ORDER NO. EDCD 83-001

Service Manual

Personal Computer

JR-200U

Specifications

CPU:	MN1800A (equivalent to 6802)
Memory:	16K ROM (BASIC) 32K RAM 2K Video RAM 2K Character RAM
Keyboard:	
Mode:	Sub CPU Transfer
Key:	63 Keys
Display Interface:	
Mode:	RGB Sync Separation Composite Video System RF Modulation (Ch-3 and 4)
Screen:	24 Lines by 32 Columns
Color:	8 Colors
Graphic:	64 by 48 Dot Matrix
Character Configuration:	
Alphanumeric:	95 Characters
Graphic Symbols:	64 Characters
Other Symbols:	17 Characters
User's Definition:	64 Characters
Music:	A compass of 5 octaves allows performance of melody consisting triad cords
Cassette Interface:	600/2400 BAUD Rate Changeable
Printer Interface:	Centronics Standard
Joystick Interface:	Two Sockets
Program Language:	JR-BASIC5.0 and Machine Language
Constants:	
Decimal:	10^{-39} to 10^{-38} and 0
Hexadecimal:	$0 to $FFFF
Power Source:	AC 120 V±10%, 50/60 Hz
Power Consumption:	8 W max.
Dimensions:	W: 2-3/16" (56 mm) D: 13-7/10" (348 mm) H: 8-1/5" (208 mm)
Weight:	Approx. 5-1/16 lbs. (2-3 kg)
Accessory:	RF Cables, Recording Cable and Antenna Selector

General Instructions

- Refer to the Operating Instruction for operation and BASIC language.
- To check the performance, please use the Diagnostic Program.
- Do not use thinner, benzine or alcohol to clean the cabinet.
- Use a silicone treated cloth or a cloth dampened with a gentle cleaning liquid that will not damage the cabinet.

Specifications are subject to change without notice.

Panasonic®

Matsushita Engineering and Service Company
Division of Matsushita Electric Corporation of America
50 Meadowland Parkway,
Secaucus, New Jersey 07094

Panasonic Hawaii, Inc.
91-238 Kauhi St. Ewa Beach.
P.O.Box 774
Honolulu, Hawaii 96808-0774

Matsushita Electric of Canada Limited
5700 Ambler Drive, Mississauga,
Ontario, L4W 2T3

Panasonic Sales Company, Division of Matsushita Electric of Puerto Rico, Inc.
Ave., 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

Panasonic Tokyo
Matsushita Electric Industrial Co., Ltd.
1-2, 1-chome, Shibakoen, Minato-ku,
Tokyo 105, Japan

Table of Contents

		Page
1.	**Diagnostic Programs**	1
	1.1. RAM Test Program	1
	1.2. ROM Test Program	1
	1.3. Function Check Program	2
2.	**Block Diagram**	17
3.	**Signal Code Table**	18
	3.1. Address Bus Signals	18
	3.2. Data Bus Signals	18
	3.3. Sub CPU	18
	3.4. External Bus	19
	3.5. Printer Interface	19
4.	**Memory Map**	20
5.	**Schematic Diagram**	21
	5.1. Power Supply and Keyboard	21
	5.2. Main P.C.B.	23
6.	**Parts Location**	24
	6.1. Main P.C.B.	24
	6.2. Keyboard	25
	6.3. Power Supply	25
7.	**Waveforms**	26
	7.1. Power-on Reset Timing	26
	7.2. Basic Timing	26
	7.3. Dynamic RAM R/W Timing	26
	7.4. CRTC Basic Timing	27
	7.5. CRTC Synchronizing Timing	28
	7.6. Keyboard Scanning	28
8.	**Circuit Descriptions**	29
	8.1. Basic Timing Generator	29
	8.2. CPU	29
	8.3. Dynamic RAM	33
	8.4. ROM	35
	8.5. Video Refresh RAM	37
	8.6. Character Generator RAM	38
	8.7. CRT Controller and Video Interface	39
	8.8. I/O Interface (PIA)	51
	8.9. Interrupt Control	58
9.	**Character Code**	60
	9.1. Display Code Table (Hexadecimal Value)	60
	9.2. Character (ASCII) Code Table (Hexadecimal Value)	60
10.	**Connector Pin Identification**	61
	10.1. Display Connector	61
	10.2. Tape Recorder Connector	61
	10.3. Printer Connector	61
	10.4. Joystick Connector	62
	10.5. External Bus Connector	62
	10.6. RS-232C Connector (Optional)	63
11.	**LSI & IC Pin Configuration**	64
	11.1. MN1800A CPU	64
	11.2. MN1544CJR Sub CPU	65
	11.3 MN4864CA2 (ROM 0), MN4864CB2 (ROM 1)	66
	11.4. HM4864P3 RAM	66
	11.5. HM6116P3 RAM	67
	11.6. MN1271 PIA	67
	11.7. CRTC HD61K201F	69
	11.8. TTL ICs	71
12.	**Disassembly**	73
13.	**Exploded View**	74
14.	**Troubleshooting**	75
15.	**Packing**	79
16.	**Replacement Parts List**	80

1. Diagnostic Programs

The JR-200U diagnostic program consists of three programs for use in RAM, ROM, and the Function Checking.

1.1. RAM Test Program (See the program list -1.)

This program is used to detect malfunctions in the JR-200U dynamic RAM, Video RAM, and character RAM.

When a malfunction is detected an error message is displayed on the screen and processing is halted.

The RAM test program is written entirely in machine language, and can be executed only once because it will rewrite data of all RAMs. Turn the main switch off and on when you want to load another program into the JR-200U.

(1) Operation Procedure

a. Switch the power supply ON.
b. Use the MLOAD command to load the program from cassette.
c. Input F=USR ($1100) from the keyboard to run the program.
d. The following message will appear on the screen when the RAM test is completed normally.

```
RAM-TEST NORMAL END
Ready
```

If a malfunction is detected, an error message indicating the number of the malfunctioning IC will be displayed on the screen and processing will be halted.

i) One of the following messages will appear on the screen when a dynamic RAM malfunctions.

```
D-RAM ERROR!
DEVICE = IC8
Ready
```

or

```
D-RAM ERROR!
DEVICE = IC9
Ready
```

or

```
D-RAM ERROR!
DEVICE = IC10
Ready
```

or

```
D-RAM ERROR!
DEVICE = IC11
Ready
```

ii) Video RAM malfunction

```
V-RAM ERROR!
DEVICE = IC7
Ready
```

iii) Character RAM malfunction

```
C-RAM ERROR!
DEVICE = IC6
Ready
```

1.2. ROM Test Program (See the program list -2.)

This program is used to detect malfunctions in the two ROMs used in the JR-200U.

When a malfunction is detected an error message is displayed on the screen and processing is halted.

The ROM test program is written entirely in machine language.

(1) Operation Procedure

a. Switch the power supply ON.
b. Use the MLOAD command to load the program from cassette.
c. Input F=USR ($1000) from the keyboard to run the program.
d. The following message will appear on the screen when the ROM test is completed normally.

```
ROM-TEST NORMAL END
Ready
```

If a malfunction is detected, an error message indicating the number of the malfunctioning IC will be displayed on the screen and processing will be halted.

One of the following messages will appear on the screen if a ROM malfunctions.

```
ROM ERROR!
DEVICE = IC4
Ready
```

or

```
ROM ERROR!
DEVICE = IC5
Ready
```

1.3. Function Check Program (See the program lists 3 and 4.)

This program is used to check Functions of the JR-200U. It tests the following items.

* Printer output
* CRT color balance
* CRT distortion
* Semi-graphic output
* User defined pattern output
* Keyboard input
* Joystick input
* Speaker output
* Cassette tape MSAVE, MLOAD and VERIFY

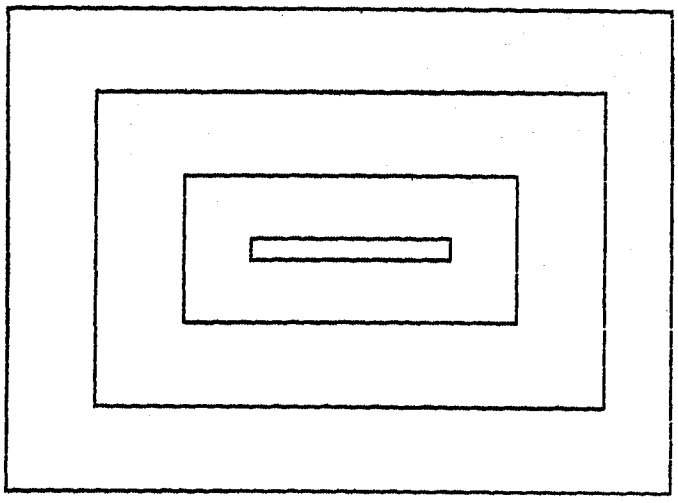
This program consists of both BASIC and machine language programs.

(1) Operation Procedure

a. Switch the power supply ON.
b. Use the LOAD command to load the program from cassette.
c. Use the MLOAD command to load the machine language program from cassette.
d. Run the program with the RUN command.
e. Printer output test
   Check that the following data is printed normally.
   `1234567890abcdefghijklmnopqrstuvwxyz!"#$%&'()=~|\{+*}<>?_@[;:],./ABCDEFGHIJKLMNOPQRSTUVWXYZ`
f. CRT color balance test
   i) Check that the color of the color bars appearing on the screen.

Black	Blue	Red	Magenta	Green	Cyan	Yellow	White

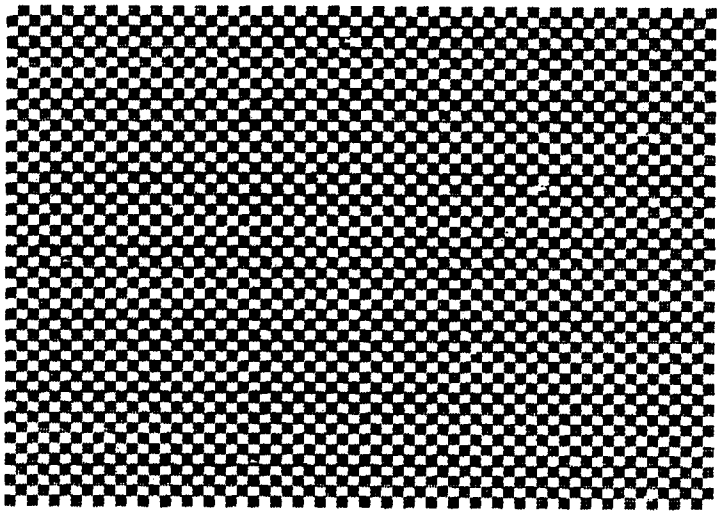
   ii) Press any key to proceed to the next test.
g. CRT distortion test
   i) Check that the pattern appearing on the screen is not distorted.



ii) Press any key to proceed to the next test.

h. Semi-graphic output test

i) Check that the semi-graphic pattern appearing on the screen is normal.



ii) Press any key to proceed to the next test.

i. User defined pattern test

i) Check that the user defined pattern appearing on the screen is normal.

ii) Test 1

Characters = White

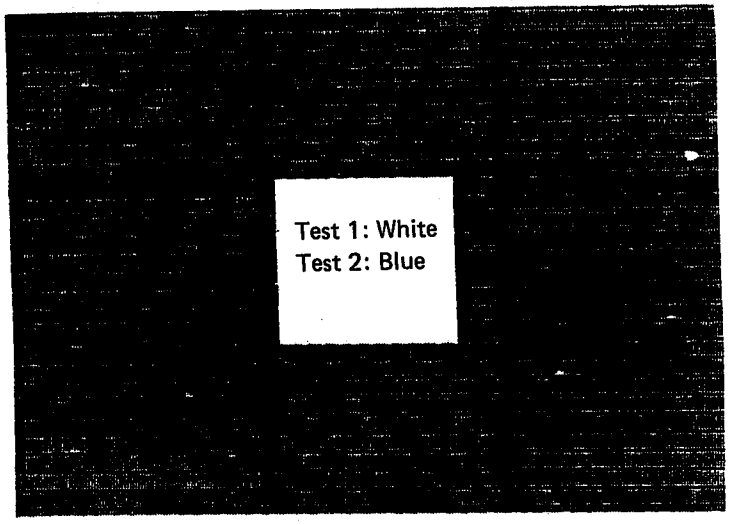
Background = Blue

iii) Press any key to proceed to the next test.

iv) Test 2

Characters = Blue

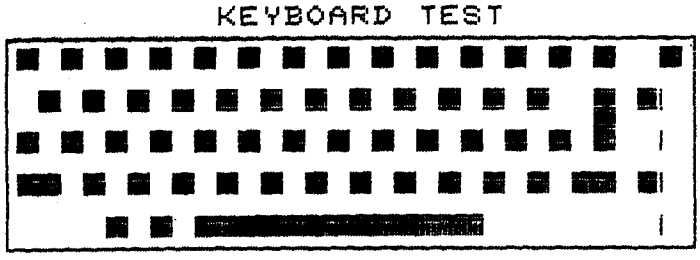
Background = White



Test 1: Blue
Test 2: White

v) Press any key to proceed to the next test.

j. Keyboard input test




```
HIT BLINKING KEY
HIT 1 KEY
```

i) Press the keys indicated on the screen.

ii) Press the SHIFT key as indicated on the screen.

iii) Press the GRAPH ON and GRAPH OFF keys as indicated on the screen.

iii-i) Press the GRAPH ON key, and then press "X" key.

iii-ii) Press the GRAPH ON key, and then press "Z" key.

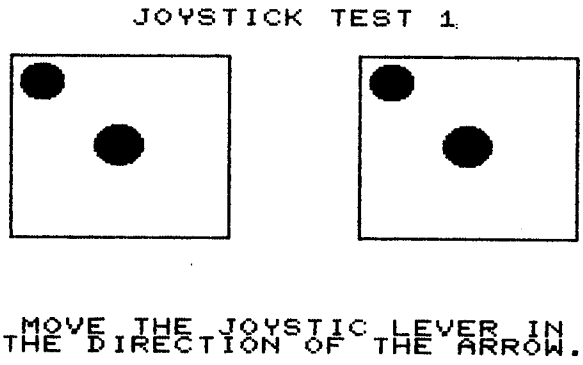
iv) Press the CTRL+C key as indicated on the screen.

```
HIT CTRL+C, AND THEN HIT RETURN
KEY

GOTO 690
```

After pressing CRTL+C to halt processing, return to the program by inputting GOTO 690 from the keyboard.

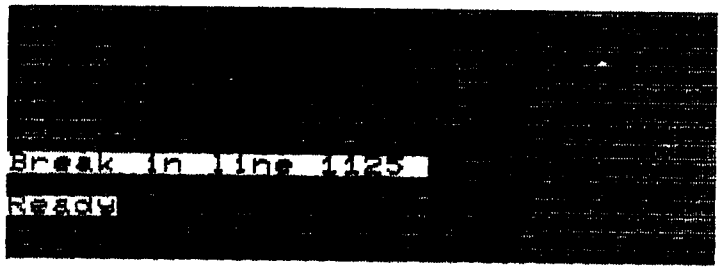
k. Joystick input test



i) Move joystick 1 as indicated on the screen.
ii) Press the joystick switch as indicated on the screen.
iii) Move joystick 2 as indicated on the screen.
iv) Press the joystick switch as indicated on the screen.

l. Speaker output test

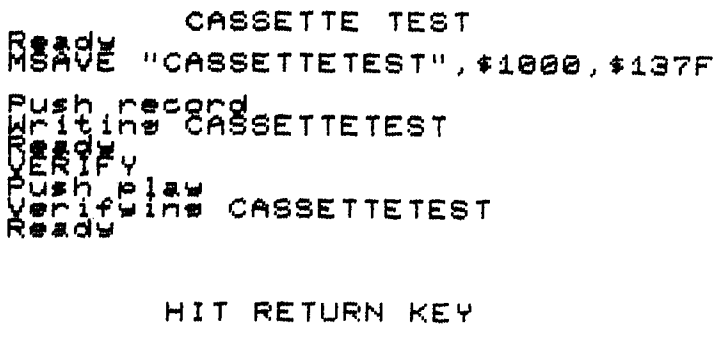
i) The same pattern as with the color balance test will appear on the screen and music will be played from the speaker in monotones (tones are emitted by three sound sources in succession). If the music is played normally, press the BREAK key to return to the program.



m. Use the CLS command (CTRL+1) to clear the screen.

n. Cassette tape test

i) Input GOTO 1400 to start the program again.
ii) Connect the cassette tape recorder and press the record button.
iii) Press the RETURN key. (Saving)



iv) Rewind the cassette, press the play button, and then press the RETURN key. (Verifying)
v) Confirm that "Ready" message appears on the screen without any error message.

(2) Processing at Error

If an error occurs during program execution, the program will stop at the step at which the error occured (only with keyboard and joystick input tests).

1.4. Program List

List 1

```
JR-200 TEST PROGRAM     RAM-TEST MEMORY DUMP

     JR-200 MEMORY DUMP V1.0                                    PAGE : 1

ADDR. 0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  CHRACTERS

1000  7F FF 40 00 00 00 3F FF 3B 00 43 68 07 FF 08 00 .\@...?\8.Ch.\..
1010  43 68 C3 FF 03 00 43 7B C7 FF 03 00 43 7B D7 FF Ch?\..C{?\..C{?\
1020  08 00 43 83 44 FF 14 FF 0F FF 4C FF 07 FF FF FF ..C.D\.\.\L\.\\\
1030  07 FF 4C FF 44 FF 57 FF D7 FF CF FF D7 FF 57 FF .\L\D\W\?\?\?\W\
1040  4F FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF O\\\\\\\\\\\\\\\\
1050  07 F9 10 00 10 70 FF FF FF FF FF FF FF FF FF FF .■...p\\\\\\\\\\
1060  44 45 56 49 43 45 20 3D 20 49 43 39 00 00 FF FF DEVICE = IC9..\\
1070  44 2D 52 41 4D 20 45 52 52 4F 52 20 21 00 FF FF D-RAM ERROR !.\\
1080  56 2D 52 41 4D 20 45 52 52 4F 52 20 21 00 FF FF V-RAM ERROR !.\\
1090  43 2D 52 41 4D 20 45 52 52 4F 52 20 21 00 FF FF C-RAM ERROR !.\\
10A0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF \\\\\\\\\\\\\\\\
10B0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF \\\\\\\\\\\\\\\\
10C0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF \\\\\\\\\\\\\\\\
10D0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF \\\\\\\\\\\\\\\\
10E0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF \\\\\\\\\\\\\\\\
10F0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF \\\\\\\\\\\\\\\\

ADDR. 0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  CHRACTERS

1100  0F 7E 11 A0 BD 12 00 4D 27 02 0E 39 CE 10 24 BD .~..ｽ..M'..9ﾎ.$ｽ
1110  14 00 7E 41 20 01 01 01 01 01 01 01 01 01 01 01 ..~A ..........
1120  CE 40 06 BD 43 00 4D 27 02 0E 39 7E 41 80 BD 44 ﾎ@.ｽC.M'..9~A.ｽD
1130  80 CE 40 0C BD 43 00 36 CE 40 30 7E 41 90 01 4D .ﾎ@.ｽC.6ﾎ@0~A ｒ.M
1140  27 02 0E 39 7E 41 C0 BD 43 00 4D 27 02 0E 39 CE '..9~Aﾀｽ C.M'..9ﾎ
1150  40 18 BD 43 00 4D 27 02 0E 39 BD EC 7F 7E 41 E0 @.ｽC.M'..9ｽｭ.~Aｏ
1160  BD 44 80 CE 40 1E BD 43 00 36 CE 40 3C BD 44 80 ｽD.ﾎ@.ｽC.6ﾎ@<ｽD.
1170  32 BD EC 7F CE 42 B0 BD F0 02 0E 39 01 01 01 01 2ｽｭ.ﾎB=ｽ┘..9....
1180  BF 40 A0 8E 40 FF CE 40 2A 7E 41 2E 01 01 01 01 ｿ@.■@ヽﾎ@*~A.....
1190  BD 44 80 32 BE 40 A0 7E 41 3F 01 01 01 01 01 01 ｽD.2ｾ@.~A?......
11A0  BD EC 7F CE 12 D0 86 00 97 09 86 05 97 0A BD F0 ｽｭ.ﾎ.ﾐ←.■.←.■.ｽ┘
11B0  02 CE 10 00 7E 11 04 01 01 01 01 01 01 01 01 01 .ﾎ..~...........
11C0  86 00 97 09 86 07 97 0A CE 42 E0 BD F0 02 CE 40 ←.■.←.■.ﾎBｏｽ┘.ﾎ@
11D0  12 7E 41 47 01 01 01 01 01 01 01 01 01 01 01 01 .~AG............
11E0  86 00 97 09 86 05 97 0A CE 42 F0 BD F0 02 CE 40 ←.■.←.■.ﾎB=ｽ┘.ﾎ@
11F0  36 7E 41 60 01 01 01 01 01 01 01 01 01 01 01 01 6~A`............

ADDR. 0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  CHRACTERS

1200  BF 10 50 FF 10 52 AE 00 EE 02 86 55 36 09 27 05 ｿ.P\.Rｪ.■.←U6.'.
1210  48 36 09 26 F5 FE 10 52 EE 02 C6 AA 32 11 26 3C H6.&■ ?R■.ﾆｪ2.&<
1220  09 27 08 54 32 11 26 30 09 26 EF FE 10 52 AE 00 .'.T2.&0.& ﾑ ?Rｪ.
1230  EE 02 86 AA 36 09 27 05 44 36 09 26 F5 FE 10 52 ■.←ｪ6.'.D6.&■ ?R
1240  EE 02 C6 55 32 11 26 10 09 27 08 58 32 11 26 0C ■.ﾆU2.&..'.X2.&.
1250  09 26 EF 4F BE 10 50 39 C6 50 20 02 C6 A0 BE 10 .& ﾑOｾP9ﾆP .ﾆ.ｾ.
1260  50 FE 10 52 84 F0 11 26 05 86 39 5F 20 04 86 31 P ?R?ｶ┘.&.←9_ .←1
1270  C6 31 CE 10 70 B7 10 6B F7 10 6C FF 10 54 BD EC ﾆ1ﾎ.pｷ.k┃ .l\.Tｽｭ
1280  7F FE 10 54 BD F0 02 7F 00 09 7C 00 0A CE 10 60 . ?.Tｽ┘....|..ﾎ.`
1290  BD F0 02 86 01 39 01 01 01 01 01 01 01 01 01 01 ｽ┘.←.9..........
12A0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
12B0  52 41 4D 2D 54 45 53 54 20 4E 4F 52 4D 41 4C 20 RAM-TEST NORMAL
12C0  45 4E 44 00 00 00 00 00 00 00 00 00 00 00 00 00 END.............
12D0  44 2D 52 41 4D 20 54 45 53 54 00 00 00 00 00 00 D-RAM TEST......
12E0  56 2D 52 41 4D 20 54 45 53 54 00 00 00 00 00 00 V-RAM TEST......
12F0  43 2D 52 41 4D 20 54 45 53 54 00 00 00 00 00 00 C-RAM TEST......
```

```
     JR-200 MEMORY DUMP V1.0                                    PAGE : 2

ADDR. 0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  CHRACTERS

1300  BF 40 50 FF 40 52 AE 00 EE 02 86 55 36 09 27 05 ｿ@P\@Rｪ.■.←U6.'.
1310  48 36 09 26 F5 FE 40 52 EE 02 C6 AA 32 11 26 3C H6.&■ ?R■.ﾆｪ2.&<
1320  09 27 08 54 32 11 26 30 09 26 EF FE 40 52 AE 00 .'.T2.&0.& ﾑ ?Rｪ.
1330  EE 02 86 AA 36 09 27 05 44 36 09 26 F5 FE 40 52 ■.←ｪ6.'.D6.&■ ?R
1340  EE 02 C6 55 32 11 26 10 09 27 08 58 32 11 26 0C ■.ﾆU2.&..'.X2.&.
1350  09 26 EF 4F BE 40 50 39 C6 50 20 02 C6 A0 BE 40 .& ﾑOｾP9ﾆP .ﾆ.ｾ@
1360  50 FE 40 52 EE 04 6E 00 84 F0 11 26 05 86 38 5F P ?R■.n.ｶ┘.&.←8_
1370  20 04 86 31 C6 30 CE 40 70 20 0E 86 37 5F CE 40  .←1ﾆ0ﾎ@p .←7_ﾎ@
1380  80 20 06 86 36 5F CE 40 90 B7 40 6B F7 40 6C FF . .←6_ﾎ@ ?ｷ@k┃ @l
1390  40 54 BD EC 7F FE 40 54 BD F0 02 7F 00 09 7C 00 @Tｽｭ. ?@Tｽ┘....|.
13A0  0A CE 40 60 BD F0 02 86 01 39 01 01 01 01 01 01 .ﾎ@`ｽ┘.←.9......
13B0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
13C0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
13D0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
13E0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
13F0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................

ADDR. 0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  CHRACTERS

1400  BF 10 50 FF 10 52 EE 04 FF 10 54 FE 10 52 AE 00 ｿ.P\.R■.\.T ?.Rｪ.
1410  EE 02 BC 10 54 27 06 A6 00 09 36 20 F5 BE 10 50 ■.ｼ.T'.ｦ..6 ■ｾ.P
1420  39 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 9...............
1430  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
1440  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
1450  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
1460  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
1470  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
1480  BF 40 50 FF 40 52 EE 04 FF 40 54 FE 40 52 AE 00 ｿ@P\@R■.\@T ?@Rｪ.
1490  EE 02 BC 40 54 27 06 A6 00 09 36 20 F5 BE 40 50 ■.ｼ@T'.ｦ..6 ■ｾ@P
14A0  39 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 9...............
14B0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
14C0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
14D0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
14E0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
14F0  01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 ................
```

List 2

JR-200 TEST PROGRAM ROM-TEST MEMORY DUMP

JR-200 MEMORY DUMP V1.0 PAGE : 1

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
1000	0F	7E	10	50	8E	9F	FF	CE	20	00	8C	40	00	27	08	32	.~.P■／＼ホ .▒@.'.2
1010	A1	00	26	18	08	20	F3	8E	DF	FF	8C	60	00	27	08	32	｡.&.. ▪■ ＼▒`.'.2
1020	A1	00	26	0C	08	20	F3	7E	10	70	01	01	86	35	20	02	｡.&.. ▪~.p..←5 .
1030	86	34	B7	18	1B	BE	18	00	0E	BD	EC	7F	CE	18	20	BD	←4ｷ..ｾ...ｽ┴.ﾎ. ｽ
1040	F0	02	7F	00	09	7C	00	0A	CE	18	10	BD	F0	02	39	01	┘....|..ﾎ..ｽ┘.9.
1050	BD	EC	7F	86	00	97	09	86	05	97	0A	CE	18	30	BD	F0	ｽ┴.←.■.←.■.ﾎ.0ｽ┘
1060	02	BF	18	00	7E	10	04	01	01	01	01	01	01	01	01	01	.ｿ..~.....
1070	BE	18	00	BD	EC	7F	CE	18	40	BD	F0	02	0E	39	01	01	ｾ..ｽ┴.ﾎ.@ｽ┘..9..
1080	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1090	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
10A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
10B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
10C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
10D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
10E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
10F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
1100	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1110	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1120	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1130	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1140	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1150	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1160	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1170	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1180	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1190	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
11A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
11B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
11C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
11D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
11E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
11F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
1200	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1210	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1220	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1230	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1240	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1250	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1260	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1270	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1280	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1290	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
12A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
12B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
12C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
12D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
12E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
12F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....

JR-200 MEMORY DUMP V1.0 PAGE : 2

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
1300	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1310	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1320	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1330	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1340	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1350	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1360	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1370	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1380	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1390	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
13A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
13B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
13C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
13D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
13E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
13F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
1400	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1410	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1420	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1430	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1440	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1450	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1460	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1470	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1480	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1490	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
14A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
14B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
14C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
14D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
14E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
14F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
1500	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1510	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1520	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1530	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1540	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1550	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1560	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1570	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1580	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
1590	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
15A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
15B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
15C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
15D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
15E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....
15F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.....

```
     JR-200 MEMORY DUMP V1.0                                    PAGE : 3

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

1600  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1610  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1620  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1630  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1640  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1650  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1660  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1670  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1680  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1690  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
16A0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
16B0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
16C0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
16D0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
16E0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
16F0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

1700  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1710  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1720  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1730  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1740  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1750  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1760  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1770  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1780  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
1790  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
17A0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
17B0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
17C0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
17D0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
17E0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
17F0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

1800  07 FB FF FF FF FF FF FF  FF FF FF FF FF FF FF FF  .\\\\\\\\\\\\\\\\
1810  44 45 56 49 43 45 20 3D  20 49 43 00 00 FF FF FF  DEVICE = IC..\\\
1820  52 4F 4D 20 45 52 52 4F  52 20 21 00 FF FF FF FF  ROM ERROR !.\\\\
1830  52 4F 4D 20 54 45 53 54  00 00 00 00 00 00 00 00  ROM TEST........
1840  52 4F 4D 2D 54 45 53 54  20 4E 4F 52 4D 41 4C 20  ROM-TEST NORMAL
1850  45 4E 44 00 00 00 00 00  00 00 00 00 00 00 00 00  END.............
```


List 3

JR-200 TEST PROGRAM I/O TEST BASIC PROGRAM

```
1 REM ************************
2 REM **  JR-200 TEST PRO.   **
4 REM **          1982/12/9   **
5 REM **          H.YASUI     **
6 REM ************************
10 REM ** MAIN **
20 CLS:GOSUB 1300:GOSUB 700:GOSUB 800:GOSUB 900:GOSUB 1000:GOTO 100
30 GOSUB 3200:GOSUB 1100
40 END
100 REM ** KEY IN TEST **
110 B=USR($6408,$4400):COLOR 7,0,0:CLS:LOCATE 10,3:PRINT "KEYBOARD TEST"
120 FOR I=1 TO 400:NEXT
130 PRINT "┌──────────────────────────────────────┐";
140 PRINT "|■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■■|";
150 PRINT "|                                    |";
160 PRINT "| ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■■ |";
170 PRINT "|                                ■   |";
180 PRINT "|■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■   |";
190 PRINT "|                                    |";
200 PRINT "|■■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■■ ■ |";
210 PRINT "|                                    |";
220 PRINT "|    ■ ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■|";
230 PRINT "└──────────────────────────────────────┘"
240 COLOR 0,7:LOCATE 30,7:PRINT "| ":LOCATE 30,9:PRINT "| "
250 LOCATE 30,11:PRINT "| ":LOCATE 30,13:PRINT "| "
260 COLOR 7,0:LOCATE 4,19:PRINT "HIT BLINKING KEY"
270 LOCATE 4,21:I=$4468
280 D=PEEK(I):X=PEEK(I+1):Y=PEEK(I+2):S1=PEEK(I+3):S2=PEEK(I+4)
290 L1=PEEK(I+5):I=I+6:N=PEEK(I):K$=CHR$(N):IF L1=1 THEN 310
300 FOR J=1 TO L1-1:N=PEEK(I+J):K$=K$+CHR$(N):NEXT
310 I=I+L1
320 N=PEEK(I):D$=CHR$(N):IF L1=1 THEN 340
330 FOR J=1 TO L1-1:N=PEEK(I+J):D$=D$+CHR$(N):NEXT
340 I=I+L1:S3=PEEK(I):L2=PEEK(I+1):I=I+2
350 N=PEEK(I):M$=CHR$(N):IF L2=1 THEN 370
360 FOR J=1 TO L2-1:N=PEEK(I+J):M$=M$+CHR$(N):NEXT
370 I=I+L2:LOCATE 4,21:COLOR 7,0,0:PRINT SPC(29)
380 LOCATE 4,21:PRINT "HIT ";:IF S3=1 THEN S$="A":GOTO 450
390 IF S3=2 THEN S$="Z":GOTO 450
400 IF S3=3 THEN S$="_":GOTO 450
410 IF S3=4 THEN S$="X":GOTO 470
420 IF S3=5 THEN S$="_":GOTO 470
430 IF S3=6 THEN S$="Z":GOTO 470
440 COLOR 0,7,0:PRINT M$;:COLOR 7,0:PRINT " KEY":GOTO 490
450 COLOR 0,7,0:PRINT M$;:COLOR 7,0:PRINT " + ";:COLOR 0,7:PRINT S$;
460 COLOR 7,0,0:PRINT " KEY":GOTO 490
470 COLOR 0,7,0:PRINT M$;:COLOR 7,0:PRINT " KEY"
480 LOCATE 3,22:PRINT ", AND THEN HIT ";:COLOR 0,7
485 PRINT S$;:COLOR 7,0,0:PRINT " KEY"
490 C=0
500 LOCATE X,Y:IF C=11 THEN COLOR 2,0,S1:PRINT K$:C=0:COLOR 2,0,0:GOTO 550
510 IF C<>6 THEN 550
520 IF K$="| " THEN COLOR 2,0,0:PRINT " ":GOTO 550
530 IF K$="■" THEN COLOR 2,0,0:PRINT " ":GOTO 550
540 COLOR 2,0,2:PRINT K$
550 C=C+1:PICK A:IF A=0 THEN 500
570 IF D<>A THEN 500
610 LOCATE X,Y:COLOR 7,1,S2:PRINT D$
620 PICK W:IF W<>0 THEN 620
630 IF I<$475A THEN 280
```

```
620 PICK W:IF W<>0 THEN 620
630 IF I<$4761 THEN 280
635 COLOR 7,0,0
640 CLS:LOCATE 0,2:COLOR 7,0,0:PRINT "HIT ";:COLOR 0,7:PRINT "CTRL+C";
650 COLOR 7,0:PRINT " ,AND THEN HIT ";
660 COLOR 0,7:PRINT "RETURN";:COLOR 7,0:PRINT " KEY"
670 LOCATE 0,9:PRINT "GOTO 690"
680 LOCATE 0,5:GOTO 680
690 GOTO 30
700 REM ** COLOR TEST **
710 CLS:LOCATE 9,3:PRINT "COLOR TEST":FOR I=1 TO 400:NEXT
720 POKE $CA00,1:F=USR($61F3)
730 PICK K:IF K=0 THEN 730
740 PICK K:IF K<>0 THEN 740
750 POKE $CA00,0:RETURN
800 REM ** LINE TEST **
810 CLS:LOCATE 10,3:PRINT "LINE TEST":FOR I=1 TO 400:NEXT:CLS
820 F=USR($6270)
830 PICK K:IF K=0 THEN 830
840 PICK K:IF K<>0 THEN 840
850 RETURN
900 REM ** SEMIGRAPHICS TEST **
910 CLS:LOCATE 7,3:PRINT "SENIGRAPHICS TEST":FOR I=1 TO 400:NEXT
920 F=USR($6327)
930 PICK K:IF K=0 THEN 930
940 PICK K:IF K<>0 THEN 940
950 RETURN
1000 REM ** USER PATTERN TEST **
1010 CLS:LOCATE 9,3:PRINT "USER PATTERN TEST":FOR I=1 TO 400:NEXT
1020 F=USR($6348,0,$FF)
1030 PICK K:IF K=0 THEN 1030
1040 PICK K:IF K<>0 THEN 1040
1050 F=USR($6348,0,$0)
1060 PICK K:IF K=0 THEN 1060
1070 PICK K:IF K<>0 THEN 1070
1080 RETURN
1100 REM ** COLOR & SPEAKER TEST **
1105 G=USR($61F3)
1110 TEMPO 50:PLAY "B",$5000,$5300,$5600:POKE $CA00,1
1120 IF PEEK($30)=0 THEN PLAY "B",$5000,$5300,$5600
1125 GOTO 1120
1130 PICK A:IF A=0 THEN 1120
1140 PICK E:IF E<>0 THEN 1140
1150 POKE $30,0:POKE $31,0:RETURN
1300 REM ** PRINTER TEST **
1310 CLS:LOCATE 10,3:PRINT "PRINTER TEST"
1320 LPRINT "1234567890abcdefghijklmnopqrstuvwxyz";
1340 LPRINT '!"#$%&';"'()=~|`{+*}<>?_@[;:],./";
1350 LPRINT "ABCDEFGHIJKLMNOPQRSTUVWXYZ":RETURN
1400 REM  ** CASSETTE TEST **
1410 POKE $CA00,0:COLOR 7,0,0:CLS:LOCATE 8,3:PRINT "CASSETTE TEST":POKE $2B,0
1430 LOCATE 0,5:PRINT 'MSAVE "CASSETTETEST",$1000,$137F'
1440 LOCATE 0,10:PRINT "VERIFY ":LOCATE 7,20:COLOR 7,0:PRINT "HIT ";
1460 COLOR 0,7:PRINT "RETURN";:COLOR 7,0:PRINT " KEY":LOCATE 0,3:END
3200 REM ** JOYSTICK TEST **
3210 F=0:F2=2:COLOR 7,0,0:Z=USR($6408,$4782)
3220 A$=CHR$($21)+CHR$($23)+CHR$($1D)+CHR$($1D)+CHR$($1F)+CHR$($22)+CHR$($24)
3230 B$=CHR$($25)+CHR$($26)+CHR$($27)+CHR$($1D)+CHR$($1D)+CHR$($1D)
3240 B$=B$+CHR$($1F)+CHR$($28)+CHR$($29)+CHR$($2A)+CHR$($1D)+CHR$($1D)
3250 B$=B$+CHR$($1D)+CHR$($1F)+CHR$($2B)+CHR$($2C)+CHR$($2D)
3260 C$=CHR$($20)+CHR$($20)+CHR$($1D)+CHR$($1D)+CHR$($1F)+CHR$($20)+CHR$($20)
3265 CLS
```



```
3260 C$=CHR$($20)+CHR$($20)+CHR$($1D)+CHR$($1D)+CHR$($1F)+CHR$($20)+CHR$($20)
3265 CLS
3270 LOCATE 8,0:PRINT "JOYSTICK TEST";F+1
3280 D$="|          |      |          |"
3290 LOCATE 2,2:PRINT "┌──────────┐      ┌──────────┐"
3300 LOCATE 2,3:PRINT D$:LOCATE 2,4:PRINT D$:LOCATE 2,5:PRINT D$
3310 LOCATE 2,6:PRINT D$:LOCATE 2,7:PRINT D$:LOCATE 2,8:PRINT D$
3320 LOCATE 2,9:PRINT D$:LOCATE 2,10:PRINT D$:LOCATE 2,11:PRINT D$
3380 LOCATE 2,12:PRINT "└──────────┘      └──────────┘"
3390 COLOR 7,0,1:LOCATE 3,3:PRINT A$:LOCATE 6,6:PRINT B$
3395 LOCATE 19,3:PRINT A$:LOCATE 22,6:PRINT B$
3400 COLOR 7,0,0:LOCATE 3,17:PRINT "MOVE THE JOYSTIC LEVER IN "
3410 LOCATE 2,18:PRINT "THE DIRECTION OF THE ARROW.":I=$4818
3420 P=PEEK(I)*256+PEEK(I+1):K=PEEK(I+2):L=PEEK(I+3):D=PEEK(I+4)
3430 A=P+$400:IF F=1 THEN P=P+16:A=A+16
3440 N=7:C=0
3460 IF C=11 THEN POKE A,2:POKE P,K:C=0:GOTO 3480
3470 IF C=6 THEN POKE A,2:POKE P,$20
3480 C=C+1:B=STICK(F+1):B2=STICK(F2):IF B=$FF THEN 3460
3485 IF B2<>$FF THEN 3460
3490 IF B<>D THEN 3460
3500 I=I+5
3510 POKE A,7:POKE P,K
3520 E=STICK(F+1):IF E<>$FF THEN 3520
3530 IF I<$482C THEN 3420
3535 Y=3:IF F=1 THEN Y=19
3540 LOCATE 0,17:PRINT SPC(60):LOCATE 6,17
3550 PRINT "HIT JOYSTICK SWITCH":C=0
3560 COLOR 2,0,1
3570 IF C=11 THEN LOCATE Y,3:PRINT A$:C=0:GOTO 3590
3580 IF C=6 THEN LOCATE Y,3:PRINT C$
3590 C=C+1:B=STICK(F+1):B2=STICK(F2):IF B=$FF THEN 3570
3595 IF B2<>$FF THEN 3570
3600 IF B<>$EF THEN 3570
3610 COLOR 7,0,1:LOCATE Y,3:PRINT A$
3620 E=STICK(F+1):IF E<>$FF THEN 3620
3630 COLOR 7,0,0:F=F+1:F2=F2-1:IF F=2 THEN RETURN
3640 FOR J=1 TO 400:NEXT:GOTO 3270
```

