KP 286 12MHz Mainboard

MORSE

User's Manual

KP 286 12MHz Mainboard

Operation and Technical Reference Manual

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Chapter I
Introduction

I - 1

Introduction

This manual covers all necessary information to operate the KP 286 12MHz system board. It will assist you in the installation and configuration of the system. By carefully following the steps described in this manual the user should be able to handle the system without additional help. The table of contents gives detailed information about the arrangement of this manual, and appendix D is a quick reference guide to the setup of your system.

The KP 286 12MHz is a fully PC/AT compatible system board implemented with a highly integrated chip set. It uses a reliable 80286-12 CPU, and the system speed can be either 6MHz or 12MHz selectable by hardware or software.

The system allows the user to run it at zero or one wait state. The table below shows the wait state choices with system speeds, and the evaluation of Landmark Speed Test, and SI Performance Test:

Wait State	Turbo / Normal Speed	System Speed	Landmark Speed Test Ver 0.99	Norton SI V4.0 Perform. Test Computing Ind.
0 W.S.	Turbo	12.0MHz	16.1MHz	15.1
	Normal	6.0MHz	7.8MHz	7.1
1 W.S.	Turbo	12.0MHz	12.0MHz	11.5
	Normal	6.0MHz	6.0MHz	5.7

Various sizes of memory can be installed on board, options include 512K, 640K, 1M, 2M or 4M bytes installed in the dual-purpose 34 pin sockets. It supports DOS Conventional memory, Expanded (EMS) memory, and Extended (running in protected mode) memory functions.

The system board can also support MS-DOS, PC-DOS, MS-OS/2, XENIX, Novell Networking and all IBM PC/AT compatible application programs.

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Specifications

I-2.1 Features

- Reliable, highly integrated, 80286-12 CPU running at 12MHz.
- TURBO/NORMAL system speed selectable by hardware or software.
- Hardware and software reset.
- Flexible memory size; 512K, 640K, 1M, 2M or 4M bytes available on board with parity check.
- Supports memory partition of 640K/384K, 640K/1408K and 640K/3456K with 1M, 2M and 4M Bytes on board memory respectively.
- Supports Conventional (DOS), Expanded (EMS) and Extended (Protected Mode) memory functions.
- Real time clock and calendar circuit.
- CMOS memory to maintain system configuration.
- Capable of addressing up to 16M bytes in the protected virtual address mode.
- Jumper selectable for one or zero wait state operation in both normal and turbo mode.
- 32KB ROM on board expandable to 64KB with 2 sockets.
- Supports 16 levels of hardware interrupts.
- Supports 7 DMA channels, three 16 bits and four 8 bits.
- 8 I/O expansion slots; five 16-bit and three 8-bit slots.
- Socket for optional 80287 math co-processor.
- LED indicator for POWER ON, TURBO mode and RESET.
- Two sets of mounting holes fit both standard AT and XT compatible chassis.
- Advanced BIOS with Set-up and Diagnostic programs.
- Supports multi-user or multi-tasking operating system such as Xenix, Unix, Novell and OS/2.

I-2.2 Power Supply Requirement

The system board is designed to use IBM PC/AT and XT compatible power supply, without any additional modification. The system board will automatically generate the AT power good signal if the XT power supply is correctly installed.

Voltage : +5V (±5%)
Current : 3.5 Amperes Maximum

I-2.3 Mechanical Specification

The system board can fit any XT, AT or compatible chassis, it has two sets of mounting holes.

Size : Length 33.1cm (13.03")
Width 22.0cm (8.66")
Height 2.5cm (0.98")

Weight : 653gm (1.61lb)

I-2.4 Environment

The KP 286 12MHz mainboard requires the following environmental conditions.

	Operation	Storage
Temperature	0°C to 45°C (32°F to 113°F)	-20°C to 50°C (-4°F to 122°F)
Humidity	10% to 95%	10% to 95%
Altitude (ft)	10K above sea level	20K above sea level

Chapter II
Hardware Installation

II - 1

Installation Guide

II-1.1 Peripherals Required

- KP 286 12MHz system board
- AT or XT compatible power supply
- Standard AT compatible keyboard
- Display card
- Monitor
- FDD (and HDD) controller
- Floppy (and hard) disk drive
- Any other XT/AT compatible equipment, such as serial port, parallel port, mouse, printer, plotter, faxcard, LANcard etc.

II-1.2 Installation Procedure

1. Check RAM and BIOS setting.
2. Select the wait state and system speed with jumpers and DIP switch.
3. Fix the motherboard to your case.
4. Connect the power supply connector to system board
5. Plug in keyboard, speaker, turbo switch, turbo LED, power LED, and keylock switch to their connectors.
6. Plug in the floppy disk drive and cables.
7. Plug in the disk drive and cable and the HDD LED indicator (optional).
8. Install display card.
9. Select display mode (mono/color).
10. Connect monitor cable to the display card.
11. Check all screws and make sure that all parts are properly fixed.
12. Switch on the monitor and the power supply.
13. Execute the setup program if your system is newly setup or has had any change of configuration.

II - 2

Location & Pin Assignment of Connectors, Jumpers, Switches etc.

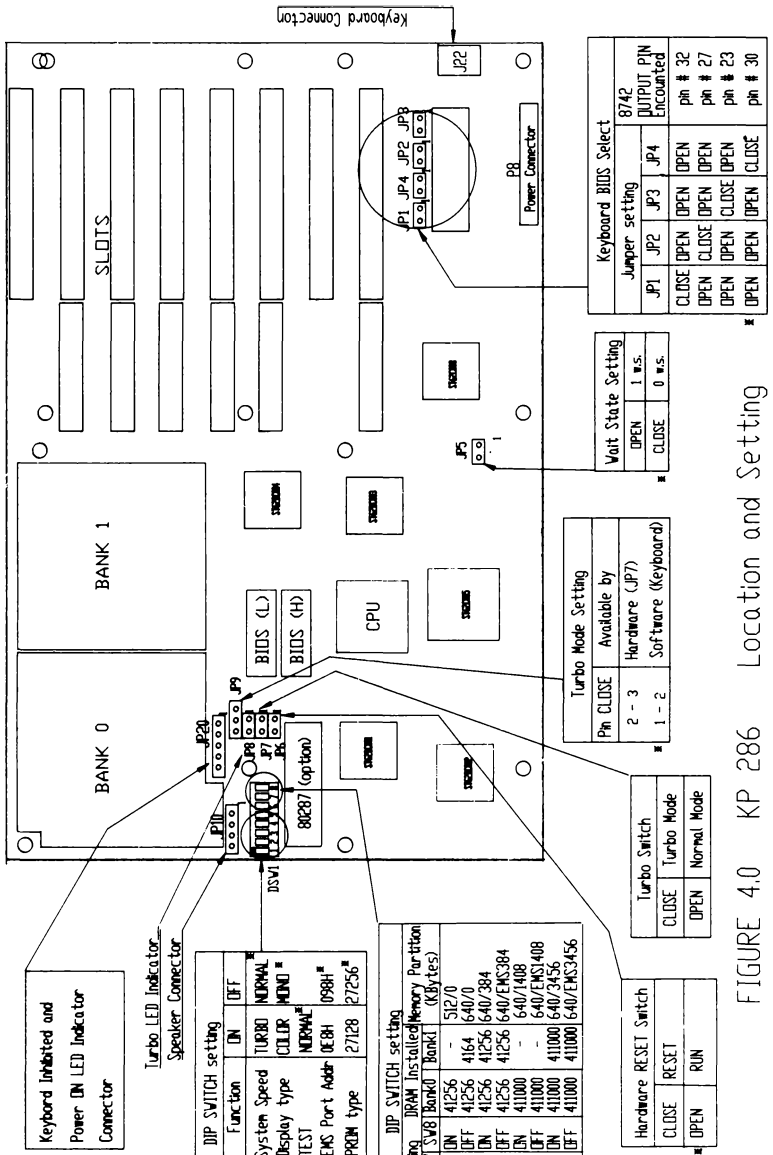

FIGURE 4.0 KP 286 Location and Setting

II-2.1 Hardware RESET Connector (JP6)

Pin	Description
1	Signal
2	GND

II-2.2 Turbo Switch Connector (JP7)

Pin	Description
1	Signal
2	GND

II-2.3 Turbo LED Indicator Connector (JP8)

Pin	Descriptio
1	Signal
2	GND

II-2.4 Speaker Connector (JP10)

Pin	Description
1	Signal
2	Not used
3	Not used
4	+5V (VCC)

II-2.5 Keyboard Inhibited and Power On LED Indicator Connector (JP20)

Pin	Description
1	Power on LED
2	Not used
3	GND
4	Keyboard inhibit
5	GND

II-2.6 Keyboard Connector (JP22)

Pin	Description
1	Keyboard clock
2	Keyboard data
3	Spare
4	Ground
5	+5V (DC)

II-2.7 Power Supply Connector (P8)

There is a 12-pin male connector linking the mainboard to the power supply.

Pin	Description
1	Power good
2	+5V DC
3	+12V DC
4	−12V DC
5	Ground
6	Ground
7	Ground
8	Ground
9	−5V DC
10	+5V DC
11	+5V DC
12	+5V DC

II-2.8 DIP Switch Pin Assignment (DSW1)

SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Off	Off	On	Off	Off	On	Off	On

SW1 : System speed select
SW2 : Display mode select
SW3 : Test (factory use only)
SW4 : EMS port address
SW5 : BIOS ROM select
SW6 : On board RAM type and memory partition
SW7 : On board RAM type and memory partition
SW8 : On board RAM type and memory partition

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Jumpers and Switch Setting

When setting jumpers & switches remember that on the KP 286 12MHz, Pin 1 is the first pin on the right. See printed pin labels on board.

II-3.1 Keyboard BIOS Select (JP1, JP2, JP3, JP4)

These jumpers are used to select the OUTPUT PIN of the keyboard BIOS (8742). This OUTPUT PIN is used to control the 'TURBO Mode' switching.

The default setting of the 8742 OUTPUT PIN was 'Pin # 30'. This pin matches the AMI BIOS on 8742. Users are reminded not to change the setting, unless they change the BIOS. Please refer to your BIOS vendor for expected OUTPUT PIN.

Jumper Setting				8742 Turbo Control Output Pin Encounted
JP1	JP2	JP3	JP4	
Close	Open	Open	Open	Pin # 32
Open	Close	Open	Open	Pin # 27
Open	Open	Close	Open	Pin # 23
*Open	Open	Open	Close	Pin # 30

II-3.2 Wait State Setting (JP5)

Jumper JP5	Setting	Wait State
Pin 1 - 2	Open	Zero
	Close	One

II-3.3 Setting the System Speed and Wait State

The system speed can be set at either NORMAL (6MHz) or TURBO (12MHz) speed by hardware (Jumper JP7) or software (Keyboard).

The jumper (JP7) is usually connected to a button switch on the front pannel by wires, the user just pushes the button to switch between TURBO and NORMAL mode. The TURBO LED indicator lights up during TURBO mode. TURBO mode means faster system speed and NORMAL mode is the slower system speed.

II-3.3.1 Setting by Hardware

JP9	JP7	System Speed	Mode
Pin 2 - 3 Set Close	Close	High speed (12MHz)	Turbo
	Open	Low speed (6MHz)	Normal

Note: DIP Switch (DSW1) SW1 default setting is OFF, this will enable JP7 to switch system speed.

II-3.3.2 Setting System Speed by Software

1) Jumper JP9 Pin 1 & Pin 2 set CLOSE to select Keyboard setting
2) Press 'Ctrl' + 'Alt' + '+' for NORMAL mode
   and 'Ctrl' + 'Alt' + '-' for TURBO mode

II-3.3.3 Examples of Setting System Speed in Different Manner

Example 1.
How to set your PC for the highest system speed ?
The board can be set up for TURBO mode (12MHz) with a 0 wait state by:

Step 1 Jumper JP7 CLOSE for full speed (12MHz)

Step 2 Set jumper JP5 CLOSE for 0 wait state

Example 2.
How to switch between TURBO and NORMAL modes:

Step 1 Set the system at TURBO mode (refer to example 1)

Step 2 The speed can now be switched by hardware or software:

a) Set by hardware switch:
Set jumper JP7 OPEN (or push the button of the front pannel), to switch the system from TURBO to NORMAL mode.

or

b) Set by software switch:
Press the following key combinations to switch:
'Ctrl' + 'Alt' + '−' for NORMAL mode
and 'Ctrl' + 'Alt' + '+' for TURBO mode

II-3.3.4 System RESET (JP6 & Keyboard)

There are two ways to warm start the system: The software RESET, by pressing Ctrl-Alt-Del keys at once, and the hardware RESET, by setting jumper (JP6) to CLOSE.

RESET by	Media	Set/Pressing
Hardware	Jumper (JP6)	Close
Software	Keyboard	'CTRL-ALT-DEL'

Note: Jumper (JP6) is usually connected to a button switch on the front pannel by wires, user just pushes the button to RESET.

II-3.3.5 Display Mode Setting (DSW1-SW2)

DIP Switch		Description
DSW1-SW2	Off	Mono
	On	Color

II-3.3.6 Mono (Color) Fine Tuning (VC1)

This variable capacitor is used to adjust the color of video mode by delivering the correct frequency to the color display card. The user may use a screw driver to tune the displayed colors with the VC1.

II-3.3.7 PROM Type Select (DSW1-SW5)

DSW1-SW5 Setting	PROM Type Installed
On	27128
Off	27256

II-3.3.8 Keylock Function (JP20)

Jumper (JP20) Set		Function
Pin 4 & Pin 5	Close	Keyboard inhibit
	Open	Keyboard functioning

Note: a) Connector JP20 has two functions: the keyboard inhibited (Pin 4 & Pin 5) and power on LED indicator (Pin 1 & Pin 3), usually connected to the front panel by wires.

b) Insert key and turn the keyboard switch to control the keyboard inhibit function.

II-3.3.9 Setting the On Board RAM Bank and Memory Partition (DSW1-SW6,7,8)

KP 286 12MHz system board was designed to support on board memory of up to 4M bytes, with 512K, 640K, 1M, 2M or 4M bytes installed in the dual-purpose 34-pin sockets. The RAM bank can be partitioned into various configurations. These are 512/0, 640/0, 640/384, 640/EMS384, 640/1048, 640/EMD1048, 640/3456, 640/EMS3456. It supports DOS Conventional memory, Expanded (EMS) memory, and Extended (running in protected mode) memory functions.

The DOS Conventional Memory is a linear memory which can be recognized by DOS. The Extended Memory is also a linear memory, but it is possible to run in protected mode from 1M to 16M. The Expanded Memory is a "paged" memory mode, designed to support EMS.

