 |    |
| 作成                  | 承認 | 年月日          | 年月日 | 修正 | 修正 | 修正 | 修正 |
| FMCT-L VER1.5 (1/6) |    | ITGC-68C-923 |     |    |    |    |    |





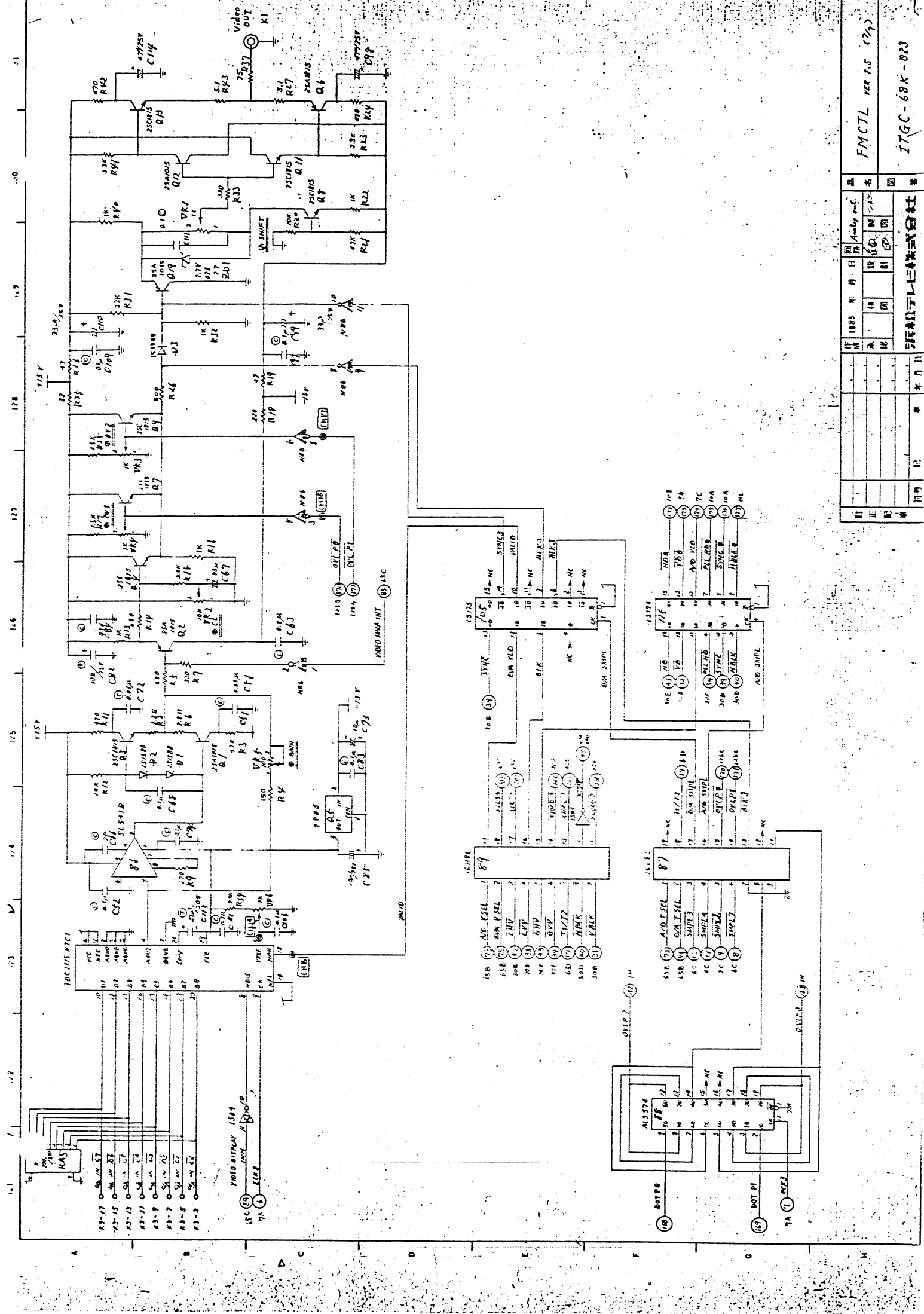
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| FMCTI VER 1.5 (1/2) |  | 品名           |  | 170C-68X-022 |  |
| 1985 年 月 日          |  | X.1.6mm      |  | 170C-68X-022 |  |
| 作 成                 |  | 図 面          |  | 170C-68X-022 |  |
| 承 記                 |  | 計 画          |  | 170C-68X-022 |  |
| 訂 正                 |  | 170C-68X-022 |  | 170C-68X-022 |  |
| 記 事                 |  | 170C-68X-022 |  | 170C-68X-022 |  |
| 符 号                 |  | 170C-68X-022 |  | 170C-68X-022 |  |

170C-68X-022









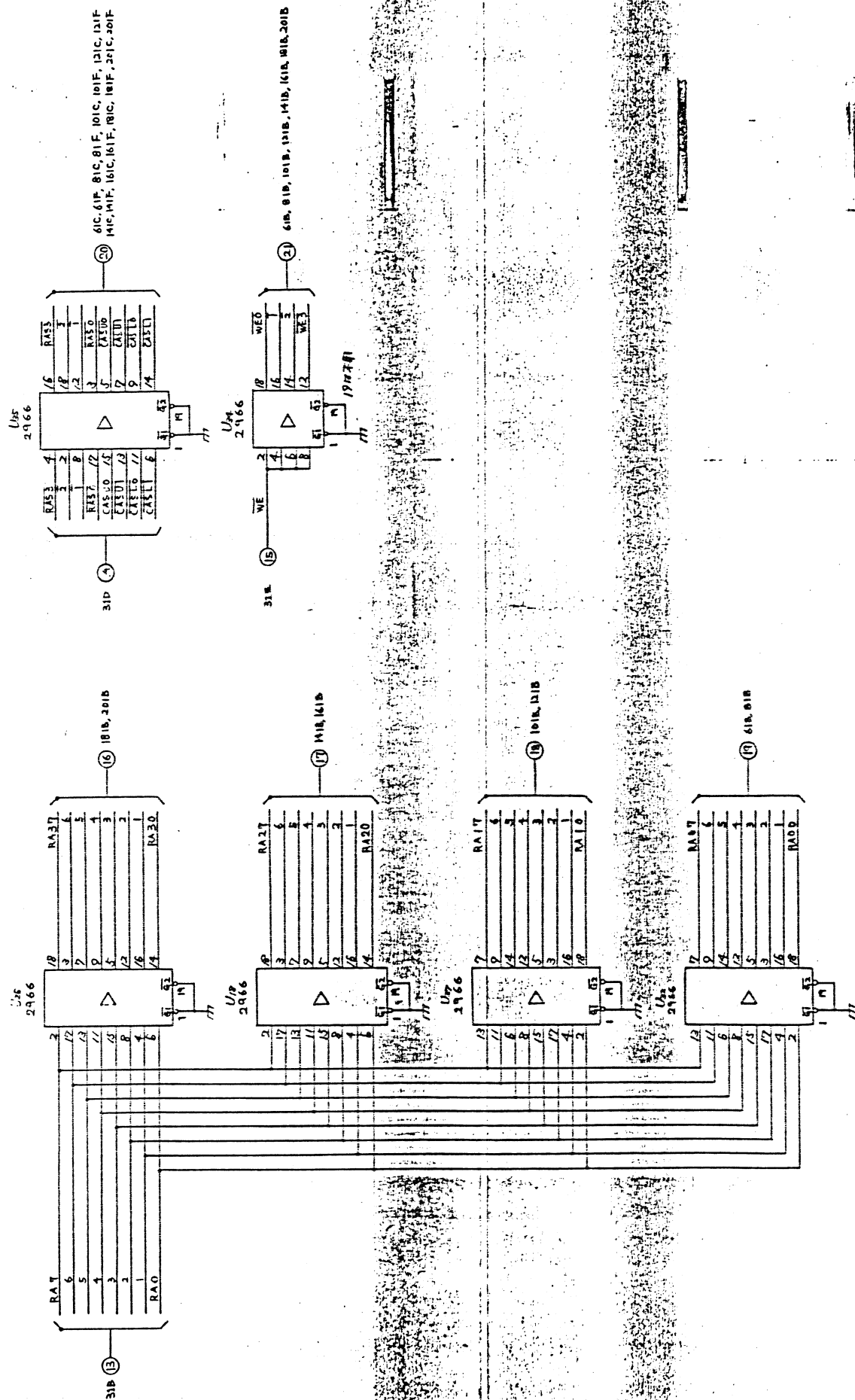
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| 品名                  | 図 | 1985         | 年 月 日 |
| 作                   | 者 | 1985         | 年 月 日 |
| 検                   | 査 | 1985         | 年 月 日 |
| 計                   | 画 | 1985         | 年 月 日 |
| 記                   | 録 | 1985         | 年 月 日 |
| 訂                   | 正 | 1985         | 年 月 日 |
| 記                   | 録 | 1985         | 年 月 日 |