List 4

```
JR-200 TEST PROGRAM      I/O TEST MEMORY DUMP

     JR-200 MEMORY DUMP V1.0                                    PAGE : 1

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

4000  01 4A 01 FF 20 52 41 4D  20 B4 D7 2D 20 21 21 FF  .J.＼ RAM ｴﾗｰ !!＼
4010  20 B1 C4 DE DA BD 20 20  20 20 20 20 20 3D 20 24   ｱﾄﾞﾚｽ          = $
4020  0F FF 20 BE B2 BC DE AE  B3 20 C3 DE 2D C0 20 3D  .＼ ｾｲｼﾞｮｳ ﾃﾞｰﾀ =
4030  20 24 0F FF 20 B4 D7 2D  20 C3 DE 2D C0 20 20 20   $.＼ ｴﾗｰ ﾃﾞｰﾀ
4040  20 3D 20 24 0F FF 00 00  00 00 00 00 00 02 41 01   = $.＼........A.
4050  FF 20 52 4F 4D 20 B4 D7  2D 20 21 21 FF 20 B1 C4  ＼ ROM ｴﾗｰ !!＼ ｱﾄ
4060  DE DA BD 20 20 20 20 20  20 20 3D 20 24 0F FF 20  ﾞﾚｽ          = $.＼
4070  BE B2 BC DE AE B3 20 C3  DE 2D C0 20 3D 20 24 0F  ｾｲｼﾞｮｳ ﾃﾞｰﾀ = $.
4080  FF 20 B4 D7 2D 20 C3 DE  2D C0 20 20 20 20 3D 20  ＼ ｴﾗｰ ﾃﾞｰﾀ     =
4090  24 0F FF 00 00 00 00 00  00 00 00 00 00 00 00 00  $.＼............
40A0  52 45 54 55 52 4E 20 B7  2D 20 A6 20 B5 00 C3 B8  RETURN ｷｰ ﾗ ｵ.ﾃｸ
40B0  C0 DE BB B2 00 00 00 00  00 00 00 00 00 00 00 00  ﾀﾞｻｲ............
40C0  52 55 4E 40 A0 40 B3 C1  00 52 41 4D 20 C3 BD C4  RUN@.@ｳﾁ.RAM ﾃｽﾄ
40D0  00 00 08 00 10 00 10 00  18 00 00 00 C1 00 1F 18  ............ﾁ...
40E0  C1 84 18 10 C2 08 10 08  C2 6B 0A 02 41 00 41 FF  ﾁ■..ﾂ...ﾂk..A.A＼
40F0  C2 00 42 00 42 FF C2 00  43 00 43 FF C6 00 00 00  ﾂ.B.B＼ﾂ.C.C＼ﾆ...

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

4100  00 00 00 00 00 00 00 00  00 00 00 00 00 01 02 03  ................
4110  04 05 06 07 00 00 00 00  00 00 00 00 00 00 00 00  ................
4120  00 00 00 00 00 00 00 00  00 00 00 00 08 09 0A 0B  ................
4130  0C 0D 0E 0F 00 00 00 00  00 00 00 00 00 00 00 00  ................
4140  00 00 00 00 00 00 00 00  00 00 00 00 10 11 12 13  ................
4150  14 15 16 17 00 00 00 00  00 00 00 00 00 00 00 00  ................
4160  00 00 00 00 00 00 00 00  00 00 00 00 18 19 1A 1B  ................
4170  1C 1D 1E 1F 00 00 00 00  00 00 00 00 00 00 00 00  ................
4180  00 00 00 00 00 00 00 00  00 00 00 00 80 81 82 83  ............♠♥♦
4190  84 85 86 87 00 00 00 00  00 00 00 00 00 00 00 00  ♣♠←↓............
41A0  00 00 00 00 00 00 00 00  00 00 00 00 88 89 8A 8B  ............↑→天☺
41B0  8C 8D 8E 8F 00 00 00 00  00 00 00 00 00 00 00 00  ▙▚■◢............
41C0  00 00 00 00 00 00 00 00  00 00 00 00 90 91 92 93  ............ ┌──
41D0  94 95 96 97 00 00 00 00  00 00 00 00 00 00 00 00  ▬▬............
41E0  00 00 00 00 00 00 00 00  00 00 00 00 98 99 9A 9B  ............ ├┤ ┤─
41F0  9C 9D 9E 9F 00 00 00 00  00 00 00 00 00 00 00 00  ◣◺╳／............

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

4200  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 00 01 02 03  ▇▇▇▇▇▇▇▇....
4210  04 05 06 07 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ....▇▇▇▇▇▇▇▇
4220  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 08 09 0A 0B  ▇▇▇▇▇▇▇▇....
4230  0C 0D 0E 0F 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ....▇▇▇▇▇▇▇▇
4240  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 10 11 12 13  ▇▇▇▇▇▇▇▇....
4250  14 15 16 17 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ....▇▇▇▇▇▇▇▇
4260  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 18 19 1A 1B  ▇▇▇▇▇▇▇▇....
4270  1C 1D 1E 1F 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ....▇▇▇▇▇▇▇▇
4280  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 80 81 82 83  ▇▇▇▇▇▇▇▇.♠♥♦
4290  84 85 86 87 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ♣♠←↓▇▇▇▇▇▇▇▇
42A0  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 88 89 8A 8B  ▇▇▇▇▇▇▇▇↑→天☺
42B0  8C 8D 8E 8F 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ▙▚■◢▇▇▇▇▇▇▇▇
42C0  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 90 91 92 93  ▇▇▇▇▇▇▇▇ ┌──
42D0  94 95 96 97 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ▬▬▇▇▇▇▇▇▇▇
42E0  8E 8E 8E 8E 8E 8E 8E 8E  8E 8E 8E 8E 98 99 9A 9B  ▇▇▇▇▇▇▇▇ ├┤ ┤─
42F0  9C 9D 9E 9F 8E 8E 8E 8E  8E 8E 8E 8E 8E 8E 8E 8E  ◣◺╳／▇▇▇▇▇▇▇▇
```



```
     JR-200 MEMORY DUMP V1.0                                    PAGE : 2

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

4300  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
4310  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
4320  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
4330  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
4340  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
4350  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
4360  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
4370  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
4380  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
4390  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
43A0  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
43B0  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
43C0  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
43D0  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............
43E0  0F 0F 0F 0F 0F 0F 0F 0F  0F 0F 0F 0F 4F 4F 4F 4F  ............0000
43F0  4F 4F 4F 4F 0F 0F 0F 0F  0F 0F 0F 0F 0F 0F 0F 0F  0000............

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

4400  44 08 44 67 C0 00 00 00  7E 7E 7E 7E 7E 7E 7E 7E  D.Dg7...~~~~~~~~
4410  E0 90 E0 A0 97 05 05 07  E0 46 49 48 46 E1 09 06  ○ r○.■...○FIHF ▪.
4420  E0 90 90 94 E4 04 04 07  60 90 B0 90 67 02 02 02  ○ r ▬▀...` r. rg.
4430  60 90 B0 B7 95 67 04 04  40 F0 50 50 02 0F 02 04  ` r.ｷ▬g..@→PP....
4440  60 90 F0 94 94 94 04 07  18 24 42 7E 42 42 42 00  ` ┌┘▬▬...$B~BBBB.
4450  42 42 24 18 24 42 42 00  00 7E 42 42 42 42 7E 00  BB$.$BB..~BBBB~.
4460  7E 02 04 18 20 40 7E 00  31 01 05 00 00 01 8E 31  ~... @~.1.....■1
4470  00 01 31 32 03 05 00 00  01 8E 32 00 01 32 33 05  ..12.....■2..23.
4480  05 00 00 01 8E 33 00 01  33 34 07 05 00 00 01 8E  ....■3..34.....■
4490  34 00 01 34 35 09 05 00  00 01 8E 35 00 01 35 36  4..45.....■5..56
44A0  0B 05 00 00 01 8E 36 00  01 36 37 0D 05 00 00 01  ..... ■6..67.....
44B0  8E 37 00 01 37 38 0F 05  00 00 01 8E 38 00 01 38  ■7..78.....■8..8
44C0  39 11 05 00 00 01 8E 39  00 01 39 30 13 05 00 00  9.....■9..90....
44D0  01 8E 30 00 01 30 2D 15  05 00 00 01 8E 2D 00 01  .■0..0-.....■-..
44E0  2D 5E 17 05 00 00 01 8E  5E 00 01 5E 5C 19 05 00  -^.....■^..^¥....
44F0  00 01 8E 5C 00 01 5C 08  1B 05 00 01 01 8E 21 00  ...■¥..¥.....■!.

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

4500  06 52 55 42 4F 55 54 71  02 07 00 00 01 8E 51 00  .RUBOUTq.....■Q.
4510  01 51 77 04 07 00 00 01  8E 57 00 01 57 65 06 07  .Qw.....■W..We..
4520  00 00 01 8E 45 00 01 45  72 08 07 00 00 01 8E 52  ....■E..Er.....■R
4530  00 01 52 74 0A 07 00 00  01 8E 54 00 01 54 79 0C  ..Rt.....■T..Ty.
4540  07 00 00 01 8E 59 00 01  59 75 0E 07 00 00 01 8E  .....■Y..Yu.....■
4550  55 00 01 55 69 10 07 00  00 01 8E 49 00 01 49 6F  U..Ui.....■I..Io
4560  12 07 00 00 01 8E 4F 00  01 4F 70 14 07 00 00 01  ......■O..Op.....
4570  8E 50 00 01 50 40 16 07  00 00 01 8E 40 00 01 40  ■P..P@......■@..@
4580  5B 18 07 00 00 01 8E 5B  00 01 5B 0D 1B 07 00 00  [.....■[..[.....
4590  07 8E 1F 1D 8E 1F 1D 8E  52 1F 1D 54 1F 1D 4E 00  .■...■...■R..T..N.
45A0  06 52 45 54 55 52 4E 61  03 09 00 00 01 8E 41 00  .RETURNa.....■A.
45B0  01 41 73 05 09 00 00 01  8E 53 00 01 53 64 07 09  .As.....■S..Sd..
45C0  00 00 01 8E 44 00 01 44  66 09 09 00 00 01 8E 46  ....■D..Df.....■F
45D0  00 01 46 67 0B 09 00 00  01 8E 47 00 01 47 68 0D  ..Fg.....■G..Gh.
45E0  09 00 00 01 8E 48 00 01  48 6A 0F 09 00 00 01 8E  .....■H..Hj.....■
45F0  4A 00 01 4A 6B 11 09 00  00 01 8E 4B 00 01 4B 6C  J..Jk.....■K..Kl
```

JR-200 MEMORY DUMP V1.0 PAGE : 3

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4600	13	09	00	00	01	8E	4C	00	01	4C	3B	15	09	00	00	01	.....■L..L;.....
4610	8E	3B	00	01	3B	3A	17	09	00	00	01	8E	3A	00	01	3A	■;..;:.....■:..:
4620	5D	19	09	00	00	01	8E	5D	00	01	5D	7A	04	0B	00	00	]......■]..]z....
4630	01	8E	5A	00	01	5A	78	06	0B	00	00	01	8E	58	00	01	.■Z..Zx.....■X..
4640	58	63	0B	0B	00	00	01	8E	43	00	01	43	76	0A	0B	00	Xc.....■C..Cv...
4650	00	01	8E	56	00	01	56	62	0C	0B	00	00	01	8E	42	00	..■V..Vb.....■B.
4660	01	42	6E	0E	0B	00	00	01	8E	4E	00	01	4E	6D	10	0B	.Bn.....■N..Nm..
4670	00	00	01	8E	4D	00	01	4D	2C	12	0B	00	00	01	8E	2C	...■M..M,.....■,
4680	00	01	2C	2E	14	0B	00	00	01	8E	2E	00	01	2E	2F	16	..,.....■..../.
4690	0B	00	00	01	8E	2F	00	01	2F	20	09	0D	00	00	0D	8E	....■/../ .....■
46A0	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	20	20	20	20	■■■■■■■■■■■■■■■■
46B0	53	50	41	43	45	20	20	20	20	00	05	53	50	41	43	45	SPACE ..SPACE
46C0	13	1D	07	00	01	01	F5	22	00	03	49	4E	53	7F	1E	07	.....■"..INS...
46D0	02	01	01	F1	23	00	03	44	45	4C	1E	1E	09	02	00	01	...| #..DEL.....
46E0	F1	88	00	01	88	1D	1D	0B	00	00	01	F5	86	00	01	86		↑..↑.....■←..←
46F0	1C	1E	0B	02	00	01	F1	89	00	01	89	1F	1E	0D	02	00	.....| →..→.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4700	01	F1	87	00	01	87	5A	01	0B	00	00	04	8E	8E	1C	8E	.| ↓...↓Z.....■■.■
4710	53	49	1C	5A	02	05	53	48	49	46	54	5F	18	0B	00	00	SI.Z..SHIFT_....
4720	04	8E	1C	8E	8E	5F	1C	53	49	03	05	53	48	49	46	54	.■.■■_.SI..SHIFT
4730	F8	06	0B	00	01	04	8E	1F	1F	8E	29	1F	1F	25	04	08	■.....■..■)..%..
4740	47	52	41	50	48	20	4F	4E	7A	04	0B	00	01	04	8E	1F	GRAPH ONz.....■.
4750	1F	8E	2B	1F	1F	27	06	09	47	52	41	50	48	20	4F	46	.■+..'..GRAPH OF
4760	46	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	F.....
4770	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4780	00	00	47	88	48	17	C0	00	00	00	00	00	00	00	00	00	..G↑H.ﾀ.....
4790	07	1F	3F	7F	7F	FF	FF	FF	FF	FF	FF	7F	7F	3F	1F	07	..?..\\\\\\\..?..
47A0	E0	F8	FC	FE	FE	FF	FF	FF	FF	FF	FF	FE	FE	FC	F8	E0	○■ ● ノ ノ\\\\\\\ ノ ノ●■ ○
47B0	00	00	00	00	01	03	07	0F	00	00	00	7E	FF	FF	FF	FF	.....~\\\\
47C0	00	00	00	00	80	C0	E0	F0	0F	1F	1F	1F	1F	1F	1F	0F	.....ﾀ○┘.....
47D0	FF	FF	FF	FF	FF	FF	FF	FF	F0	F8	F8	F8	F8	F8	F8	F0	\\\\\\\\┘■■■■■■■┘
47E0	0F	07	03	01	00	00	00	00	FF	FF	FF	FF	7E	00	00	00	.....\\\\~...
47F0	F0	E0	C0	80	00	00	00	00	00	70	60	50	08	04	02	00	┘○ﾀ.....p'P....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4800	00	0E	06	0A	10	20	40	00	00	02	04	08	50	60	70	00	..... @.....P'p.
4810	00	40	20	10	0A	06	0E	00	C1	A7	88	00	FE	C1	E9	89	.@ .....ﾁｧ↑. ｰﾁ+→
4820	00	F7	C2	27	87	00	FD	C1	E5	86	00	FB	00	00	00	00	.| ｯ' ↓.ｰﾁ▌ ←. ･....
4830	40	C0	40	C2	C2	40	00	00	00	00	00	00	00	00	00	00	@ﾀ@ﾂﾂ@.....
4840	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4850	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4860	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4870	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4880	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4890	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
48A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
48B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
48C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
48D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
48E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
48F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

JR-200 MEMORY DUMP V1.0 PAGE : 4

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4900	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4910	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4920	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4930	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4940	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4950	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4960	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4970	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4980	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4990	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
49A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
49B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
49C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
49D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
49E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
49F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4A00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4A90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4AA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4AB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4AC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4AD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4AE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4AF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4B00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4B90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4BA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4BB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4BC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4BD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4BE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4BF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

JR-200 MEMORY DUMP V1.0 PAGE : 5

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4C00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4C90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4CA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4CB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4CC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4CD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4CE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4CF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4D00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4D90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4DA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4DB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4DC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4DD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4DE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4DF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4E00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4E90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4EA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4EB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4EC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4ED0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4EE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4EF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

JR-200 MEMORY DUMP V1.0 PAGE : 6

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
4F00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4F90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4FA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4FB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4FC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4FD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4FE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4FF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5000	30	00	18	00	18	00	F0	29	18	00	18	00	18	00	18	00	0.....┘)....
5010	24	00	0C	1B	18	00	18	00	18	16	18	00	30	00	18	14	$.....0...
5020	18	00	30	00	18	16	18	00	30	00	24	19	0C	00	18	00	..0.....0.$.....
5030	18	17	18	00	18	00	30	19	30	00	30	00	18	16	48	00	.....0.0.0...H.
5040	24	00	0C	1B	18	00	18	00	18	16	18	00	30	00	18	14	$.....0...
5050	18	00	30	00	18	16	18	00	30	00	24	19	0C	00	18	00	..0.....0.$.....
5060	18	17	18	00	18	00	30	19	30	00	30	00	18	16	48	00	.....0.0.0...H.
5070	30	00	30	00	30	00	18	00	18	00	F0	00	C0	00	18	0F	0.0.0.....┘.ﾀ...
5080	18	00	2D	00	03	00	15	00	03	00	15	18	03	00	30	00	..-.....0.
5090	18	16	18	00	18	00	48	14	30	00	18	00	18	14	30	00	.....H.0.....0.
50A0	18	00	18	18	30	00	18	00	18	18	60	00	30	00	18	1B	....0.....`.0...
50B0	18	00	2D	00	03	00	18	00	18	00	30	14	18	00	18	00	..-.....0.....
50C0	18	1B	48	00	30	00	18	11	18	00	30	00	18	13	18	00	..H.0.....0.....
50D0	30	00	18	18	18	00	60	00	30	00	30	00	30	00	24	19	0.....`.0.0.0.$.
50E0	0C	00	18	00	18	17	18	00	18	00	30	19	18	00	18	00	.....0.....
50F0	30	17	18	00	18	00	30	19	24	00	0C	00	18	19	18	00	0.....0.$.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5100	18	00	18	17	30	00	30	00	30	19	18	00	48	00	30	00	....0.0.0...H.0.
5110	30	00	30	00	18	29	18	00	F0	00	C0	00	48	00	18	00	0.0..)...┘.ﾀ.H...
5120	24	14	0C	00	24	00	0C	16	60	00	60	00	2D	19	03	00	$...$...`.`.-...
5130	30	00	30	14	30	00	90	00	30	00	48	00	18	00	24	14	0.0.0. ┌.0.H...$.
5140	0C	00	24	00	0C	16	60	00	60	00	2D	16	03	00	2D	00	..$...`.`.-...-.
5150	03	00	30	00	30	00	90	16	30	00	45	00	03	00	18	00	..0.0. ┌.0.E.....
5160	24	00	0C	16	24	00	0C	00	60	14	60	00	2D	00	03	00	$...$...`.`.-...
5170	30	00	30	00	30	16	90	00	30	00	48	11	18	00	24	00	0.0.0. ┌.0.H...$.
5180	0C	13	24	00	0C	00	45	0F	03	00	18	00	60	14	48	00	..$...E.....`.H.
5190	18	00	30	18	30	00	90	00	30	00	22	00	02	00	0A	0F	..0.0. ┌.0.".....
51A0	02	00	22	00	02	00	0C	00	48	00	18	13	22	00	02	00	.."......H..."...
51B0	0A	11	02	00	22	00	02	00	0C	00	48	00	18	14	22	00	...."......H...".
51C0	02	00	0A	13	02	00	22	00	02	00	0C	00	30	00	30	13	....."......0.0.
51D0	30	00	30	00	60	18	22	00	02	00	0A	0F	02	00	22	00	0.0.`."......".
51E0	02	00	0C	00	48	00	18	13	22	00	02	00	0A	11	02	00	....H...".......
51F0	22	00	02	00	0C	00	48	00	18	14	22	00	02	00	0A	13	"......H...".....

```
     JR-200 MEMORY DUMP V1.0                                    PAGE : 7

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

5200  02 00 22 00 02 00 0C 00  30 00 30 13 90 00 30 00  ..".....0.0. ｒ.0.
5210  30 00 30 00 18 00 18 00  F0 00 C0 00 C0 00 FE 00  0.0.....ｺ.ﾀ.ﾀ. ｸ.
5220  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5230  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5240  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5250  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5260  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5270  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52B0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5290  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52A0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52B0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52C0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52D0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52E0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
52F0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

5300  30 00 18 29 18 00 F0 00  18 00 18 00 18 00 18 00  0..)..ｰ.........
5310  24 00 0C 00 18 19 18 00  18 00 18 17 30 00 18 00  $...........0...
5320  18 16 30 00 18 00 18 17  30 00 24 00 0C 1B 18 00  ..0.....0.$.....
5330  18 00 18 16 18 00 30 00  30 14 30 00 18 00 48 12  ......0.0.0...H.
5340  24 00 0C 00 18 19 18 00  18 00 18 17 30 00 18 00  $...........0...
5350  18 16 30 00 18 00 18 17  30 00 24 00 0C 1B 18 00  ..0.....0.$.....
5360  18 00 18 16 18 00 30 00  30 14 30 00 18 00 48 12  ......0.0.0...H.
5370  30 00 30 00 30 00 18 00  18 00 F0 29 C0 00 18 00  0.0.0.....ｰ)ﾀ...
5380  18 14 2D 00 03 00 15 18  03 00 15 00 03 00 30 00  ..ｰ...........0.
5390  18 00 18 18 18 00 48 00  30 00 18 00 18 00 30 18  ......H.0.....0.
53A0  18 00 18 00 30 1B 18 00  18 00 60 16 30 00 18 00  ....0.....｀.0...
53B0  18 19 2D 00 03 00 18 18  18 00 30 00 18 16 18 00  ..ｰ.......0.....
53C0  18 00 48 19 30 00 18 00  18 10 30 00 18 00 18 14  ..H.0.....0.....
53D0  30 00 18 00 18 16 60 00  30 00 30 00 30 00 24 00  0.....｀.0.0.0.$.
53E0  0C 1B 18 00 18 00 18 16  18 00 30 00 18 14 18 00  ..........0.....
53F0  30 00 18 16 18 00 30 00  24 19 0C 00 18 00 18 17  0.....0.$.......

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

5400  18 00 18 00 30 19 30 00  30 00 18 16 48 00 30 00  ....0.0.0...H.0.
5410  30 00 30 00 18 00 18 00  F0 00 C0 00 48 14 18 00  0.0.....ｰ.ﾀ.H...
5420  24 00 0C 0F 24 00 0C 00  60 18 60 00 2D 00 03 00  $...$...｀.｀.-...
5430  30 00 30 00 30 16 90 00  30 00 48 14 18 00 24 00  0.0.0. ｒ.0.H...$.
5440  0C 0F 24 00 0C 00 60 18  60 00 2D 00 03 00 2D 00  ..$...｀.｀.-...-.
5450  03 00 30 16 30 00 90 00  30 00 45 00 03 00 18 16  ..0.0. ｒ.0.E.....
5460  24 00 0C 00 24 18 0C 00  60 00 60 0F 2D 00 03 00  $...$...｀.｀.-...
5470  30 19 30 00 30 00 90 18  30 00 48 00 18 13 24 00  0.0.0. ｒ.0.H...$.
5480  0C 00 24 14 0C 00 45 00  03 00 18 00 60 00 48 18  ..$...E.....｀.H.
5490  18 00 30 00 30 16 90 00  30 00 22 0F 02 00 0A 00  ..0.0. ｒ.0.".....
54A0  02 00 22 00 02 00 0C 0F  48 00 18 00 22 11 02 00  .."".....H..."...
54B0  0A 00 02 00 22 00 02 00  0C 11 48 00 18 00 22 13  ....".....H...".
54C0  02 00 0A 00 02 00 22 00  02 00 0C 13 30 00 30 00  ......".....0.0.
54D0  30 14 30 00 60 00 22 0F  02 00 0A 00 02 00 22 00  0.0.｀."......".
54E0  02 00 0C 0F 48 00 18 00  22 11 02 00 0A 00 02 00  ....H..."".....
54F0  22 00 02 00 0C 11 48 00  18 00 22 13 02 00 0A 00  "".....H..."".....
```

```
     JR-200 MEMORY DUMP V1.0                                    PAGE : 8

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

5500  02 00 22 00 02 00 0C 13  30 00 30 00 90 14 30 00  ..".....0.0. ｒ.0.
5510  30 00 30 00 18 00 18 00  F0 29 C0 00 C0 00 FE 00  0.0.....ｰ)ﾀ.ﾀ. ｸ.
5520  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5530  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5540  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5550  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5560  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5570  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5580  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
5590  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
55A0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
55B0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
55C0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
55D0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
55E0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................
55F0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ................

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

5600  30 00 18 00 18 00 F0 00  18 00 18 00 18 00 18 00  0.....ｰ.........
5610  24 19 0C 00 18 00 18 17  18 00 18 00 30 19 18 00  $...........0...
5620  18 00 30 17 18 00 18 00  30 19 24 00 0C 00 18 19  ..0.....0.$.....
5630  18 00 18 00 18 17 30 00  30 00 30 19 18 00 48 00  ......0.0.0...H.
5640  24 19 0C 00 18 00 18 17  18 00 18 00 30 19 18 00  $...........0...
5650  18 00 30 17 18 00 18 00  30 19 24 00 0C 00 18 19  ..0.....0.$.....
5660  18 00 18 00 18 17 30 00  30 00 30 19 18 00 48 00  ......0.0.0...H.
5670  30 00 30 00 30 00 18 29  18 00 F0 00 C0 00 18 00  0.0.0..)..ｰ.ﾀ...
5680  18 00 2D 18 03 00 15 00  03 00 15 00 03 00 30 18  ..ｰ...........0.
5690  18 00 18 00 18 16 48 00  30 00 18 0F 18 00 30 00  ......H.0.....0.
56A0  18 14 18 00 30 00 18 19  18 00 60 00 30 00 18 00  ....0.....｀.0...
56B0  18 00 2D 18 03 00 18 00  18 16 30 00 18 00 18 18  ..ｰ.......0.....
56C0  18 00 48 00 30 00 18 00  18 00 30 0F 18 00 18 00  ..H.0.....0.....
56D0  30 16 18 00 18 00 60 14  30 00 30 00 30 00 24 00  0.....｀.0.0.0.$.
56E0  0C 00 18 19 18 00 18 00  18 17 30 00 18 00 18 16  ..........0.....
56F0  30 00 18 00 18 17 30 00  24 00 0C 1B 18 00 18 00  0.....0.$.......

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

5700  18 16 18 00 30 00 30 14  30 00 18 00 48 12 30 00  ....0.0.0...H.0.
5710  30 00 30 00 18 00 18 00  F0 29 C0 00 48 00 18 0F  0.0.....ｰ)ﾀ.H...
5720  24 00 0C 00 24 14 0C 00  60 00 60 14 2D 00 03 00  $...$...｀.｀.-...
5730  30 19 30 00 30 00 90 18  30 00 48 00 18 0F 24 00  0.0.0. ｒ.0.H...$.
5740  0C 00 24 14 0C 00 60 00  60 14 2D 00 03 00 2D 16  ..$...｀.｀.-...-.
5750  03 00 30 00 30 18 90 00  30 00 45 16 03 00 18 00  ..0.0. ｒ.0.E.....
5760  24 15 0C 00 24 00 0C 16  60 00 60 00 2D 19 03 00  $...$...｀.｀.-...
5770  30 00 30 14 30 00 90 00  30 00 48 00 18 00 24 14  0.0.0. ｒ.0.H...$.
5780  0C 00 24 00 0C 11 45 00  03 00 18 0F 60 00 48 00  ..$...E.....｀.H.
5790  18 19 30 00 30 00 90 14  30 00 22 00 02 00 0A 00  ..0.0. ｒ.0.".....
57A0  02 00 22 0F 02 00 0C 00  48 14 18 00 22 00 02 00  .."".....H..."...
57B0  0A 00 02 00 22 11 02 00  0C 00 48 16 18 00 22 00  ....".....H...".
57C0  02 00 0A 00 02 00 22 13  02 00 0C 00 30 11 30 00  ......".....0.0.
57D0  30 00 30 16 60 00 22 00  02 00 0A 00 02 00 22 0F  0.0.｀."......".
57E0  02 00 0C 00 48 14 18 00  22 00 02 00 0A 00 02 00  ....H..."".....
57F0  22 11 02 00 0C 00 48 16  18 00 22 00 02 00 0A 00  "".....H..."".....
```

JR-200 MEMORY DUMP V1.0 PAGE : 9

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5B00	02	00	22	13	02	00	0C	00	30	11	30	00	90	00	30	00	..".....0.0. .0.
5B10	30	00	30	00	18	29	18	00	F0	00	C0	00	C0	00	FE	00	0.0..)..... .0.
5B20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5B90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5BA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5BB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5BC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5BD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5BE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5BF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5900	20	20	20	20	20	20	20	20	8E	8E	8E	82	81	80	8E	8E	
5910	8E	8E	8E	19	18	8E	8E	8E	20	20	20	20	20	20	20	20	
5920	20	20	20	20	20	20	20	20	8E	8E	8E	8E	1F	1E	1D	92	
5930	92	1C	1B	1A	8E	8E	8E	8E	20	20	20	20	20	20	20	20	
5940	20	20	20	20	20	20	20	20	8E	8E	8E	8E	8E	8E	00	01	
5950	8E	8E	8E	8E	8E	8E	8E	8E	20	20	20	20	20	20	20	20	
5960	20	20	20	20	20	20	20	20	8E	8E	8E	8E	8E	8E	20	20	
5970	00	01	8E	8E	8E	8E	8E	8E	20	20	20	20	20	20	20	20	
5980	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
5990	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
59A0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
59B0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
59C0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
59D0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
59E0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
59F0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5A00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5A80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	01	01	.....
5A90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5AA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5AB0	01	01	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5AC0	00	00	00	00	00	00	00	00	00	00	00	00	03	03	03	00	.....
5AD0	00	03	03	03	00	00	00	00	00	00	00	00	00	00	00	00	.....
5AE0	00	00	00	00	00	00	00	00	00	00	00	03	03	00	00	00	.....
5AF0	00	00	03	03	03	00	00	00	00	00	00	00	00	00	00	00	.....