There are 3 switches designed to set the on board RAM bank and memory partition.

Setting			DRAM Installed		Memory Partition	Memory Location	Total On Board Memory
SW6	SW7	SW8	Bank0	Bank1	(KBytes)		
On	On	On	41256	—	3512/0	0-7FFFF	512K
On	On	Off	41256	4164	640/0	0-9FFFF	640K
On	Off	On	41256	41256	640/384	0-9FFFF 10000-15FFFF	1M
On	Off	Off	41256	41256	640/EMS384 (16Kx24Page)	0-9FFFF	1M
Off	On	On	411000	—	3640/1408	0-9FFFF 10000-25FFFF	2M
Off	On	Off	411000	—	3640/EMS1408 (16Kx88Page)	0-9FFFF	2M
Off	Off	On	411000	411000	640/3456	0-9FFFF 10000-45FFFF	4M
Off	Off	Off	411000	411000	640/EMS3456 (16Kx216Page)	0-9FFFF	4M

Make sure that the CMOS RAM configuration matches this memory selection. (III-1 of Chapter III describes CMOS setup in detail)

II-3.3.10 Setting the EMS Port Address

The default setting for this PIN is OFF, setting the address at 98H. Usually the user is reminded not to change this setting. In the case (nearly impossible) there is any add-on card which conflicts with this address, you may change the setting to ON for the next address.

DSW1-SW4 Setting	Location
On	E8H
Off	98H

Chapter III

Software Setup

III - 1

Real Time Clock and CMOS RAM Setup

The system board contains user modifiable system configuration information in a CMOS RAM. This power conserving RAM is battery-backed up so that it retains the configuration setup information even when the computer's power is switched off. Thus, when power is switched on, configuration information is immediately available to the BIOS and the operating system. The SETUP program allows the user to change the configuration information stored in the CMOS RAM to match the configuration of the system.

The BIOS executes the Power On Self Test <POST> when the power is turned on, it will give an error message if the test results fail to match the configuration identified in the CMOS RAM. The SETUP program may then be used to modify the contents of the CMOS RAM so that it matches the system configuration. The CMOS RAM stores the eight bits of information listed below:

Bit	Status
7	Lost power
6	Check sum
5	Power on check sum
4	Memory size compare
3	Fixed disk compare
2	Time status
1	Reserved
0	Reserved

Below is a step by step example to run the CMOS setup supported by the AMI BIOS:

III-1.1 Switch on the System,

screen shows:

```
286-BIOS (C)1987 AMI, for KP 286 12MHz Personal Computer


xxxxx KB OK
Press <ESC> To bypass MEMORY test


                    (C) American Megatrends Inc.,
                      SSUN-1216-092588-K0
```

III-1.2 To Enter the CMOS SETUP

III-1.2.1 If you want to bypass the memory test press <ESC>, otherwise wait for the system to complete the memory test, and screen appears as below. Press <DEL> to run CMOS SETUP.

```
286-BIOS (C)1987 AMI, for KP 286 12MHz Personal Computer


xxxxx KB OK
Press <DEL> If you want to run SETUP


                    (C) American Megatrends Inc.,
                      SSUN-1216-092588-K0
```

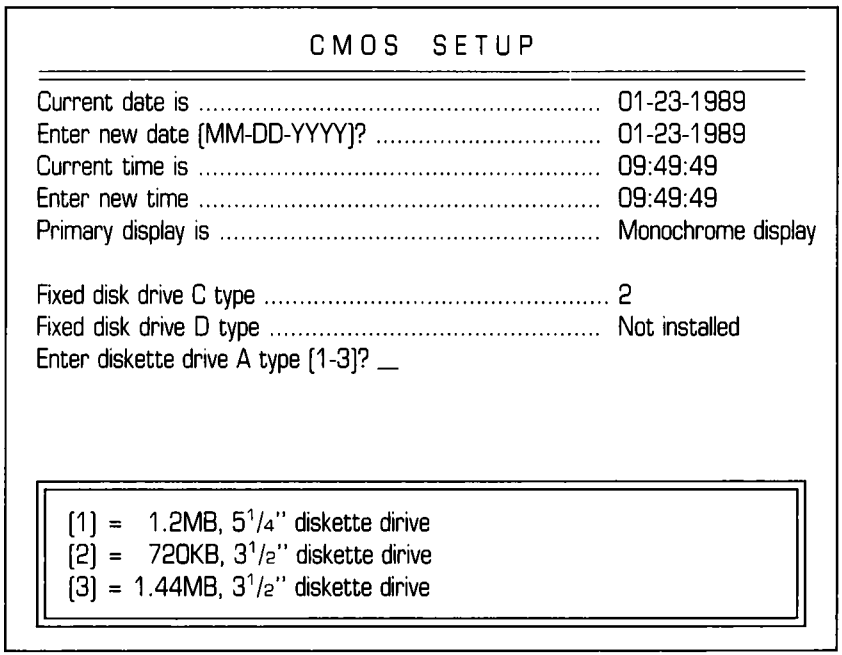
III-1.2.2 After a few seconds the system displays the test result, for example as shown below:

```
286-BIOS (C)1987 AMI, for KP 286 12MHz Personal Computer


xxxxx KB OK

CMOS display type mismatch
HDD controller failure

RUN SETUP UTILITY
Press <F1> to RESUME



                    (C) American Megatrends Inc.,
                    SSUN-1216-092588-K0
```

III-1.2.3 Press <F1> to run setup utility, screen shows:

```
                    Entering SYSTEM SETUP
                    Want to run SETUP (Y/N)?
```

III-1.2.4 Respond "Y", and type in the data required by the screen. Press <Enter> if the default data is correct. The bottom of the screen shows you options. Please refer to the example shown below:



III-1.3 Final Approval

After all entries have been completed, respond "Y" to "Are these options correct [Y/N]?". Otherwise respond 'N' to go back to step 2. Refer to the following example:

```
                    CMOS    SETUP
==========================================================
Current date is ................................ 01-23-1989
Enter new date [MM-DD-YYYY]? ................... 01-23-1989
Current time is ................................ 09:49:49
Enter new time ................................. 09:49:49
Primary display is ............................. Monochrome display


Fixed disk drive C type ........................ 1
Fixed disk drive D type ........................ Not installed
Diskette drive A is ............................ 1.2MB, 5¹/₄" drive
Diskette drive B is ............................ 360KB, 5¹/₄" drive
Base memory size is ............................ 640KB
Expansion memory size is ....................... 1408KB
Numeric processor .............................. Absent


Are these options correct [Y/N]? _
```

III-1.4 Respond "Y", and wait for the system to reboot. SETUP procedure is now complete.

III - 2

Example:

How to Preformat a Hard Disk with AMI BIOS

III-2.1 Switch on the System, screen shows:

```
286-BIOS (C)1987 AMI, for KP 286 12MHz Personal Computer MORSE
Personal Computer.

xxxxx KB OK

Press <ESC> To bypass MEMORY test


                (C) American Megatrends Inc.,
                SSUN-1216-092588-KO
```

III-2.2 To Enter the DIAGNOSTICS

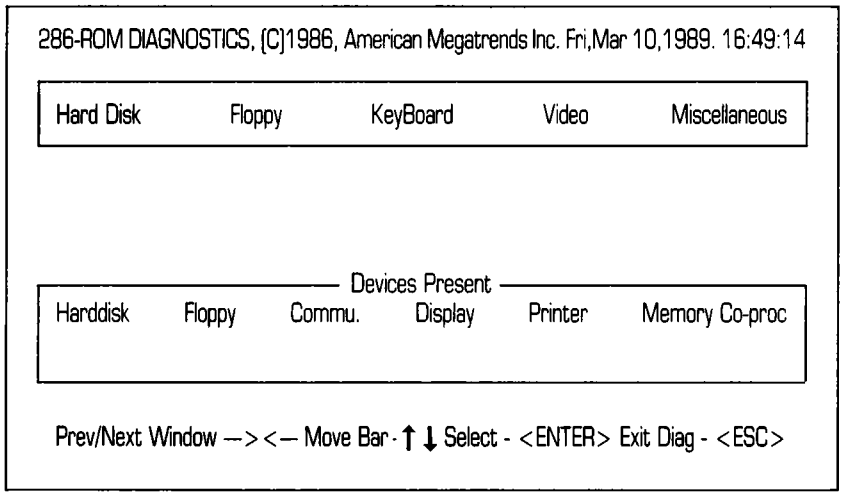
III-2.2.1 If you wish to bypass the memory test press <ESC>, otherwise wait for the system to complete the memory test, and the screen display shown below. Press <DEL> to run CMOS SETUP or DIAGS.

```
286-BIOS (C)1987 AMI, for KP 286 12MHz Personal Computer MORSE
Personal Computer.

xxxxx KB OK

Press <DEL> If you want to run SETUP or DIAGS


                (C) American Megatrends Inc.,
                SSUN-1216-092588-KO
```

III-2.2.2 The screen will show the following questions.

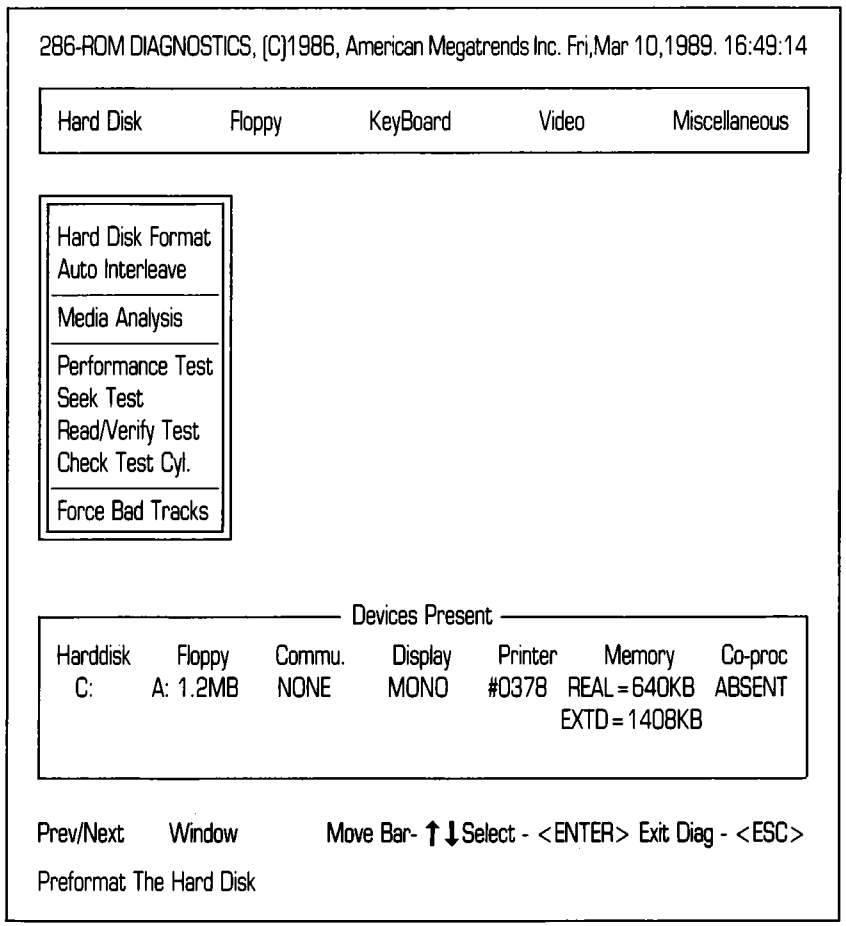
```
Entering SYSTEM SETUP

Want to run SETUP or DIAGS (Y/N)? Y

SETUP or DIAGS (1/2)? 2
```

III-2.2.3 After few seconds screen shows as follows. Select options, the Hard Disk Utility. The display should look like the chart shown below:



III-2.3 Execute the Diagnostic Program

The AMI utilities include support of hard disk, floppy, keyboard, video and miscellaneous. It provides an easy to operate screen-menu allowing the user to operate the program. Simply press "↑" or "↓" to move the highlight bar to select the option desired. The example below shows how to preformat a hard disk with 286-ROM DIAGNOSTICS.



III-2.4 Example to Preformat a 20MB (Type 2) Hard Disk.

III-2.4.1 Move highlight bar and press <ENTER> to select 'Hard Disk Format' (this means you will preformat the hard disk). Then type 'C' to select 'Disk Drive C:'. Press the "↑" or "↓" to move highlight bar for 'Disk Driver type' and hit <ENTER> to confirm.
Refer to the figures below:

Hard Dist Format	
Disk Drive [C/D]	? C
Disk Drive type	? 2
Interleave [1-6]	?
Mark Bad Tracks [Y/N]	?
Start cylinder number	?
End cylinder number	?
Start head number	?
End head number	?
Proceed [Y/N]	?

Type	Cyl.	Heads	W-pcomp	L-zone	Capacity
1	306	4	128	305	10 MB
2	615	4	300	615	21
3	615	6	300	615	31
4	940	8	512	940	63
5	940	5	512	940	47
6	615	4	FFFF	615	21
7	462	8	256	511	31
8	733	5	FFFF	733	31
9	900	15	FFFF	901	112
10	820	3	FFFF	820	21
11	855	5	FFFF	855	36
12	855	7	FFFF	855	50
13	306	8	128	319	21
14	733	7	FFFF	733	43
15	000	0	0000	000	00
16	612	4	0000	663	21

Move Bar- Select-↑↓ <RET> Quit- <ESC>

III-2.4.2 The default interleave is 3:1, some higher performance HDD controllers such as the 'KP-2000' have a higher data transfer rate and support interleave 2:1. Type "2" and press <ENTER> to change the interleave to 2:1.

Hard Disk Format	
Disk Drive [C/D]	? C
Disk Drive type	? 2
Interleave [1-16]	? 3
Mark Bad Tracks [Y/N]	?
Start cylinder number	?
End cylinder number	?
Start head number	?
End head number	?
Proceed [Y/N]	?