M2005

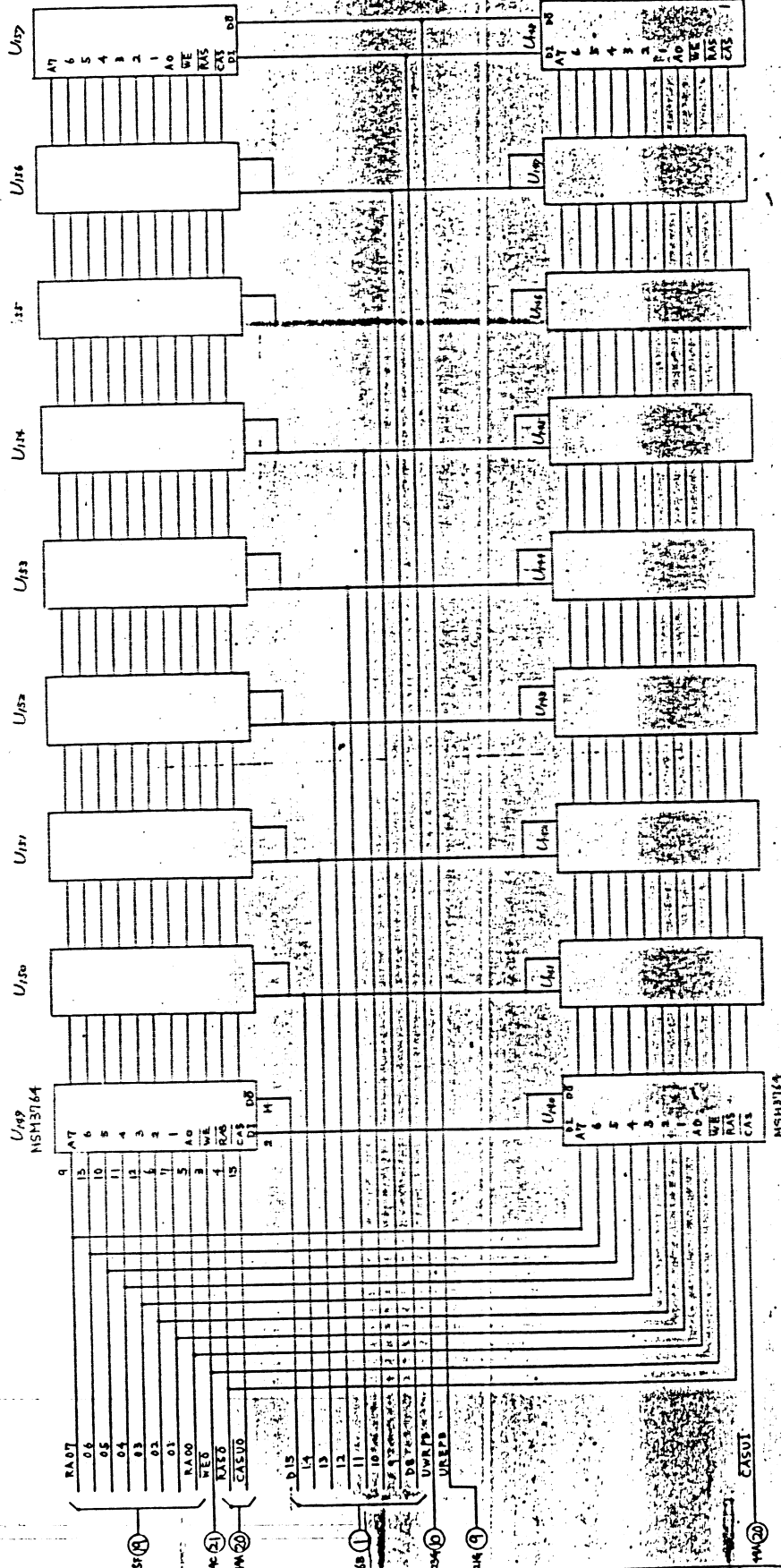
1Mbyte MASS MEMORY  
BOARD







| HAMAMATSU PHOTOONICS K.K. |     |             |       | D-RAM DRIVER |     |        |                     |
|---------------------------|-----|-------------|-------|--------------|-----|--------|---------------------|
| REV                       | LOC | DESCRIPTION | DATE  | APP          | DES | JOB No | 1M-byte D-RAM Board |
|                           |     |             | 11/01 |              |     |        |                     |
|                           |     |             |       | CHE          | DRA | C No   | TITLE               |
|                           |     |             |       |              |     | DATE   | SHEET OF            |
|                           |     |             |       |              |     | CODE   | ITGC-68K 004 3/11   |