JR-200 MEMORY DUMP V1.0 PAGE : 10

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5B00	00	00	00	00	00	00	00	00	00	00	03	03	00	00	00	00	.....
5B10	00	00	03	03	03	03	00	00	00	00	00	00	00	00	00	00	.....
5B20	00	00	00	00	00	00	00	00	00	00	03	00	00	00	00	00	.....
5B30	00	00	03	00	00	03	00	00	00	00	00	00	00	00	00	00	.....
5B40	00	00	00	00	00	00	00	00	00	00	01	01	01	01	00	01	.....
5B50	00	00	01	01	01	01	01	00	00	00	00	00	00	00	00	00	.....
5B60	00	00	00	00	00	00	00	00	00	02	01	01	01	03	00	01	.....
5B70	00	02	01	01	01	03	01	00	00	00	00	00	00	00	00	00	.....
5B80	00	00	00	00	00	00	00	00	00	01	00	01	00	03	03	01	.....
5B90	01	01	00	01	01	00	01	00	00	00	00	00	00	00	00	00	.....
5BA0	00	00	00	00	00	00	00	00	00	01	00	01	01	00	01	01	.....
5BB0	01	01	00	01	01	00	01	00	00	00	00	00	00	00	00	00	.....
5BC0	00	00	00	00	00	00	00	00	00	00	03	00	00	03	00	00	.....
5BD0	00	00	00	00	00	03	00	00	00	00	00	00	00	00	00	00	.....
5BE0	00	00	00	00	00	00	00	00	00	00	03	03	03	03	00	00	.....
5BF0	00	00	00	00	03	03	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5C00	00	00	00	00	00	00	00	00	00	00	00	03	03	03	00	00	.....
5C10	00	00	00	03	03	00	00	00	00	00	00	00	00	00	00	00	.....
5C20	00	00	00	00	00	00	00	00	00	00	00	00	03	03	03	02	.....
5C30	02	03	03	03	00	00	00	00	00	00	00	00	00	00	00	00	.....
5C40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	03	03	.....
5C50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5C60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5C70	03	03	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5C80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5C90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5CA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5CB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5CC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5CD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5CE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5CF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5D00	00	01	01	02	02	03	03	04	04	05	05	06	06	07	07	00	.....
5D10	00	02	01	03	02	04	03	05	04	06	05	07	06	00	07	01	.....
5D20	00	03	01	04	02	05	03	06	04	07	05	00	06	01	07	02	.....
5D30	00	04	01	05	02	06	00	07	04	00	05	01	06	02	07	03	.....
5D40	00	05	01	06	02	07	03	00	04	01	05	02	06	03	07	04	.....
5D50	00	06	01	07	02	00	03	01	04	02	05	03	06	04	07	05	.....
5D60	00	07	01	00	02	01	03	02	04	03	05	04	06	05	00	06	.....
5D70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5D80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5D90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5DA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5DB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5DC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5DD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5DE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5DF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5E00	00	B7	78	4C	B6	66	AB	27	10	B6	C8	00	8A	01	B7	C8	.ｷxLｶｲ'.ｶﾈ.ｴ.ｷﾈ
5E10	1E	B6	C8	0A	CE	6E	DB	FF	FA	BD	73	EE	FE	66	A0	FF	.ｶﾈ.ﾎnﾛ＼ ■ｽs■ ﾉf.＼
5E20	06	C0	00	66	A2	FF	06	C2	FE	66	A4	FF	06	C4	EE	66	.ﾀ.f｢＼.ﾂ ﾉf.＼.ﾄ■f
5E30	A6	FF	06	C6	CE	66	B0	BD	74	08	CE	66	B6	BD	74	08	ﾗ＼.ﾆﾎf.ｽt.ﾎf←ｽt.
5E40	CE	66	90	BD	74	00	BD	FD	FD	CE	C5	00	FF	78	4E	CE	ﾎf ｒｽt.ｽﾉﾉﾎﾅ.＼xNﾎ
5E50	00	00	FF	78	50	CE	6A	00	FF	78	52	FE	00	52	A6	00	..＼xPﾎj.＼xR ﾉ.Rﾗ.
5E60	FE	78	50	81	02	2D	06	A6	01	66	00	20	04	A6	00	E6	ﾉxP◆.ｰ.ﾗ.f. .ﾗ.■
5E70	01	58	58	58	1B	EE	78	52	E6	00	C5	01	27	02	8B	40	.XXX.■xR■.ﾅ.'.◎@
5E80	FE	00	4E	A7	00	08	FF	78	4E	F6	78	4C	C5	01	27	11	ﾉ.Nｧ..＼xN■xLﾅ.'.
5E90	86	92	B7	C8	03	86	93	B7	C8	03	CE	62	1E	FF	06	CB	←▁ｷﾈ.←▁ｷﾈ.ﾎb.＼.ﾋ
5EA0	39	FE	00	52	08	FF	78	52	8C	6D	00	26	AE	CE	00	FF	9 ﾉ.R.＼xR■m.&ｮﾎ.＼
5EB0	09	26	FD	CE	6A	00	FF	78	52	FE	06	CB	A6	00	81	FE	.&ﾉ ﾎj.＼xR ﾉ.ﾋﾗ.◆ﾉ
5EC0	26	03	BD	FD	FD	CE	C5	00	FF	78	4E	FE	78	50	08	08	&.ｽﾉﾉﾎﾅ.＼xN ﾉxP..
5ED0	FF	78	50	8C	6D	70	26	83	7E	6E	49	B6	C8	1C	85	01	＼xP■mp&◆^nIｶﾈ.◆.
5EE0	26	03	7E	F9	D2	B6	C8	0A	66	01	B7	78	4C	CE	00	00	&.~■ﾒｶﾈ.f.ｷxLﾎ..
5EF0	DF	FA	3B	01	01	01	01	01	01	01	01	01	01	01	01	01	° ■;............

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
5F00	CE	6D	00	FF	78	50	CE	C5	00	FF	78	4E	CE	6A	00	FF	ﾎm.＼xPﾎﾅ.＼xNﾎj.＼
5F10	78	52	FE	78	52	A6	00	FE	78	50	81	02	2D	06	A6	01	xR ﾉxRﾗ. ﾉxP◆.ｰ.ﾗ.
5F20	E6	00	20	04	A6	00	E6	01	58	58	58	1B	FE	78	52	E6	■. .ﾗ.■.XXX. ﾉxR■
5F30	00	C5	01	27	02	8B	40	FE	78	4E	A7	00	08	FF	78	4E	.ﾅ.'.◎@ ﾉxNｧ..＼xN
5F40	FE	78	52	08	FF	78	52	8C	6D	00	26	C6	FE	78	50	08	ﾉxR.＼xR■m.&ﾆ ﾉxP.
5F50	08	FF	78	50	39	B6	C8	1F	84	EF	B7	C8	1F	CE	FF	FF	.＼xP9ｶﾈ.◆ ﾚｷﾈ.ﾎ＼／
5F60	09	26	FD	B6	C8	1D	B6	CB	1F	BA	10	B7	C8	1F	39	00	.&ﾉ ｶﾈ.ｶﾈ.ｴ.ｷﾈ.9.
5F70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5F80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5F90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5FA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5FB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5FC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5FD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5FE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....
5FF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
6000	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6010	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6020	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6030	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6040	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6050	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6060	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6070	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6080	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6090	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
60A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
60B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
60C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
60D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
60E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
60F0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
6100	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6110	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6120	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6130	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6140	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6150	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6160	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6170	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6180	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
6190	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
61A0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
61B0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
61C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
61D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
61E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
61F0	01	01	01	01	01	01	01	01	01	CE	C1	00	86	8E	A7	00	.........ﾎﾁ.←■ｱ.

ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
6200	08	8C	C2	80	26	F8	86	20	A7	00	08	8C	C4	00	26	F8	.■ﾘ.&■ ← ｱ..■ﾄ.&■
6210	5F	4F	CE	C8	00	FF	68	3E	CE	C5	00	FF	68	40	A7	00	_Oﾎﾈ.＼h>ﾎﾅ.＼h@ｱ.
6220	A7	01	A7	02	A7	03	FF	68	42	B7	68	44	B6	68	43	8B	ｱ.ｱ.ｱ.＼hBｷhDｳhC◎
6230	20	24	03	7C	68	42	B7	68	43	FE	68	42	BC	68	3E	27	$.¦hBｷhC ﾉhBｼh>'
6240	05	B6	68	44	20	DB	B6	68	3F	8B	04	24	03	7C	68	3E	.ｳhD ﾘｳh?◎.$.¦h>
6250	B7	68	3F	B6	68	41	8B	04	24	03	7C	68	40	B7	68	41	ｷh?ｳhA◎.$.¦h@ｷhA
6260	B6	68	44	8B	09	81	48	27	05	FE	68	40	20	B0	39	01	ｳhD◎.◆H'. ﾉh@ −9.
6270	01	01	01	01	01	01	CE	C5	00	86	07	A7	00	08	8C	C8	......ﾎﾅ.←.ｱ..■ﾈ
6280	00	26	F8	7F	68	45	CE	40	DC	FF	68	46	A6	02	E6	03	.&■ .hEﾎ@ﾜ＼hFﾗ.■.
6290	B7	68	48	F7	68	49	EE	00	FF	68	4A	B6	00	A7	00	08	ｷhH¦ hI■.＼hJ←.ｱ..
62A0	86	9B	C6	01	A7	00	08	5C	F1	68	48	26	F7	09	86	8D	←¬ﾆ.ｱ..¥| hH&¦ .←¬
62B0	A7	00	FF	68	4A	C6	01	B6	68	4B	8B	20	24	03	7C	68	ｱ.＼hJﾆ.ｳhK◎ $.¦h
62C0	4A	B7	68	4B	FE	68	4A	86	9A	A7	00	5C	F1	68	49	26	JｷhK ﾉhJ←¦ｱ.¥| hI&
62D0	E6	FE	68	4A	86	F0	A7	00	09	C6	01	86	9B	A7	00	09	■ ﾉhJ←┘ｱ..ﾆ.←¬ｱ..
62E0	5C	F1	68	48	26	F7	08	86	EF	A7	00	FF	68	4A	C6	01	¥| hH&¦ .← ﾚｱ.＼hJﾆ.
62F0	B6	68	4B	80	20	24	03	7A	68	4A	B7	68	4B	FE	68	4A	ｳhK. $.zhJｷhK ﾉhJ

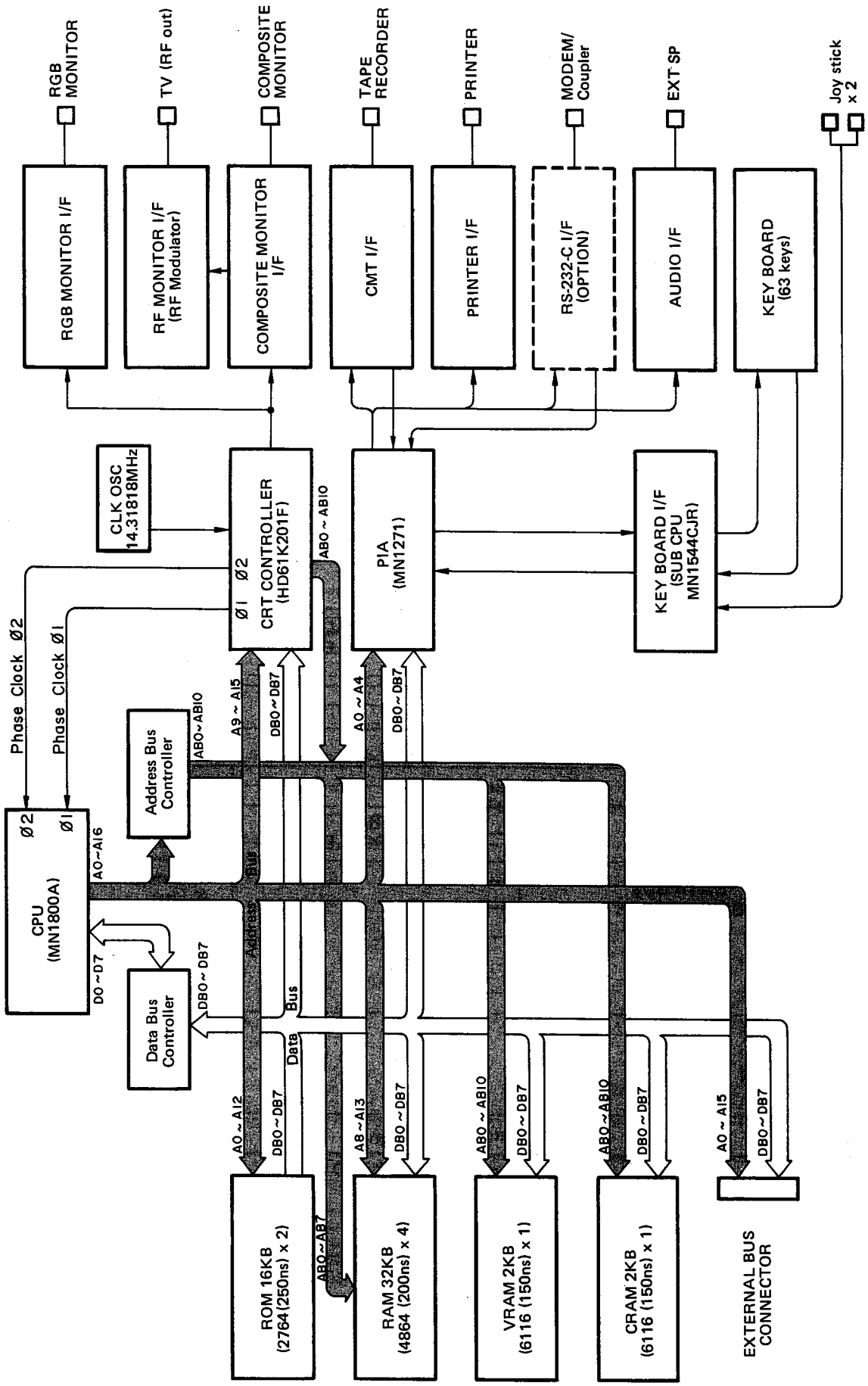
ADDR.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	CHRACTERS
6300	86	9A	A7	00	5C	F1	68	49	26	E6	86	90	A7	00	FE	68	←¦ｱ.¥| hI&■← ｒｱ. ﾉh
6310	46	08	08	08	08	FF	68	46	B6	68	45	4C	B7	68	45	81	F....＼hFｳhELｷhE◆
6320	04	27	03	7E	62	89	39	01	01	01	01	01	01	CE	C1	00	.'.~b→9.....ﾎﾁ.
6330	86	B9	A7	00	08	8C	C4	00	26	F8	CE	C5	00	86	8F	A7	←ｹｱ..■ﾄ.&■ ﾎﾅ.←◢ｱ
6340	00	08	8C	C8	00	26	F8	39	01	01	01	01	01	01	CE	C0	..■ﾈ.&■ 9.....ﾎﾀ
6350	00	A7	00	08	8C	C1	00	26	F8	CE	C4	00	A7	00	08	8C	.ｱ..■ﾁ.&■ ﾎﾄ.ｱ..■
6360	C5	00	26	F8	CE	C5	00	C6	0F	E7	00	08	8C	C8	00	26	ﾅ.&■ ﾎﾅ.ﾆ.■..■ﾈ.&
6370	F8	81	00	27	05	BD	63	7E	20	03	BD	63	98	39	CE	C1	■ ◆.'.ｽc~ .ｽc ﾄ9ﾎﾁ
6380	00	86	00	A7	00	08	8C	C4	00	26	F8	CE	40	EC	BD	64	.←.ｱ..■ﾄ.&■ ﾎ@ｰｽd
6390	08	CE	40	F8	BD	64	08	39	CE	C1	00	86	8E	A7	00	08	.ﾎ@■ ｽd.9ﾎﾁ.←■ｱ..
63A0	8C	C4	00	26	F8	CE	40	F2	BD	64	08	CE	40	F8	BD	64	■ﾄ.&■ ﾎ@■ ｽd.ﾎ@■ ｽd
63B0	08	39	01	01	01	01	01	01	01	01	01	01	01	01	01	01	.9..............
63C0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
63D0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	....
63E0	01	01	01	01	01	01	01	01	01	01	01	01	01	01	CE	C1	..............ﾎﾁ
63F0	00	4F	A7	00	08	8C	C4	00	26	F8	CE	C5	00	86	07	A7	.Oｱ..■ﾄ.&■ ﾎﾅ.←.ｱ

```
     JR-200 MEMORY DUMP V1.0                                  PAGE : 13

ADDR. 0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   CHRACTERS

6400  00 08 8C C8 00 26 F8 39  36 37 FF 68 00 B6 68 00  ..▒▒.&■ 967＼h.ｶh.
6410  F6 68 01 36 37 EE 00 FF  68 02 FE 68 00 EE 04 FF  ▄h.67■.＼h. ﾊh.■.＼
6420  68 04 FE 68 00 EE 02 08  FF 68 06 FE 68 02 A6 00  h. ﾊh.■..＼h. ﾊh.ｦ.
6430  08 FF 68 02 FE 68 04 A7  00 08 FF 68 04 FE 68 02  .＼h. ﾊh.ｧ..＼h. ﾊh.
6440  BC 68 06 26 E6 33 32 F7  68 01 B7 68 00 FE 68 00  ｼh.&■32▌ h.ｷh. ﾊh.
6450  33 32 39 01 01 01 01 01  01 01 01 01 01 01 01 01  329.............
6460  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
6470  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
6480  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
6490  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
64A0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
64B0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
64C0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
64D0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
64E0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
64F0  01 01 01 01 01 01 01 01  01 01 01 01 01 01 01 01  ................
```

2. Block Diagram



3. Signal Code Table

3.1. Address Bus Singals

Signal Code	Direction	Function
A0 to A15	CPU → CRTC, ROM, MEMORY ADDRESS CONTROLLER, ADDRESS BUS CONTROLLER, PIA	CPU Address bus signal. (16 bits)
AB0 to AB10	CRTC → VRAM, CRAM	CRTC Address bus signal for CRT display. (AB0 to AB10)
	CRTC → MEMORY ADDRESS CONTROLLER	CRTC Address bus signal for Memory RAS–only refresh. (AB0 to AB6)
	ADDRESS BUS CONTROLLER → VRAM, CRAM, MEMORY ADDRESS CONTROLLER	CPU Address bus signal controlled by 0_2S signal. (AB0 to AB10)
MA0 to MA7	MEMORY ADDRESS CONTROLLER → DRAM	8 bits Address bus signal.
E0, E1	CRTC → MEMORY ADDRESS CONTROLLER	2 bits external Address bus signal created by CRTC for Memory controll.

3.2. Data Bus Singals

Signal Code	Direction	Function
D0 to D7	CPU ↔ DATA BUS CONTROLLER	CPU Data bus signal. (8 bits)
DB0 to DB7	DATA BUS CONTROLLER ↔ CRTC, ROM, VRAM, CRAM, PIA	System Data bus signal. (8 bits)

3.3. Sub CPU

Signal Code	Direction	Function
KST0 to KST9	SUB CPU → KEYBOARD	Key strobe signal. (KST0 to KST7) Joystick strobe signal. (KST8, KST9)
KIN0 to KIN7	KEYBOARD, JOYSTICK → SUB CPU	Key-in signal. (KIN0 to KIN7) Joystick-on signal. (KIN0 to KIN5)
KD0 to KD7	SUB CPU → PIA	Key Code Data signal. (8 bits)

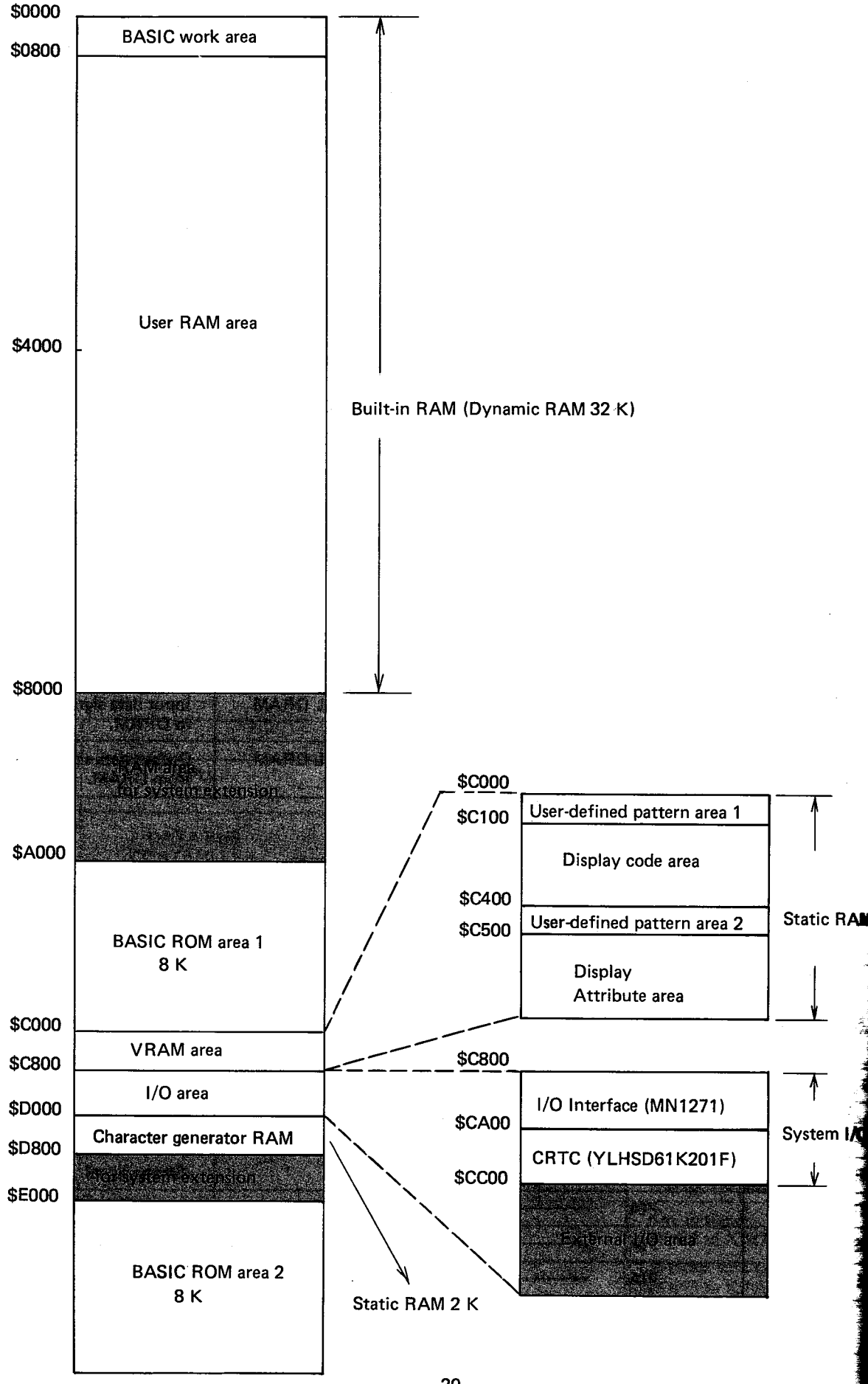
3.4. External Bus

Signal Code	Direction			Function
$\overline{E\phi_2}$	CRTC	→	EXTERNAL EQUIPMENT	CPU clock ϕ_2
$\overline{E0_2S}$	CRTC	→	EXTERNAL EQUIPMENT	Clock for peripheral chips.
$\overline{ER/W}$	CPU	→	EXTERNAL EQUIPMENT	CPU Read/Write signal.
$\overline{VMA}$	CPU	→	EXTERNAL EQUIPMENT	Valid memory address signal.
$\overline{ERESET}$	POWER ON RESET CIRCUIT	→	EXTERNAL EQUIPMENT	System reset signal.
$\overline{SYSINT}$	PIA	←	EXTERNAL EQUIPMENT	System interrupt signal.
$\overline{USERINT}$	PIA	←	EXTERNAL EQUIPMENT	User interrupt signal.
$\overline{KILL}$	CPTC	←	EXTERNAL EQUIPMENT	ROM0 (IC5) kill signal.
$\overline{DRAMSEL}$	CRTC	←	EXTERNAL DRAM	RAM Select signal.
$\overline{RAS}$	CRTC	→	EXTERNAL DRAM	RAS timing signal for DRAM.
TCAS	CRTC	→	EXTERNAL DRAM	CAS timing signal for DRAM.
ADSEL	CRTC	→	EXTERNAL DRAM	Memory address select signal.
DRAMϕ IN DRAM1 IN	CRTC	→	EXTERNAL DRAM	Input data signal to DRAM.
DRAMϕ OUT DRAM1 OUT	CRTC	←	EXTERNAL DRAM	Output data signal from DRAM.

3.5. Printer Interface

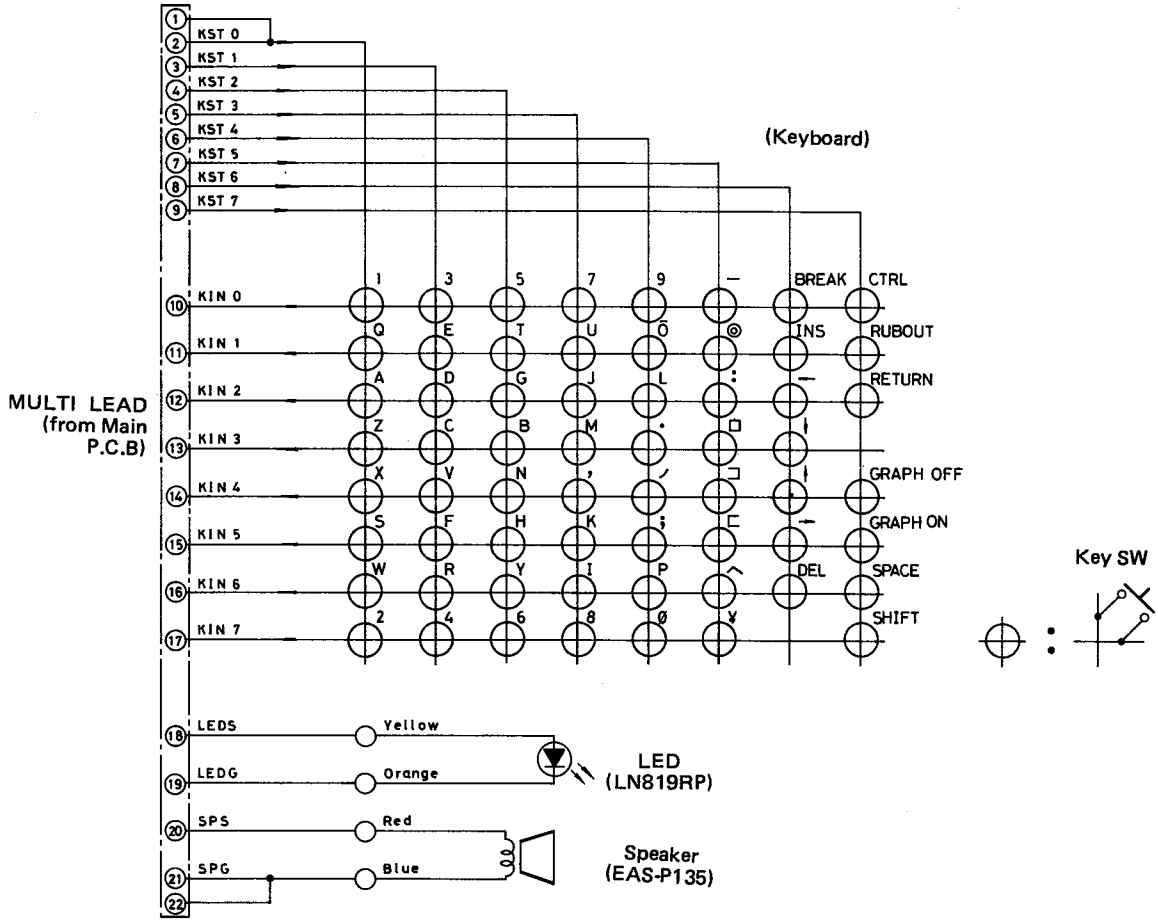
Signal Code	Direction			Function
PDATA0 to PDATA7	PIA	→	PRINTER	Data bus signal to printer.
STROBE	PIA	→	PRINTER	Strobe signal.
INITIAL	PIA	→	PRINTER	PRINTER reset signal.
BUSY	PIA	←	PRINTER	Busy signal to system.
PSEL	PIA	←	PRINTER	PRINTER select signal.

4. Memory Map



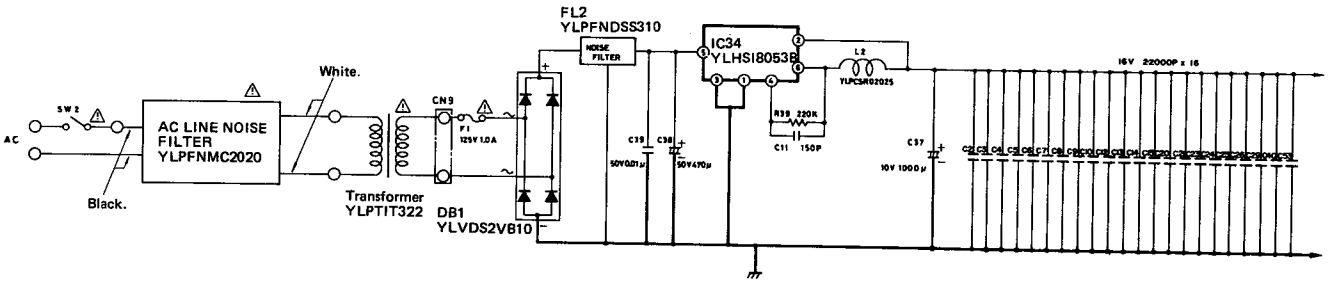
5. Schematic Diagram

5.1. Power Supply and Keyboard

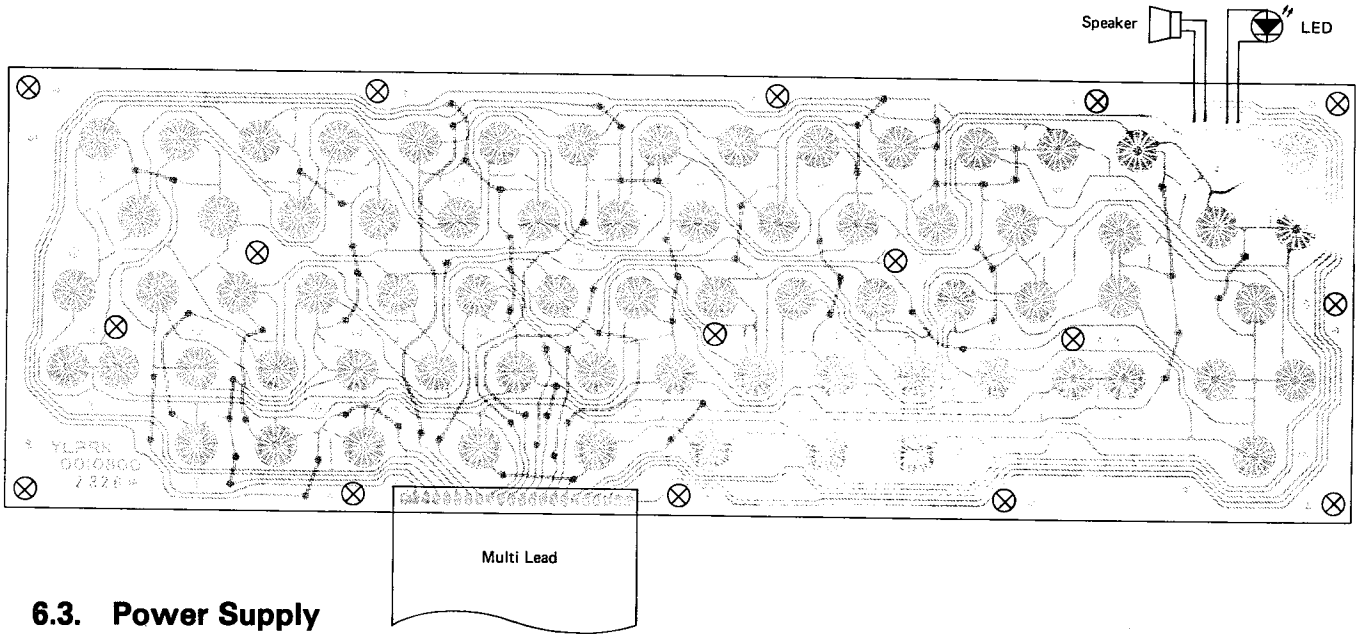


Power Supply Block

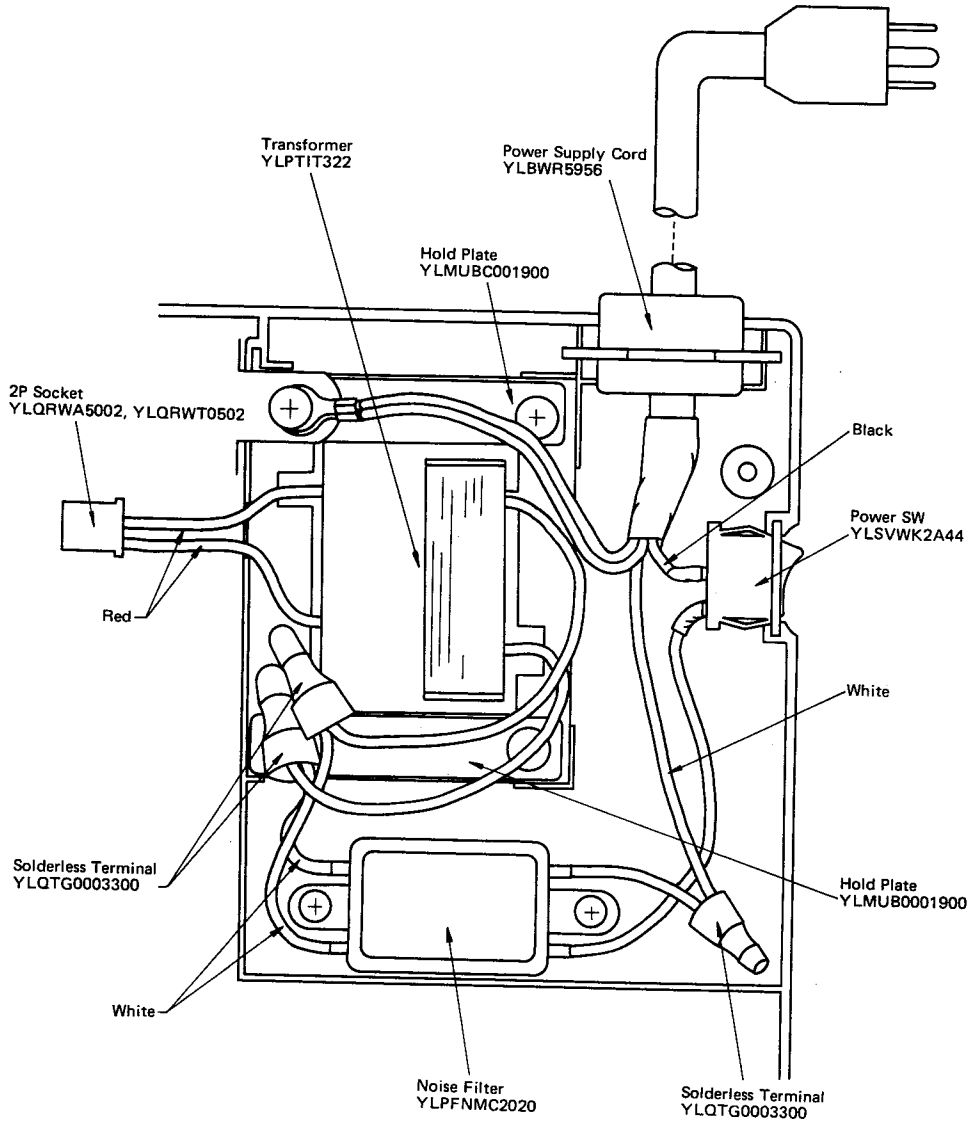
Main P.C.B.