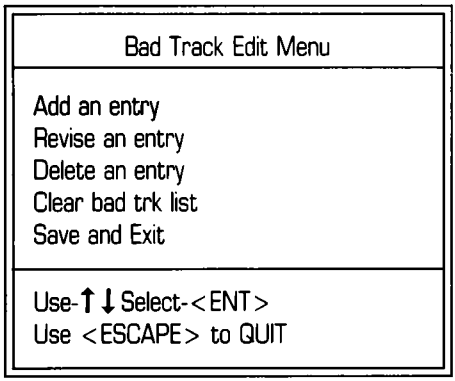
<-----Type "2" to change Interleave for 2:1

III-2.4.3 The cursor will then move to next item and the default value is given, press <ENTER> to confirm or type a new value to change. In this example we want to mark a bad track, you may skip to step III-2.4.4 if no values need to be changed. Below is the default value for the remaining items:

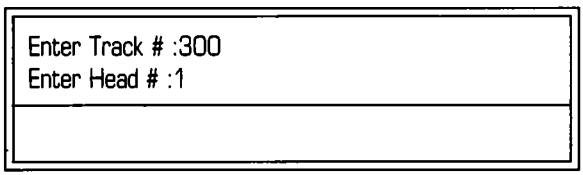
Hard Disk Format	
Disk Drive [C/D]	? C
Disk Drive type	? 2
Interleave [1-16]	? 2
Mark Bad Tracks [Y/N]	? N
Start cylinder number	? 0
End cylinder number	? 614
Start head number	? 0
End head number	? 3
Proceed [Y/N]	? N

<-------
<-----
<----- --------Press <ENTER> to confirm or new value to change.
<-----
<-------
<---------- Respond "Y" to continue or <ENTER> to cancel the format.

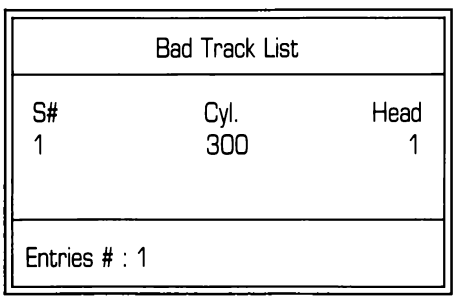
A. Respond "Y" to 'Mark Bad Track [Y/N] ?' screen shows the 'Bad Track Edit Menu' as follows:



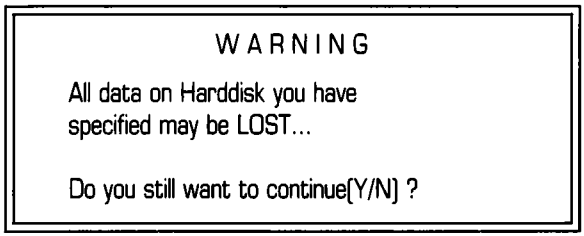
B. Move highlight bar and press <ENTER> to select 'Add an entry'. Key in the bad track and head number provided by the hard disk manufacturer. For example track 300 and head 1



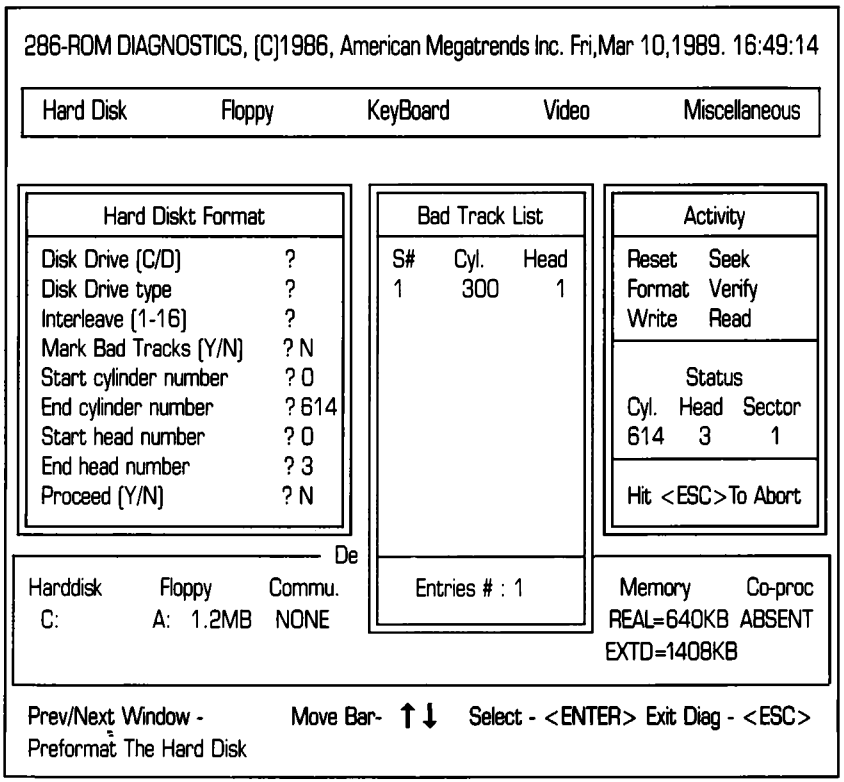
C. The system will automatically add this entry to the 'Bad Track List' as shown below, and return to step 4.3.1 menu. You may repeat the process or SAVE these entries by moving the highlight bar and press <ENTER> to confirm.



III-2.4.4 After all the BAD TRACK(S) have been entered, press <ENTER> to confirm the default value, and respond "Y" to 'Proceed [Y/N]' to continue.



III-2.4.5 Type "Y" to 'Do you still want to continue[Y/N] ?' to proceed to preformat. Screen shows as below. User may press <ESC> to abort preformat.



III-2.4.6 Screen shows status while preformat is in precess, user may Hit <ESC> to abort. When preformat complete screen shows:

III - 3

EMS Driver Setup

III-3.1 What Is EMS

The LIM Expanded Memory Specification (EMS) was created by Lotus Development Corporation, Intel Corporation, and Microsoft Corporation to use memory beyond DOS's 640K byte limit. It supports up to 32M bytes of expanded memory, and defines the software interface between the memory and the Expanded Memory Manager (EMM). Because the PC, XT, and AT (in real mode) can physically address only 1M byte of memory, they access expanded memory through a window in their physical address range.

There are many different application software packages supported by EMS, such as:

Lotus Symphony
Lotus 1-2-3 (Ver 2.0 or later)
Sidekick Plus
Framework II
SuperCalc 4
PC Tools (Rev r.11 or later)
DesqView

III-3.2 Example of Installing the EMS Driver Setup

We provide a diskette to install the EMS Driver Setup. Below is an example of installing the EMS Driver Setup:

A. Boot the system

Boot the system from drive A (DOS Diskette) or drive C (hard disk). This example uses a hard disk. Prompt appears:

```
C>
```

B. Copy files from the EMS Driver Setup Diskette

Insert the Setup Diskette in Drive A, and copy the SEMS.SYS file to the hard disk (root path), by typing:

```
C>copy a:SEMS.SYS <enter>
```

C: Create a boot up configuration file

This file will automatically install the EMS Driver when the system boots up. Type:

```
C>copy con: config.sys <enter>
device=sems.sys /M:xxx /P:xxxx /I:xxx <enter>
<^Z> <enter>

        1 File[s] copied

C>
```

where:

M:xxx : System memory size, default is 640KB
P:xxxx : EMS Physical page segment address, default automatic
I:xxx : EMS Port address, default E8H or 98H

D. Reboot the system to install the EMS software

The EMS will be automatically setup when system boots, the screen shows:

```
KP 286 12MHz EMS Driver Rev. 1.00
(C)Copywright SUN ELECTRONICS CORP. 1987
.....

EMS DRIVER INSTALL TOTAL PAGES:xxxx
EMS PAGE SEGMENT:xxxxH
EMS PORT ADDRESS:xxxxH

C>
```

III-3.3 Example: To create a file for installing a 384KB virtual disk and the EMS driver.

Create a configuration file as follow:

```
C>copy con: config.sys <enter>
device=sems.sys /M:xxx /P:xxxx /I:xxx <enter>
device=vd.sys/384/ <enter>
<^Z> <enter>
        1 File(s) copied
C>
```

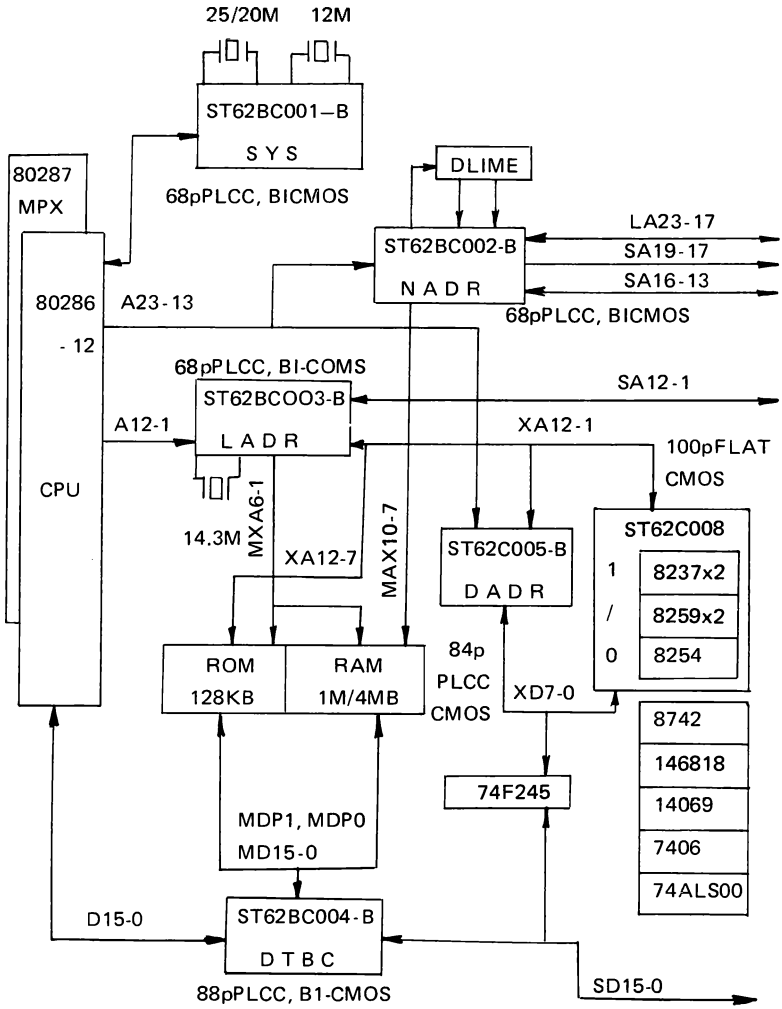
Chapter IV
Technical Reference

IV - 1

Microprocessor

The 80286-12 microprocessor is a 16-bit data pathing, 24-bit addressing microprocessor. It has four levels of memory protection in memory management. In real address mode (8086/8088 compatible), it supports one mega byte of continuous memory by generating a 20-bit physical address. In protected mode, it has one gigabyte of virtual address space per task mapped into a 16 megabyte physical address space.

IV-2.1 System Board Block Diagram



IV-2.2 System Memory Map

The system board contains up to four banks of dynamic RAM. The RAM is parity checked and will generate an NMI interrupt if a parity error occurs.

Address	Start - End	Name	Function
000000-07FFFF	000K-512K	Bank 0	System memory (512K)
080000-09FFFF	512K-640K	Bank 1	System memory (128K)
0A0000-0BFFFF	640K-768K	Video	Graphic buffer (128K)
0C0000-0DFFFF	768K-896K	I/O ROM	Expansion ROM (128K)
0E0000-0EFFFF	896K-960K	ROM	System usage (64K)
0F0000-0FFFFF	960K-1M	ROM	BIOS (64K)
100000-15FFFF	1M-1.375M	Bank 1	System memory (384K)
160000-FDFFFF	1.375M-15.875M	RAM	Expansion RAM (14.5M)
FE0000-FEFFFF	15.875M-15.9375M	ROM	System usage (64K)
FF0000-FFFFFF	15.9375M-16M	RIM	BIOS (64K)

IV-2.3 I/O Channel Map and Pin Assignments

SIGNAL		PIN	SLOTS	PIN	SIGNAL	
Ground		B1		A1	−I/O CH CK	(I)
Reset Drive	(O)	B2		A2	SD7	(I/O)
+5V DC		B3		A3	SD6	(I/O)
IRQ9	(I)	B4		A4	SD5	(I/O)
−5V DC		B5		A5	SD4	(I/O)
DKQ2	(I)	B6		A6	SA3	(I/O)
−12V DC		B7		A7	SD2	(I/O)
OWS	(I)	B8		A8	SD1	(I/O)
+12V DC		B9		A9	SD0	(I/O)
Ground		B10		A10	−I/O CH RDY	(I)
−SMEMW	(O)	B11		A11	AEN	(O)
−SMEMR	(O)	B12		A12	SA19	(I/O)
−IOW	(I/O)	B13		A13	SA18	(I/O)
−IOR	(I/O)	B14		A14	SA17	(I/O)
−DACK3	(O)	B15		A15	SA16	(I/O)
DRQ3	(I)	B16		A16	SA15	(I/O)
−DACK1	(O)	B17		A17	SA14	(I/O)
DRQ1	(I)	B18		A18	SA13	(I/O)
−Refresh	(I/O)	B19		A19	SA12	(I/O)
CLK	(O)	B20		A20	SA11	(I/O)
IRQ7	(I)	B21		A21	SA10	(I/O)
IRQ6	(I)	B22		A22	SA9	(I/O)
IRQ5	(I)	B23		A23	SA8	(I/O)
IRQ4	(I)	B24		A24	SA7	(I/O)
IRQ3	(I)	B25		A25	SA6	(I/O)
−DACK2	(O)	B26		A26	SA5	(I/O)
T/C	(O)	B27		A27	SA4	(I/O)
BALE	(O)	B28		A28	SA3	(I/O)
+5V DC		B29		A29	SA2	(I/O)
OSC	(O)	B30		A30	SA1	(I/O)
Ground		B31		A31	SA0	(I/O)
−MEMCS16	(I)	D1		C1	SBHE	(I/O)
−I/O CS16	(I)	D2		C2	LA23	(I/O)
IRQ10	(I)	D3		C3	LA22	(I/O)
IRQ11	(I)	D4		C4	LA21	(I/O)
IRQ12	(I)	D5		C5	LA20	(I/O)
IRQ15	(I)	D6		C6	LA19	(I/O)
IRQ14	(I)	D7		C7	LA18	(I/O)
−DACK0	(O)	D8		C8	LA17	(I/O)
DRQ0	(I)	D9		C9	−MEMR	(I/O)
−DACK5	(O)	D10		C10	−MEMW	(I/O)
DRQ5	(I)	D11		C11	SD8	(I/O)
−DACK6	(O)	D12		C12	SD9	(I/O)
DRQ6	(I)	D13		C13	SD10	(I/O)
−DACK7	(O)	D14		C14	SD11	(I/O)
DRQ7	(I)	D15		C15	SD12	(I/O)
+5V DC		D16		C16	SD13	(I/O)
−Master	(I)	D17		C17	SD14	(I/O)
Ground		D18		C18	SD15	(I/O)