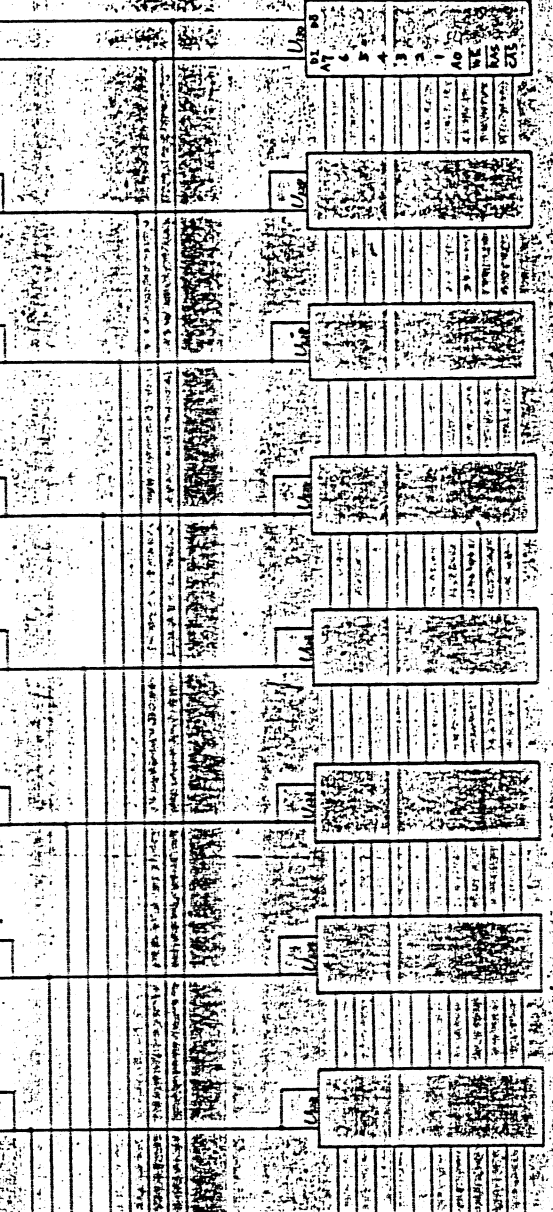
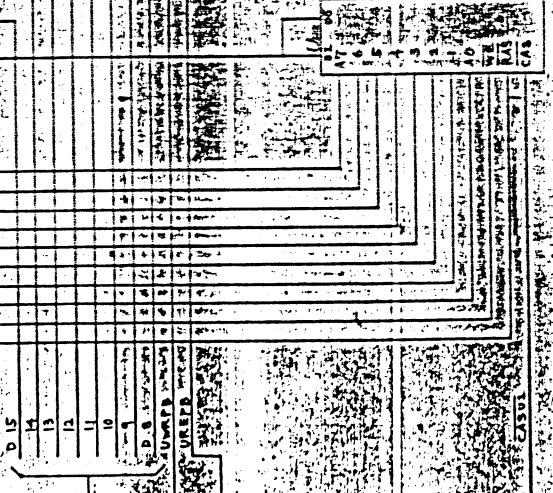
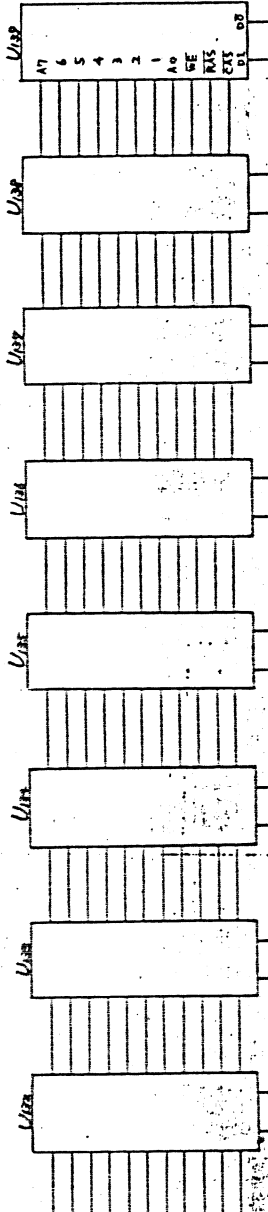
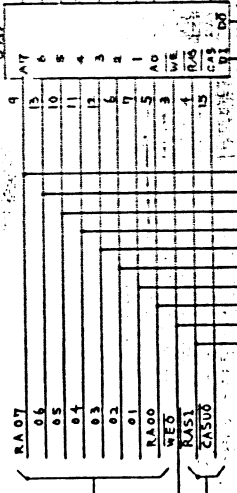
D-RAM 0

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|     |     |             |       | CHE | DRA | C No   | SHEET OF          |
|     |     |             |       |     |     | DATE   | ITGC-68K 004 4/11 |

HAMAMATSU PHOTONICS K.K.



MS13764



MS13764

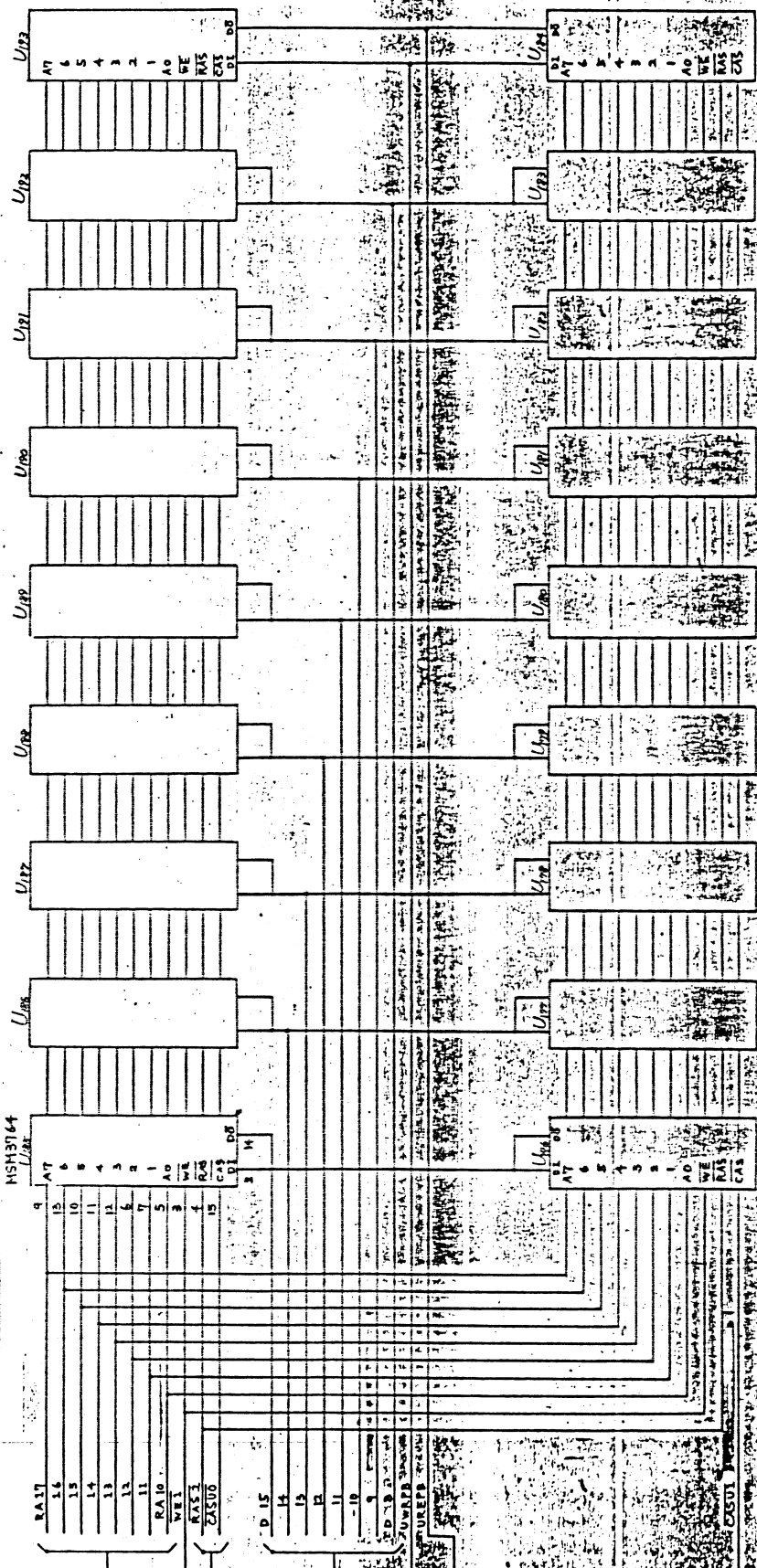
MS13764

D-RAM 1

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|     |     |             | 82/00 |     |     |        | D-RAM Board       |
|     |     |             |       | CHE | DRA | C No   |                   |
|     |     |             |       |     |     |        | SHEET OF          |
|     |     |             |       |     |     | DATE   | CODE              |
|     |     |             |       |     |     |        | ITGC-68K 004 5/11 |

HAWAIIAN PHOTOGRAPHICS K.K.