6.2. Keyboard

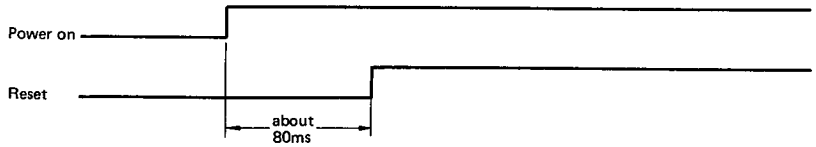


6.3. Power Supply

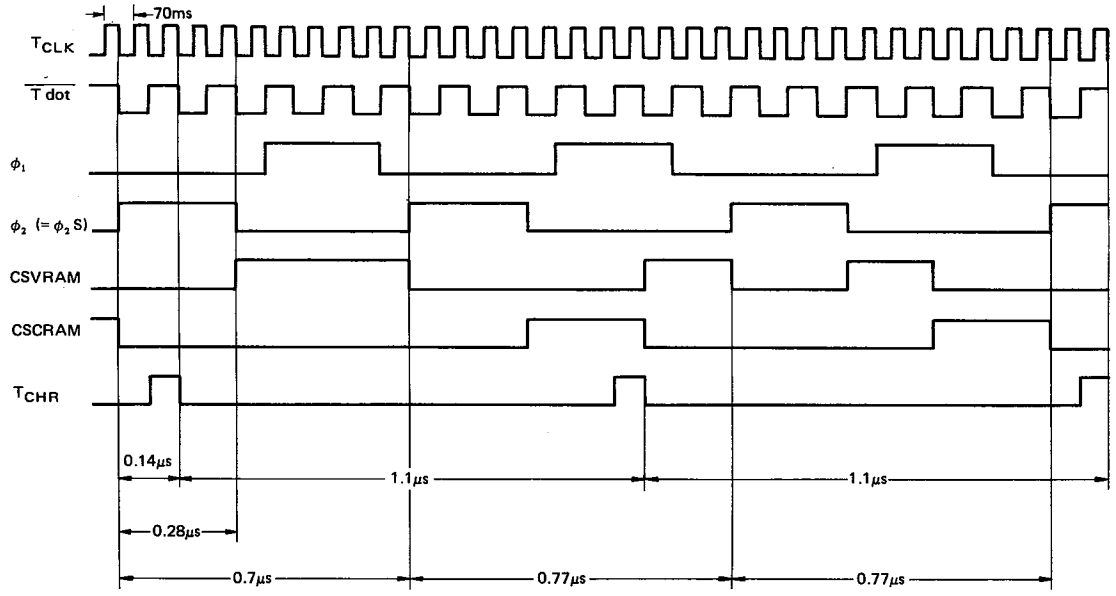


7. Waveforms

7.1. Power On Reset Timing

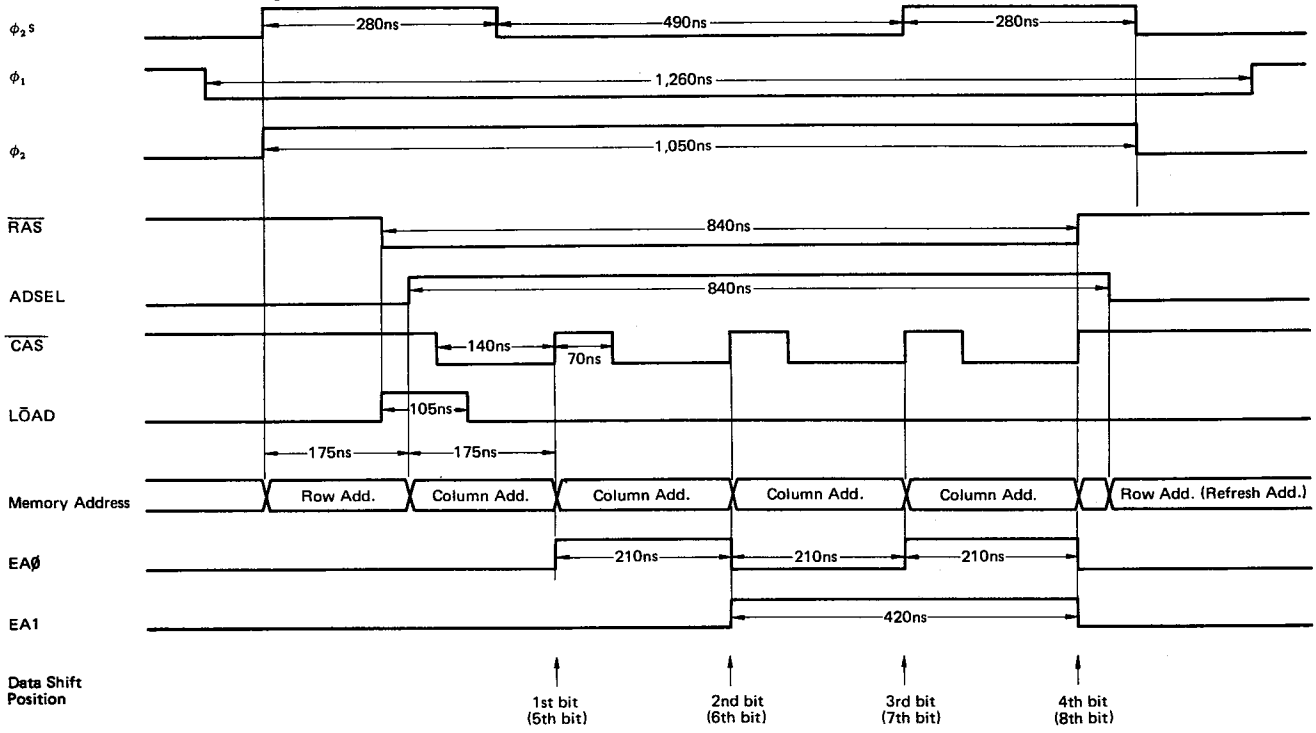


7.2. Basic Timing (See levels are TTL level:5 V)

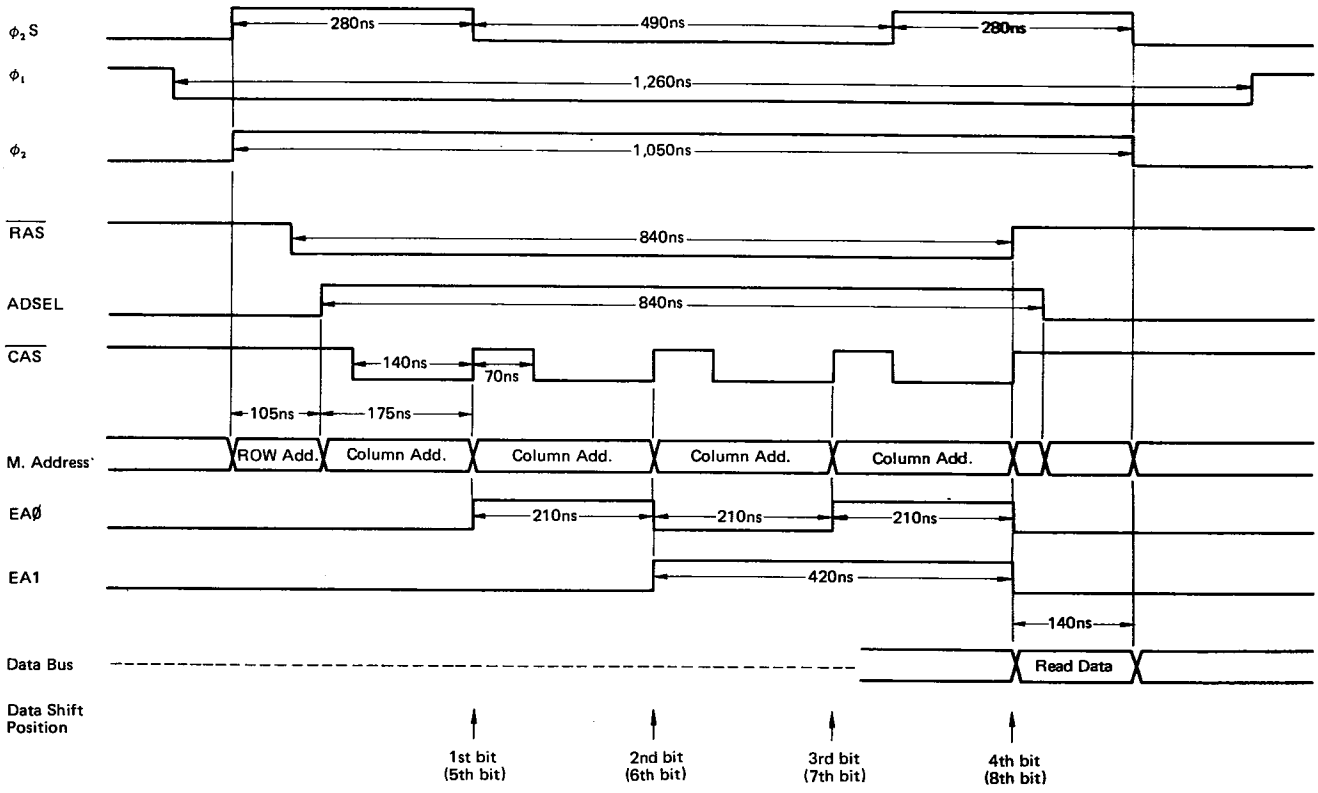


7.3. Dynamic RAM R/W Timing

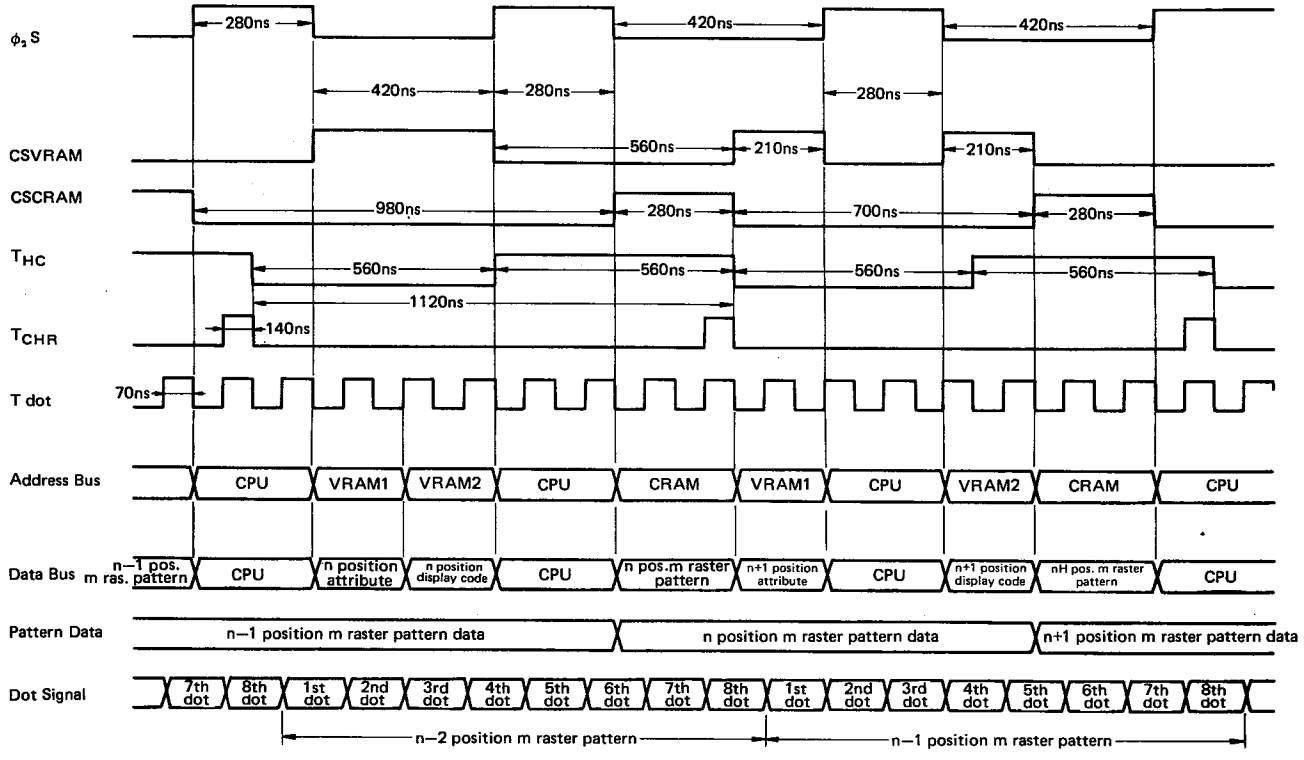
(1) Write Timing (All levels are TTL level:5 V)



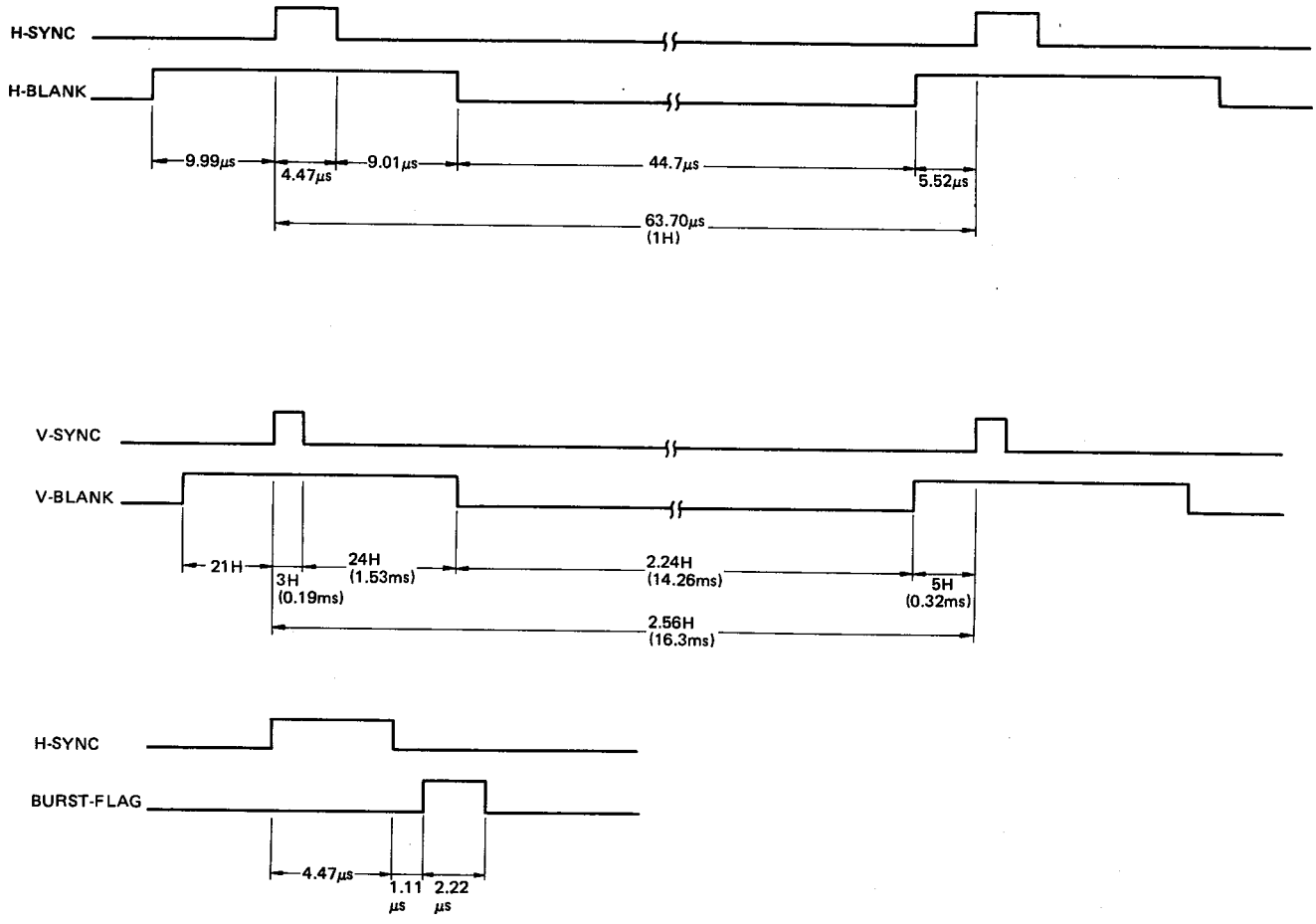
(2) Read Timing (All levels are TTL level:5 V)



7.4. CRTC Basic Timing (All levels are TTL level:5 V)



7.5. CRTC Synchronizing Timing (All levels are TTL level:5 V)



7.6. Keyboard Scanning

4-bit Data				Key Scan Data (decoded data)									
D	C	B	A	KST0	KST1	KST2	KST3	KST4	KST5	KST6	KST7	KST8	KST9
0	0	0	0	0	1	1	1	1	1	1	1	1	1
0	0	0	1	1	0	1	1	1	1	1	1	1	1
0	0	1	0	1	1	0	1	1	1	1	1	1	1
0	0	1	1	1	1	1	0	1	1	1	1	1	1
0	1	0	0	1	1	1	1	0	1	1	1	1	1
0	1	0	1	1	1	1	1	1	0	1	1	1	1
0	1	1	0	1	1	1	1	1	1	0	1	1	1
0	1	1	1	1	1	1	1	1	1	1	0	1	1
1	0	0	0	1	1	1	1	1	1	1	1	0	1
1	0	0	1	1	1	1	1	1	1	1	1	1	0

8. Circuit Descriptions (See the waveforms 7.2.)

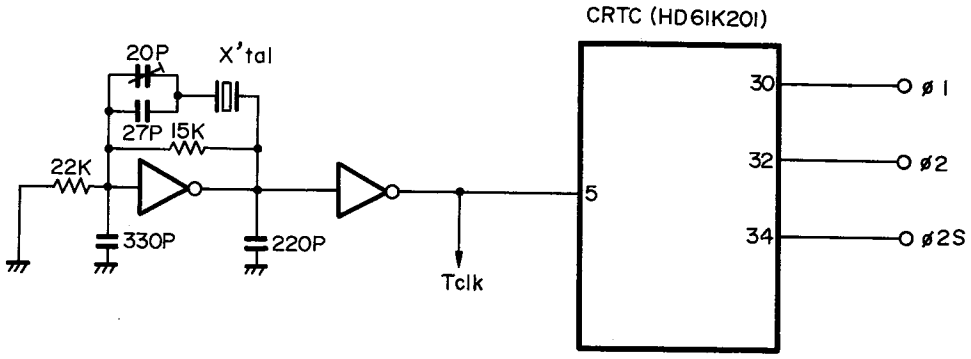
8.1. Basic Timing Generator

Timing for the JR-200U is provided by the basic timing generator composed of a crystal oscillator and CRT controller (CRTC: 80-pin flat package).

TCLK is the crystal oscillator frequency with a middle frequency of 14.31818 MHz (four times the burst frequency in the NTSC system).

ϕ_1 and ϕ_2 are two-phase clocks required by the CPU. ϕ_2S is a clock required by the peripheral LSI. The ϕ_2 and ϕ_2S signals are similar, but the latter is required because the phases of ϕ_1 and ϕ_2 change when reading from or writing into the dynamic RAM. *1 (Details are described in paragraph 18-3, Dynamic RAM)

*1 Because hardware timers are operated from ϕ_2S as the standard clock, correct timer values cannot be obtained if the phase of the standard clock changes.



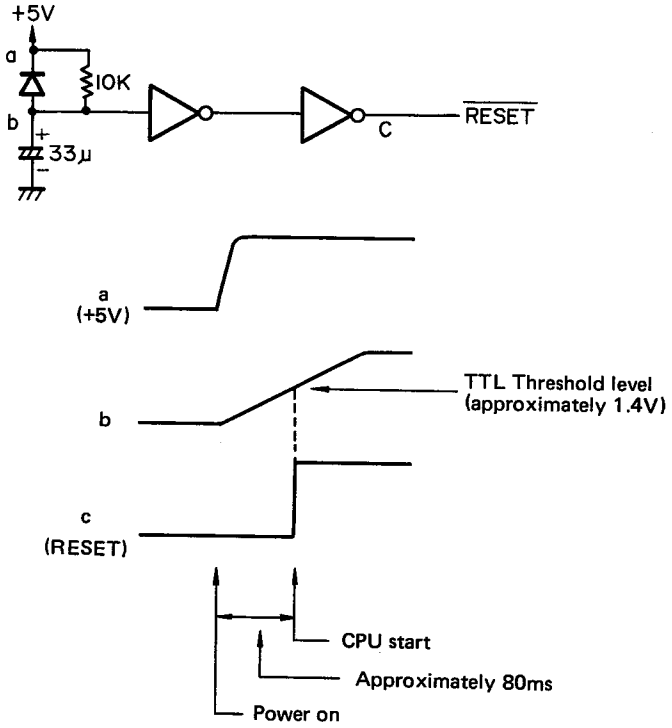
8.2. CPU

An MN18A00 (1.5 MHz version) is used as the CPU.

The CPU is synchronized by clocks ϕ_1, ϕ_2, and ϕ_2S from the basic timing generator. The repetition frequency of ϕ_2S is approximately 1.34 MHz, but its pulse width is approximately 0.28 μs, so a 1.5 MHz CPU is used, providing some tolerance.

(1) Reset Operation at Power-on

A reset signal is generated to operate the CPU properly from its starting address and initialize the system when power is turned on.

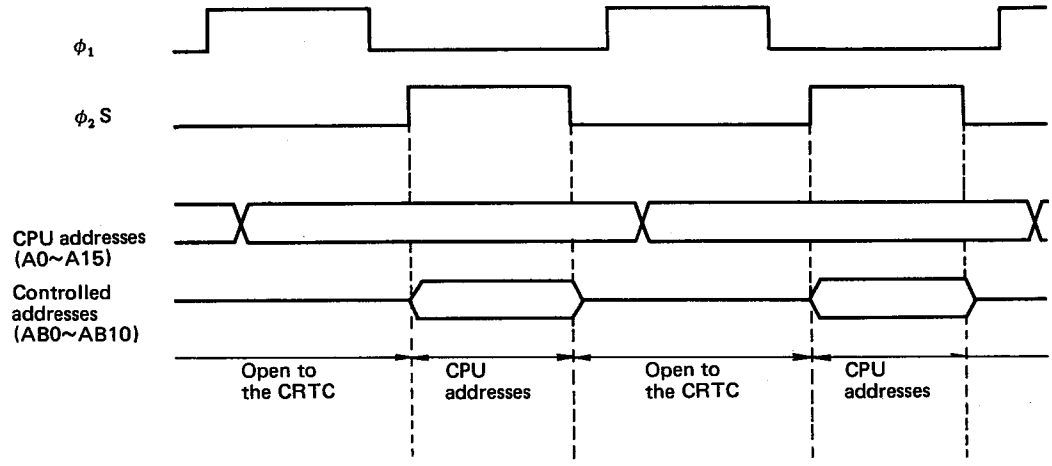


(2) Address Bus Signal Control

The video refresh memory (VRAM) and character pattern memory (CRAM) are used by the CPU and CRT controller.

In the JR-200U, the CPU and CRT controller time-share the VRAM and CRAM.

CPU address bus signals are output only at ϕ_2S timing so the address bus must be controlled to open other timing to the CRT controller.



Address bus control timing

As shown in the timing chart, CPU addresses (A0 to A15) are sent to the controlled address bus (AB0 to (AB10) at ϕ_2S periods only, and held in the pending state during other periods.

(3) Data Bus Signal Control

Like address bus signals, data bus signals are used by the CPU only at ϕ_2S timing, and those at other times are sent to the CRT controller.

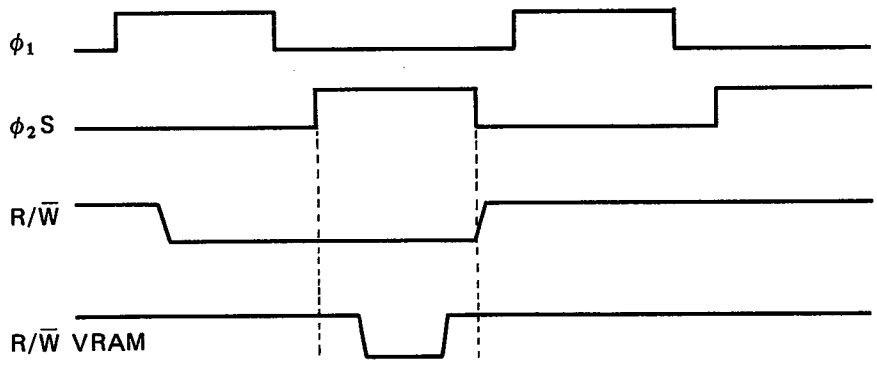
This is done by controlling the bus transceiver (74LS245) with ϕ_2S and read/write signals.

(4) Read/write Signal Control

The VRAM and CRAM may use the same device with continuous timing from the CPU and CRT controller.

In this case, CPU read/write signals are input into the VRAM and CRAM after control signals to prevent malfunction at the change of timing while writing from the CPU.

This control circuit is included in the CRTC.



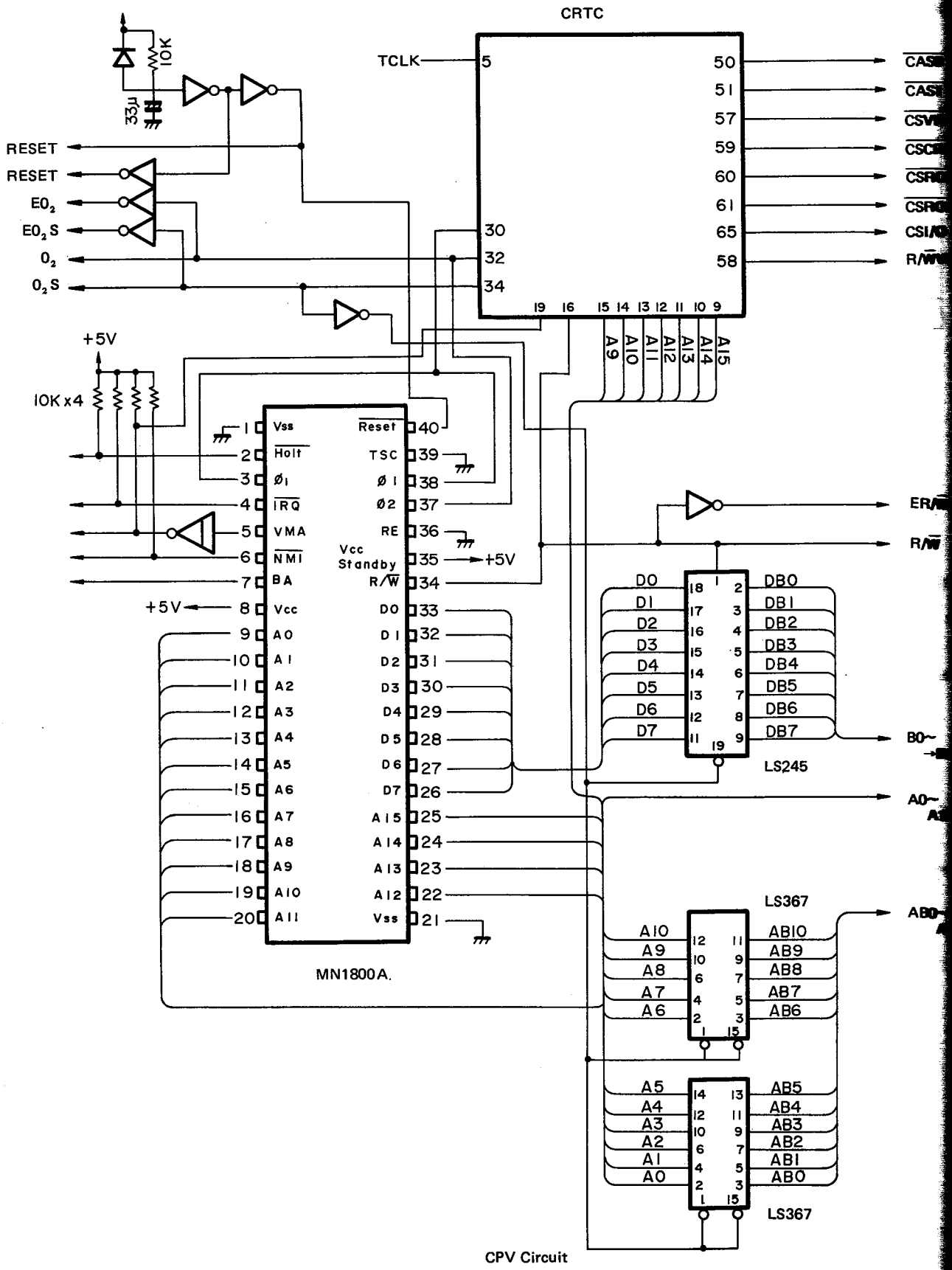
(Note) R/W VRAM – Read/write signals to VRAM and CRAM.

(5) Device-select Signal Generation

Device-select signals are generated to select devices allocated on the memory map. In the JR-200U, these signals are included in the CRTC functions to reduce the quantity of elements.

Address signal							VMA	Signal name	Address space	Application
A15	A14	A13	A12	A11	A10	A9				
0	0	*	*	*	*	*	1	CAS0	0~S3FFF	Dynamic RAM
0	1	*	*	*	*	*	1	CAS1	S4000~S7FFF	
1	1	0	0	0	*	*	1	CSVRAM	SC000~SC7FFF	VRAM
1	1	0	1	0	*	*	1	CSCRAM	SD000~SD7FF	CRAM
1	1	0	0	1	0	0	1	CS I/O	SC800~SC9FF	I/O Chip (MN1271)
1	1	0	0	1	1	0	1		SCA00~SCBFF	CRTC

(Note) For CSVRAM and CSCRAM, address select signals are output even at the timing used by the CRT controller.



8.3. Dynamic RAM

The main storage in the JR-200U uses 64-kilobit dynamic RAMs. They are used to reduce the quantity of elements.

For efficient memory use in byte lengths, parallel-to-series and series-to-parallel conversions are made at write and read respectively using two 64-kilobit dynamic RAMs for a capacity of 16 kilobytes.

(1) Write Operation (See the waveforms 7.3(1)).

W1, W2: Data bus signals are divided into upper and lower segments of 4 bits each, which are latched in two shift registers.

W3: The lower 8 bits (AB0 to AB7) of an address bus signal are input to the memory address to send RAM signals.

W4: Address bus signals (A8 to A13) and external addresses (EA0, EA1) are input to the memory address, and the shift register lower bits are written upon input of CAS signals.

W5: The external address is advanced by one and the shift register is shifted by a bit.

W6: The same operation as W4 is performed.

W7: The same operation as W5 is performed.

W8: The same operation as W4 is performed.

W9: The same operation as W5 is performed.

W10: The same operation as W4 is performed.

W11: The write operation is complete.

(2) Read Operation

R1: The lower 8 bits of address bus signals are input to the memory address to send RAS signals.

R2: Address bus signals (A8 to A13) and external addresses (EA0, EA1) are input to the memory address, and CAS signals are input to store the output data of the memory in the shift registers.

R3: The external address is advanced by one and the shift register is shifted by a bit.

R4: The same operation as R2 is performed.

R5: The same operation as R3 is performed.

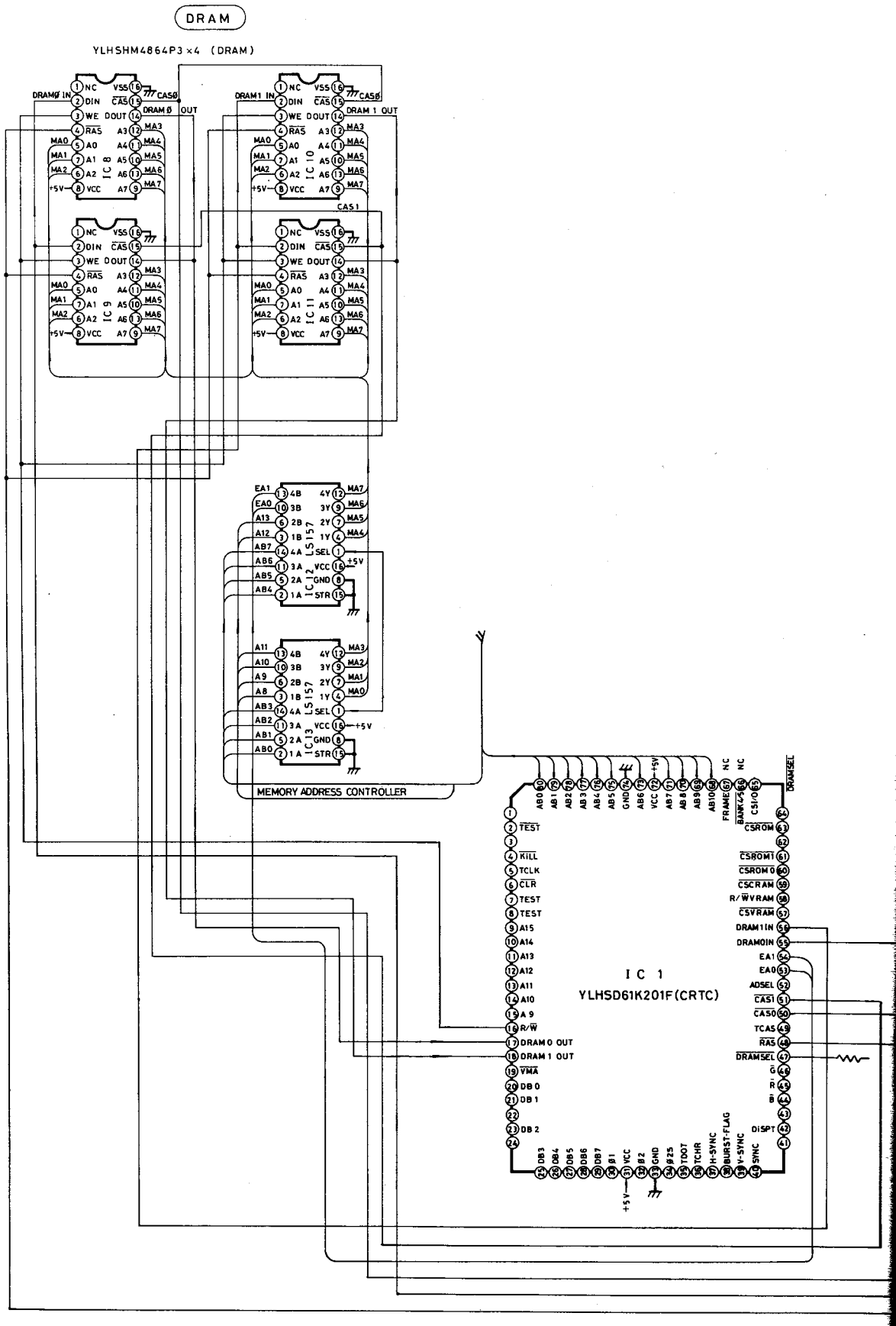
R6: The same operation as R2 is performed.

R7: The same operation as R3 is performed.

R8: The same operation as R2 is performed.

R9: The contents of the shift registers are arranged in the same two 4-bit groups as those latched at the time of a write operation, and the 4 bits from each of the two registers are output to the data bus.

R10: The read operation is complete.

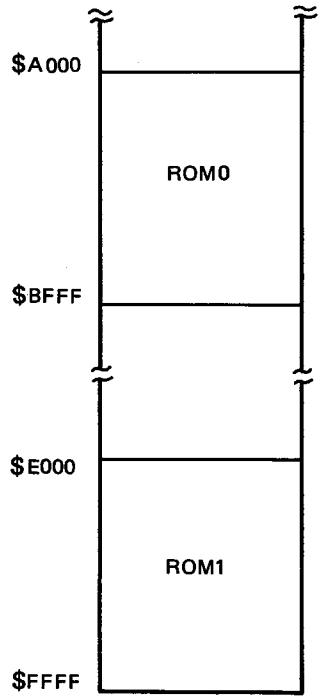


8.4. ROM

The ROM has a capacity of 16 kilobytes, being composed of two 8-kilobyte mask ROMs.