IV-2.4 I/O Address Map

Hex Range	Devices	Usage
000-01F	DMA controller 1,8237A-5	System
020-03F	Interrupt controller 1,8259A	System
040-05F	Timer, 8254-2	System
060-06F	8042 (Keyboard)	System
070-07F	Rea time clock, NMLmask	System
080-09F	DMA page register 74LS612	System
0A0-DBF	Interrupt controller 2,8259A	System
0C0-0DE	DMA controller 2,8237A-5	System
0F0	Clear Math Coprocessor Busy	System
0F1	Reset Math Coprocessor	System
0F8-0FF	Math Coprocessor	System
1F0-1F8	Fixed Disk	I/O
200-207	Game I/O	I/O
278-27F	Parallel printer port 2	I/O
2F8-2FF	Serial port 2	I/O
300-31F	Prototype card	I/O
360-36F	Reserved	I/O
378-37F	Parallel printer port 1	I/O
380-38F	SDLC bisynchronous 2	I/O
3A0-3AF	Bisynchronous 1	I/O
380-38F	Monochrome display and printer adapter	I/O
3C0-3CF	Reserved	
3D0-3DF	Color/Graphic monitor adapter	I/O
3F0-3F7	Floppy diskette controller	I/O
3F8-3FF	Serial port 1	I/O

Chapter V
Appendix

Appendix A

Power On Self Test <POST> Error Message

POSTal Code Hex	POSTal Code Dec	Test
6	6	INITIALIZE CHIPS (DMA, 8259's, CMOS)
7	7	PROCESSOR TEST #2
8	8	INITIALIZE CMOS CHIP
9	9	EPROM CHECKSUM FOR 32 KBYTES
A	10	INITIALIZE VIDEO INTERFACE
B	11	TEST 8254 CHANNEL 0
C	12	TEST 8254 CHANNEL 1
D	13	3TEST 8254 CHANNEL 2
E	14	TEST CMOS DATE AND TIMER
F	15	3TEST CMOS SHUTDOWN BYTE
10	16	TEST DMA CHANNEL 0
11	17	TEST DMA CHANNEL 1
12	18	TEST DMA PAGE REGISTERS
13	19	3TEST 8741 KEYBOARD CONTROLLER
14	20	3TEST MEMORY RERESH TOGGLE CIRCUITS
15	21	TEST 1ST 64K BYTES OF SYSTEM MEMORY
16	22	SETUP INTERRUPT VECTOR TABLE
17	23	SETUP VIDEO I/O OPERATIONS
18	24	TEST VIDEO MEMORY
19	25	TEST 8259 CHANNEL 1 MASK BITS
1A	26	TEST 8259 CHANNEL 2 MASK BITS
1B	27	TEST CMOS BATTERY LEVEL
1C	28	TEST CMOS CHECKSUM
1D	29	SETUP CONFIGURATION BYTE FROM CMOS
1E	30	SIZING SYSTEM MEMORY & COMPARE W/CMOS
1F	31	TEST FOUND SYSTEM MEMORY
20	32	TEST STUCK 8259's INTERRUPT BITS
21	33	TEST STUCK NMI (PARITY/IO CHK) BITS

POSTal Code Hex	Dec	Test
22	34	3TEST 8259 INTERRUPT FUNCTIONALITY
23	35	TEST PROTECTED MODE AND A20 GATE
24	36	SIZING EXTENDED MEMORY ABOVE 1MB
25	37	TEST FOUND SYSTEM/EXTENDED MEMORY
26	38	TEST EXCEPTIONS IN PROTECTED MODE
27	39	RESERVED
28	40	RESERVED

V - 2

Appendix B

Partitioning and Formatting by MS-DOS

A new hard disk must be preformatted before partitioning, but a used hard disk need not be preformatted if it just needs to be reinitialized. Below is the process of partitioning and formatting a 10MB hard disk using MS-DOS Ver 3.30.

V-2.1 Partitioning

1. Boot the DOS from drive A, and type "fdisk" as shown below:

```
Current date is Mon 12-17-1988
Enter new date (mm-dd-yy): <enter>
Current time is 21:02:30.06
Enter new time: <enter>

Microsoft(R) MS-DOS(R) Version 3.30
(C)Copyright Microsoft Corp 1981-1987

A>fdisk <enter>
```

2. A fixed disk menu will appear after a few seconds:

```
Fixed Disk Setup Program Version 3.30
(C)Copyright Microsoft Corp 1987

FDISK Options

Current Fixed Disk Drive:1
Choose one of the following:
    1. Create DOS Partition
    2. Change Active Partition
    3. Delete DOS Partition
    4. Display Partition Information

Enter choice:[1]

Press ESC to return to DOS
```

3. Select "1" to choose 'Create DOS partition'.
   Screen shows:

```
Create DOS Partition
Current Fixed Disk Drive: 1

    1. Create Primary DOS Partition
    2. Create Extended DOS Partition

Enter choice: [1]

Press ESC to return to FDISK Options
```

4. Enter '1' to create primary partition, screen will show:

```
Create Primary DOS Partition
Current Fixed Disk Drive: 1

Do you wish to use the maximum size
for a DOS partition and make the DOS
partition active [Y/N] ..... ? [Y]

Press ESC to return to FDISK Options
```

5. Respond "Y" to use the maximum size for DOS partition.

```
System will now restart
Insert DOS diskette in drive A:
press any key when ready ...
```

6. The partitioning process is now complete, You may proceed to formatting the hard disk.

V-2.2 Formatting a Hard Disk

1. Boot DOS from drive A, and type:

```
Current date is Tue 12-18-1988
Enter new date (mm-dd-yy): <enter>
Current time is 13:48:53.00
Enter new time: <enter>

Microsoft(R) MS-DOS(R) Version 3.30
(C) Copyright Microsoft Corp 1981-1987

A>format c:/s <enter>
```

2. After a few seconds the screen will prompt you with a ready message.

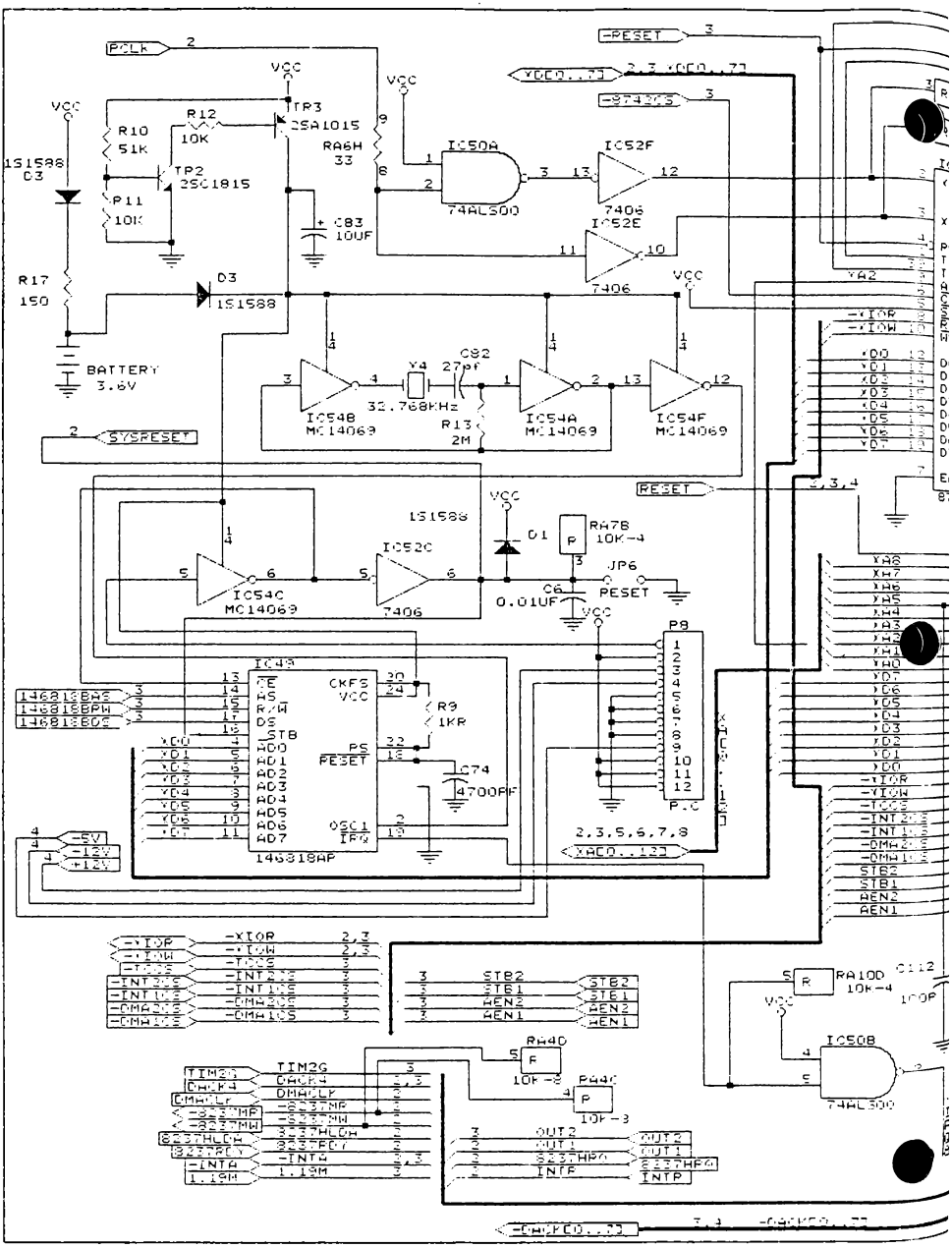
Respond "Y" and the formatting begins. You must wait for a few minutes until the process is complete. The screen will show:

```
WARNING, ALL DATA ON NON-REMOVABLE DISK
DRIVE C: WILL BE LOST !
Proceed with Format (Y/N) ?_ <------ Respond "Y" to begin
                                     preformatting prpcess
Format complete
System transferred

10585088 bytes total disk space
   86016 bytes used by system
10499072 bytes available on disk

A>
```