10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 11.0 11.1

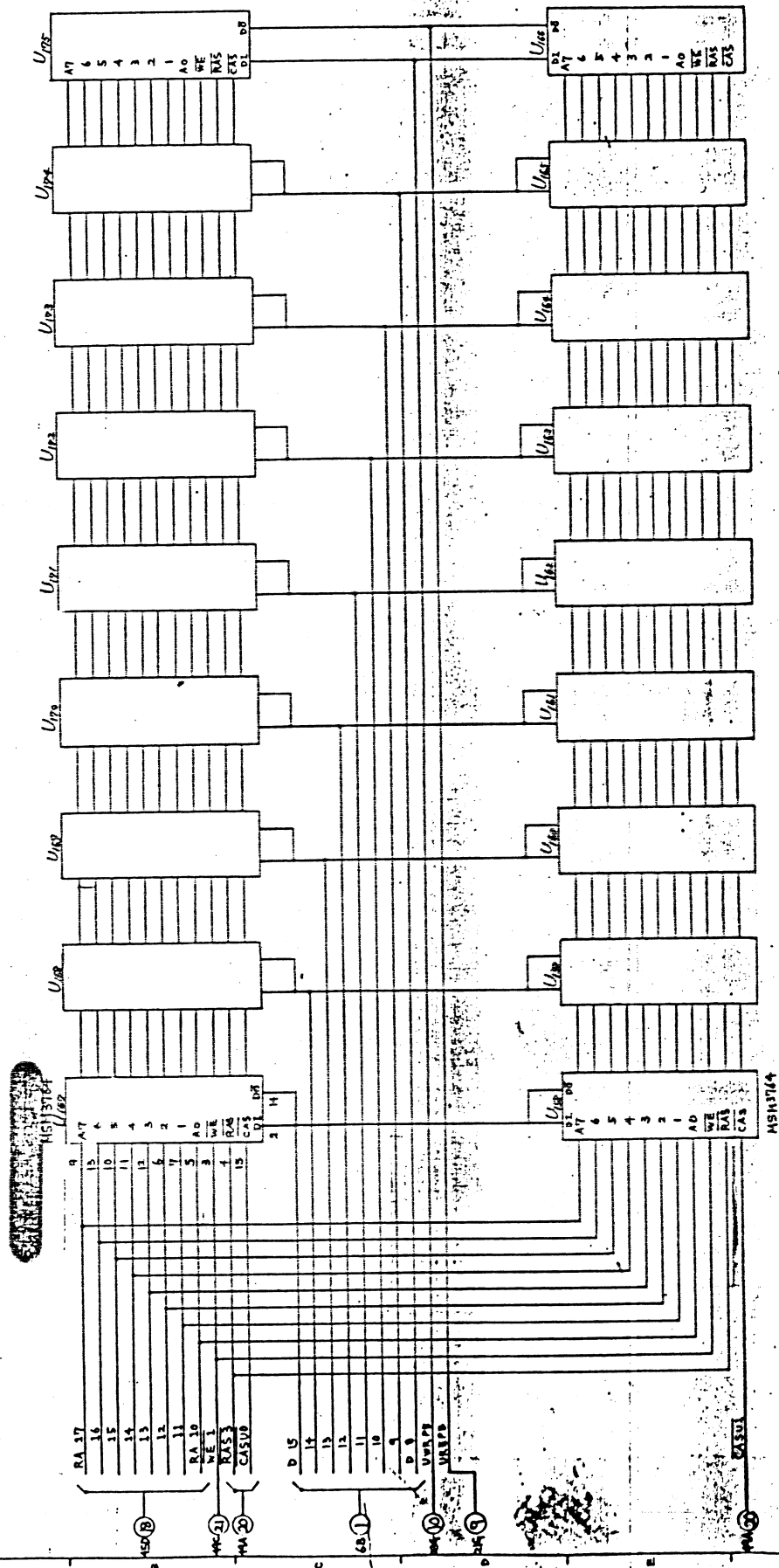


| REV | LOC | DESCRIPTION | DATE | APP   | DES | JOB No | TITLE       | 1M-byte |
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|     |     |             |      | CHIEF | DRA |        | SHEET OF    |         |
|     |     |             |      |       |     |        | DATE        |         |
|     |     |             |      |       |     |        | CODE        |         |

D-RAM 2

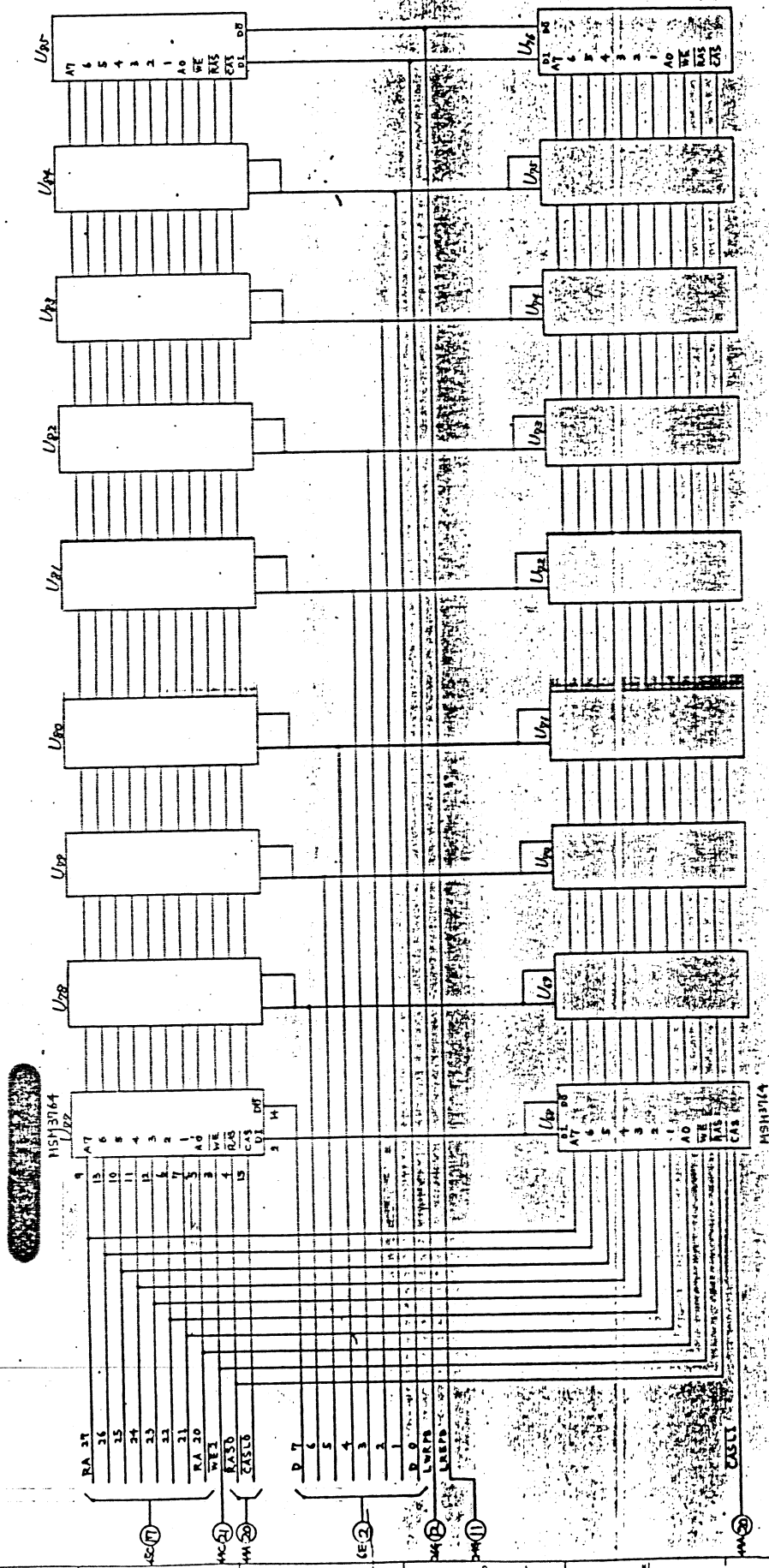
HAMAMATSU PHOTOINICS K.K.