A BASIC interpreter and an I/O control routine are included in the ROM.

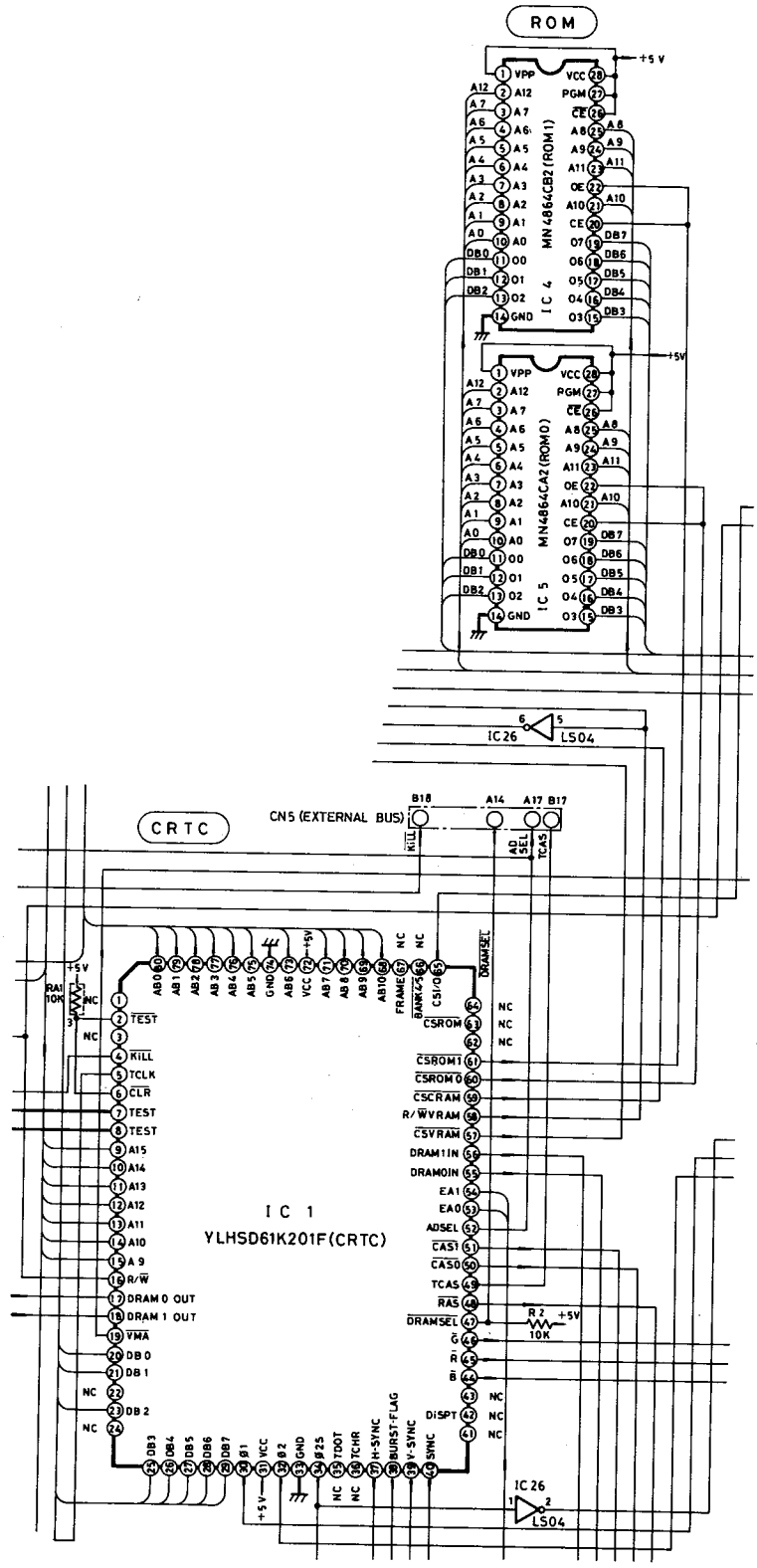
[ROM Memory Map]



Chip select signals for ROM0 and ROM1 are output to the ROM from the CRTC. The CRTC also controls the ROM as follows:

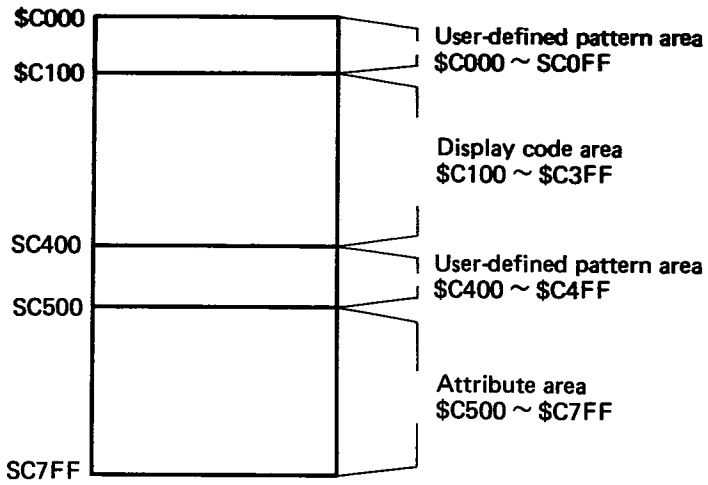
[KILL signal]

When the four-pin (KILL) input to the CRTC is at ground level, a chip select signal (CSROM0) for ROM0 is not output even if the CPU accesses addresses $A000 to $BFFF. ROM0 includes a BASIC interpreter, which can override calls to ROM0 as when floppy disk BASIC is used.



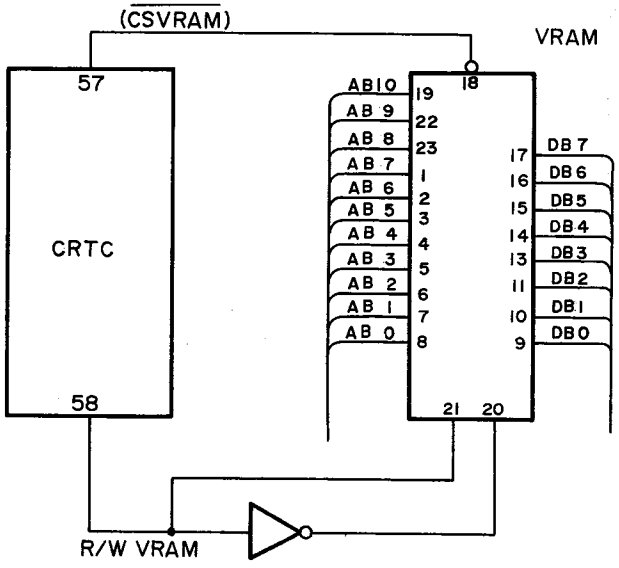
8.5. Video Refresh RAM

The VRAM employs a 2-kilobyte static RAM.



VRAM Memory Map

The VRAM is divided into four areas, as shown in the memory map. Details are described in the CRT controller paragraph.



The chip select signal (CSVRAM) and read/write signal (R/W VRAM) for the VRAM are output from the CRTC.

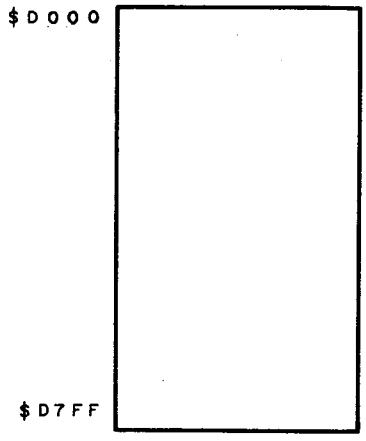
8.6. Character Generator RAM

The CRAM employs a 2-kilobyte static RAM.

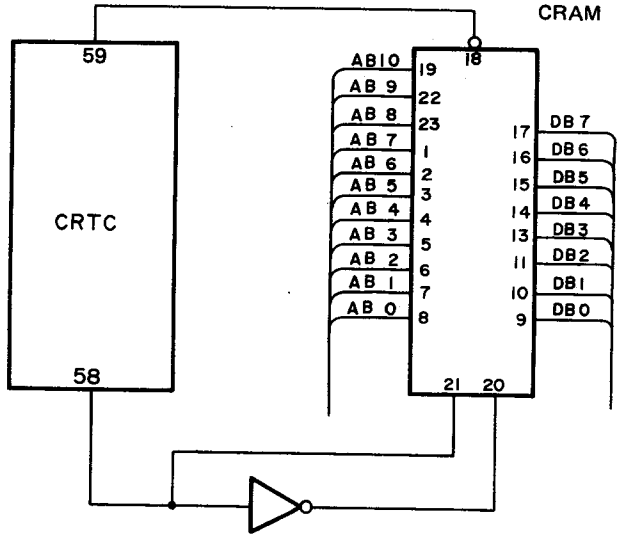
A ROM is usually used for this function, but the JR-200U uses a RAM because it provides faster access.

When power is turned on the CPU through the I/O interface, reads the character patterns contained in the internal ROM of the sub-CPU (MN1544 CJR) and stores them in the CRAM.

[CRAM Memory Map]



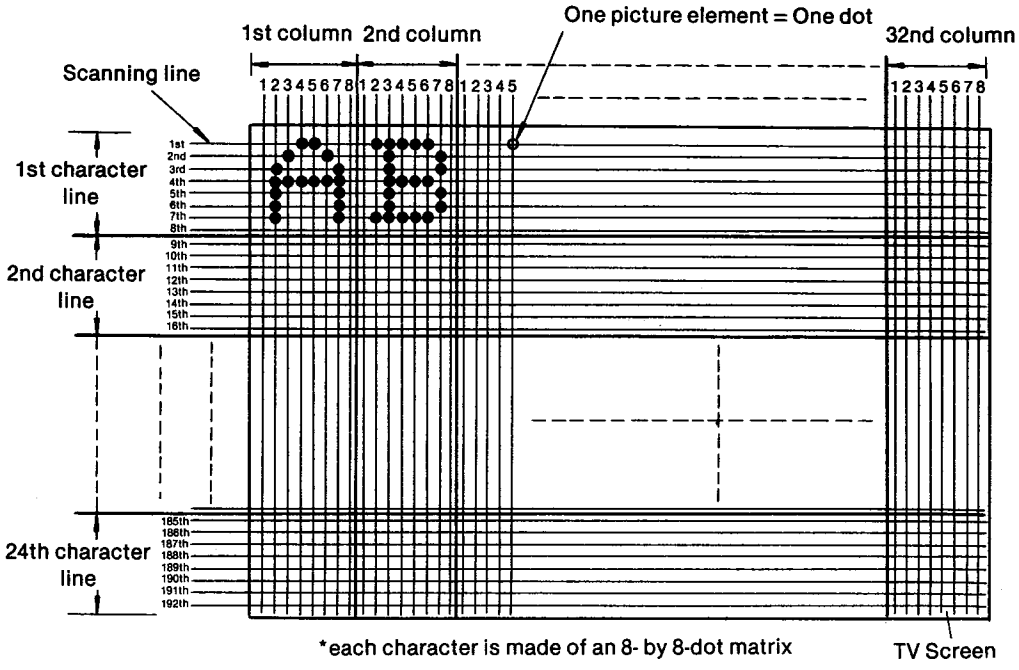
The chip select signal (CSVRAM) and read/write signal (R/W VRAM) for the CRAM are output from the CTRC.



8.7. CRT Controller and Video Interface

(1) Basic Operations of the CRT Controller

a. Screen formation



Screen Formation

The screen of the JR-200U shown in the figure is formed by:

Character formation	8 x 8 dots
Number of characters	32 characters (per line)
	x 24 lines

The CRT displays 32 characters per line, using eight horizontal lines. The effective 256 (8x32) dots in a horizontal line are controlled by the dot clock (Tdot = 7.15909 MHz), and character timing (TCHR) is generated every eight dots to control the characters. The lines are controlled by the counter that counts every eight horizontal lines.

b. Display character and character pattern control

The controller has two kinds of information, character information and color information (attribute), in the video refresh memory (VRAM), and character pattern information in the character pattern memory (CRAM), displaying color-controlled characters on the CRT. Memory addresses in the display code area of the VRAM are allocated corresponding to display positions on the screen.

(column)

(line)	0	1		31
0	$C100	$C101		$C11F
1	$C120	$C121		$C13F
23	$C3E1	$C3E1		$C3FF

[Display Position on Screen and Display Code Area of VRAM]

The data in this area is a character code used in BASIC in the normal display mode (normal mode).

Color information is stored in the attribute area. Memory addresses in this attribute area, like those in the display code area, are allocated corresponding to display positions on the screen.

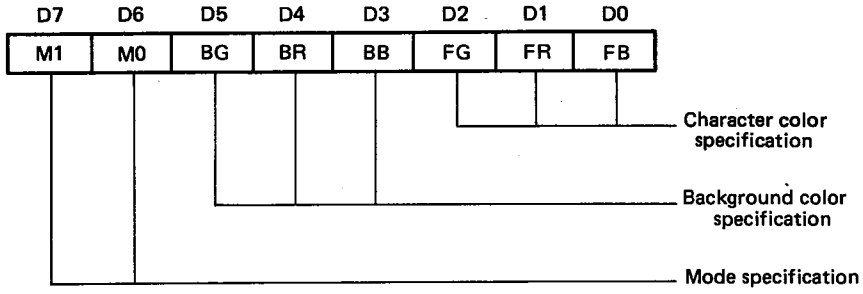
The data in address $C100 in the display code area is displayed on the screen according to that of address $C500.

(column)

(line)	0	1		31
0	$C500	$C501		$C51F
1	$C520	$C521		$C53F
23	$C7E0	$C7E1		$C7FF

[Display Position on Screen and Attribute Area of VRAM]

- **Contents of Attribute**



- Color Specification

	G	R	B
Black	0	0	0
Blue	0	0	1
Red	0	1	0
Violet	0	1	1
Green	1	0	0
Light blue	1	0	1
Yellow	1	1	0
White	1	1	1

- Mode Specification

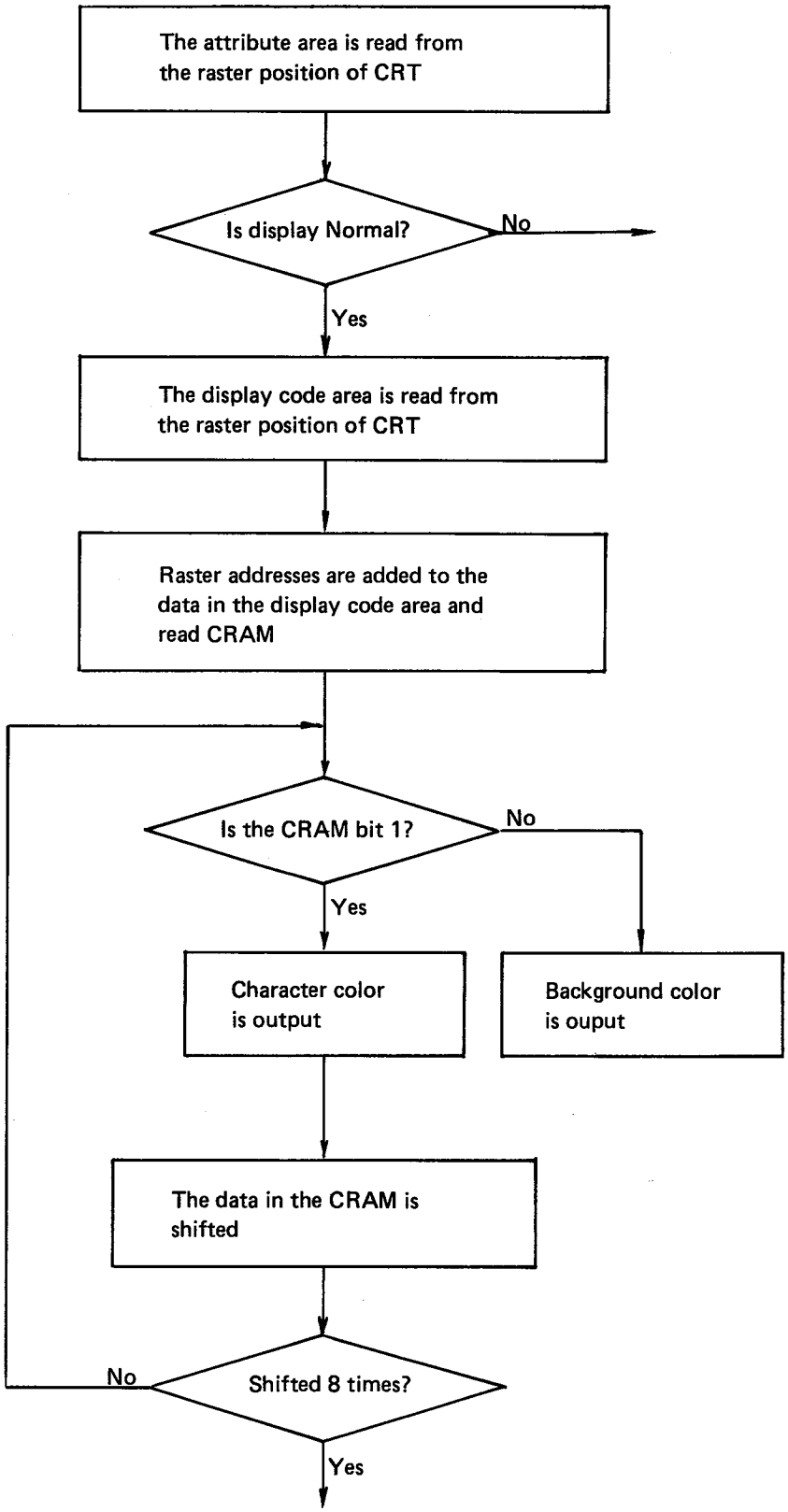
M1	M0	Mode
0	0	Normal display mode
0	1	User-defined display mode
1	0	Semi-graphic display mode

(Note) Inverted display is performed, exchanging character color specification with background color specification, by software.

If the mode in the attribute area corresponding to the display position on the screen is specified as the normal mode, the CRAM data is read out because display patterns are obtained from the display code area. (The data in the display code area and those indicating the positions of eight horizontal lines are read out as the addresses of the CRAM.)

The CRAM pattern data, CRAM, attribute character color information if the CRAM bit is 1 and background color information if 0, are output to the CRT while being shifted in bits by the dot timing.

[Character Display Flow in Normal Display Mode]



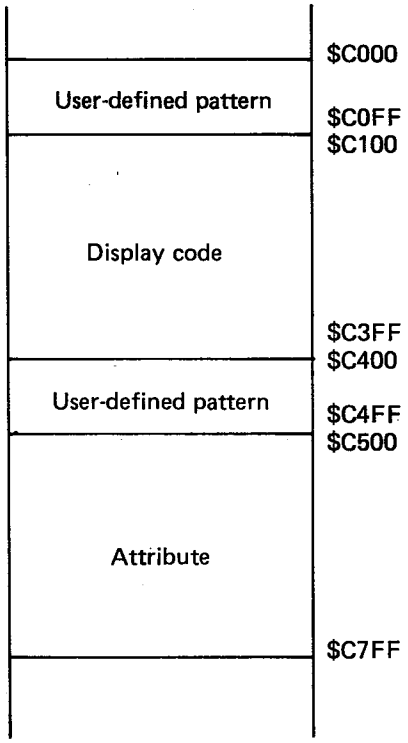
c. **User-defined pattern display [M1=0, M0=1]**
If the attribute area mode is specified as user-defined pattern display mode, character patterns are determined by the data in the user-defined pattern area and not by those in the CRAM.

The JR-200U allows 64 user-defined patterns.

Character codes that can be defined by users

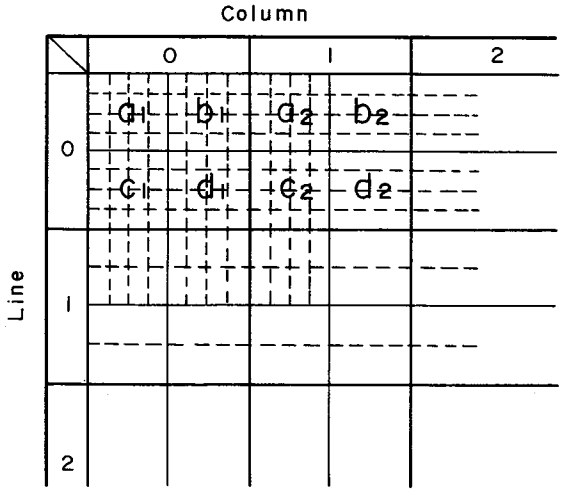
$20 (Space) ~ $3F (?) [$C000 ~ $C0FF]
$40 (@) ~ $5F (–) [$C400 ~ $C4FF]

- User-defined pattern area

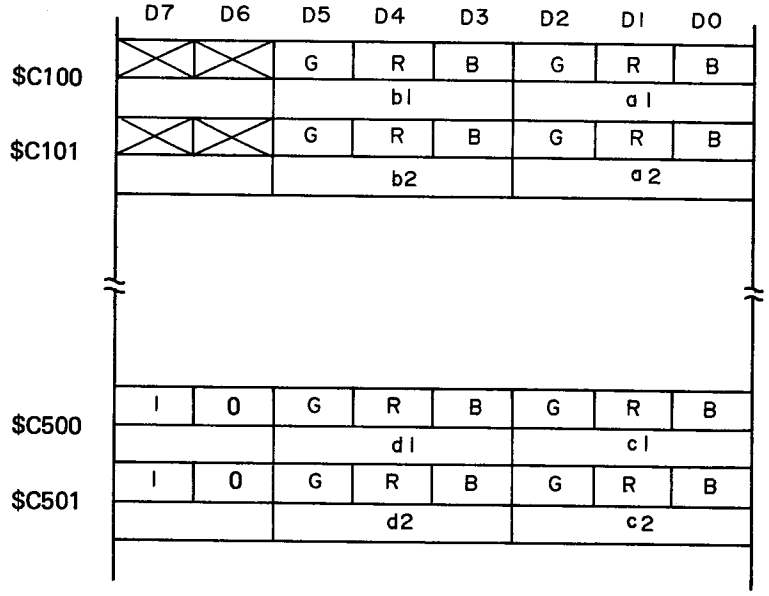


d. Semi-graphic display [M1=1, M0=0]
If the attribute area mode is specified as the semi-graphic display mode, character patterns are not displayed, but the four quarters of each 8x8-dot area are specified as a color and displayed according to the data in the display code area and attribute area. Each quarter is formed of 4x4 dots, and is specified in color as follows:

[Display Position on Screen]



[Contents of VRAM Semi-graphic Display]

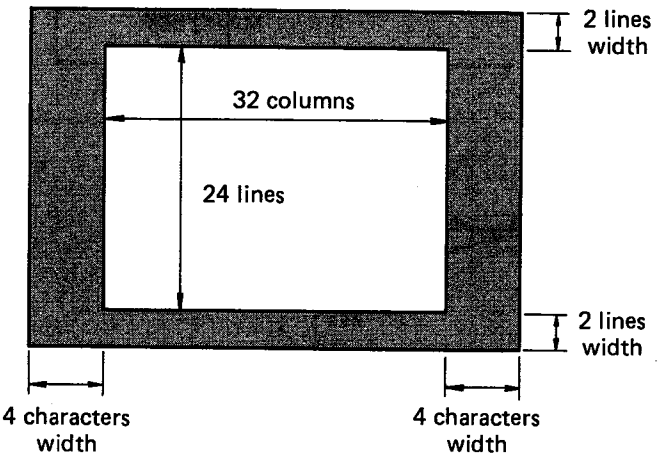


e. Frame display

The CRT controller of the JR-200U provides for frame display.

The frame is a mono-color display around the effective screen area of 32 characters x 24 lines.

[Frame Display]



The frame is composed of a four-character space on each side and a two-line space on each end.

The frame color is displayed as the color specified by writing color data in address $CA00.

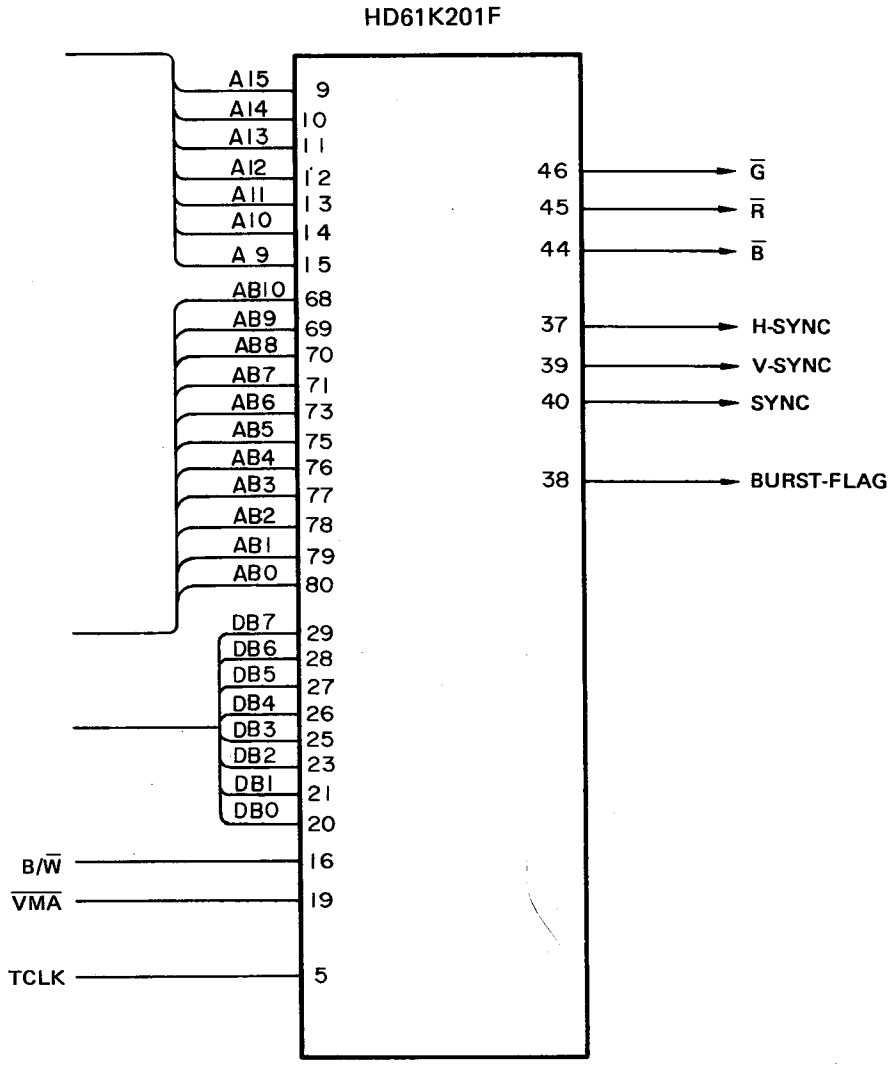
Data	Color
0	Black
1	Blue
2	Red
3	Violet
4	Green
5	Light Blue
6	Yellow
7	White

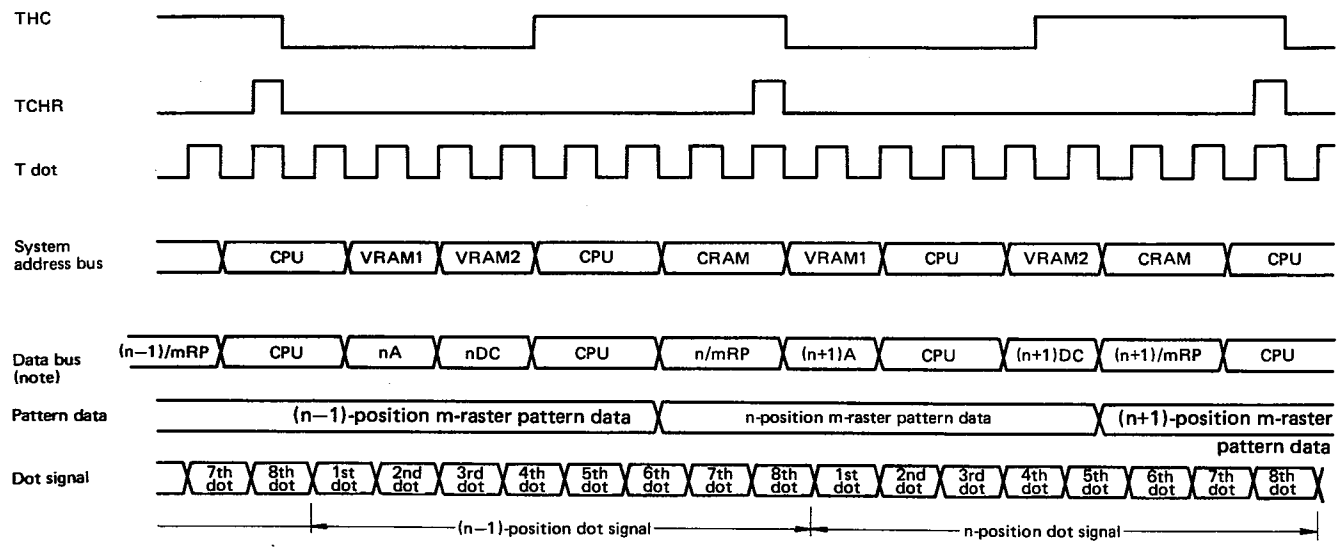
The low-order three bits of the data written in address $CA00 are valid, but the upper bits are ignored.

Only writing to this address is valid; reading is impossible.

(2) Video Signal Generator

The CRTC (CRT controller) of the JR-200U is composed of an exclusive LSI shown in the circuit diagram.

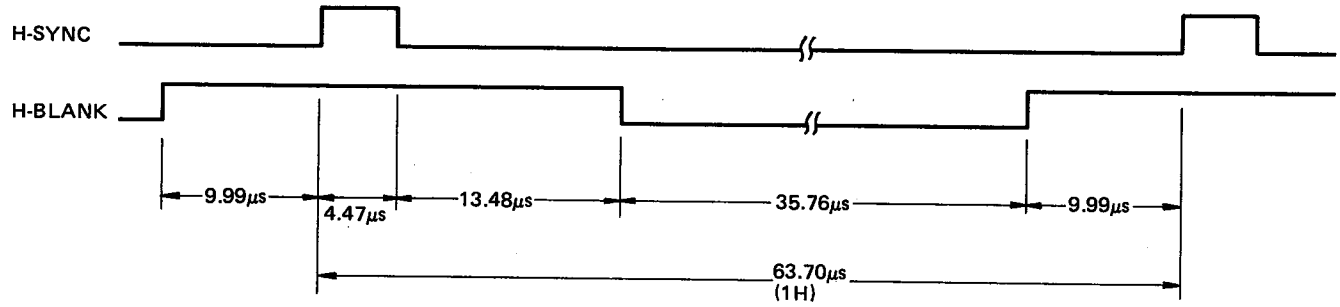


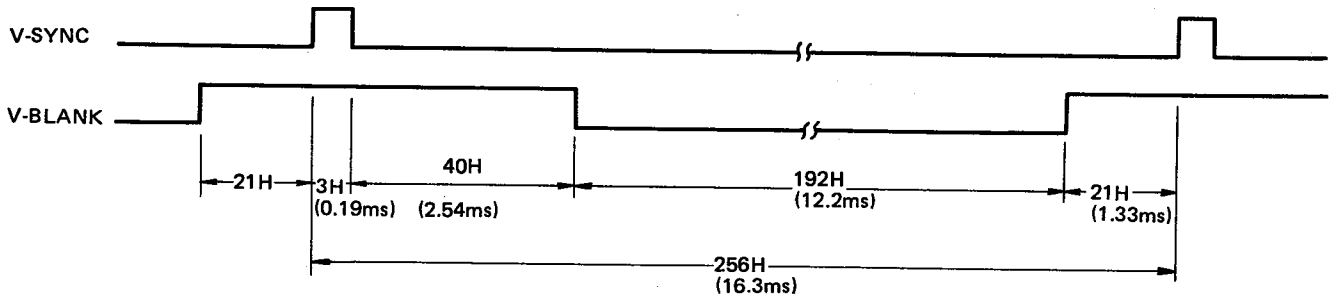


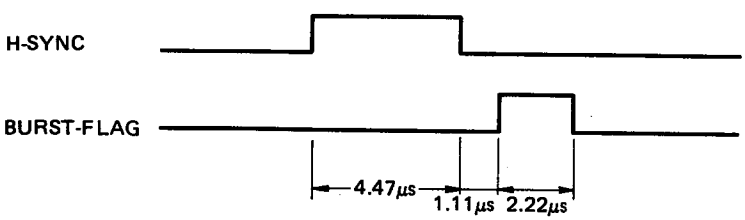
(Note)

1. (n−1)/mRP means (n−1)-position m-raster pattern data
2. nA means n attribute
3. nDC means n display code

[CRTC Basic Timing Chart]







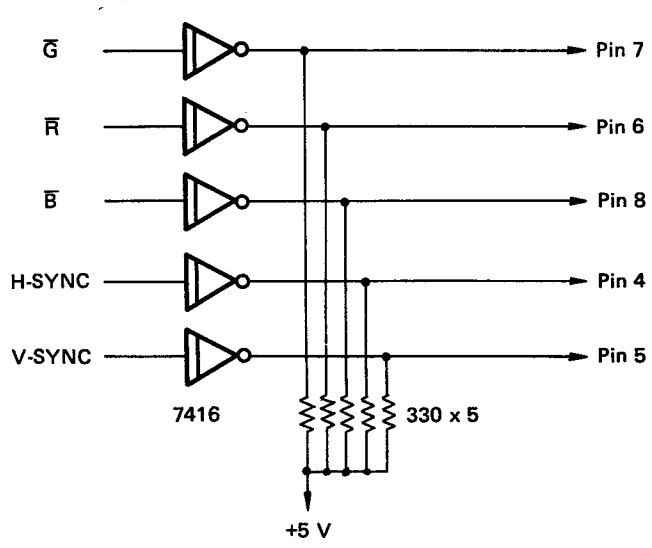
[CRTC Synchronizing Timing Chart]

(3) Video Signal Processor

The JR-200U has three kinds of video outputs.

a. RGB synchronizing signal separation output

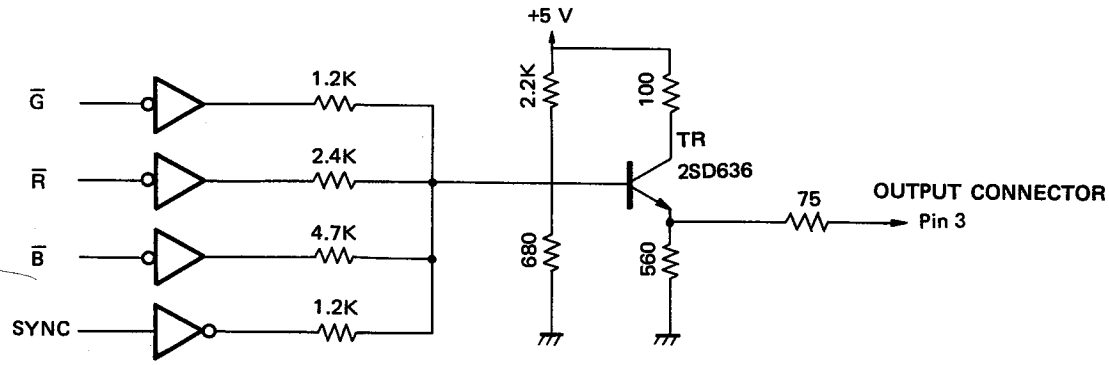
This video signal is output to the connector through a buffer because the CRTC needs output circuit, buffering.