3. The above screen tells the user that the hard disk drive was formatted with total disk space of 10M bytes.

V - 3

Appendix C
Circuit Diagram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2SA1015
R10
51K
R12
10K
RA6H
33
TP2
2SC1815
P11
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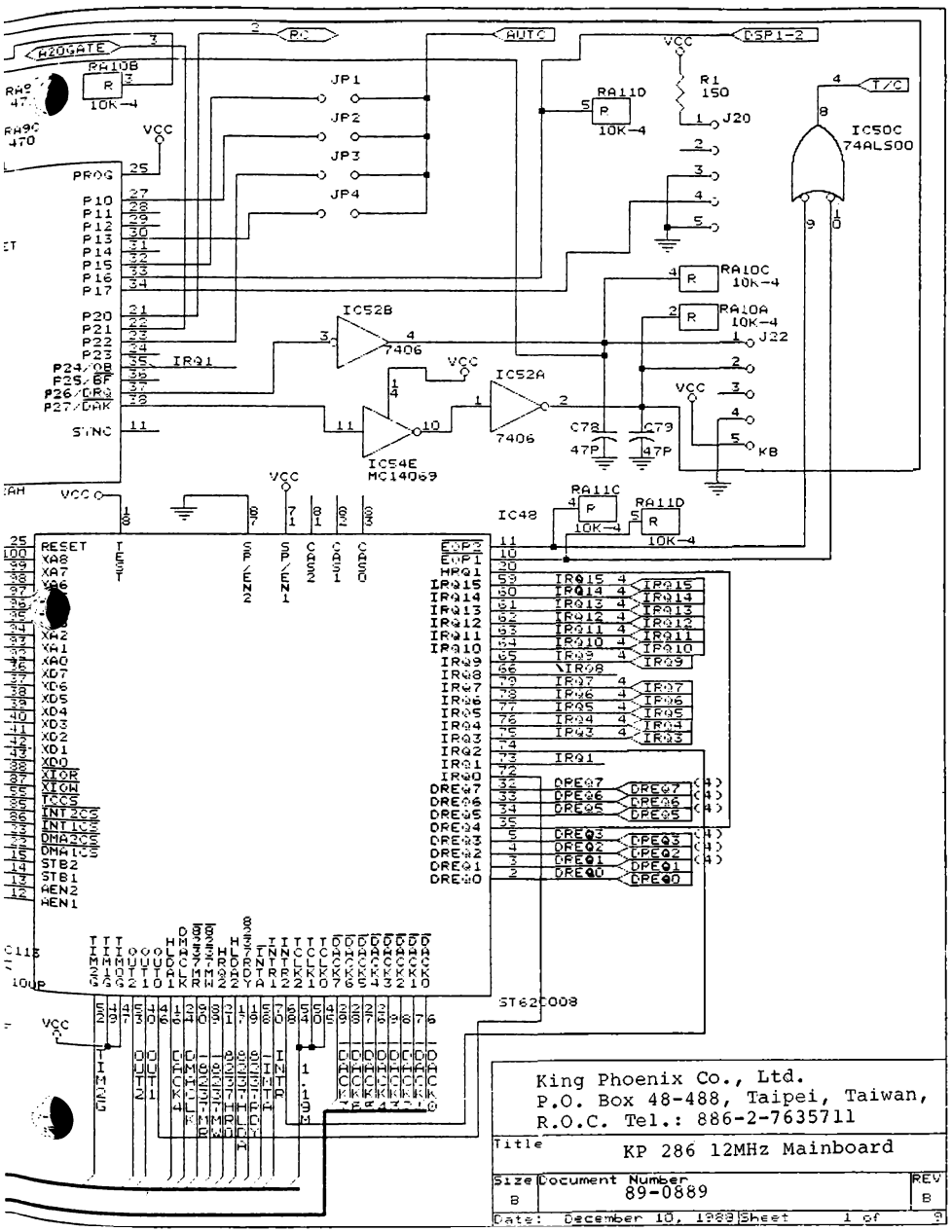
1S1588
D3
R17
150
BATTERY
3.6V
C83
100UF
IC50A
74ALS00
IC52F
7406
IC52E
7406
-RESET
-8742CS
32.768KHz
C82
27pF
R13
2M
IC54B
MC14069
IC54A
MC14069
IC54F
MC14069
SYSRESET
IC52C
7406
IC54C
MC14069
D1
RA7B
10K-4
JP6
C6
0.01UF
PRESET
P8
IC48
14813BAS
14813BPW
14813BCS
CKFS
R9
1KR
C74
4700PF
14813BAP
-5V
-12V
+12V
2,3,5,6,7,8
-XIOR
-XIOW
-TCCS
-INT2CS
-INT1CS
-DMA2CS
-DMA1CS
STB2
STB1
AEN2
AEN1
RA10D
10K-4
C112
100P
IC50B
74ALS00
RA4D
10K-8
RA4C
10K-8
TIM2G
CHCK4
DMA0LP
-8237HRQ
-8237HWR
-8237HLDA
8237HRQ
-INTA
1.19M
OUT2
OUT1
8237HPA
INTP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KB
AUTO
DSP1-2
T/C
JP1
JP2
JP3
JP4
R1
150
J20
J22
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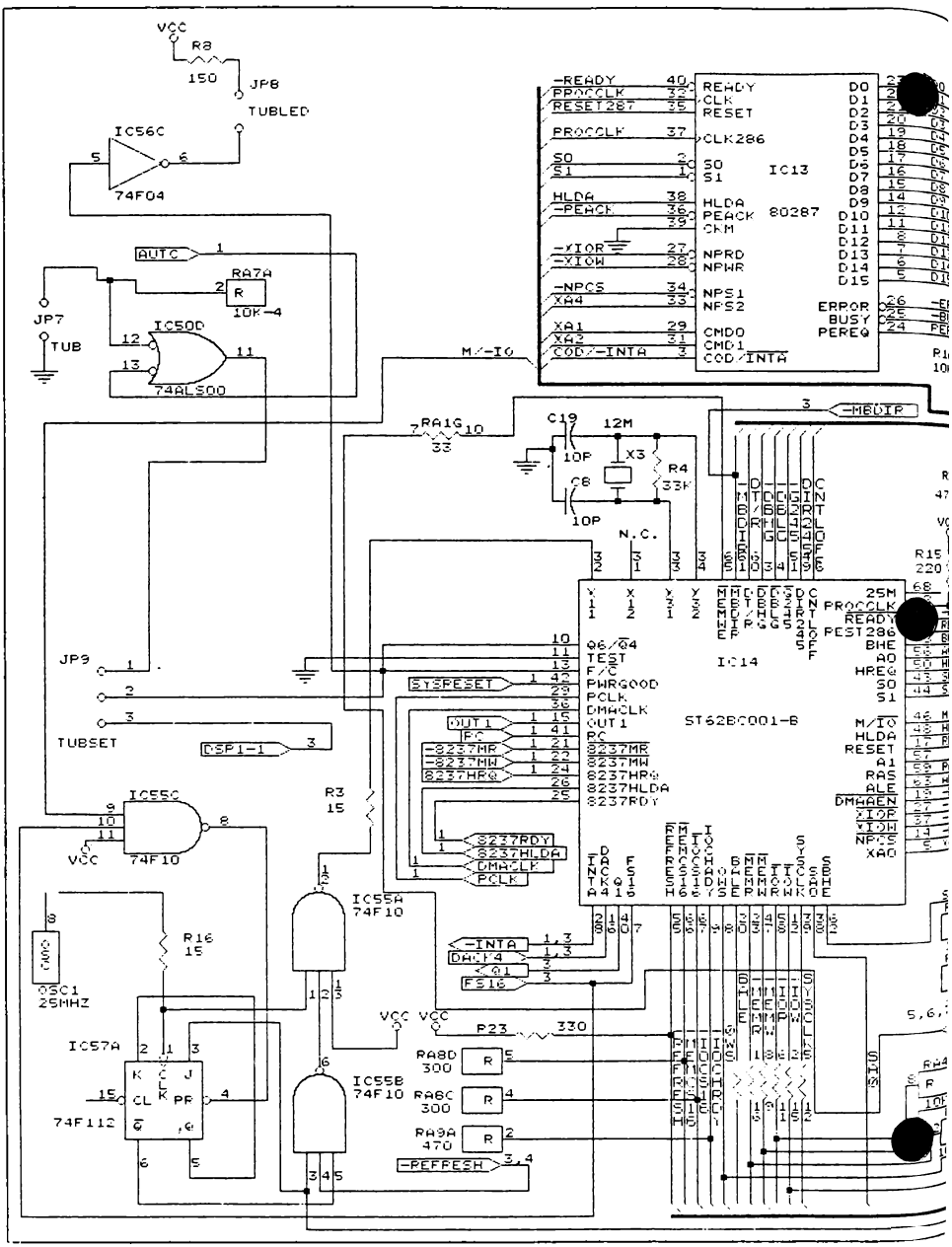
74ALS00
IC52B
IC52A
7406
IC54E
MC14069
IC48
C78
47P
C79
47P
RA10B
RA10C
RA10A
RA11C
RA11D
10K-4
VCC
PROG
SYNC
IRQ1
RESET
ST62T008
King Phoenix Co., Ltd.
P.O. Box 48-488, Taipei, Taiwan,
R.O.C. Tel.: 886-2-7635711
Title
KP 286 12MHz Mainboard
Size
B
Document Number
89-0889
REV
B
Date: December 10, 1988
Sheet 1 of 9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R8
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TUBLED
IC56C
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AUTC
RA7A
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JP7
TUB
IC50D
74ALS00
M/-IO
-READY
PROCCLK
RESET287
PROCCLK
S0
S1
HLDA
-PEACK
-XIOR
-XIOW
-NPCS
XA4
XA1
XA2
COD/-INTA
READY
CLK
RESET
CLK286
S0
S1
IC13
HLDA
PEACK
80287
CKM
NPRD
NPWR
NPS1
NPS2
CMD0
CMD1
COD/INTA
ERROR
BUSY
PEREQ
D0
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
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RA1G
33
C19
10P
12M
X3
C8
10P
R4
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R15
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S1
M/IO
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RAS
ALE
DMAAEN
XA0
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-8237MW
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DMACLK
OUT1
FC
8237MR
8237MW
8237HRQ
8237HLDA
8237RDY
8237RDY
8237HLDA
DMACLK
PCLK
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74F10
R3
15
VCC
IC55A
74F10
R16
15
OSC1
25MHZ
IC57A
74F112
IC55B
74F10
-INTA
DACK4
Q1
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VCC
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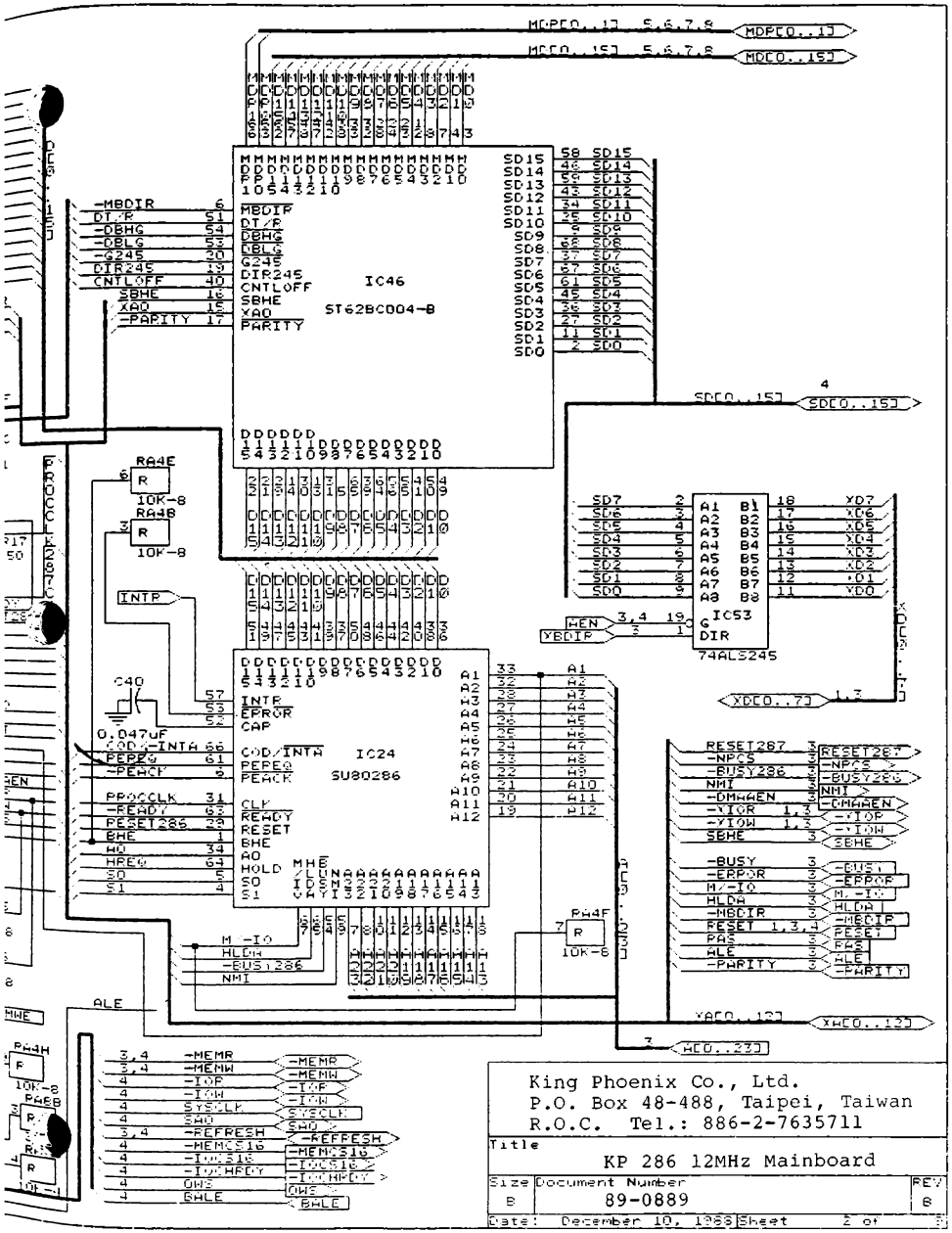
300
RA8C
300
RA9A
470
-PEFRESH
-MBUF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SD14
SD13
SD12
SD11
SD10
SD9
SD8
SD7
SD6
SD5
SD4
SD3
SD2
SD1
SD0
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DT/R
-DBHG
-DBLG
-G245
DIR245
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RA4B
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COD/-INTA
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IC24
SU80286
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-READY
RESET286
BHE
HD
HREQ
SD
SI
M/-IO
HLDA
-BUSL286
NMI
ALE
RA4H
RA4B
-MEMR
-MEMW
-IOR
-IOW
SYSCLK
SMD
-REFRESH
-MEMCS16
-IOCS16
-IOCHRDY
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XD4
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-BUSY
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-HLDA
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XHD0..23]
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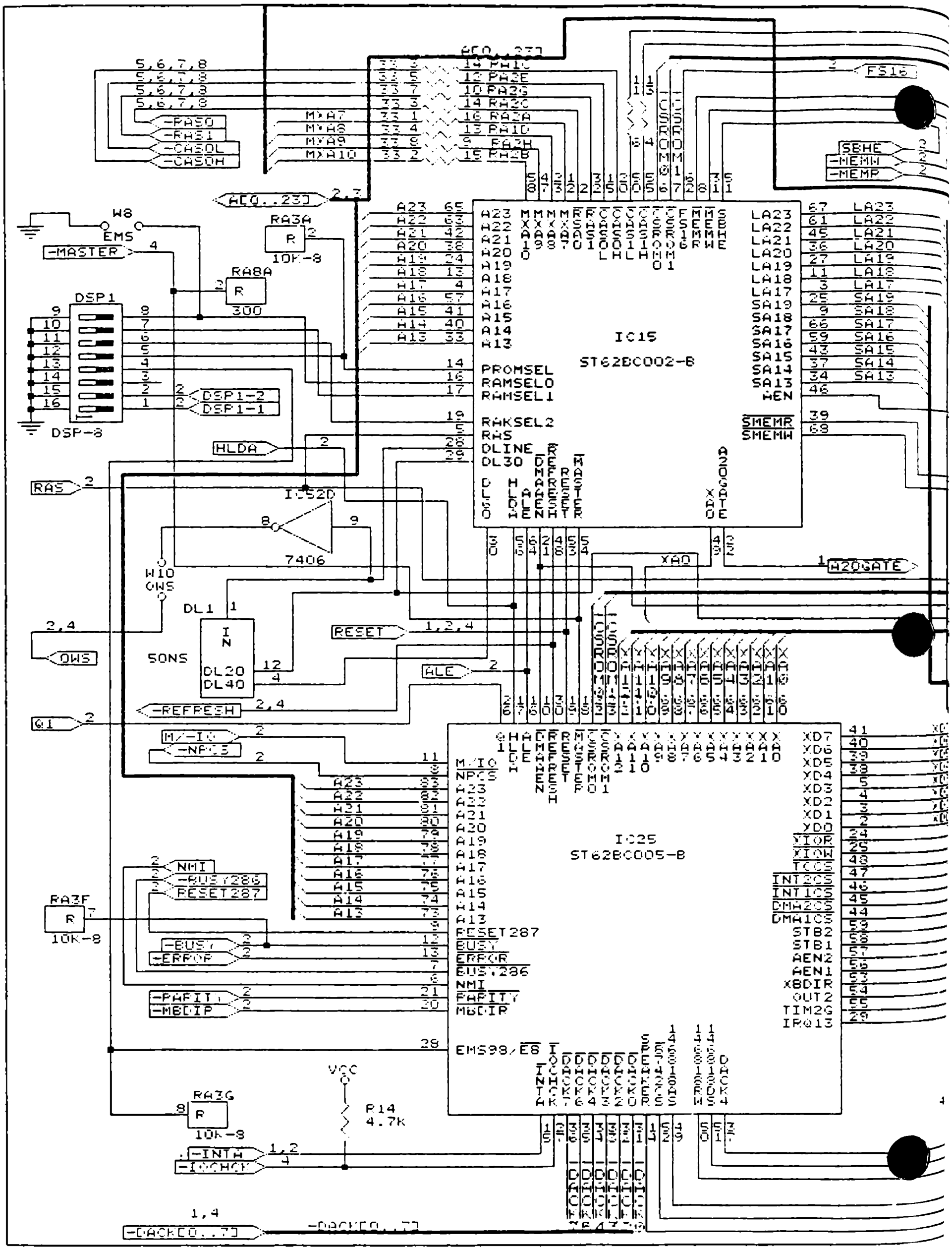
Size B
Document Number 89-0889
REV B
Date: December 10, 1993 Sheet 2 of 5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RA3F
10K-8
RA3G
10K-8
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VCC
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-CASOL
-CASOH
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-ERROR
-PARITY
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LA17
SA19
SA18
SA17
SA16
SA15
SA14
SA13
XD7
XD6
XD5
XD4
XD3
XD2
XD1
XD0
XIOR
XIOW
TCCS
INT2CS
INT1CS
DMA2CS
DMA1CS
STB2
STB1
AEN2
AEN1
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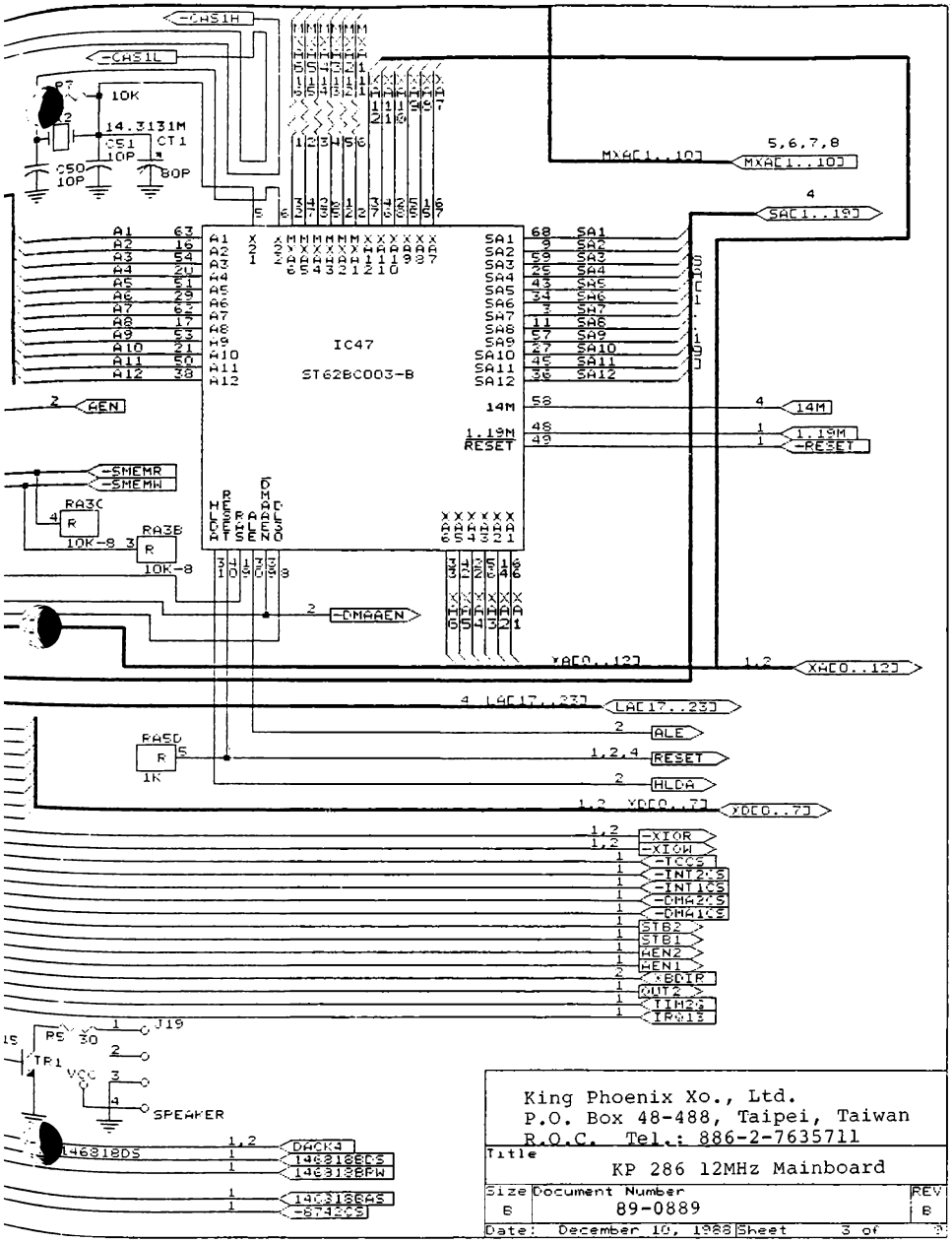
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CS0
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30P
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5,6,7,8
SAC1..19J
AEN
14M
1.19M
RESET
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-SMEMW
RA3C
10K-8
RA3B
10K-8
-DMAAEN
XAC0..12J
LAC17..23J
ALE
RA5D
1K
HLDA
XDC0..7J
-XIOR
-XIOW
-TCCS
-INT2:3
-INT1CS
-DMA2CS
-DMA1CS
STB2
STB1
AEN2
AEN1
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J19
TR1
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SPEAKER
DACK4
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Title
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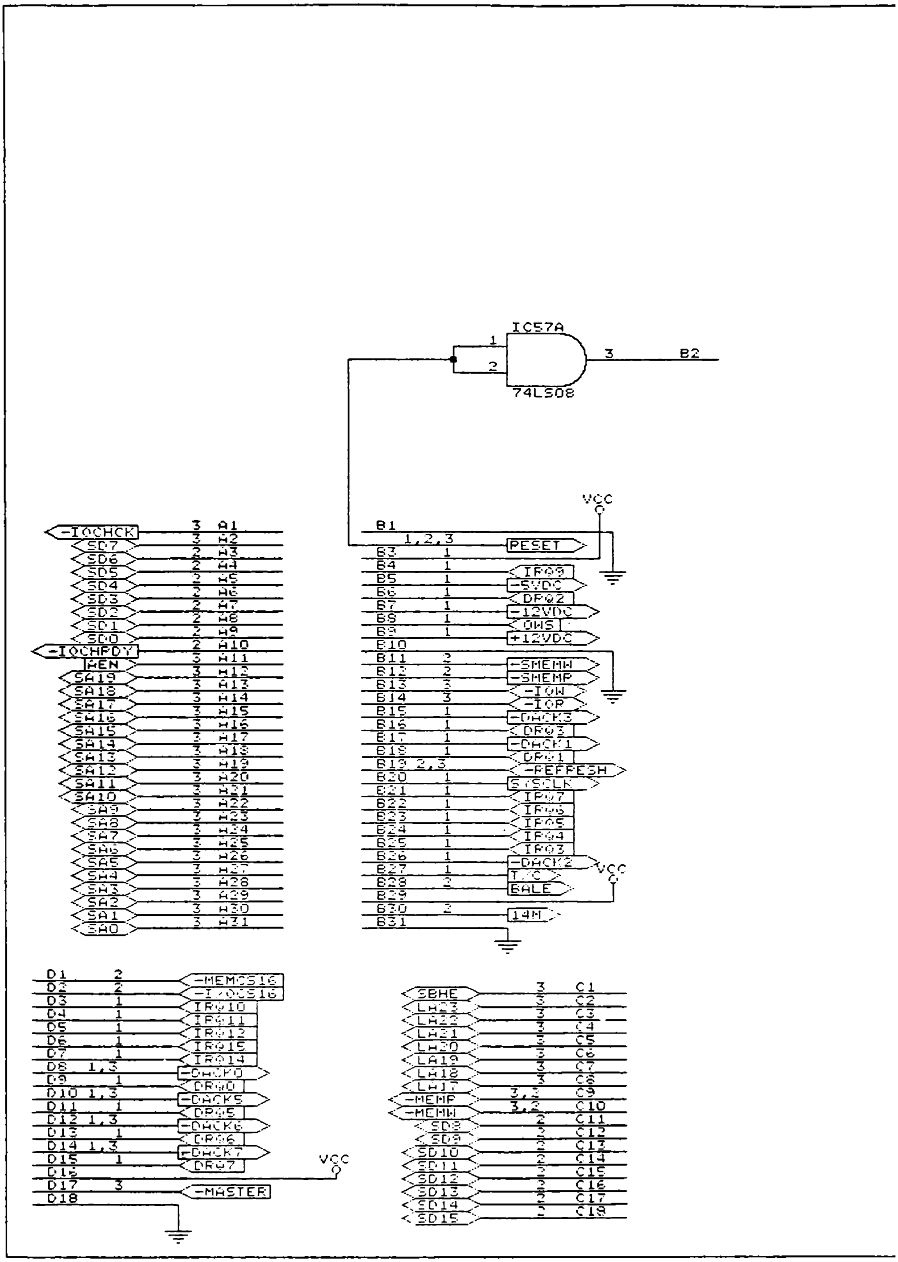
REV B
Date: December 10, 1988 Sheet 3 of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-IOR
-REFRESH
-DACK2
BALE
14M
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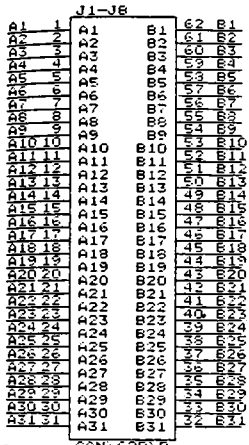
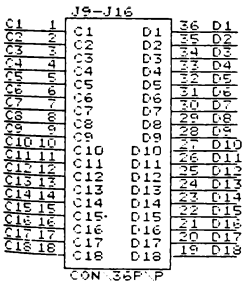
SBHE
-MEMR
-MEMW