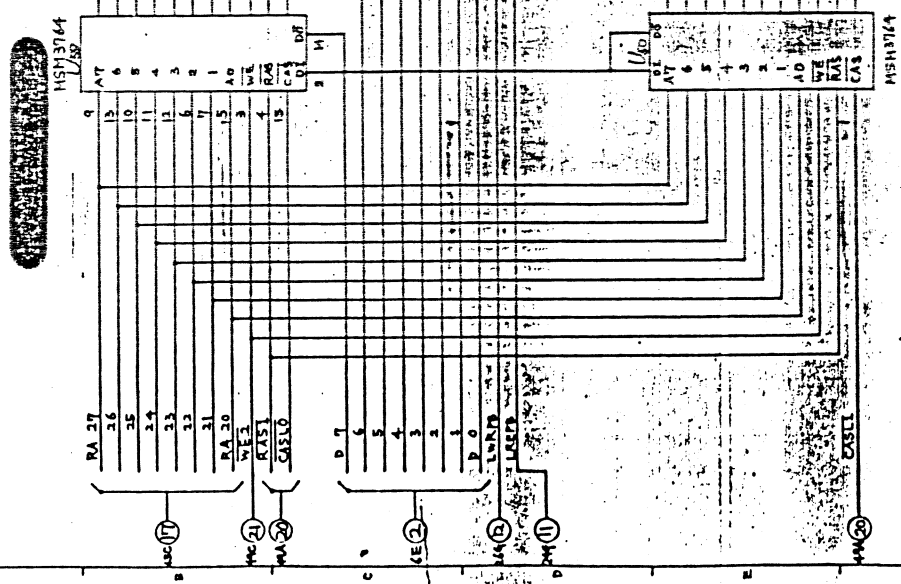
ITGC-68K 004 6/11



| D-RAM 3 |  |  |  | JOB No. |  | TITLE       |  | 1M-byte      |  |
|---------|--|--|--|---------|--|-------------|--|--------------|--|
|         |  |  |  |         |  | D-RAM Board |  | D-RAM Board  |  |
|         |  |  |  |         |  | C No.       |  | SHEET OF     |  |
|         |  |  |  |         |  | DATE        |  | CODE         |  |
|         |  |  |  |         |  | DATE        |  | ITGC-68K 004 |  |
|         |  |  |  |         |  | 7/11        |  |              |  |

HAMAMATSU PHOTOINIC K.K.

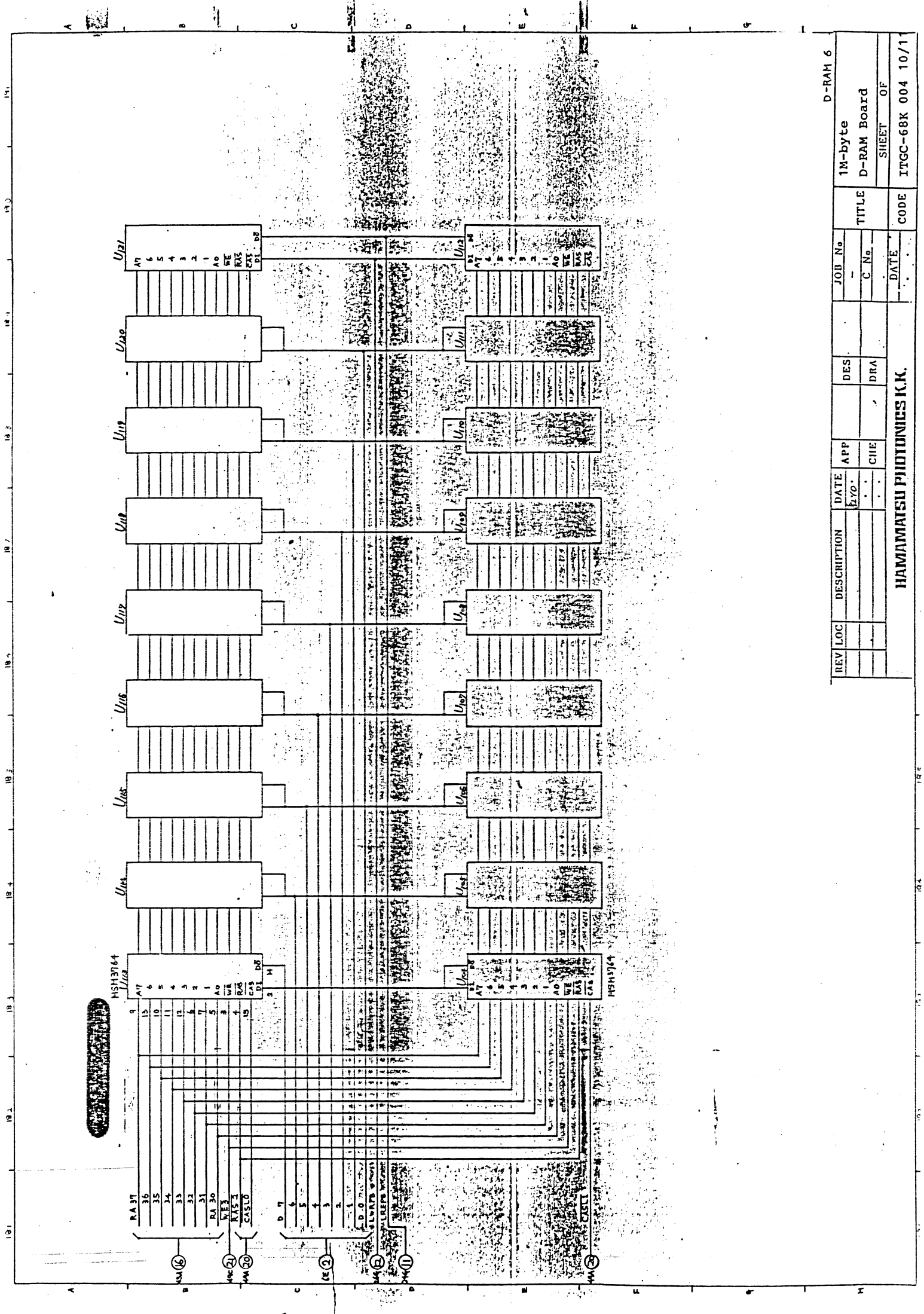




| REV | LOC | DESCRIPTION | DATE | APP | DES | JOB No | TITLE | 1M-byte<br>D-RAM Board |
|-----|-----|-------------|------|-----|-----|--------|-------|------------------------|
|     |     |             | 8/20 | CHE | DRA | C No   | SHEET | OF                     |
|     |     |             |      |     |     | DATE   | CODE  | ITGC-68K 004 9/11      |

HAMAMATSU PHOTONICS K.K.