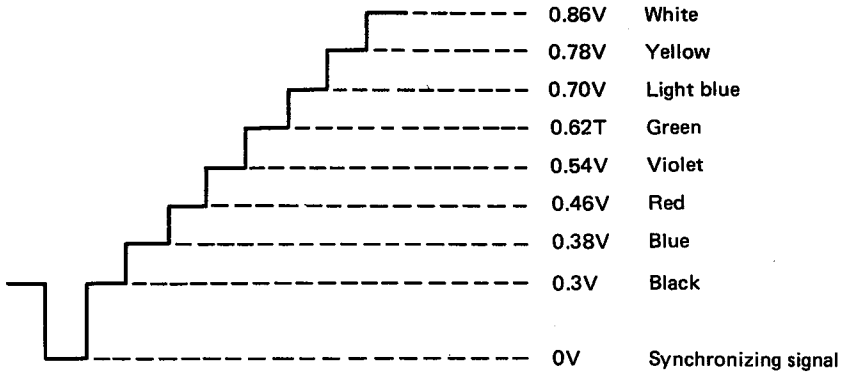
b. Composite video signal output

Because composite video signals are not generated in the CRTC, an external circuit is added to generate the signals.

Luminance signals are generated by the resistance adder from R.G.B. signals and synchronizing signals.



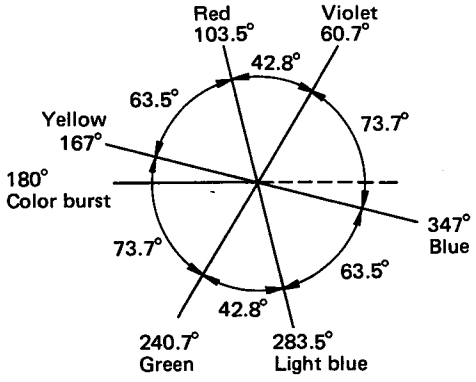
Luminance signals are selected so that signal R is 2 and signal G is 4 when the deviation of signal B is 1.



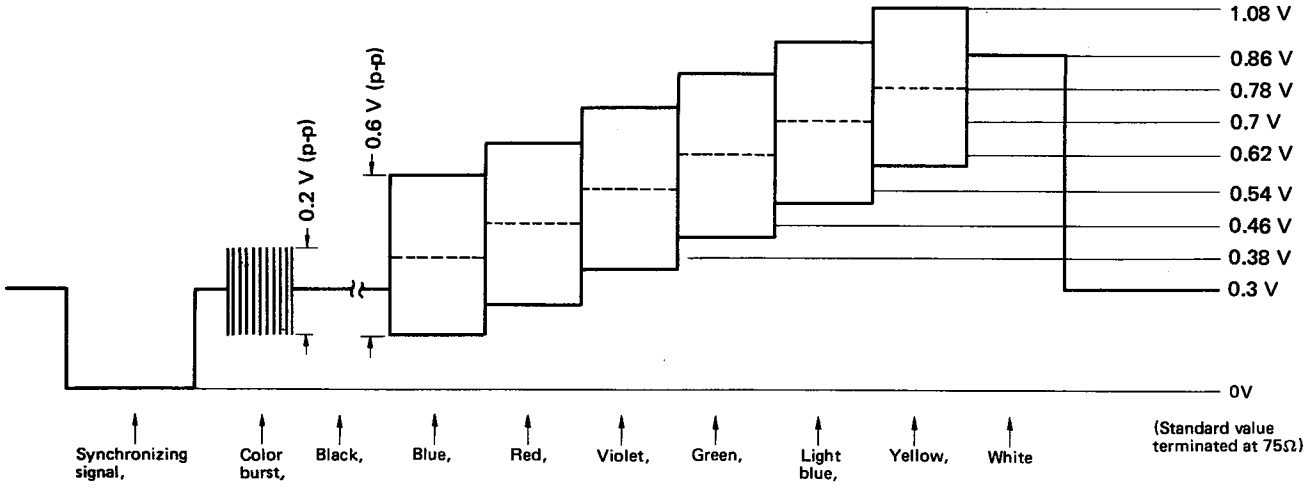
(Note) Voltage terminated in 75Ω.

Color signal formation

Color signals for the eight colors should be added to the luminance signals as a phase difference to the burst signal (3.579545 MHz).

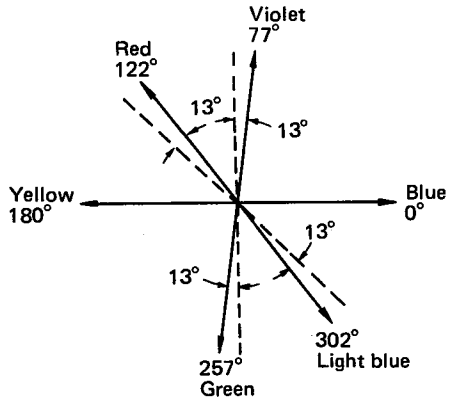


[Phase of Color Signal in NTSC System]



[Color Composite Video Signal]

The phase difference can be considered below, based on the timing chart.



When the TTL gate delay is 10 ns (TPY), a phase difference of approximately 13 degrees occurs at fo=3.579545 MHz. The counter output is used as a color signal in the NTSC system, making use of that phase difference.

The color signal selected by R.G.B. signals is added to the luminance signal by the resistance adder through the filter.

Also the burst signal, like the color signal, is added to the luminance signal by the resistance adder through the filter after BURST and AND output from the CRTC are provided. The burst signal phase-adjusts the filter circuit for the phases of color and burst signals.

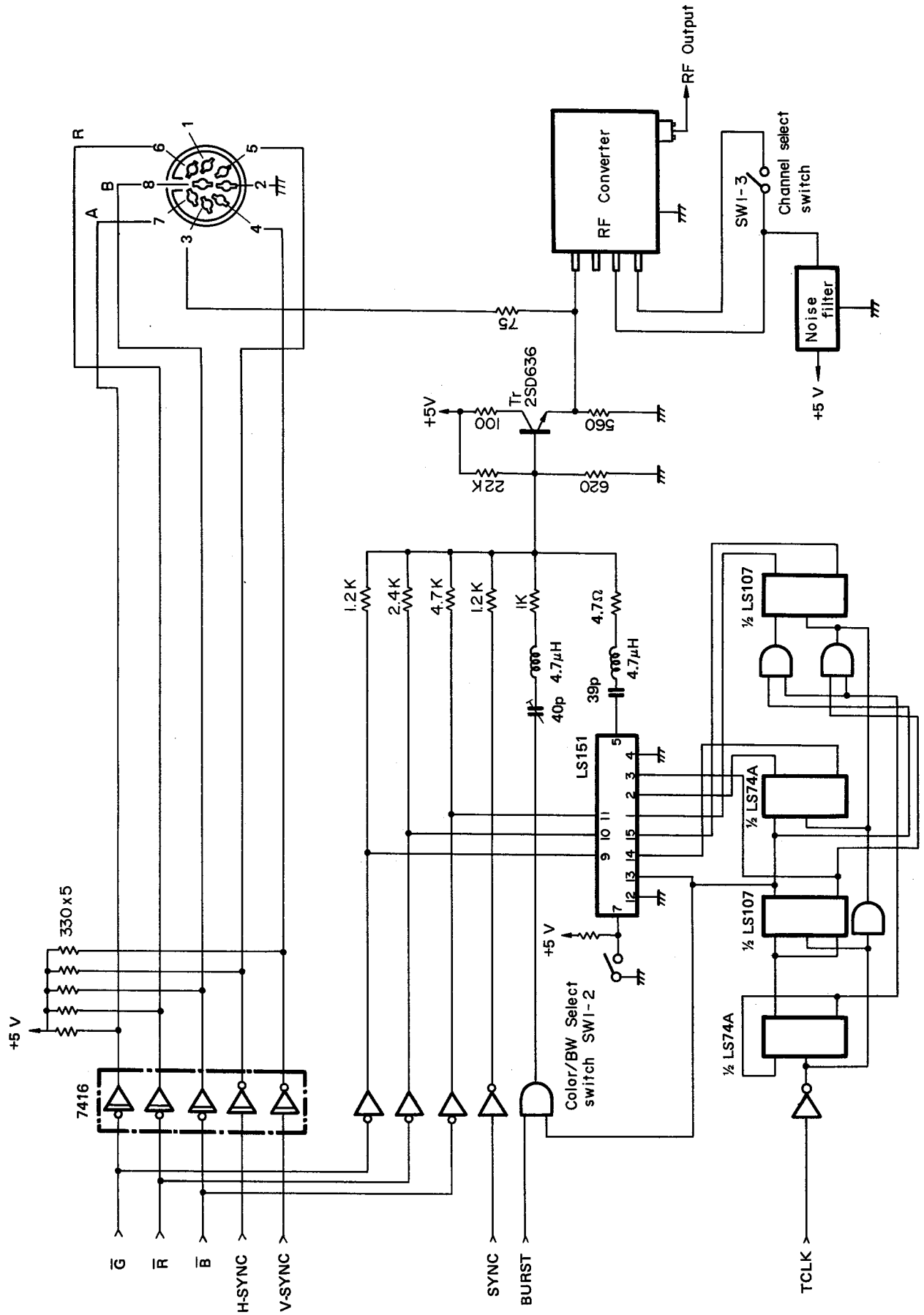
When a black-and-white monitor is used, the display quality is degraded if the color signal is added. To avoid this, a switch (SW1-2) is provided to cut the color signal.

The composite signal made in the resistance adder is output to pin 3 of the connector through the emitter follower circuit and the 75-ohm series resistance.

c. RF signal

Composite video signals are output to a pin jack after modulation by the RF converter to connect the JR-200U to a home television.

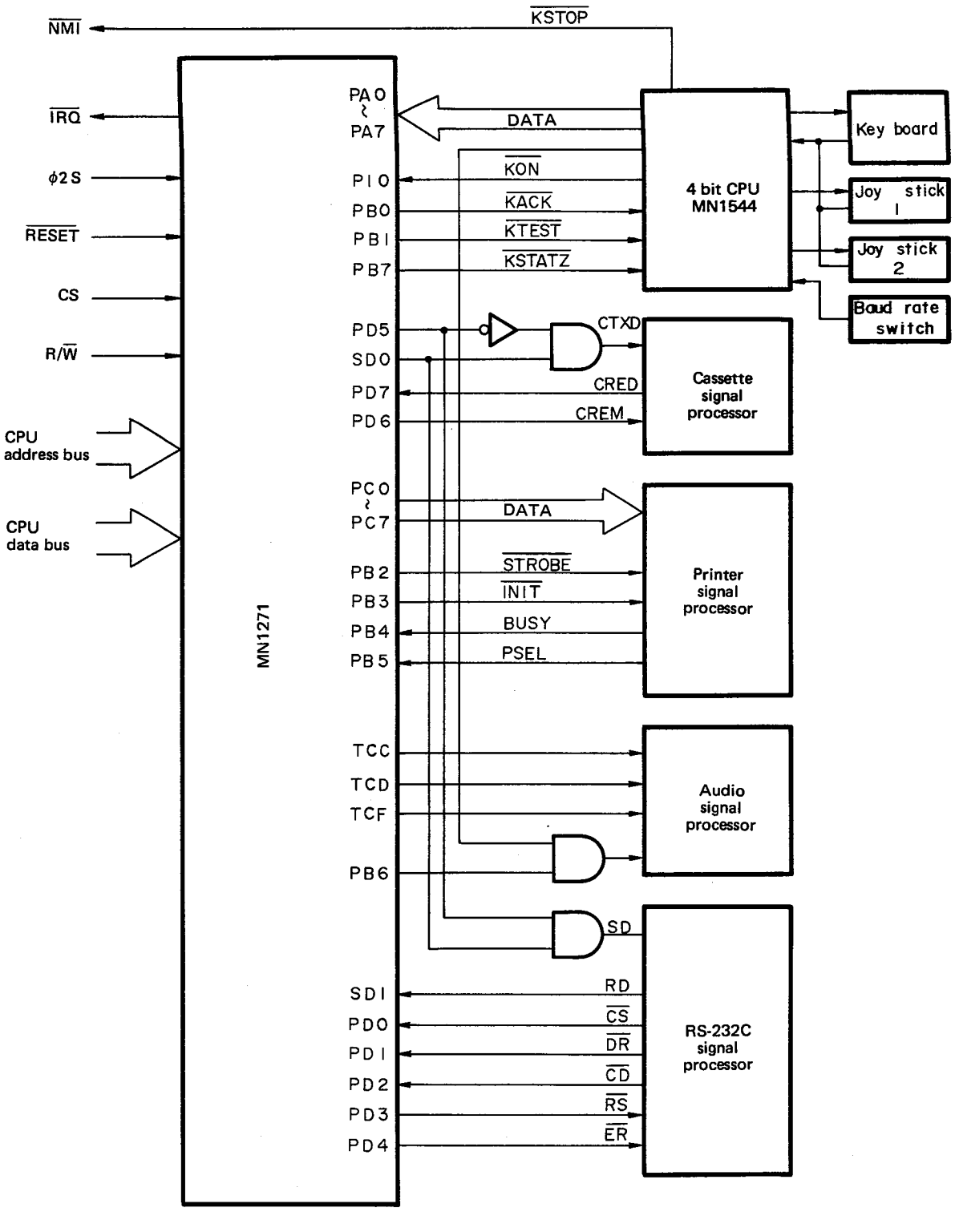
Channel 3 or 4 of the television is chosen with the DIP switch (SW1-3).



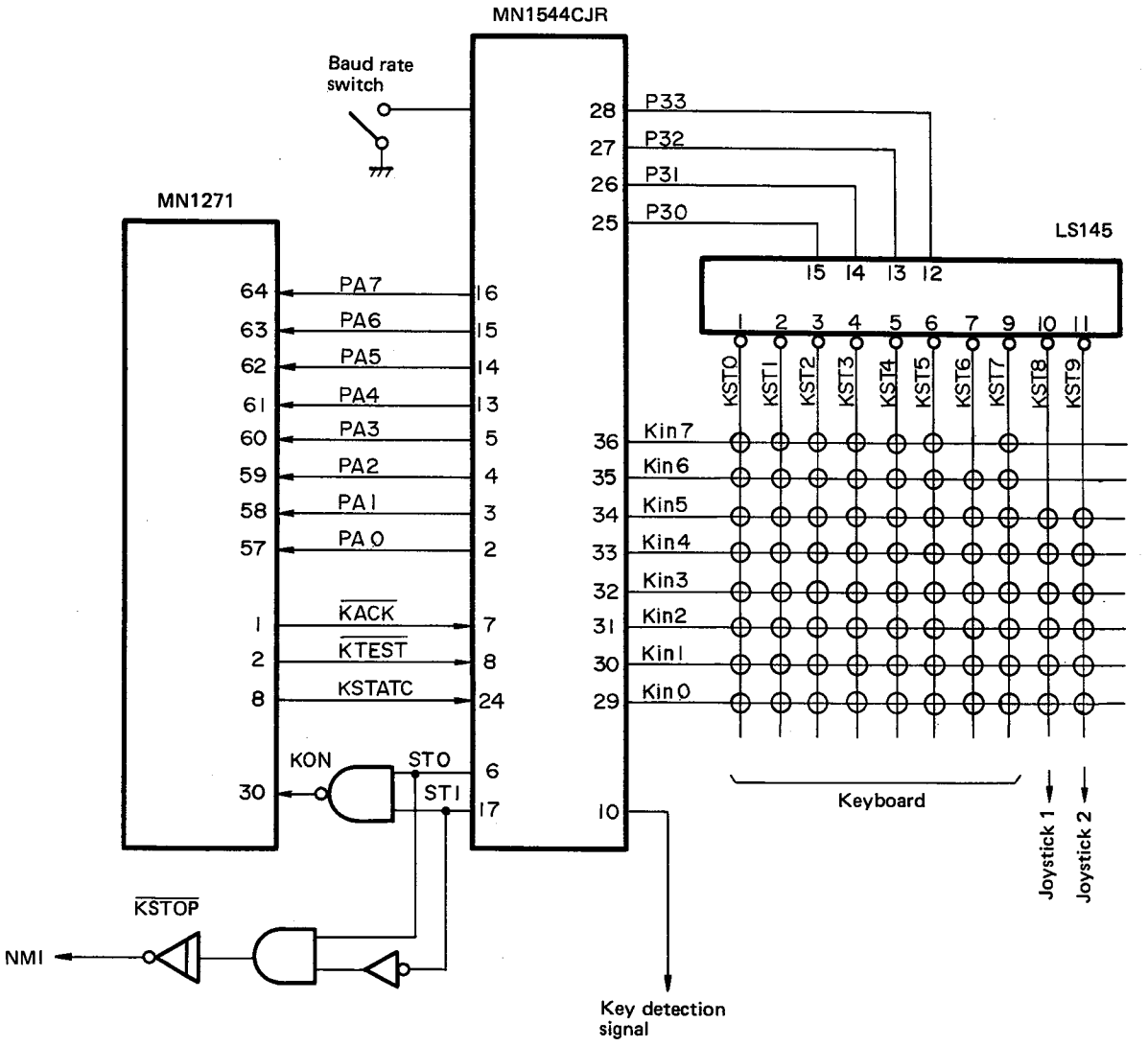
[Video Interface Circuit]

8.8. I/O Interface (PIA)

The I/O interface is composed of the MN1271 and other hardware.



(1) Keyboard interface



The keyboard interface detects ON/OFF signals of keys and joysticks with the 4-bit CPU (MN1544 CJR) and sends the detection results to the main CPU through the I/O interface (MN1271).

Ten strobe signals (KST0 to KST9), for detecting the keyboard and joysticks, are made from the outputs (P30 and to P33) of the MN1544 CJR by the decoder (74LS145).

a. Keyboard interface functions

- Transfer of display character patterns
  Transfers character patterns stored in the MN1544 when initialized by KTEST signals just after power is turned on.

- Transfer of baud rate information
  Transfers baud rate information after transferring character patterns, when initialized by KTEST signals just afer power is turned on.

- Transfer of key information
  Transfers character codes assigned to keys when keys are depressed.

- Transfer of joystick information
  Transfers joystick 1 and 2 information (each 1 byte of ON/OFF data) together with character codes.

b. Interface signal functions

- KSTOP signal (BREAK key detection and interrupt signal) KSTOP is an output pulse indicating that the BREAK key is depressed. This signal is connected to the CPU non-maskable interrupt (MNI) input.

- KON signal (ON key interrupt signal)
  KON is an output pulse indicating that the 4-bit CPU requires the main CPU to transfer data.

  This signal is connected to P10 of the MN1271. When the signal is output, the data to be transferred is set up.

- KDATA signal (Data signal)
  KDATA is a data signal sent by the 4-bit CPU.

- KSTAT2 signal (Operation mode control status signal)
  KSTAT2 is used to specify the input information transfer system (*1) to the 4-bit CPU.

- KACK signal (Data read complete response signal)
  KACK is a response signal (pulse signal) indicating that the main CPU has received KON signals and read KDATA signals.

- KTEST signal (Key test signal)
  KTEST is a signal indicating that the main CPU requires the key test result.

  Processing by 4-bit CPU

  a) Key buffer data not yet sent or now being sent are all made invalid.

  b) Key and joystick information is detected and the results are transferred.

c. Input information transfer system

The system defines the operation mode, based on which the 4-bit CPU conducts a keyboard test, by operation mode control status signals (KSTAT2). The operation mode may be BASIC mode or neutral mode. Operation mode is set by keying [CTRL] + [Letter].

a) KSTAT2 = 0 (BASIC mode)
When [CTRL] + [Letter] is keyed in, letters or the letter code assigned to one letter key is generated.

(Example) When keys [CTRL] + [P] are depressed, the five-letter character code PRINT is generated.

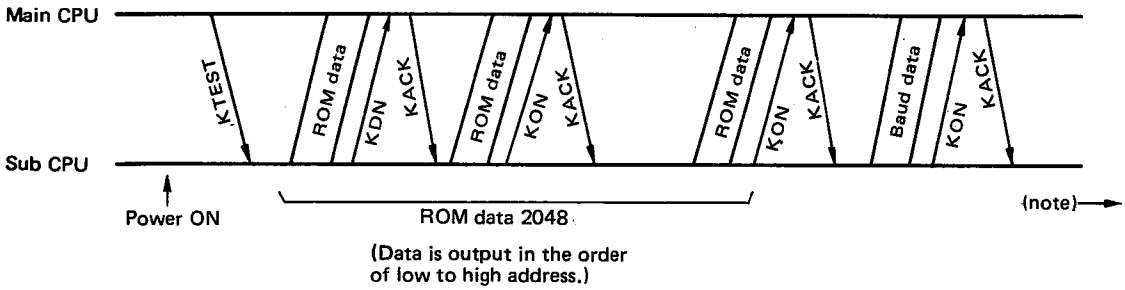
b) KSTAT2 = 1 (Neutral mode)
When [Letter] is keyed in, the transmission code ($10 to $18) assigned to one letter key is generated.

(Example) When key [P] is depressed, character code $10 is generated.

In this mode, the key operation is valid with letter/numeral mode and graphics mode.

d. Typical procedure

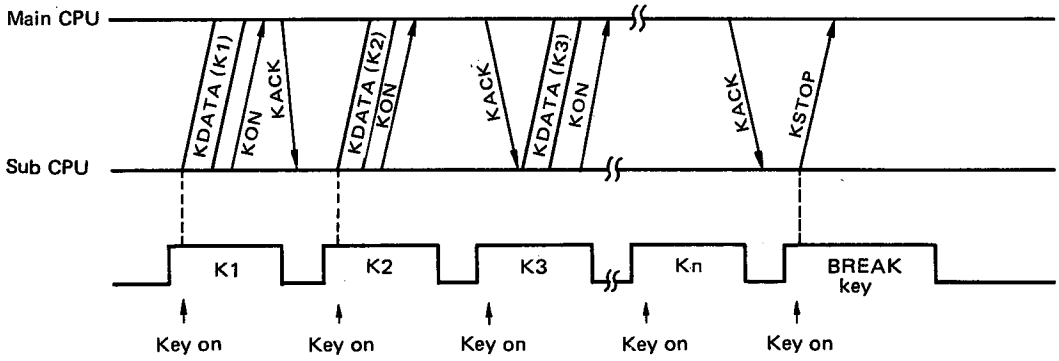
- Immediately after power is turned on.



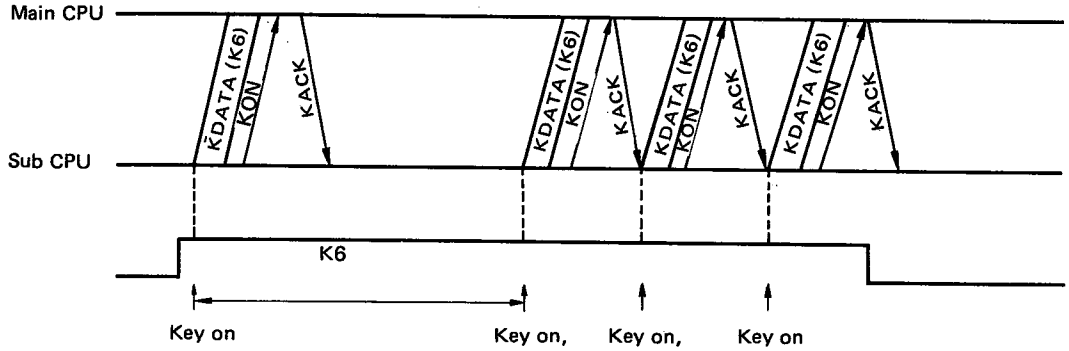
(Data is output in the order of low to high address.)

(Note) Ordinary processing thereafter

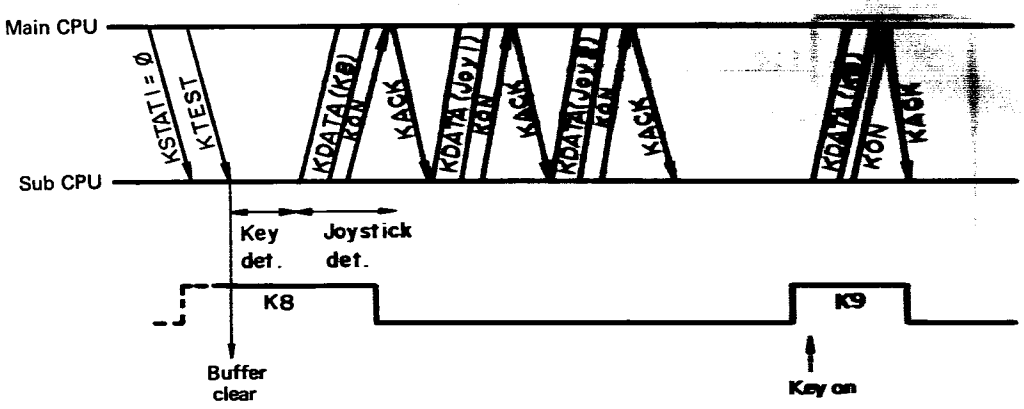
- Ordinary key detection



- Repeat operation



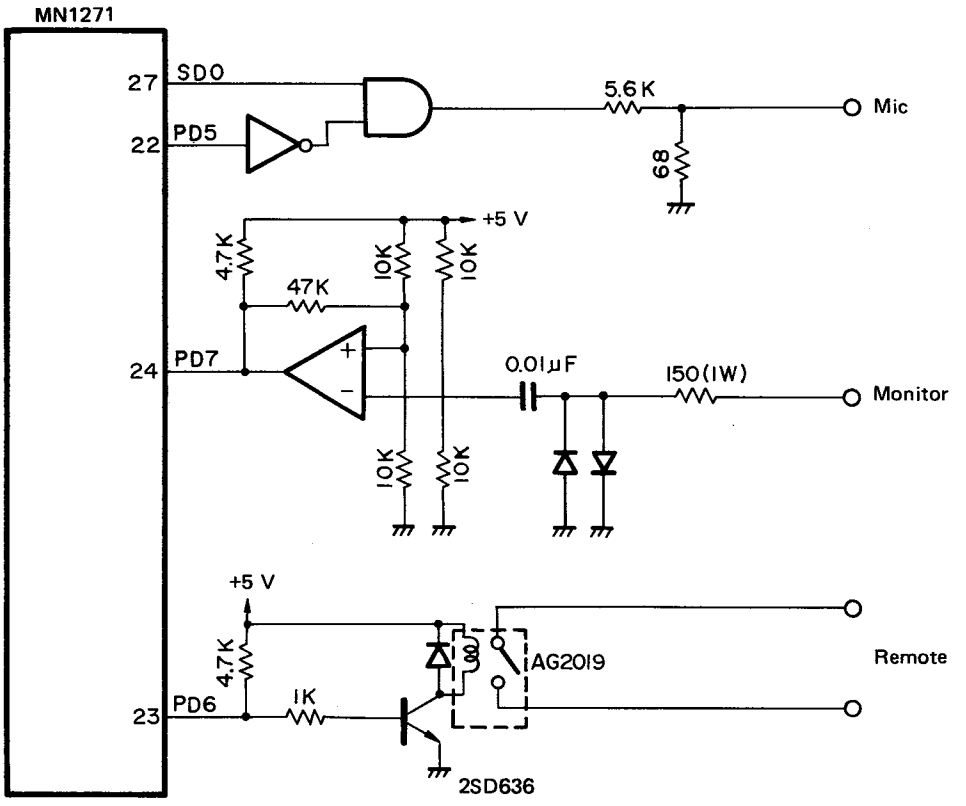
● Key detection required by main CPU



e. Keyboard Matrix

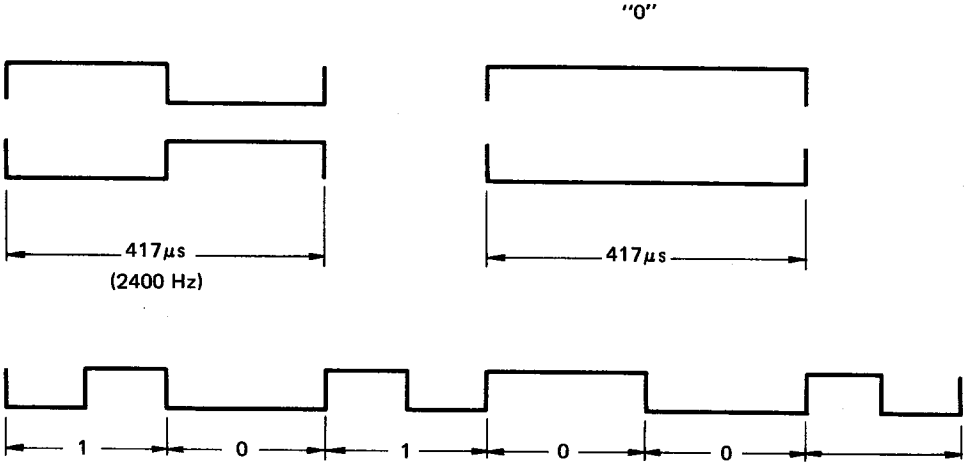
	KST0 (P20)	KST1 (P21)	KST2 (P22)	KST3 (P23)	KST4 (P30)	KST5 (P31)	KST6 (P32)	KST7 (P33)
KIN7 (P53)	2	4	6	8	0	¥		SHIFT
KIN6 (P52)	W	R	Y	I	P	^	DEL	SPACE
KIN5 (P51)	S	F	H	K	;	[	→	GRAPH
KIN4 (P50)	X	V	N	,	/	]	↑	
KIN3 (P43)	Z	C	B	M	.	□	↓	
KIN2 (P42)	A	D	G	J	L	:	←	RETURN
KIN1 (P41)	Q	E	T	U	0	@	INS	RUBOUT
KIN0 (P40)	1	3	5	7	9	—	STOP	CTRL

(2) Cassette interface

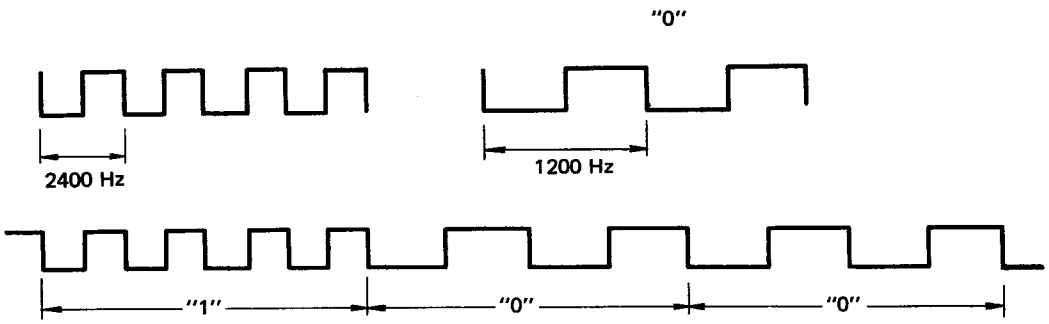


Remote control is possible from the cassette interface. One of the two baud rates, 2,400 and 600 baud, can be selected with the DIP switch on the bottom of the unit.

[Write Waveform]
2400 Baud "1"



600 Baud



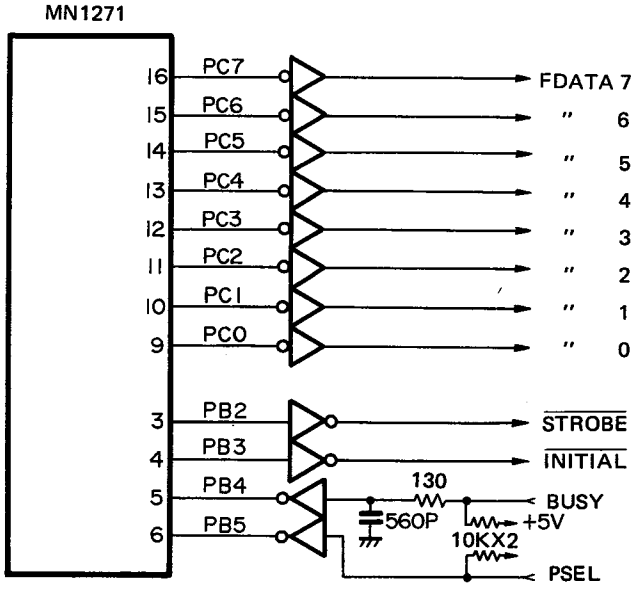
Writing to cassette tape
Because the write signal is common to the transmitting data signal for the RS-232C, it is controlled by PD5. The write signal is output to the cassette tape when PD5=0.

Write signal level: approximately 50 mV (p-p)

Reading from cassette tape
The audio output of the cassette tape is input to the comparator (AN6914) through an attenuator.

The comparator has a hysteresis of approximately 0.22 V and converts the input signal to an ON/OFF signal (5 V/ground).

(3) Printer interface



The printer interface is a Centronics-compatible parallel interface.

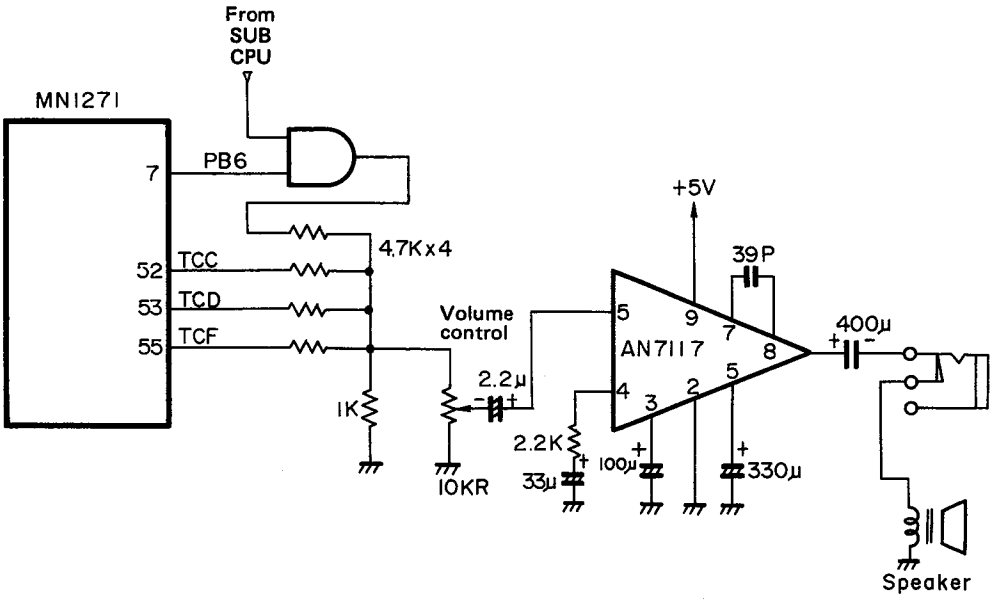
The following two printers can be used as standard.

JR-P02U	Panasonic	(PSEL=0)
MX-80	Epson	(PSEL=1)

The printer control signals are output from the MN1271 to the connector through the buffer (74LS04) circuit. The input signals from the printer is connected to the MN1271 through the buffer (74LS04).

Refer to the specification manual for each printer for the control sequence.

(4) Audio interface



The audio interface mixes three counter (C, D, F) outputs and key detection sounds and amplifies them through the AN7117, driving a speaker.