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Size B	Document Number 89-0889	REV B
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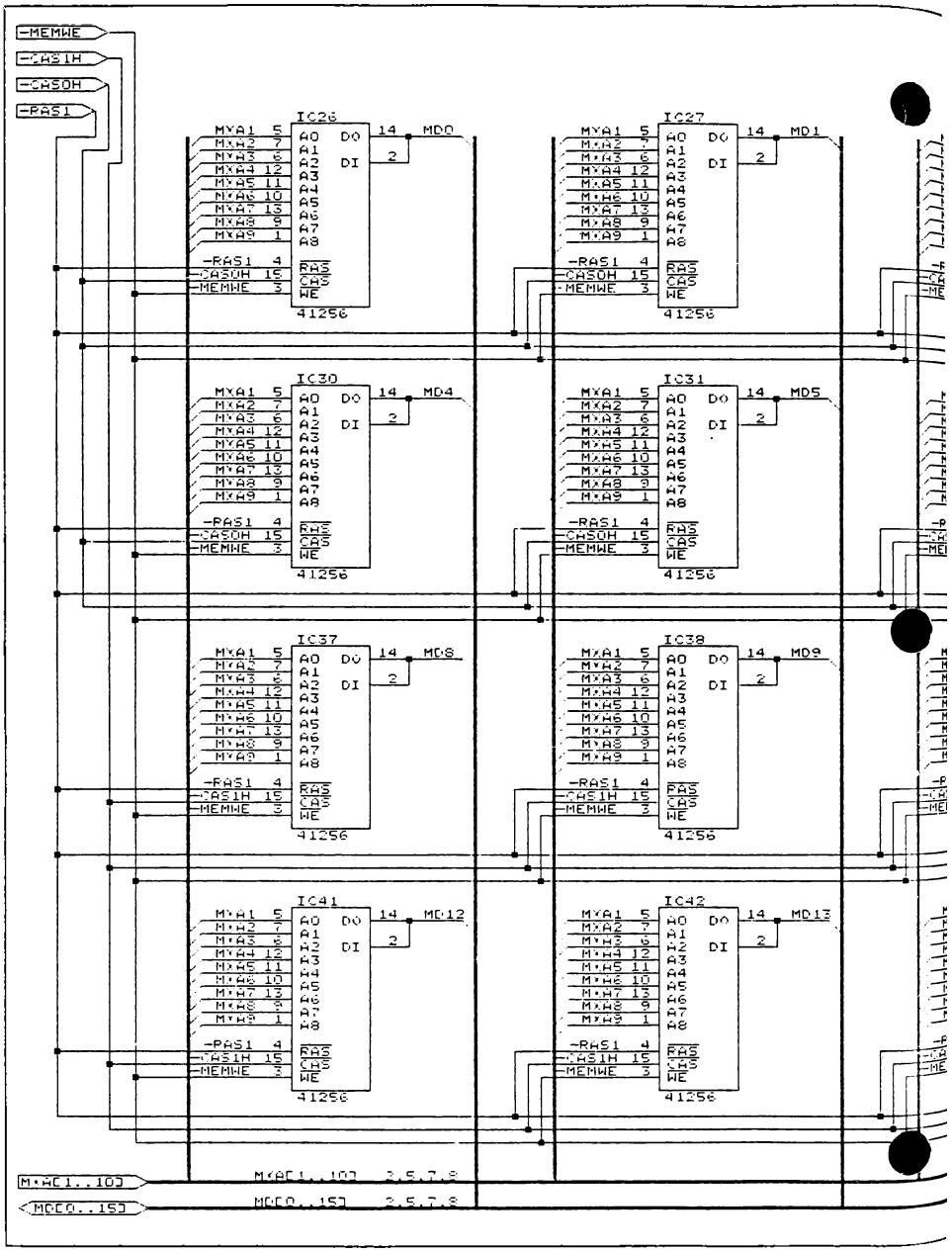
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-CAS0H
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IC27
IC30
IC31
IC37
IC38
IC41
IC42
41256
MD0
MD1
MD4
MD5
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MD9
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MD13
MXA1..10
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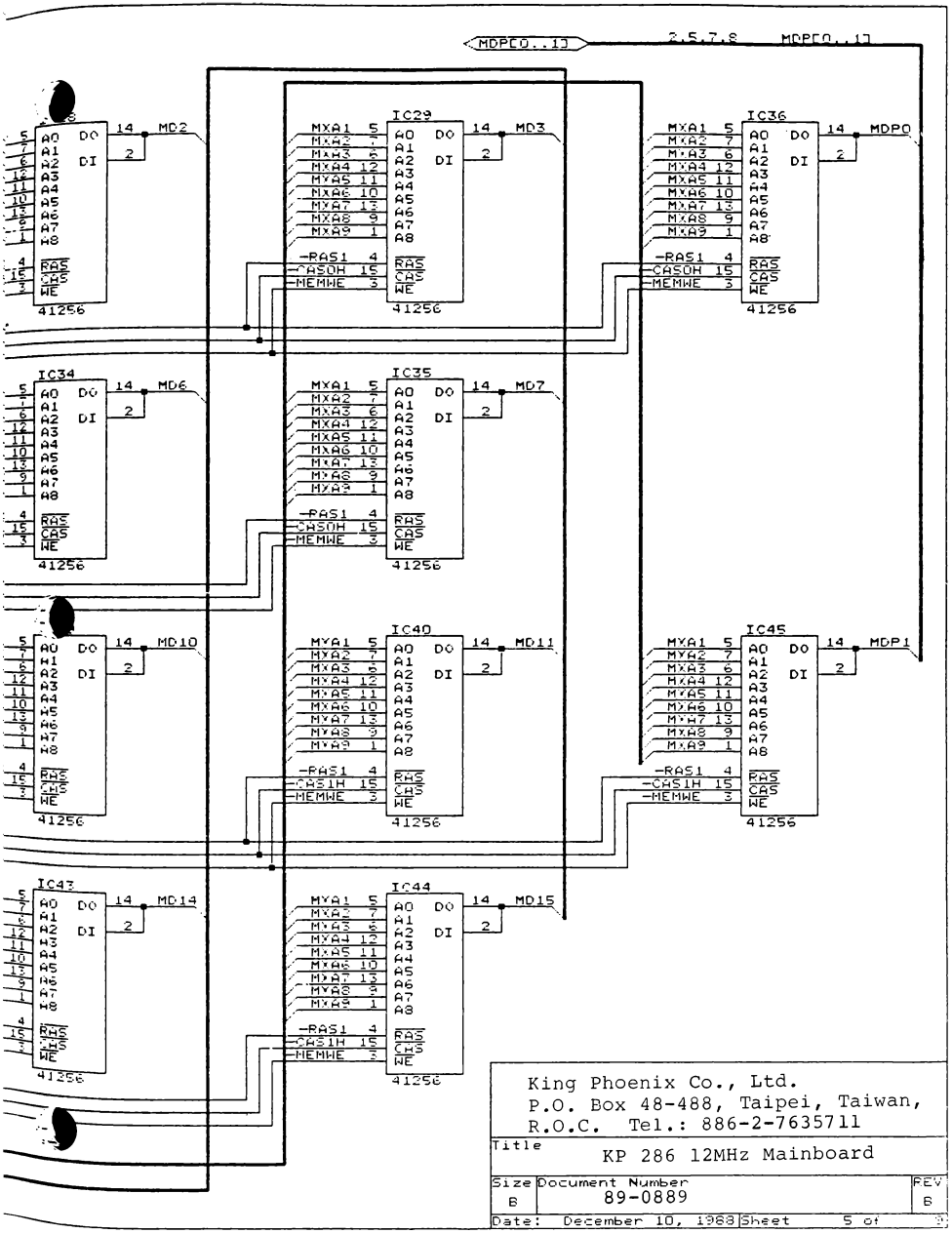
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MXA2
MXA3
MXA4
MXA5
MXA6
MXA7
MXA8
MXA9
-RAS1
-CAS0H
-CAS1H
-MEMWE
MD2
MD3
MDP0
MD6
MD7
MD10
MD11
MDP1
MD14
MD15
King Phoenix Co., Ltd.
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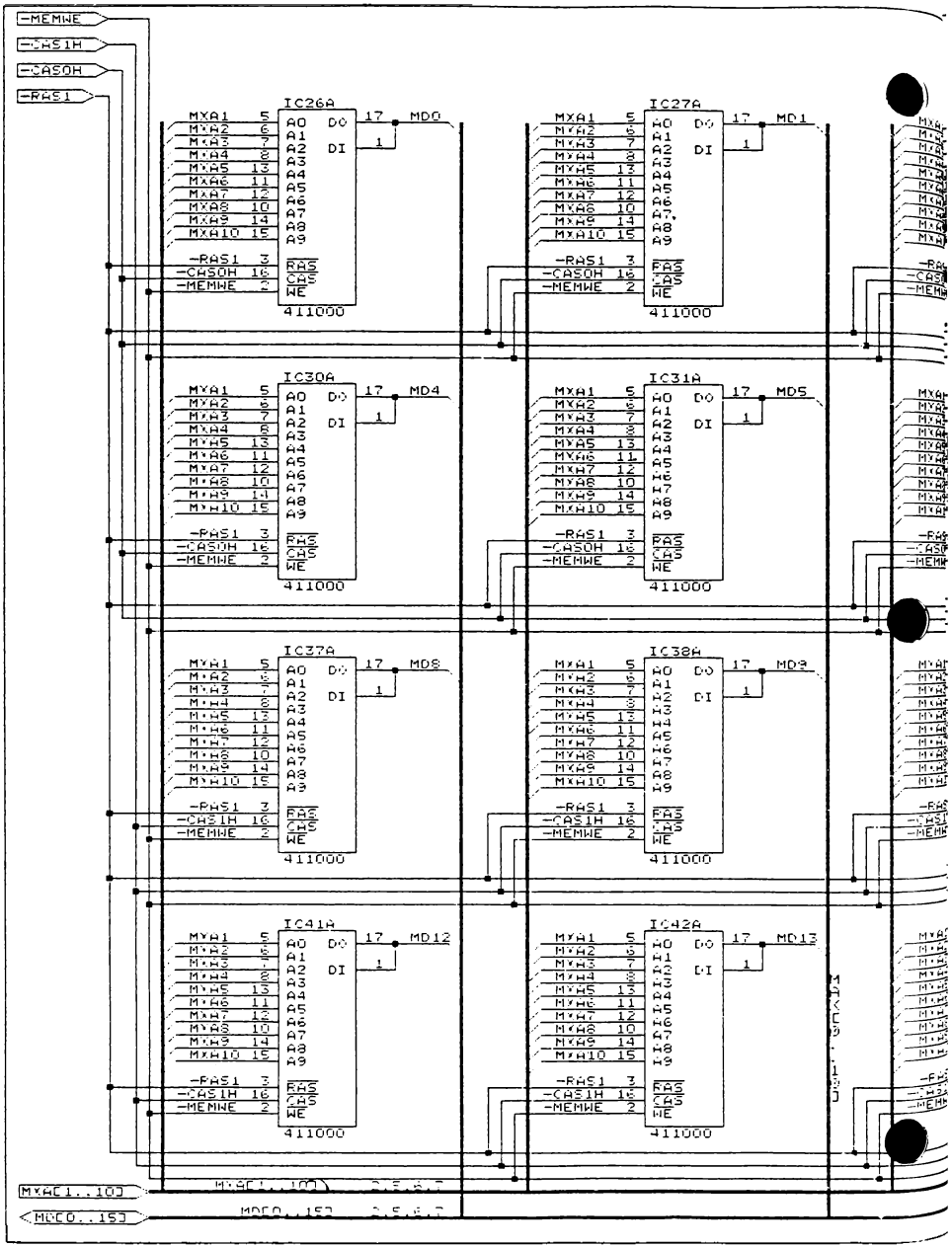
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MD4
MD5
MD8
MD9
MD12
MD13
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MXA3
MXA4
MXA5
MXA6
MXA7
MXA8
MXA9
MXA10
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A1
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RAS
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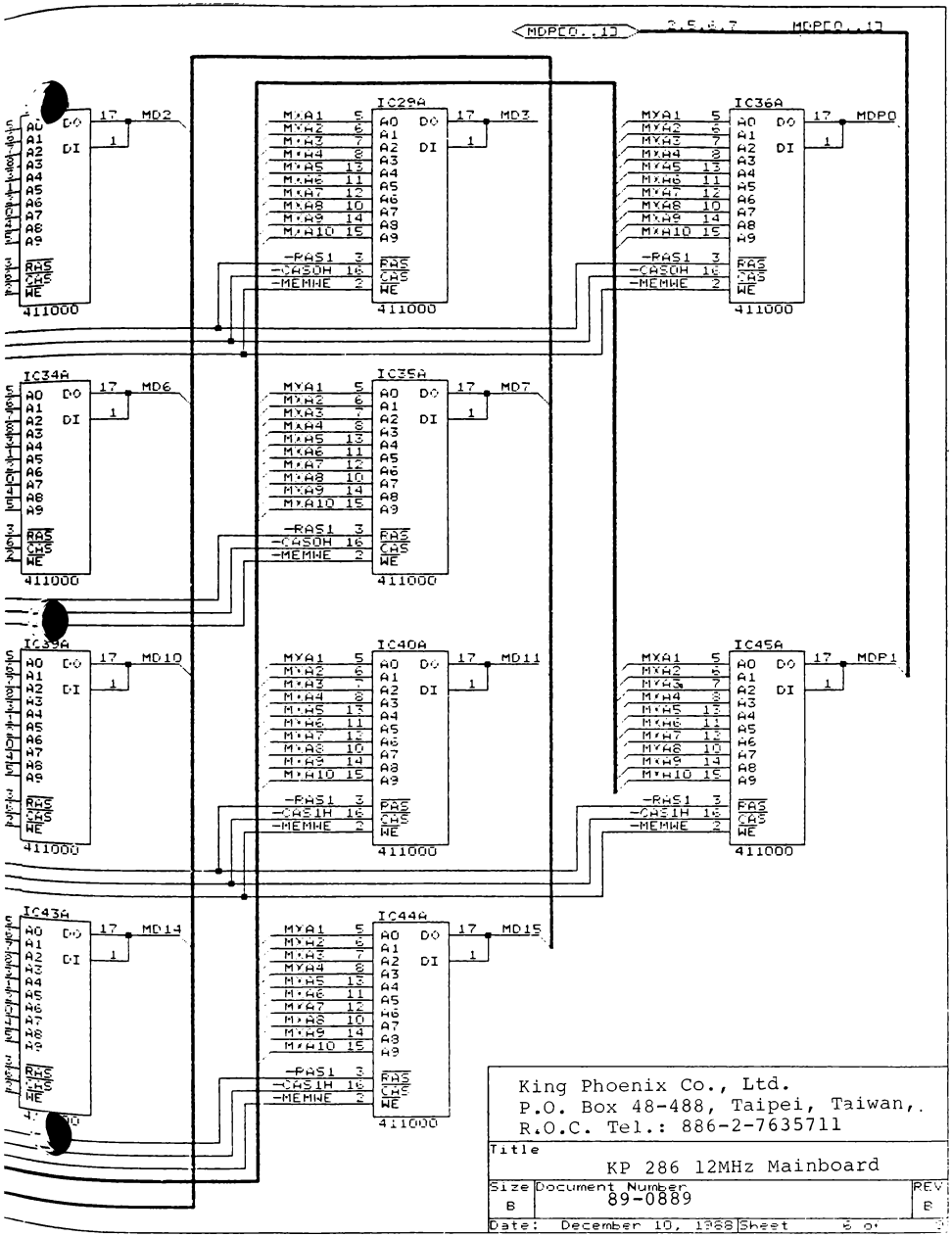
MDD0..15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IC43A
IC44A
411000
MD2
MD3
MDP0
MD6
MD7
MD10
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MDP1
MD14
MD15
-RAS1
-CAS0H
-CAS1H
-MEMWE
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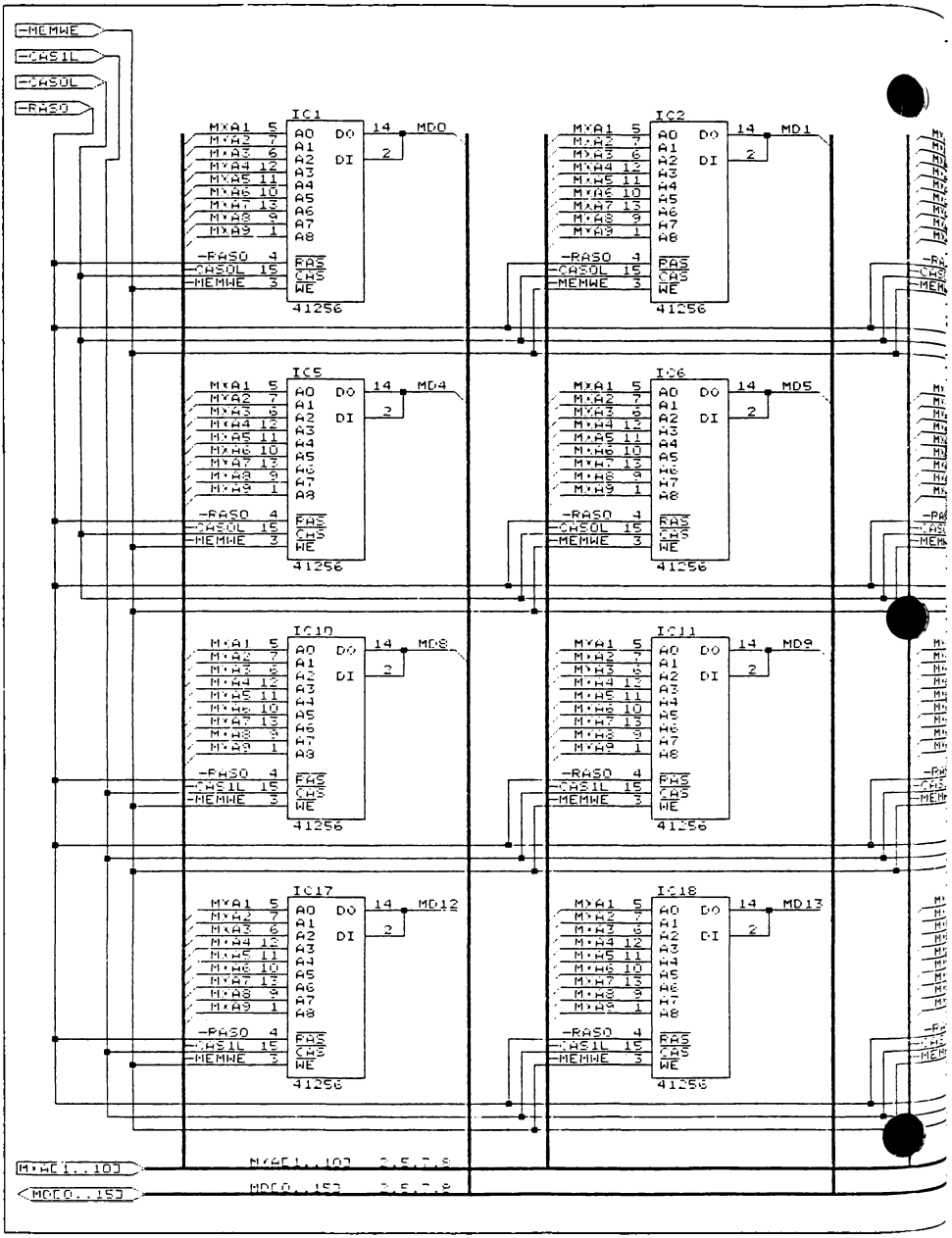