D-RAM 5



| REV LOC |  | DESCRIPTION | DATE | APP | DES | JOB No | TITLE       | CODE              |
|---------|--|-------------|------|-----|-----|--------|-------------|-------------------|
|         |  |             | 1970 |     |     |        | D-RAM Board | ITGC-68K 004 10/1 |
|         |  |             |      | CHE | DRA |        | SHEET OF    |                   |
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| REV LOC |  | DESCRIPTION | DATE | APP | DES | JOB No | TITLE       | CODE              |
|---------|--|-------------|------|-----|-----|--------|-------------|-------------------|
|         |  |             | 1970 |     |     |        | D-RAM Board | ITGC-68K 004 10/1 |
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HAMAMATSU PHOTOINICS K.K.

D-RAM 6

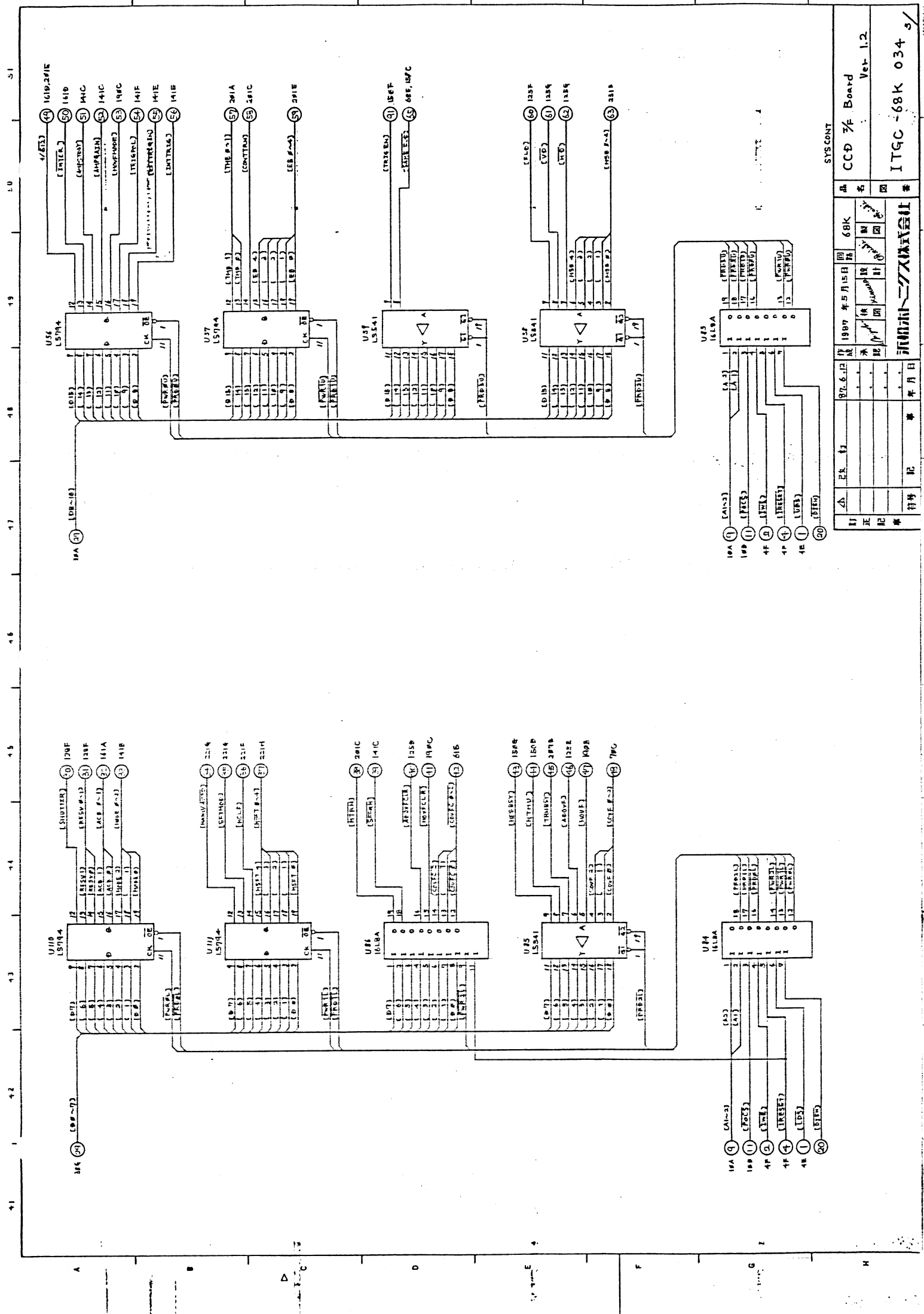


M3141

C-CCD CAMERA I/F  
BOARD







SYSTEM

品名

CCD 7/6 Board

Ver. 1.2

品名

ITQC-68K 034

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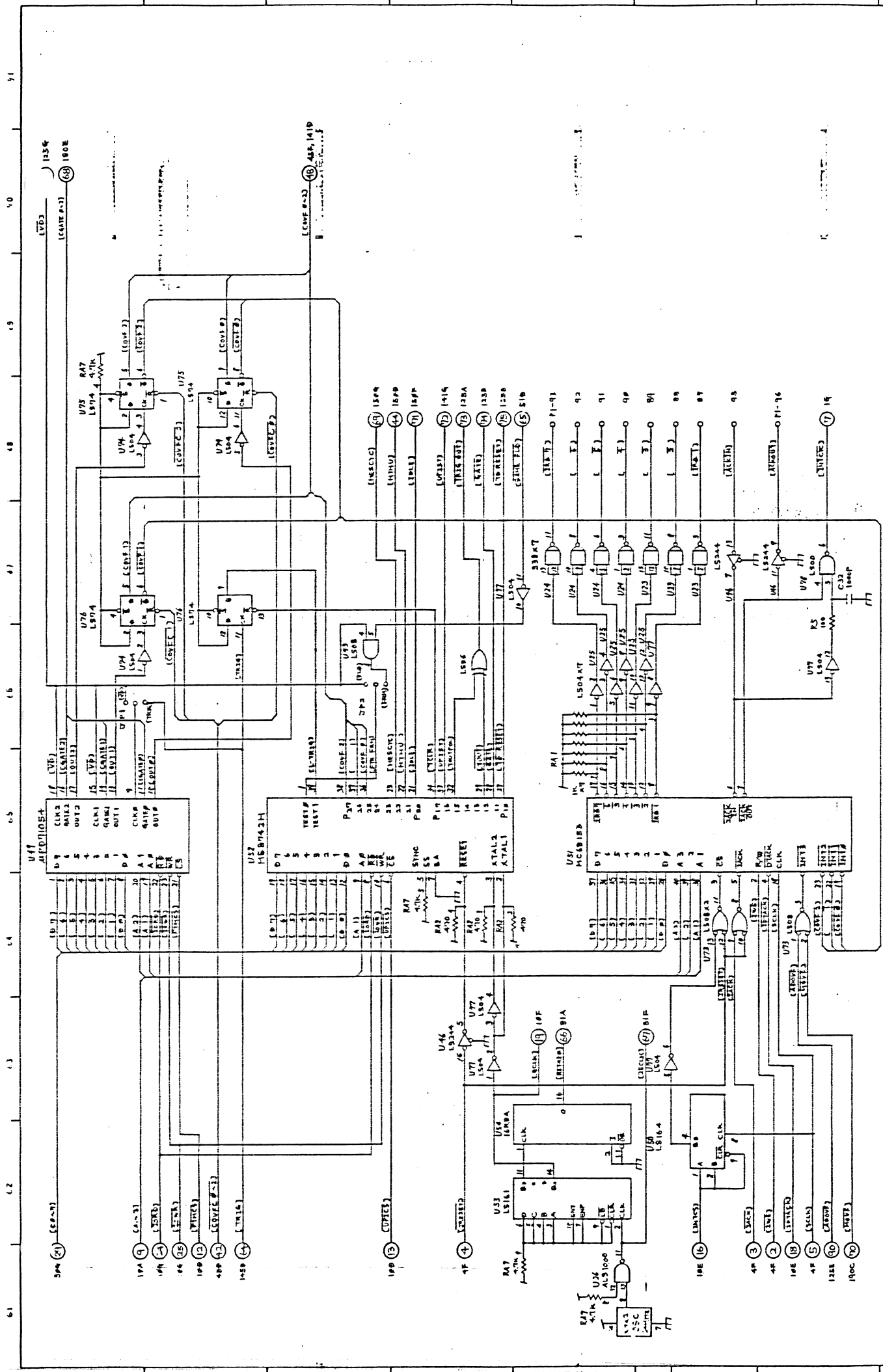
ITQC-68K 034