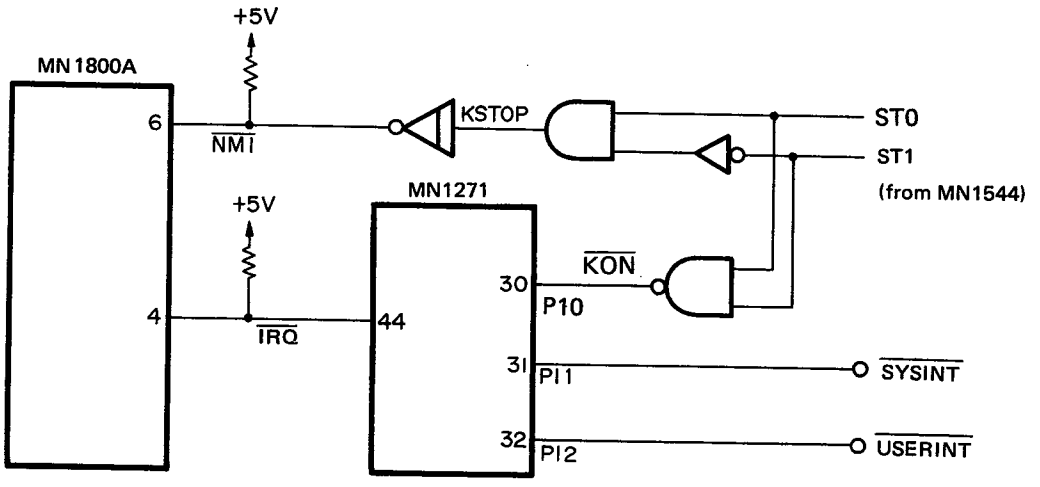
Key detection sounds can be switched by PB6.

PB6 = 0 —— No key detection sound is generated.
PB6 = 1 —— Key detection sound is generated.

The volume provided for input to the amplifier enables if to drive the speaker at an adequate sound level.

The amplifier output is connected to the external speaker terminal, so an external speaker can be connected. In this case, the internal speaker is cut off.

8.9. Interrupt Control



The interrupt control uses the interrupt control functions of the I/O interface and MN1271.

The CPU (MN1800A) has the following two interrupt control signals:

a. Non-maskable interrupt ($\overline{\text{NMI}}$)
A non-maskable interrupt sequence is generated in the CPU automatically at the leading-edge input of NMI signals.

b. Interrupt request ($\overline{IRQ}$)

This signal is an input for interrupt request. The interrupt sequence is executed in the CPU if the signal is input.

When $\overline{NMI}$ and $\overline{IRQ}$ signals are received, the index register, program counter, accumulator, and condition register are stored in stacks and branched to the memory addresses of which contents are shown by the following memory addresses.

$\overline{NMI}$	$FFFC (Upper address),	$FFFD (Lower address)
$\overline{IRQ}$	$FFF8 (Upper address),	$FFF9 (Lower address)

The $\overline{IRQ}$ signal to the CPU is output from the MN1271.

The MN1271 receives interrupt requests and generates the $\overline{IRQ}$ signal to the CPU as a logical sum of them.

Interrupt requests

a. $\overline{KON}$ signal
   Indicating that the keyboard interface has detected the ON key.

b. $\overline{SYSINT}$ signal
   Interrupt request signal reserved by the system, for future system extension.

c. $\overline{USERINT}$ signal
   Interrupt request signal controllable by users with extension units.

d. Interrupt request signal generated in the MN1271
   - Timer interrupt request signal
   - Serial interface interrupt request signal

The $\overline{NMI}$ signal is connected to the KSTOP signal generated when the BREAK key is depressed.

9. Character Code

9.1. Display Code Table (Hexadecimal Value)

Upper / Lower	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		~	(sp)	0	@	P	`	p								
1		÷	!	1	A	Q	a	q	♠							
2		α	▾▾	2	B	R	b	r	♥							
3		β	#	3	C	S	c	s	♦							
4		γ	$	4	D	T	d	t	♣							
5		Σ	%	5	E	U	e	u								
6		θ	&	6	F	V	f	v	←							
7			▼	7	G	W	g	w	↓							
8			(	8	H	X	h	x	↑							
9			)	9	I	Y	i	y	→							
A			*	:	J	Z	j	z								
B		♪	+	;	K	[	k	{								
C			,	<	L	¥	l	|								
D		∓	−	=	M	]	m	}								
E	☎		·	>	N	^	n	¯								
F	π			?	O	_	o	(DEL)								

Note:
1. SP means Space.
2. Display and Characters respectively indicated by shaded areas are actually assigned to Japanese Characters.

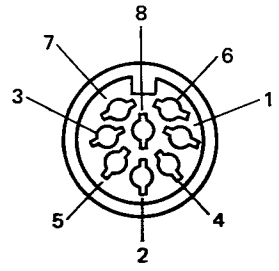
9.2. Character (ASCII) Code Table (Hexadecimal Value)

Upper / Lower	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NULL		(sp)	0	@	P	`	p	Graph on							
1			!	1	A	Q	a	q	♠							
2			▾▾	2	B	R	b	r	♥							
3	BREAK	INS	#	3	C	S	c	s	♦							
4		Graph off	$	4	D	T	d	t	♣							
5			%	5	E	U	e	u								
6		HCOPY	&	6	F	V	f	v	←							
7			▼	7	G	W	g	w	↓							
8	RUB OUT	CANSEL	(	8	H	X	h	x	↑							
9			)	9	I	Y	i	y	→							
A		LINS	*	:	J	Z	j	z								
B	HOME		+	;	K	[	k	{								
C	CLS	→	,	<	L	¥	l	|								
D	RETURN	←	−	=	M	]	m	}								
E		↑	·	>	N	^	n	¯								
F		↓	/	?	O	_	o									

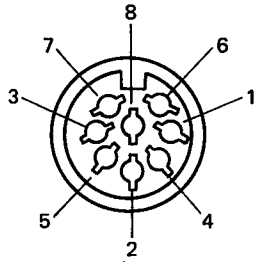
Note:
1. SP means Space.
2. Display and Characters respectively indicated by shaded areas are actually assigned to Japanese Characters.

10. Connector Pin Identification

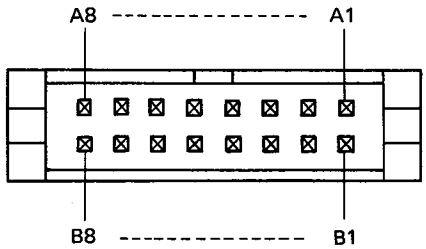
10.1. Display Connector

Pin No.	Signal	I/O	Pin Connection
1	NC		
2	GND		
3	Video	output	
4	$\overline{\text{H-SYNC}}$	output	
5	$\overline{\text{V-SYNC}}$	output	
6	R	output	
7	G	output	
8	B	output	

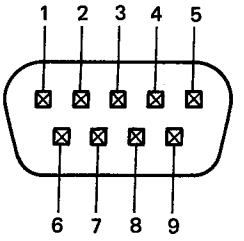
10.2. Tape Recorder Connector

Pin No.	Signal	I/O	Pin Connection
1	GND		
2	GND		
3	GND		
4	REC	output	
5	MON	input	
6	REM1		
7	REM2		
8	GND		

10.3. Printer Connector

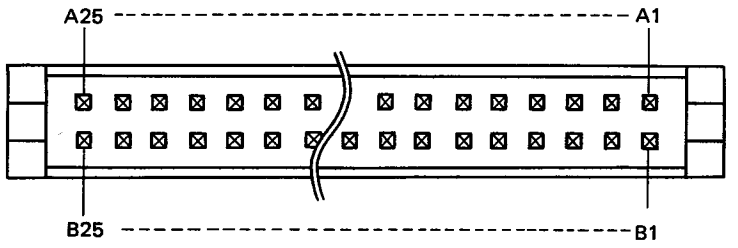
Pin No.	Signal	I/O	Pin Connection
A1	PDATA0	output	
A2	PDATA1	output	
A3	PDATA2	output	
A4	PDATA3	output	
A5	PDATA4	output	
A6	PDATA5	output	
A7	PDATA6	output	
A8	PDATA7	output	
B1	$\overline{\text{STROBE}}$	output	
B2	GND		
B3	$\overline{\text{INITIAL}}$	output	
B4	GND		
B5	BUSY	input	
B6	GND		
B7	PSEL	input	
B8	GND		

10.4. Joystick Connector

Pin No.	Signal (Joystick 1, Joystick 2)		I/O	Pin Connection
1	KIN0	KIN0	input	
2	KIN1	KIN1	input	
3	KIN2	KIN2	input	
4	KIN3	KIN3	input	
5	+5 V	+5 V		
6	KIN4	KIN4	input	
7	KIN5	KIN5	input	
8	KST8	KST9	output	
9	GND	GND		

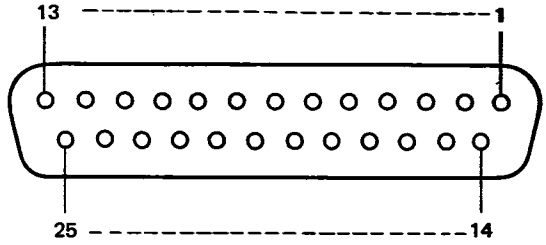
10.5. External Bus Connector

Pin Connection



Pin No.	Signal	I/O	Pin No.	Signal	I/O
A1	GND	input/ output	B1	GND	input/ output
A2	DB0	input/ output	B2	DB1	input/ output
A3	DB2	input/ output	B3	DB3	input/ output
A4	DB4	input/ output	B4	DB5	input/ output
A5	DB6	input/ output	B5	DB7	input/ output
A6	A0	output	B6	A1	output
A7	A2	output	B7	A3	output
A8	A4	output	B8	A5	output
A9	A6	output	B9	A7	output
A10	A8	output	B10	A9	output
A11	A10	output	B11	A11	output
A12	A12	output	B12	A13	output
A13	A14	output	B13	A15	output
A14	$\overline{\text{DRAMSEL}}$	input	B14	$\overline{\text{E}\emptyset_2}$	output
A15	DRAM0 IN	output	B15	DRAM1 IN	output
A16	DRAM0 OUT	input	B16	DRAM1 OUT	input
A17	ADSEL	output	B17	TCAS	output
A18	$\overline{\text{RAS}}$	output	B18	$\overline{\text{KILL}}$	input
A19	+5 V		B19	+5 V	
A20	GND		B20	GND	
A21	ER/$\overline{\text{W}}$	output	B21	BA	output
A22	$\overline{\text{HALT}}$	input	B22	$\overline{\text{VMA}}$	output
A23	$\overline{\text{SYSINT}}$	input	B23	$\overline{\text{USRINT}}$	input
A24	$\overline{\text{E}\emptyset_2\text{S}}$	output	B24	$\overline{\text{ERESET}}$	output
A25	GND		B25	GND	

10.6. RS-232C Connector (Optional)

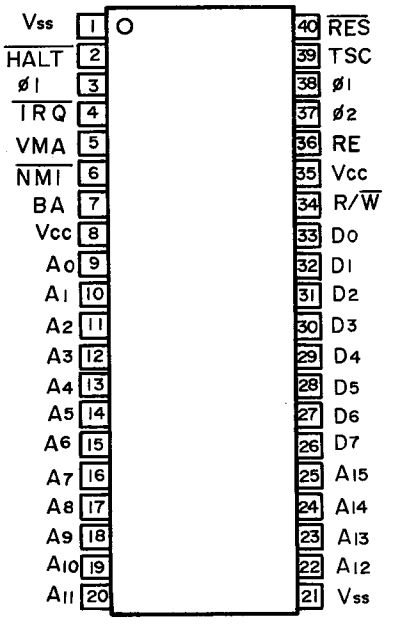
Pin No.	Signal	I/O	Pin Connection
2	SD	output	
3	RD	input	
4	RS	output	
5	CS	input	
6	DR	input	
7	SG		
8	CD	input	
20	ER	output	

Other Pins are NC.

11. LSI & IC Pin Configuration

11.1. MN1800A CPU

Pin Assignments



(Viewed from above)

(1) Ground (Vss) (pins 1, 21)

(2) HALT (pin 2)

When this line is "H" the CPU receives and executes instructions. When it goes "L" the CPU halts processing after completion of the current instruction.

(3) Phase 1 Clock (pin 3)

The system clock $\phi 1$ is input to this pin.

(4) Interrupt Request Line (IRQ) (pin 4)

When the interrupt mask is not set and the PIA (or another external device) IRQ line goes "L", the CPU generates interrupt after completing the current instruction.

(5) Valid Memory Address (VMA) (pin 5)

This line is connected to all devices connected to the address lines from the CPU. When it is "H" it indicates that a valid address is on the address bus.

(6) Nonmaskable Interrupt (NMI) (pin 6)

This interrupt is the same as IRQ except that it cannot be masked with the "I" bit. As with IRQ, the current instruction is completed before the NMI routine is executed.

(7) Bus Available (BA) (pin 7)

This line is normally "L" to indicate that the address and data buses are under the control of the CPU. When it goes "H" the address and data buses may be used by devices other than the CPU.

(8) +5 V Power (Vcc) (pin 8, 35)

(9) Address Lines (A0~A15) (pins 9~20, 22~25)

These 16 output lines are used to address devices other than the CPU.

(10) Data Lines (D0~D7) (pins 26~33)

These 8 bi-directional lines are used to transfer data between the CPU and peripheral devices.

(11) [illegible]

This [illegible] "L", it indicates to all external [illegible]

(12) RAM [illegible]

When [illegible]

(13) Phase 2 [illegible]

The [illegible] pin.

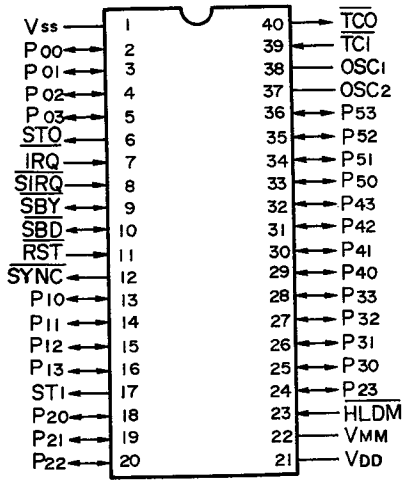
(14) [illegible] (pin 39)

When this signal is "H" all address lines and the R/W line assume the high impedance condition and VMA and BA go "L".

(15) Reset ($\overline{RES}$) (pin 40)

This input signal is used to start the CPU from the power down condition. The $\overline{RES}$ input must be maintained at "L" for a minimum of 8 clock cycles after voltage reaches 4.75 V. During this interval the address bus outputs the address $FFFE.

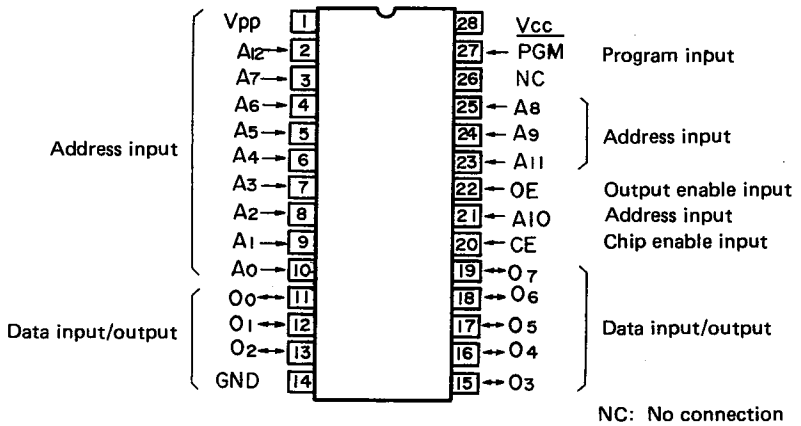
11.2. MN1544CJR Sub CPU



V_{DD}	Power supply (+5 V)
V_{MM}	RAM power supply
V_{SS}	Power supply (GND)
OSC1, OSC2	Clock generator terminals (OSC1 is for external clock input)
$\overline{SYNC}$	Internal cycle synchronizing signal output
$\overline{IRQ}$	Program control interrupt input
$\overline{SIRQ}$	Maximum priority interrupt input
$\overline{SBD}$	Serial input
$\overline{SBY}$	Serial I/O clock input
$\overline{TCI}$	Timer/counter input
$\overline{TCO}$	Timer/counter output
$\overline{HLDM}$	RAM power supply maintenance specification
$\overline{RST}$	Reset signal input
P00~P53	Parallel I/O port
ST0, ST1	Strobe output for I/O ports P0 and P1

11.3. MN4864CA2 (ROM 0), MN4864CB2 (ROM 1)

Pin Assignments

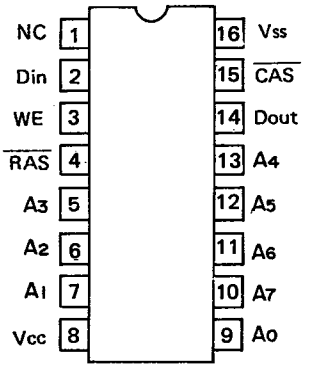


(viewed from above)

A0~A12	Address input
O0~O7	Data input/output
$\overline{PGM}$	Program input
OE	Output enable
CE	Chip enable input

11.4. HM4864P3 RAM

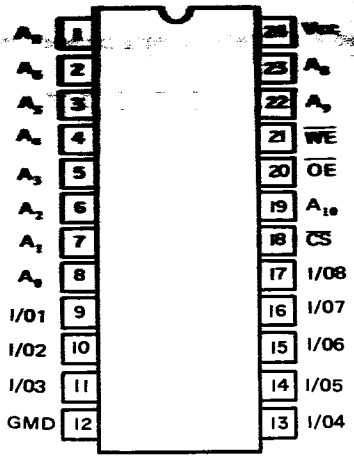
Pin Assignments



(viewed from above)

A0~A7	Address input
$\overline{CAS}$	Column address strobe
Din	Data input
Dout	Data output
$\overline{RAS}$	Row address strobe
WE	Read/Write input
Vcc	Power supply (+5 V)
Vss	GND

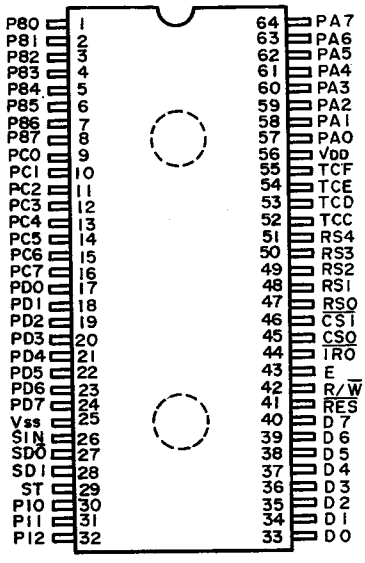
11.5. HM6116P3 RAM



(viewed from above)

A0~A10	Address input
I/01~I/07	Data input/output
$\overline{WE}$	Read/Write input
$\overline{OE}$	Output enable
$\overline{CS}$	Chip select input

11.6. MN1271 PIA



(1) 8-bit Parallel Ports (PA0~PA7, PB0~PB7, PC0~PC7, PD0~PD7)

The PIA supports four 8-bit parallel ports (PA, PB, PC, PD), each port having an 8-bit data register and direction register to permit single bit input/output. The direction register is set to input with "0" and output with "1".

(2) 3-bit Parallel Port (PI0~PI2)

The 3-bit parallel port supports a mode register, a data register, and an edge detection register for level input edge detection (rising edge, falling edge), level output, and pulse output.

(3) Serial Port (SDO, SDI, ST)

This port is used for transmission and reception of serial data, data being transmitted from SDO and received at SDI. The timing clock signal required for transmission/reception is supplied to ST.

(4) Sine Wave Generation (SIN)

The 3-bit precision stepped wave generated with output under the control of the timer/counter is output from SIN.

(5) Data Bus (D0~D7)

The bi-directional data bus is used for transfer of data between the CPU and the MN1271.

(6) Timer/Counter Input/Output (TCC, TCD, TCE, TCF)

TCC, TCD: 8-bit timer/counters
TCE, TCF: 16-bit timer/counters

Frequency divided waveforms are output in the timer mode, and input pulses are counted in the event count mode. E and F support a pulse width measurement function as well.

(7) Register Select (RS0~RS4)

Five signal input pins (5 bits) for register selection.

(8) Chip Select (CS0, $\overline{CS1}$)

Chip select signal input pins, the chip is selected when CS0 is "H" and CS1 and "L".

(9) Interrupt Request ($\overline{IRQ}$)

Interrupt requests for registers within the PIA. OR is taken within the chip and the IRQ signal output from this pin. The $\overline{IRQ}$ signal is active low, and may be connected with other interrupt signals in a wired OR configuration.

(10) Enable (E)

The MC6800 $\phi 2$ clock is normally input to this pin.

(11) Reset ($\overline{RES}$)

A "L" signal is input to this pin to apply system reset to the chip. System reset is cleared by writing "0" into the MSB of the edge detection register.

(12) Read/Write (R/$\overline{W}$)

The CPU reads data when this signal is "H" and write data when it is "L".

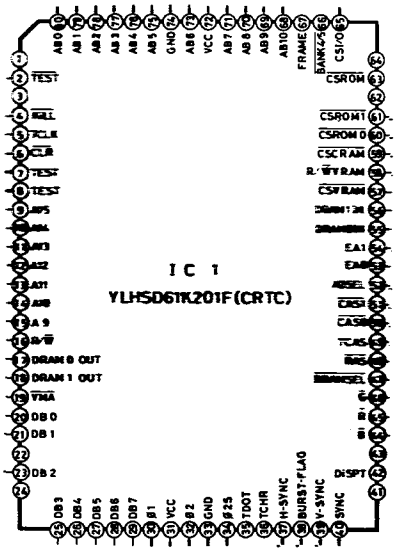
(13) V_{SS}

Normally connected to 0 V or GND.

(14) V_{DD}

Normally connected to +5 V.

11.7. CRTC HD61K201F



(1) Memory Control Signal Generation

$\overline{RAS}$	RAS timing signal
TCAS	CAS timing signal To be used after ANDing with chip select signals
ADSEL	Address select signal Timing for switching addresses for rows and columns
DRAM0 IN	Input data signal to DRAM
DRAM1 IN	"
DRAM0 OUT	Output data signal from DRAM
DRAM1 OUT	"
EA0, EA1	External address signal
R/$\overline{W}$ VRAM	Read/write signals to VRAM and CRAM
$\overline{KILL}$	ROM0 kill signal (IC5) If this terminal is set at low level, the system ROM becomes invalid. (IC5)
$\overline{DRAMSEL}$	RAM select signal (negative) If this terminal is set at low level, the control signals are output when a 64K dynamic RAM is used. (EXTERNAL) The chip select signal is input to the terminal.

(2) Device-select signal generation

Device-select signals are generated to select devices allocated on the memory map.

Signal Name	Application
$\overline{CAS0}$	for DRAM (IC8, IC10)
$\overline{CAS1}$	for DRAM (IC9, IC11)
$\overline{CSVRAM}$	for VRAM (IC7)
$\overline{CSCRAM}$	for CRAM (IC6)
$\overline{CS\ I/O}$	for DIA (IC17)
$\overline{CSROM0}$	for ROM (IC5)
$\overline{CSROM1}$	for ROM (IC4)

(3) System Clock Generation

TCLK is the crystal oscillator frequency with a middle frequency of 14.31818 MHz (four times higher than the $\phi 1$ and $\phi 2$ are the two-phase clocks required by the CPU.

$\phi 2S$ is a clock required by peripheral LSI.

(4) CRT Control Signals Generation

a. For RGB Signal Processor

$\overline{R}$	Color (Red) Signal
$\overline{G}$	Color (Green) Signal
$\overline{B}$	Color (Blue) Signal
H-SYNC	Horizontal Synchronzing Signal
V-SYNC	Vertical Synchronizing Signal

b. For Composite Signal Processor

$\overline{R}$	Color (Red) Signal
$\overline{G}$	Color (Green) Signal
$\overline{B}$	Color (Blue) Signal
SYNC	Synchronizing Signal
BURST FLAG	Burst Signal (3.579545 MHz)

(5) Address Bus/Data Bus

A9~A15	Address bus signals from CPU
AB0~AB10	Address bus signals to VRAM and CRAM
DB0~DB7	Data bus signals from CPU, VRAM and CRAM

(6) Control Signal from CPU

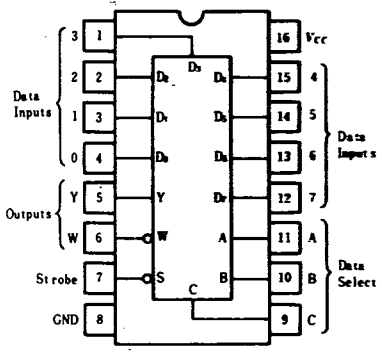
R/$\overline{W}$	Read/Write Control Signal
VMA	Valid Memory Address Signal

(7) Refresh Address Generation

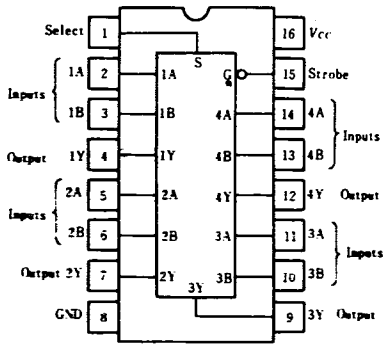
AB0 to AB6 are required for the $\overline{RAS}$-only refresh, but these signals are not available. It is, therefore, preferable to use a RAM with the refresh function built-in.

11.8. TTL ICs

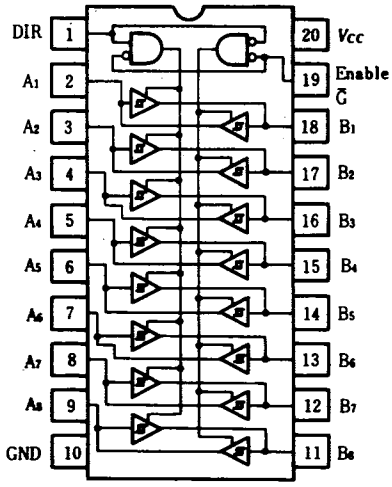
LS151



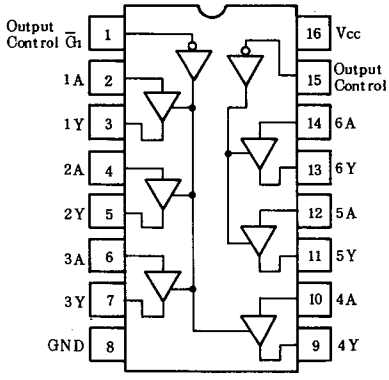
LS157



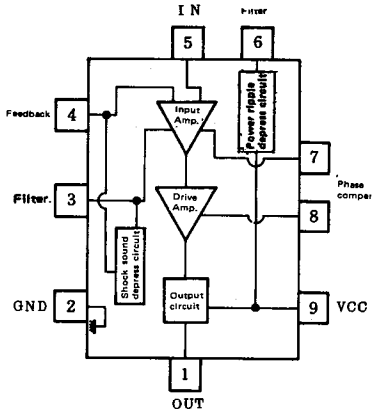
LS245



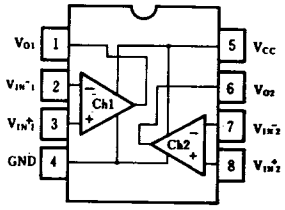
LS367



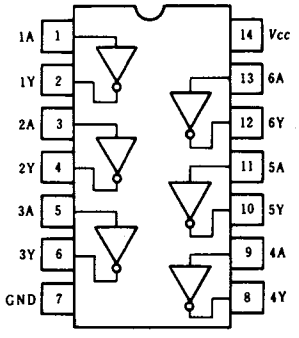
7117



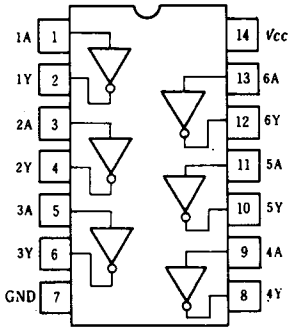
AN6914



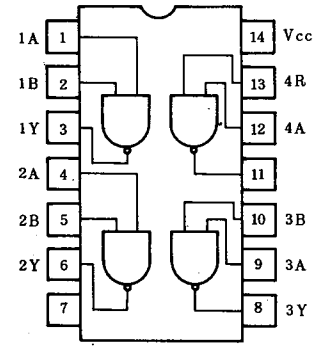
7416



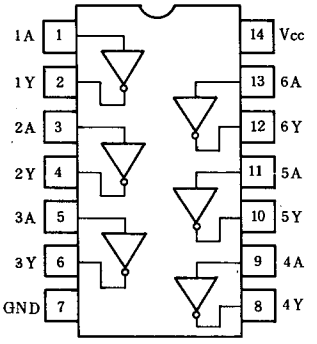
7404



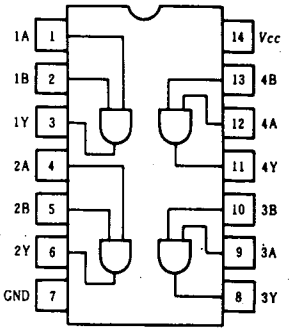
LS00



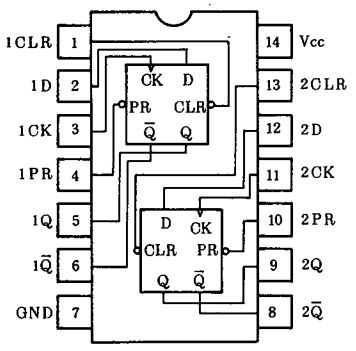
LS04
LS05



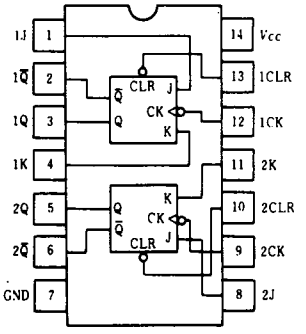
LS08



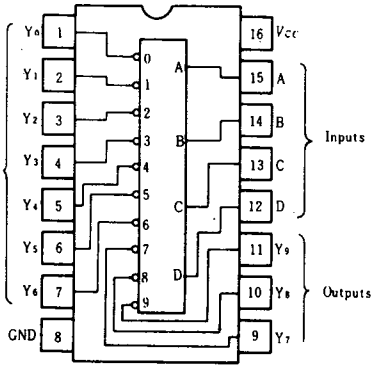
LS74



LS107



LS145



12. Disassembly

Disassemble JR-200U in the following manner with care not to damage the cabinet.

1) Place the JR-200U up side down.
2) Remove 6 screws from the lower case.
3) Remove the upper case from the lower case while pushing 2 points as indicated.
   Be careful not to damage the multi lead connecting the keyboard and the main P.C.B.
4) Pull the LED out of the upper case.
5) Remove the speaker from the upper case after removing 2 screws.
6) Clear six spurs, and remove the keyboard panel from the upper case.
7) Remove nine screws fastening the shield case (B) and remove the shield case B.
8) Remove the connector from the power transformer to the main P.C.B., four screws fastening the power transformer and two screws fastening the noise filter, and remove the power supply assembly.