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-CAS0L
-RAS0
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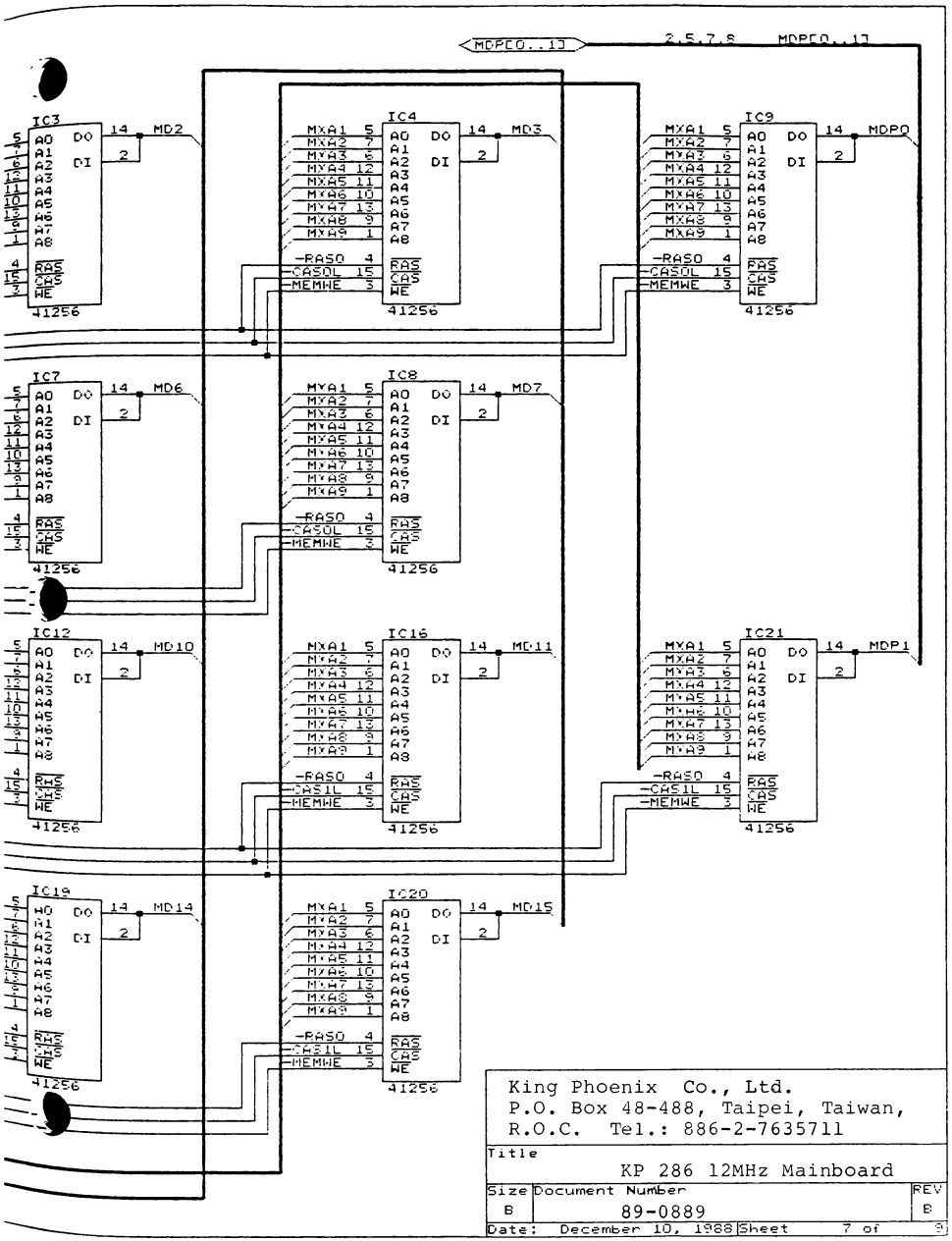
MD12
MD13
M*A1..10
MD0..15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2,5,7,8
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IC7
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IC21
IC19
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41256
MD2
MD3
MDP0
MD6
MD7
MD10
MD11
MDP1
MD14
MD15
MXA1
MXA2
MXA3
MXA4
MXA5
MXA6
MXA7
MXA8
MXA9
-RAS0
-CAS0L
-CAS1L
-MEMWE
RAS
CAS
WE
DO
DI
A0
A1
A2
A3
A4
A5
A6
A7
A8
King Phoenix Co., Ltd.
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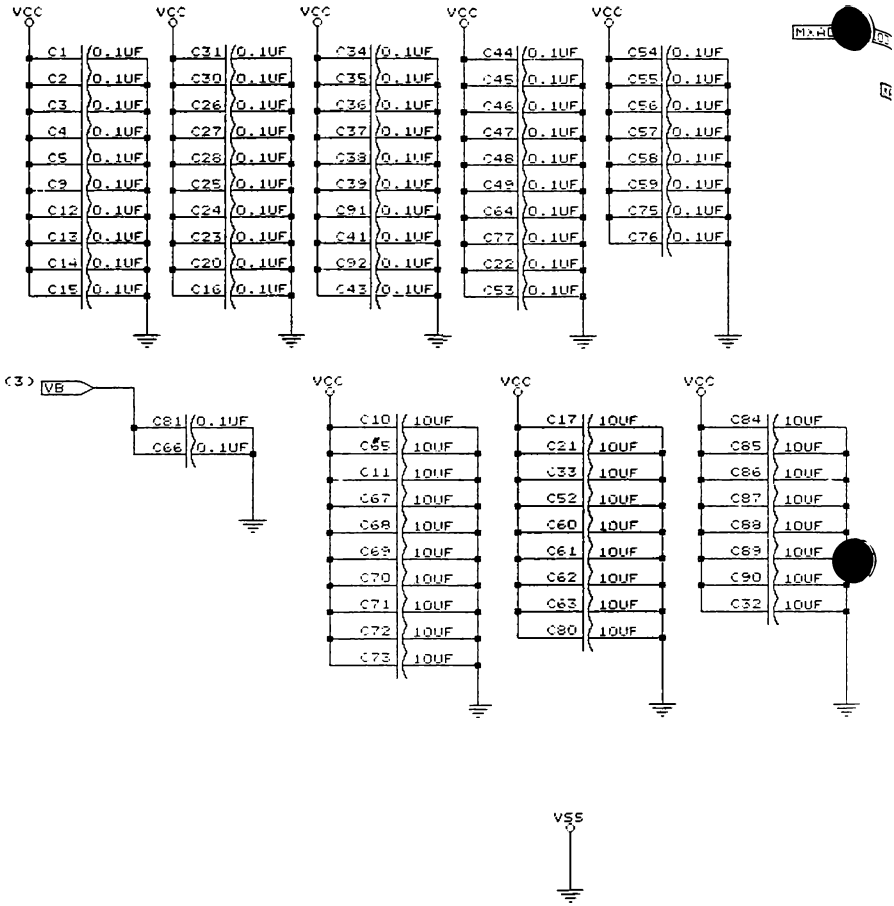
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C2 0.1UF
C3 0.1UF
C4 0.1UF
C5 0.1UF
C9 0.1UF
C12 0.1UF
C13 0.1UF
C14 0.1UF
C15 0.1UF
C31 0.1UF
C30 0.1UF
C26 0.1UF
C27 0.1UF
C28 0.1UF
C25 0.1UF
C24 0.1UF
C23 0.1UF
C20 0.1UF
C16 0.1UF
C34 0.1UF
C35 0.1UF
C36 0.1UF
C37 0.1UF
C38 0.1UF
C39 0.1UF
C91 0.1UF
C41 0.1UF
C92 0.1UF
C43 0.1UF
C44 0.1UF
C45 0.1UF
C46 0.1UF
C47 0.1UF
C48 0.1UF
C49 0.1UF
C64 0.1UF
C77 0.1UF
C22 0.1UF
C53 0.1UF
C54 0.1UF
C55 0.1UF
C56 0.1UF
C57 0.1UF
C58 0.1UF
C59 0.1UF
C75 0.1UF
C76 0.1UF
MXHD
(3) VB
C81 0.1UF
C66 0.1UF
C10 10UF
C65 10UF
C11 10UF
C67 10UF
C68 10UF
C69 10UF
C70 10UF
C71 10UF
C72 10UF
C73 10UF
C17 10UF
C21 10UF
C33 10UF
C52 10UF
C60 10UF
C61 10UF
C62 10UF
C63 10UF
C80 10UF
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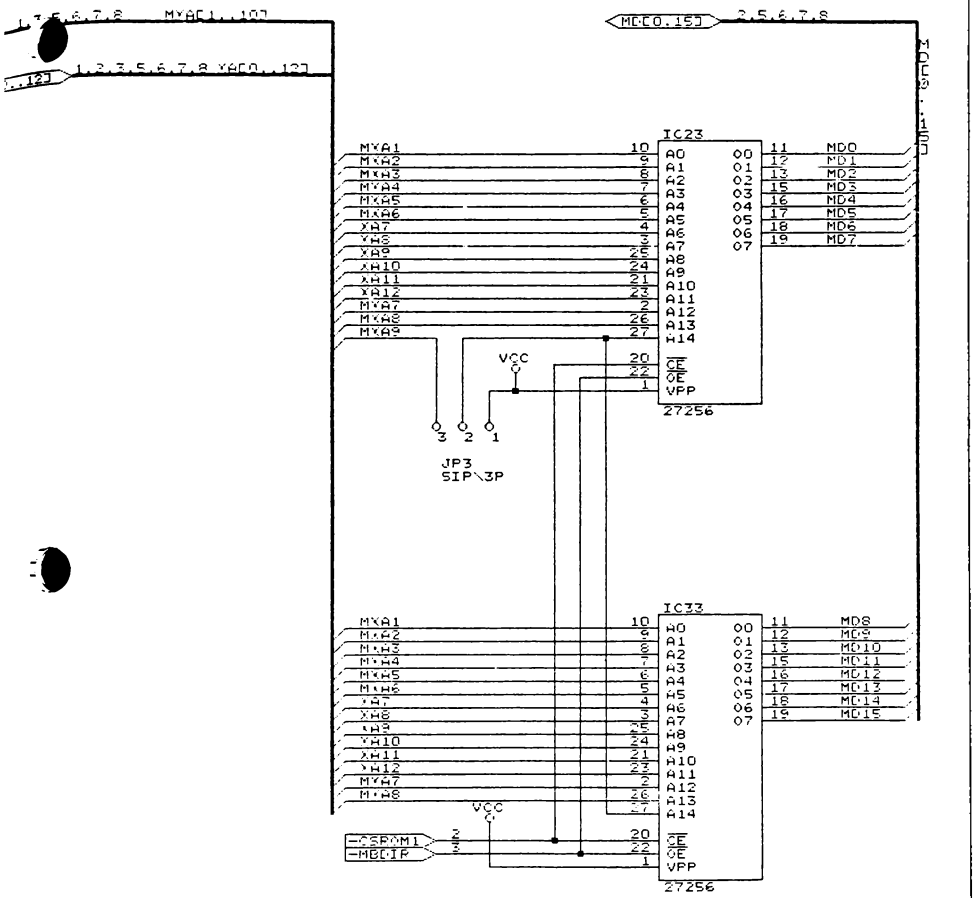