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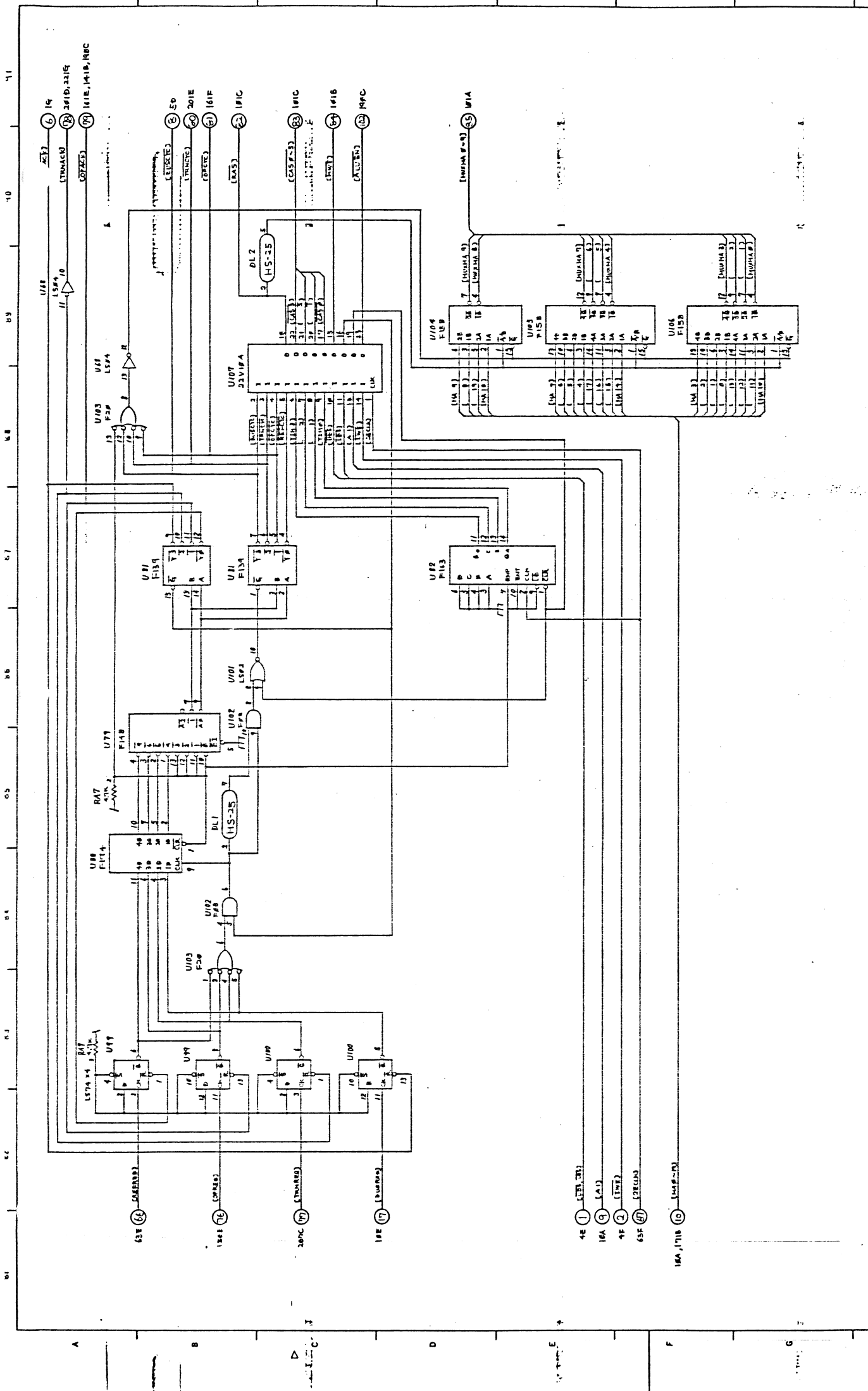
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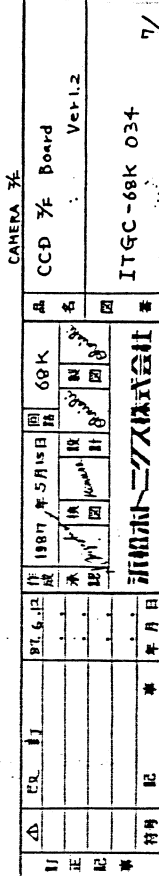


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|-----------------|-----|--------------|-----|--------------|--|
| PTM, UPT, INT   |     | CCD 7# Board |     | Ver 1.2      |  |
| 1987 年 5 月 15 日 |     | 69K          |     | ITQC-68K 034 |  |
| 作 成             | 日 付 | 図 号          | 図 名 | 4/           |  |
| 正 記             | 事 記 | 年 月 日        | 記 号 | 4/           |  |