Fig. 1

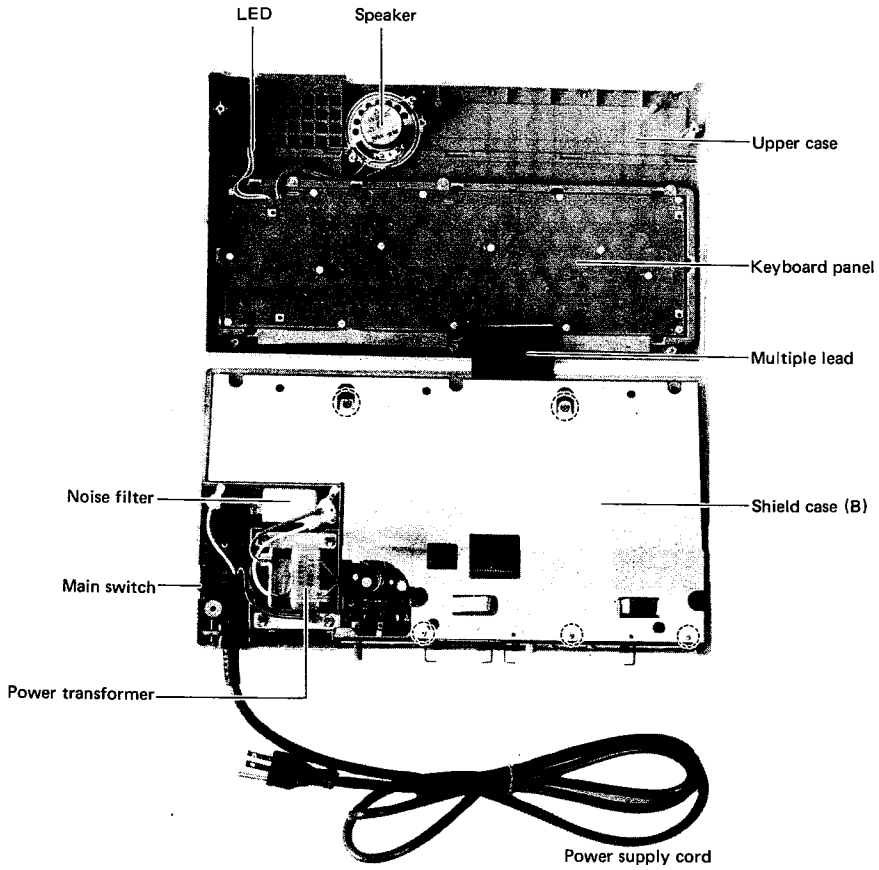


Fig. 2

13. Exploded View

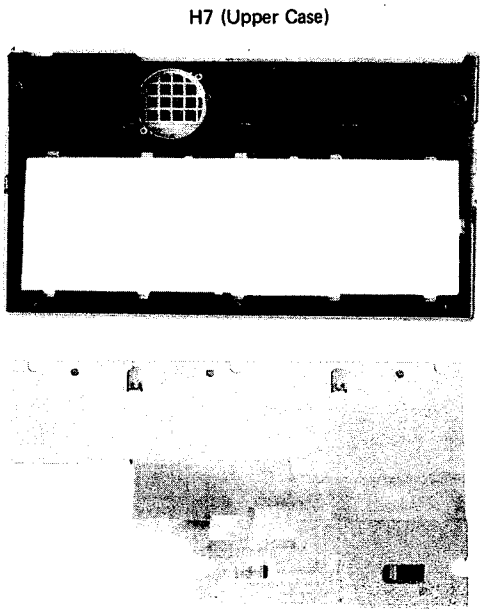


Fig. 1

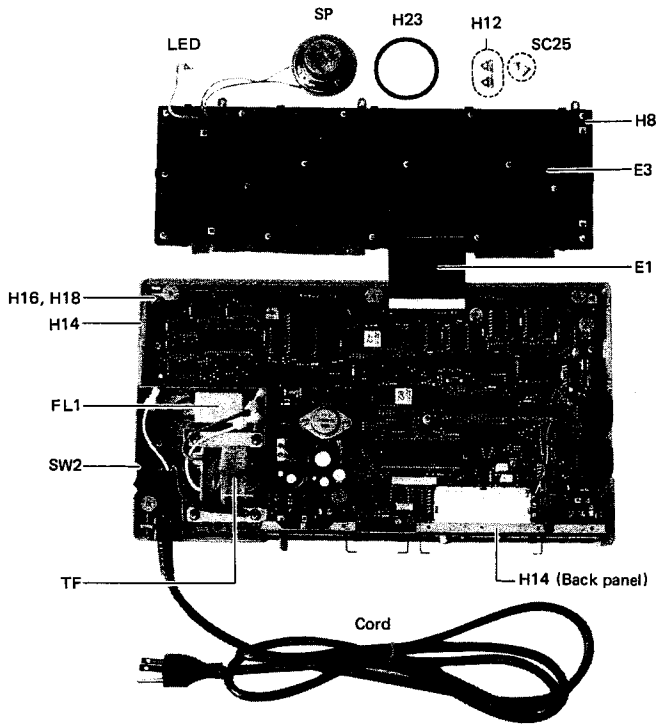


Fig. 2

● Accessories

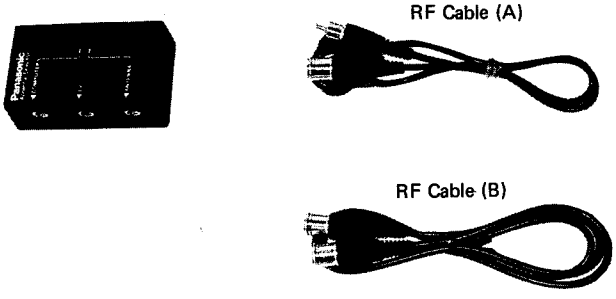
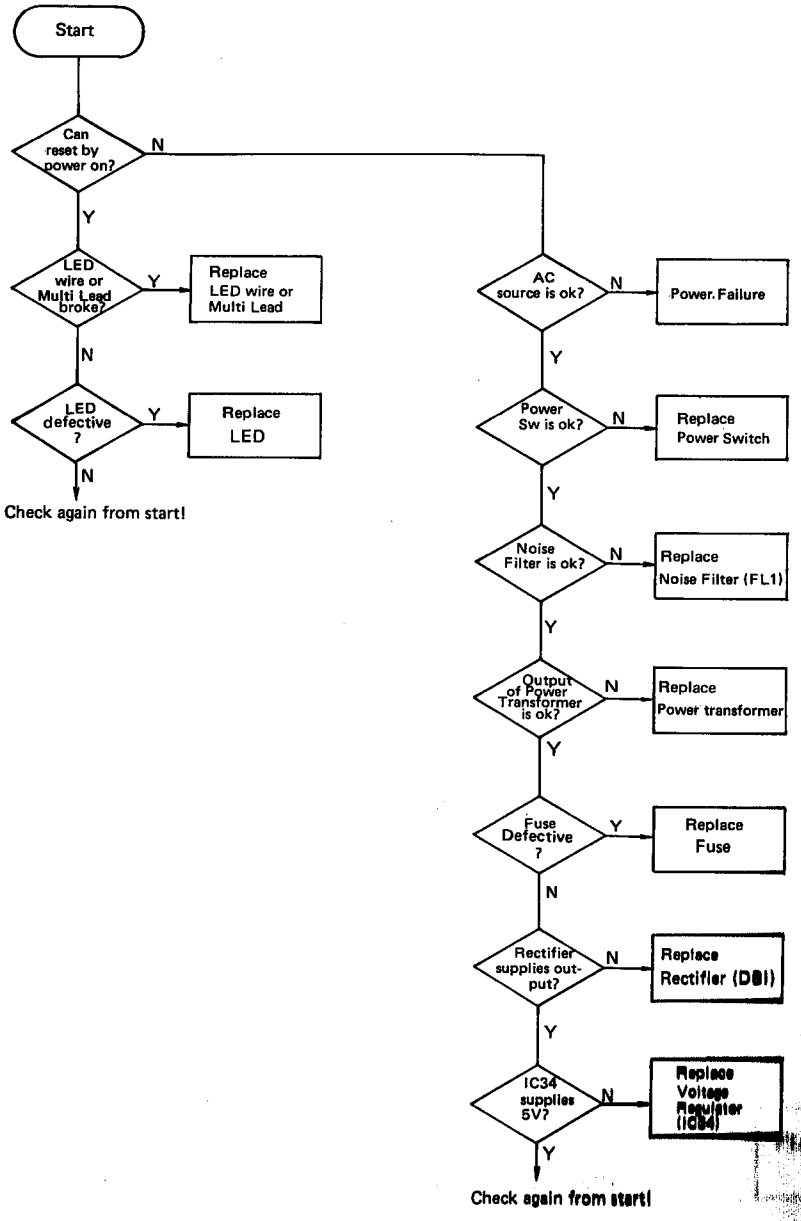


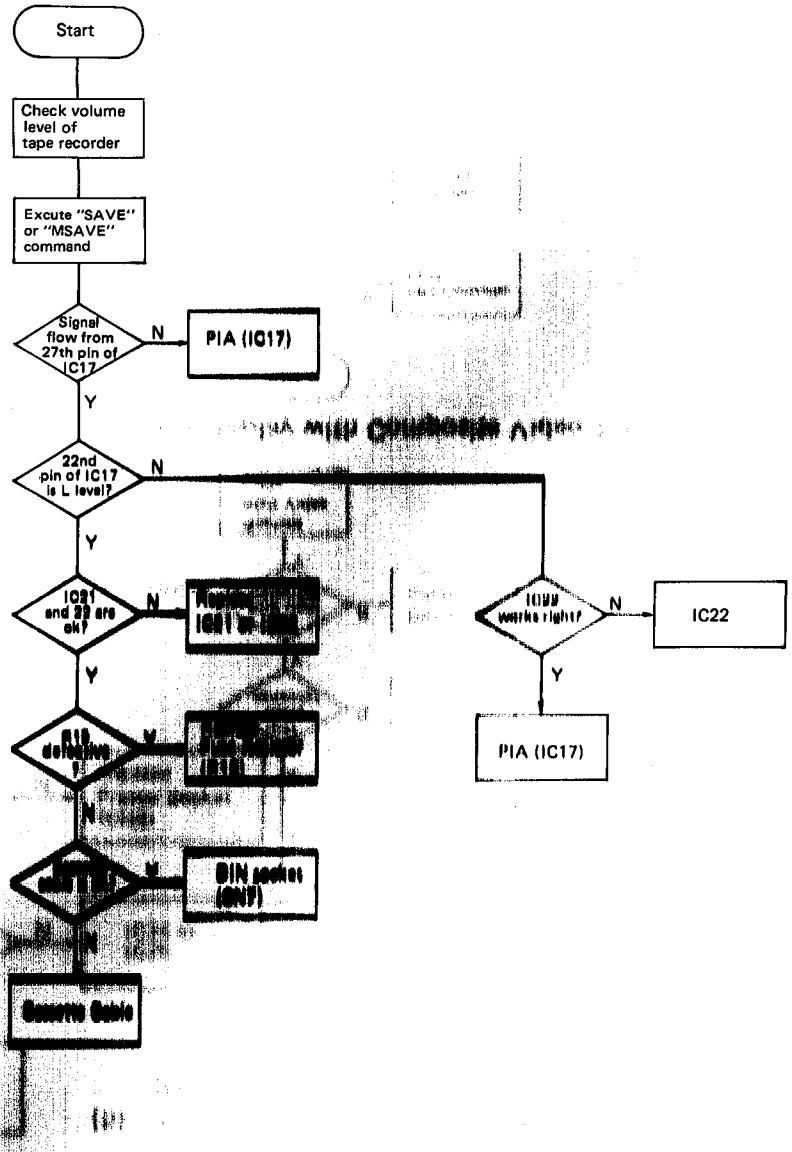
Fig. 3

14. Troubleshooting

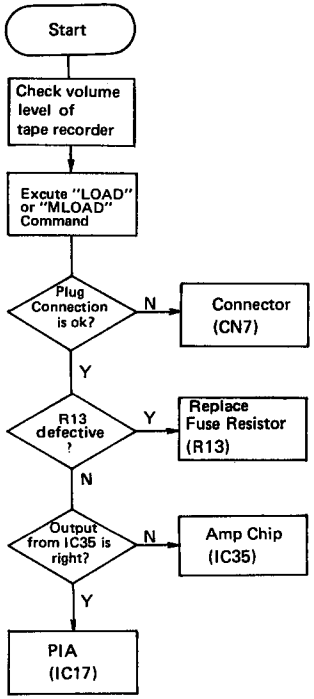
(1) Power Indicator Does Not Light Up



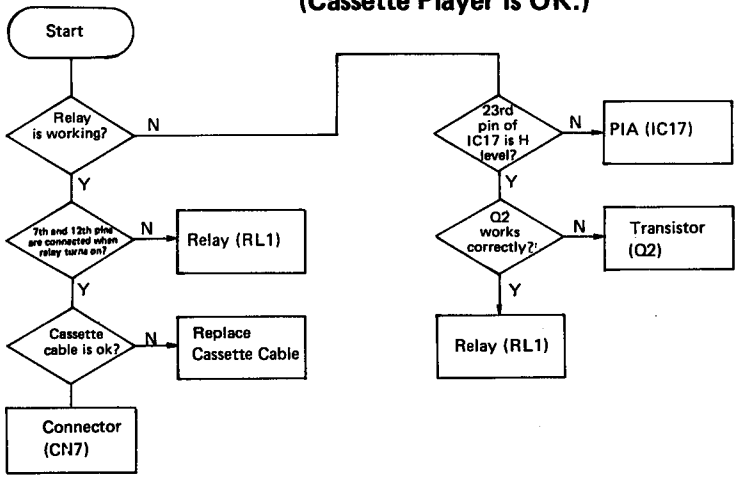
(2) Can't SAVE or MSAVE (Cassette Player is OK.)



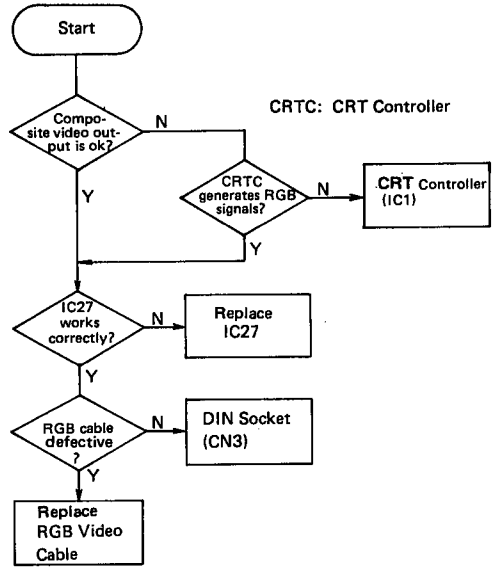
(3) Can't LOAD or MLOAD (Cassette Player is OK.)



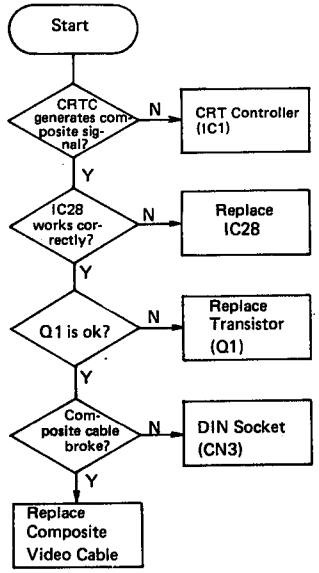
(4) Remote Control of Cassette Player Won't Work (Cassette Player is OK.)



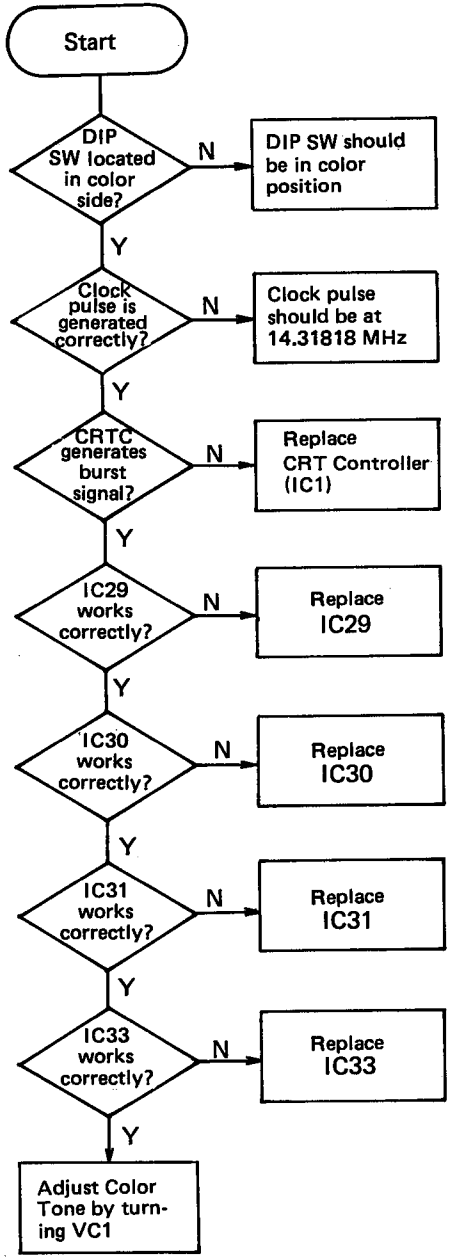
(5) No Display with RGB Video Terminal (RGB Monitor is OK.)



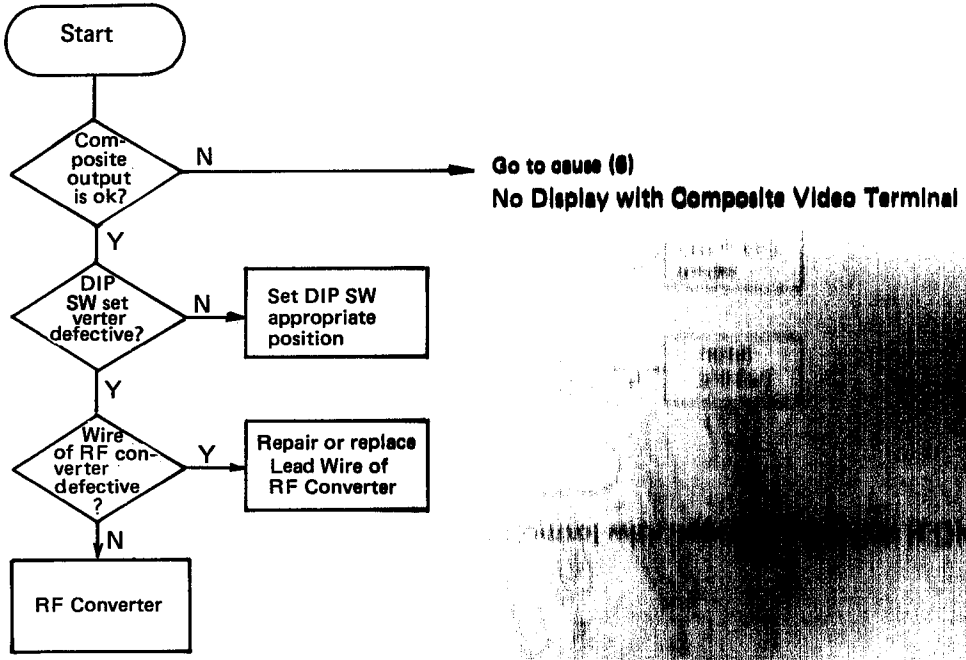
(6) No Display with Composite Video Terminal (TV is OK.)



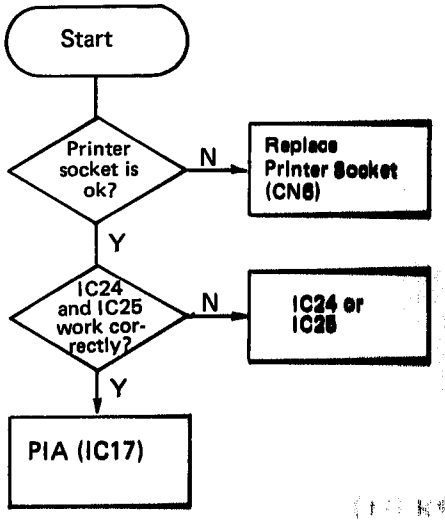
(7) No-Color Display with Composite Video Terminal (TV is OK)



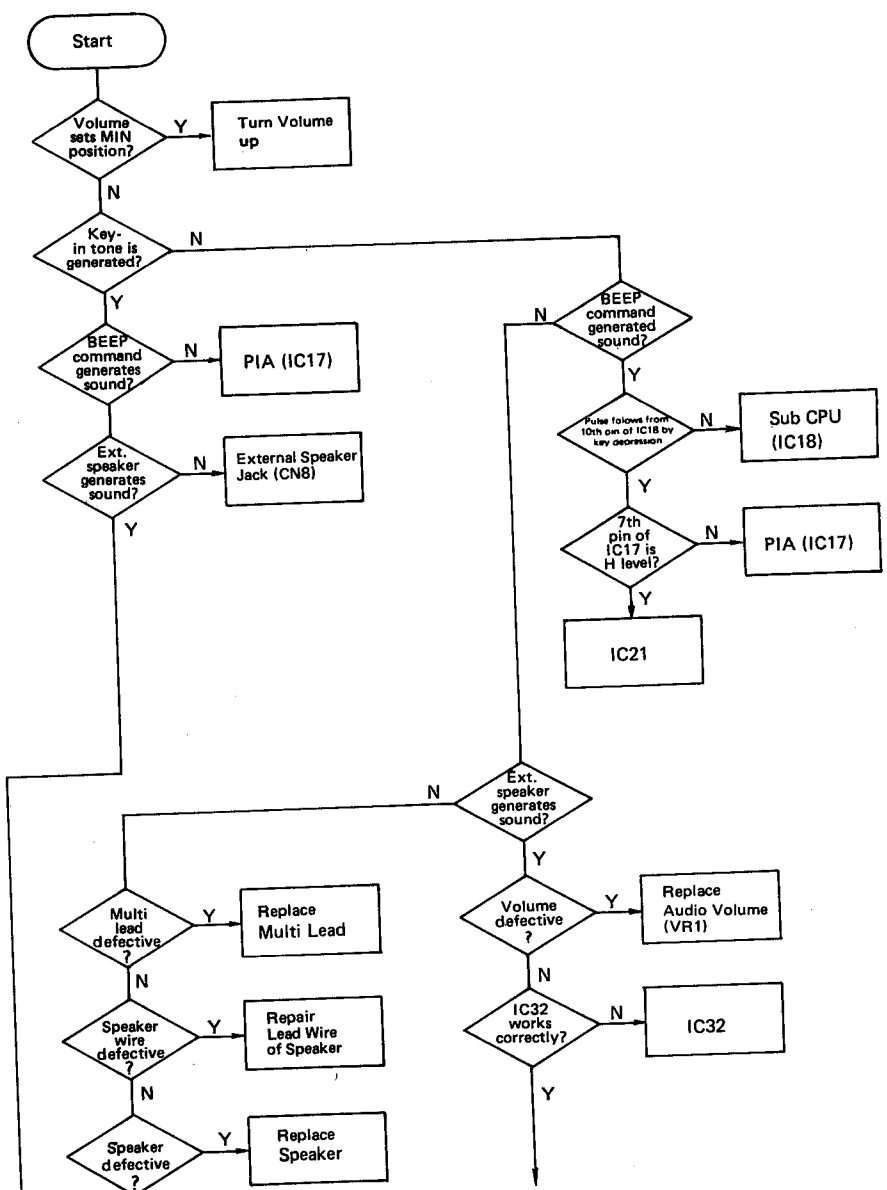
(8) No Display with RF Terminal (TV is OK.)



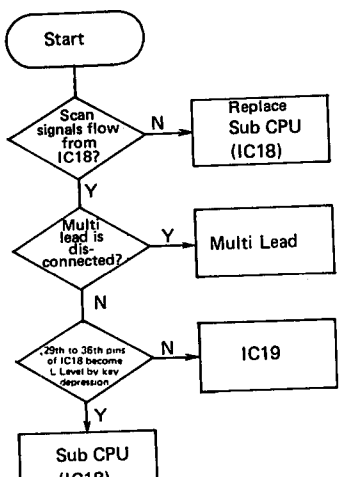
(9) Printer Won't Print (Printer is OK.)



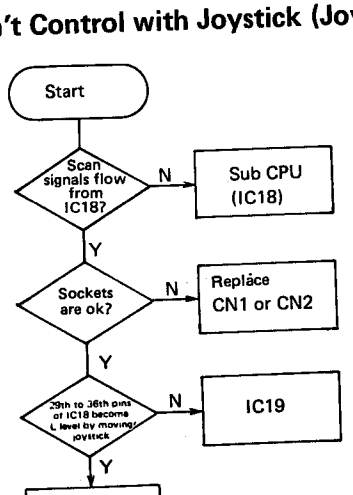
(10) Sound is Not Generated

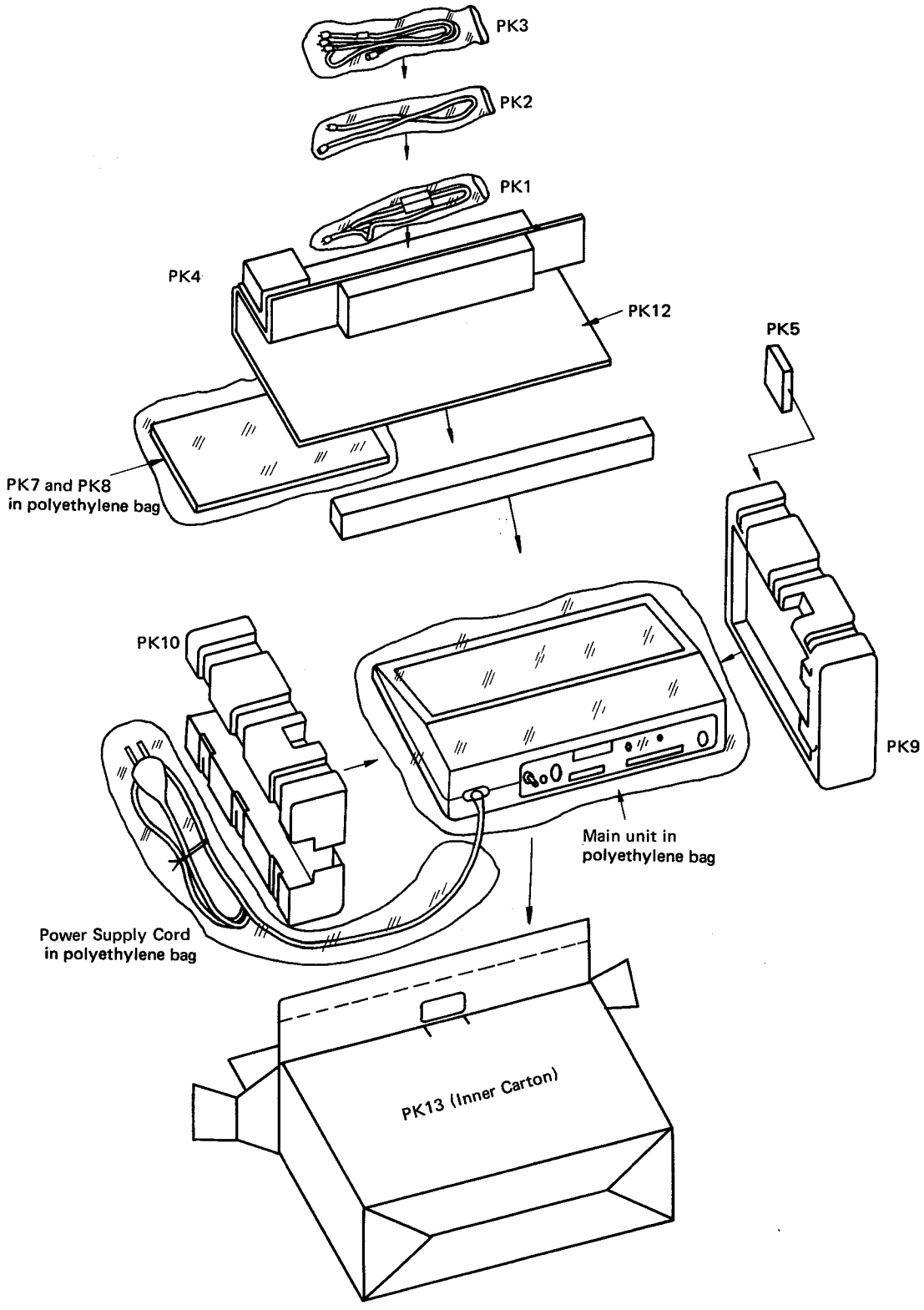


(11) Key Won't Make



(12) Can't Control with Joystick (Joystick is OK)

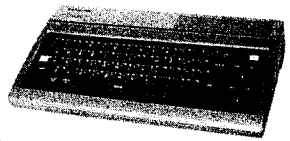




16. Replacement Parts List

Model: JR-200U

Note:
* When ordering replacement parts, indicate Part No. and Name of Part.
* ⚠ Indicates that only parts specified by the manufactures be used for replacement in critical circuits.



Ref. No.		Part No.	Part Name & Descriptions			Pcs/Set	Remarks
MAIN CIRCUIT BOARD & KEYBOARD							
IC2		MN1800A	Main CPU			1	
IC18		MN1544CJR	Keyboard Controller (Sub CPU)			1	
IC4		MN4864CA2	ROM (8KB)			1	
IC5		MN4864CB2	ROM (8KB)			1	
IC8–11		YLHSHM4864P3	Dynamic RAM (64 K bits)			4	
IC6, 7		YLHSHM6116P3	Static RAM (2KB)			2	
IC17		MN1271	I/O Controller (PIA)			1	
IC1C		YLHSD61K201F	CRT Controller			1	
IC23		DN74LS00	TTL IC			1	
IC22, 28, 24–26		DN74LS04	TTL IC			5	
IC20		DN74LS05	TTL IC			1	
IC21, 29		DN74LS08	TTL IC			2	
IC30		DN74LS74A	TTL IC			1	
IC31		DN74LS107	TTL IC			1	
IC19		DN74LS145	TTL IC			1	
IC33		YLHSH74LS151	TTL IC			1	
IC12, 13		DN74LS157	TTL IC			2	
IC3		YLHSH74LS245	TTL IC			1	
IC14, 15		DN74LS367A	TTL IC			2	
IC16		YLHSHD7404P	TTL IC			1	
IC27		YLHSHD7416P	TTL IC			1	
IC32		AN7117	Power Amplifier			1	
IC35		AN6914	Comparator			1	
IC34		YLHSI 8053B	IC (Voltage Regulator)			1	
Q1, 2		2SD636	Transistor			2	
D1–3		YLUD1S2473T	Diode			3	
D4		YLUD10E1T	Diode			1	
X1		EYXBD146S20	Crystal (14.31818 MHz)			1	
RL1		AG2019	DS Relay			1	
E1		YLWJL222X70	Multi Lead			1	
SW1		YLSSJS874703	Dip Switch 3p			1	
R37		ERD25TJ750T	Resistor	1/4 W	75 ohm	1	
R23, 24		ERD25TJ101T	Resistor	1/4 W	100 ohm	2	
R7, 22		ERD25TJ151T	Resistor	1/4 W	150 ohm	2	
R38,43,44 47		ERD25TJ331T	Resistor	1/4 W	330 ohm	4	
R32		ERD25TJ471T	Resistor	1/4 W	470 ohm	1	
R18, 36		ERD25TJ561T	Resistor	1/4 W	560 ohm	2	
R35		ERD25TJ681T	Resistor	1/4 W	680 ohm	1	
R17, 31		ERD25TJ102T	Resistor	1/4 W	1 k	2	
R27, 30		ERD25TJ122T	Resistor	1/4 W	1.2 k	2	
R4		ERD25TJ152T	Resistor	1/4 W	1.5 k	1	
R5,33,38		ERD25TJ222T	Resistor	1/4 W	2.2 k	3	
R28		ERD25TJ242T	Resistor	1/4 W	2.4 k	1	

Ref. No.		Part No.	Part Name & Descriptions			Pcs/Set	Remarks
R16, 29 19–21,40		ERD25TJ472T	Resistor	1/4 W	4.7 k	6	
R14		ERD25TJ562T	Resistor	1/4 W	5.6 k	1	
R1–3, 6, 9–12, 15, 24–26		ERD25TJ103T	Resistor	1/4 W	10 k	11	
R8		ERD25TJ473T	Resistor	1/4 W	47 k	1	
R39		ERD25TJ224T	Resistor	1/4 W	220 k	1	
R15		ERD2FCG680P	Fuse Resistor	1/4 W	68 ohm	1	
R13		ERQ12HJ151P	Fuse Resistor	1/2 W	150 ohm	1	
VR1		EVJEAAE03B14	Variable Resistor	10 k		1	
RA1		EXBP85103K	Resistor Array	10 k	X 5	1	
RA2		EXBP85331K	Resistor Array	330	X 5	1	
C31		ECEA1HS2R2	Electrolytic Capacitor	50 V	2.2	1	
C38		ECEA1HS471	Electrolytic Capacitor	50 V	470	1	
C1, 35		ECEA1AS330	Electrolytic Capacitor	10 V	33	2	
C32,34,41		ECEA1AS101	Electrolytic Capacitor	10 V	100	3	
C33		ECEA1AS331	Electrolytic Capacitor	10 V	330	1	
C36		ECEA1AS471	Electrolytic Capacitor	10 V	470	1	
C37		ECEA1AS102	Electrolytic Capacitor	10 V	1000	1	
C27		YLCQMS05103K	Polyester Capacitor	50 V	0.01 μ	1	
C17		ECBT1H270JC	Ceramic Capacitor	50 V	27 P	1	
C22, 33		ECBT1H390K	Ceramic Capacitor	50 V	39 P	2	
C54–56		ECBT1H101KB	Ceramic Capacitor	50 V	100 P		
C11		ECBT1H151KB	Ceramic Capacitor	50 V	150 P	1	
C44		ECBT1H391KB	Ceramic Capacitor	50 V	390 P	1	
C16		ECCW1H221JC	Ceramic Capacitor	50 V	220 P	1	
C18		ECCW1H331JL	Ceramic Capacitor	50 V	330 P	1	
C28, 43		ECBT1H561KB	Ceramic Capacitor	50 V	560 P	2	
C45–52		ECKF1H331KB	Ceramic Capacitor	50 V	1000 P	8	
C39		ECKW1H103KB	Ceramic Capacitor	50 V	0.01 μ	1	
C2–10,20, 12–15,22, 23–26		ECBT1C223ND	Ceramic Capacitor	16 V	22000 P	22	
C57		ECBT1H221KB	Ceramic Capacitor	50V	220 P	1	
VC1		ECV1ZW40X53T	Variable Capacitor		40 P	1	
VC2		ECV12W20X53T	Variable Capacitor		20 P	1	
RFC		YLBX45000600	RF Converter (American CH.)			1	
CN8		YLQJSQ3096	Pin Jack (for Ext. Speaker)			1	
CN5		YLQP5001120N	Connector 50 P (for Expansion)			1	
CN6		YLQP1601120N	Connector 16 P (for Printer)			1	
CN1, 2		YLQQA2074561	Connector 9 P (for Joysticks)			2	
CN3, 7		YLQRTCS4480	Connector 8 P (DIN Jack)			2	
CN9		YLQPWP3002	Connector (F) 2 P (Power Supply)			1	
CN9		YLQRWA5002	Connector (M) 2 P (Power Supply)			1	
CN9		YLQRWT0502	Connector Terminal (for above)			2	
CN10		EMCS1252M	Connector 12 P (for RS232C Card)			1	
DB1		YLUDS2VB10	Rectifier			1	
FL2		YLPFNDSS310	Noise Filter			1	
FL3		YLPFNXM9V	Low Pass Filter			1	
FL4–7		YLPFNDSB271M	EMI Filter			4	
L1, 2		ELQS470KB	Coil			2	
L3		YLPCSR02025	Coil			1	
L10		YLPCFL9H102J	Coil			1	
L4–9		YLPCEMCB3	Coil			6	

Ref. No.		Part No.	Part Name & Descriptions	Pcs/Set	Remarks
E2		YLPS45B00100	Shield Plate Ass'y (including feed through capacitors)	1	
E3		YLPRK0010800	Keyboard P.W.B.	1	
LED		LN819RP	LED	1	
SP		EAS5P13S	Speaker	1	
			POWER SUPPLY ASS'Y		
TF	⚠	YLPTIT322	Power Transformer (120 V)	1	
FUSE		YLPTITSC1	Fuse 125 V 1.0 A	1	
PS1		YLPHSN5053	Fuse Holder	2	
PS2	⚠	YLQTG0003300	Solderless Terminal	1	
CORD		YLBWR5956	Power Supply Cord	1	
SW2	⚠	YLSVWK2A44	Power Switch	1	
FL1	⚠	YLPFNMC2020	Noise Filter	1	
			HOUSING		
H1		YLLIA0077500	Supply Panel	1	
H2		YLLIG0010700	FCC Label	1	
H3		YLLIG0010900	Caution Label	1	
H4		YLMC45B34200	Lower Case Ass'y	1	
H5		YLLIH0017900	Switch Label	1	
H6		YLLIH0018000	Joy Stick Label	1	
H7		YLMC45A50300	Upper Case Ass'y	1	
H8		YLMCG0056600	Keyboard Panel	1	
H9		YLQTF0022500	Contact Rubber (1)	1	
H10		YLQTF0022600	Contact Rubber (2)	1	
H11		YLQTF0022700	Contact Rubber (3)	1	
H12		YLQTF0020500	Contact Rubber (4)	1	
H13		YLPSB0000400	Shield Sheet (for keyboard panel)	1	
H14		YLMCG0056700	Back Panel	1	
H15		YLMIM0008200	Masking Plate	1	
H16		YLMCC0005700	Shield Case (A) (lower)	1	
H17		YLMCC0005800	Shield Case (B) (upper)	1	
H18		YLMCK0011000	Shield Case Sheet (lower)	1	
H19		YLMCM0035100	Connector Cover	2	
H20		YLMBE0002700	Connector Earth Plate	2	
H21		YLMUB0001900	Hold Plate (for power transformer)	2	
H22		YVN101SA005A	Speaker Holder	2	
H23		YLLXB0006800	Speaker Pad (1)	1	
SC1		XTB3+10JFX	Screw (for Cabinet)	6	
SC2		XTB3+8JFX	Screw (for Main P.C.B. and Noise filter)	9	
SC3		XTB4+20JFX	Screw (for Power Transformer)	4	
SC4		XYN26+C6FX	Screw (for Back Panel)	2	
SC5		XTB3+6JFX	Screw (for Speaker)	2	
SC6		YLLSA0003200	Screw (for Keyboard)	22	
SC7		XSB26+10FX	Screw (for Printer Connector & I/O Connector)	4	
SC8		XNG26H	Nut (for Printer Connector & I/O Connector)	4	
SC9		XTM26+6HFZ	Screw (for Masking Panel)	2	
SC10		XYN26+C5FN	Screw (for Shield Case)	3	
SC11		XSB+3FZ	Screw (for RF converter)	2	
			PACKING & ACCESSORIES		
PK1		YLBWR492800	RF Cable (A)	1	
PK2		YLBWR492900	RF Cable (B)	1	
PK3		YLBWCAST	Audio Cassette Cable	1	
PK4		YLSSJR200U	Antenna Selector	1	

Ref. No.		Part No.	Part Name & Descriptions	Pcs/Set	Remarks
PK5		YLVTR0007400	Demonstration Cassette Tape	1	
PK6		TJB-525000	Antenna Plug	(1)	
PK7		YLMZH0009700	Warranty Card	1	
PK8		YLEX76003600	Operating Instructions	1	
PK9		YLMZC0116500	Inner Styrol (R)	1	
PK10		YLMZC0116600	Inner Styrol (L)	1	
PK11		YLMZC0119300	Styrol Pad	1	
PK12		YLMZC0116700	Inner Pad	1	
PK13		YLMZC0121600	Inner Carton	1	