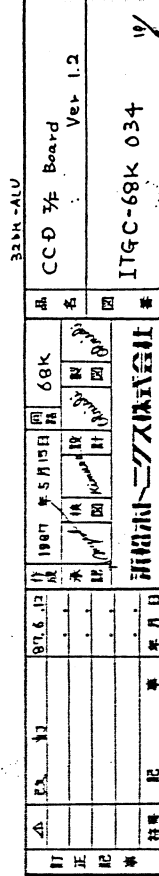
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| D-RAM CONT      |  | CCD Y/C Board   |  | Ver 1.2         |  |
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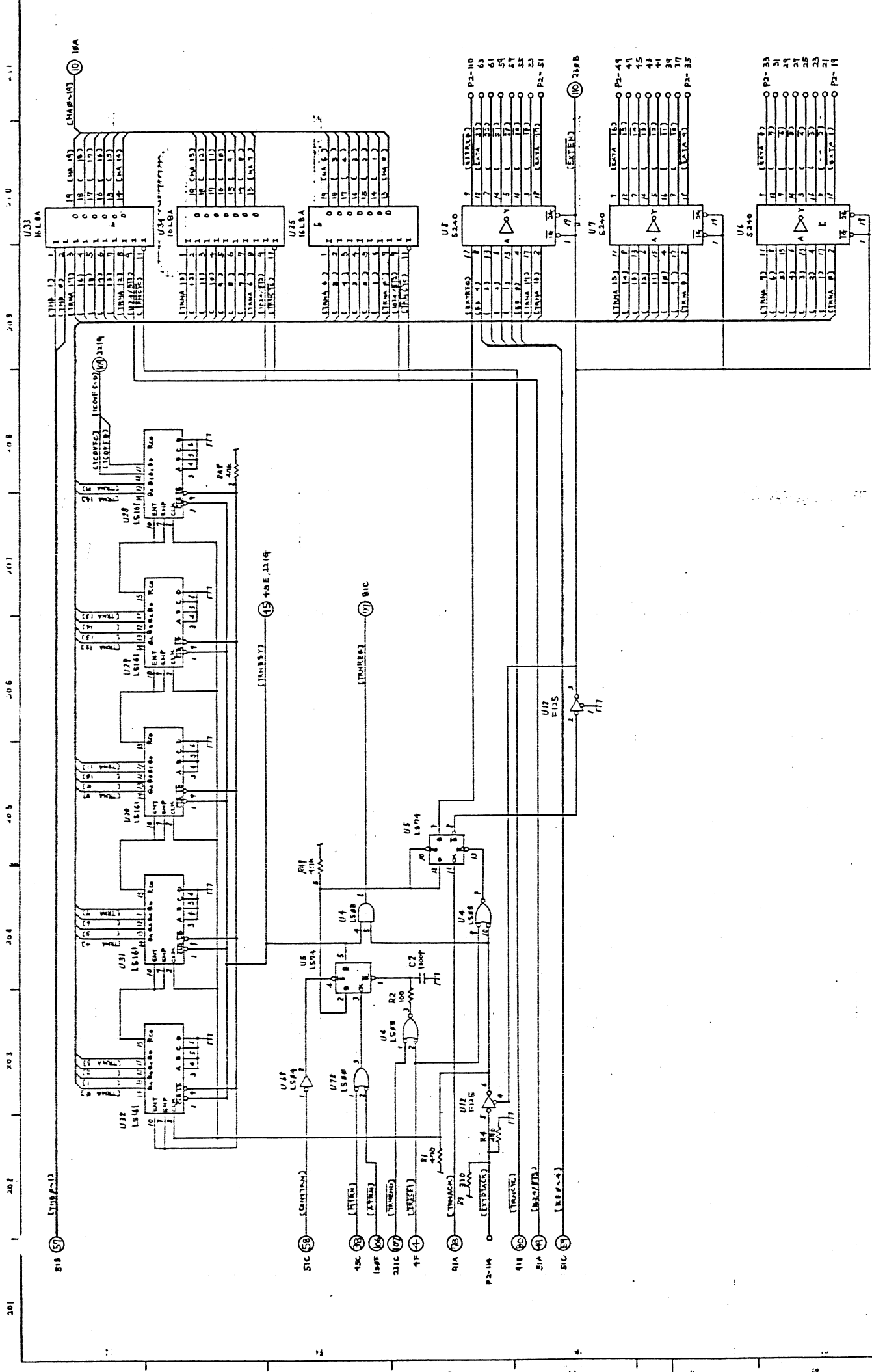




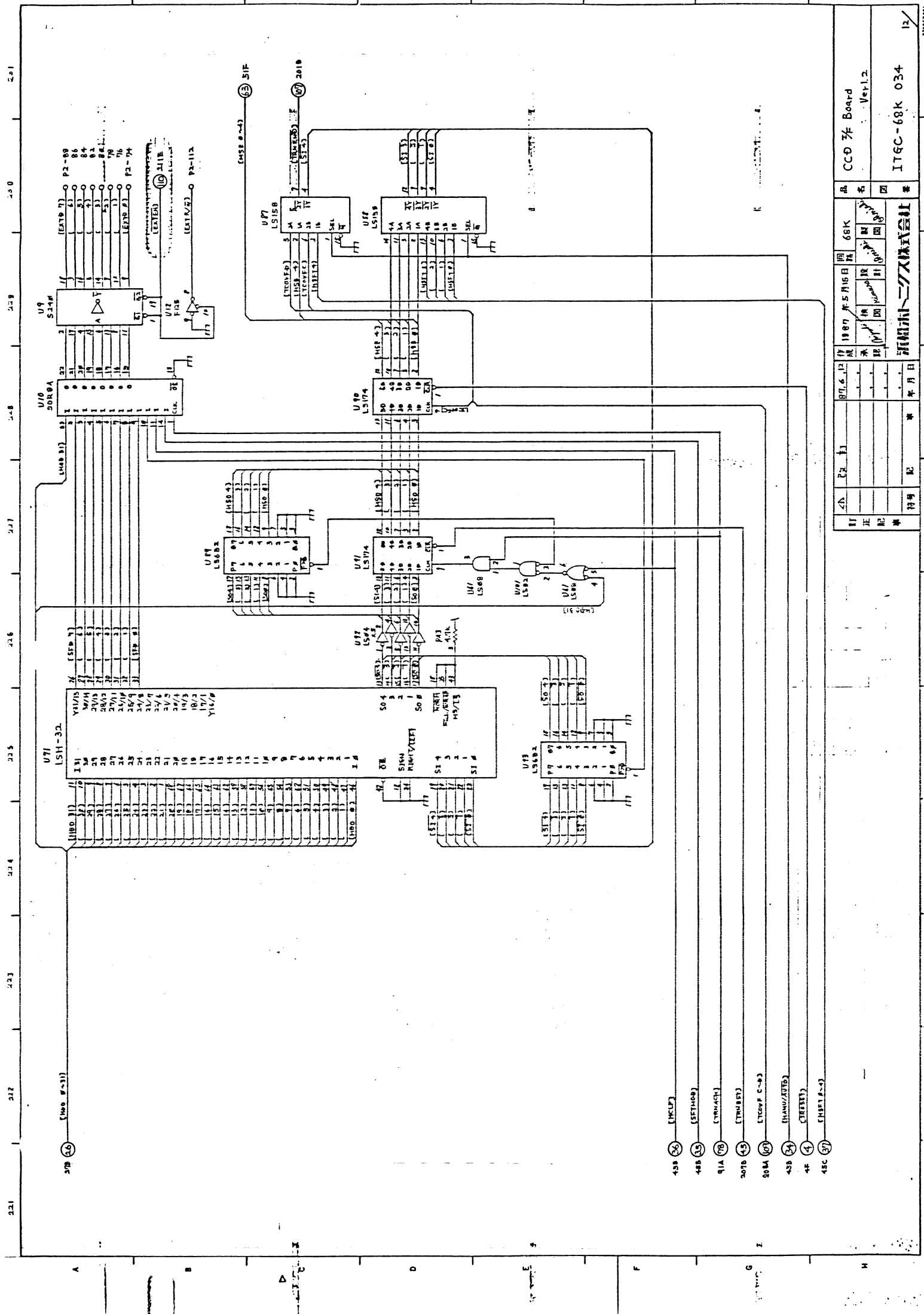








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|------|------|------|------|------|------|------|------|------|------|------|
| 221  | 222  | 223  | 224  | 225  | 226  | 227  | 228  | 229  | 230  | 231  |
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| 702  | 703  | 704  | 705  | 706  | 707  | 708  | 709  | 710  | 711  | 712  |
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| 999  | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 |
| 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 |
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| 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 |
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| 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 |
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FLOPPY DISK CONTROL  
CARD



FRONT PANEL  
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