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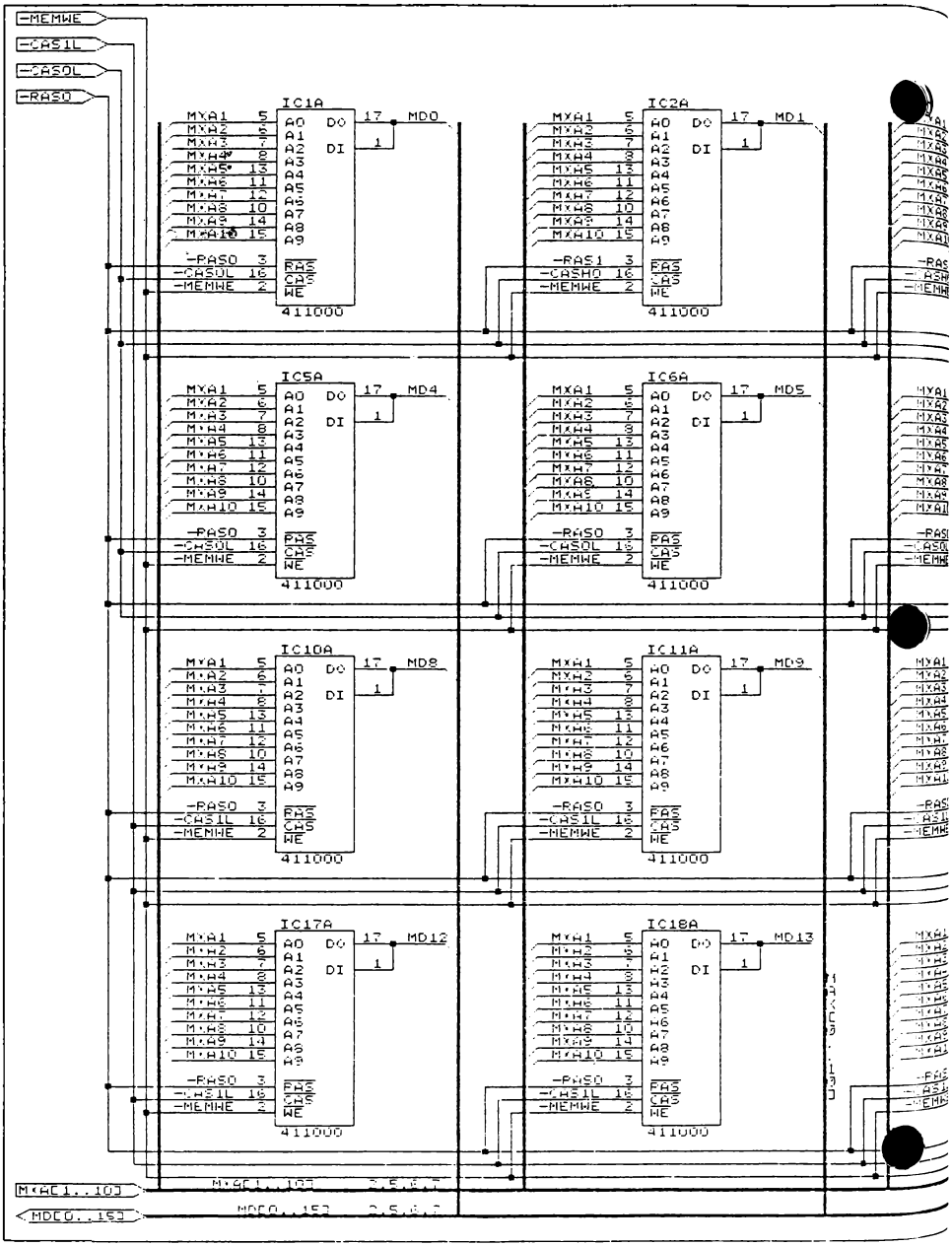
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-CAS0L
-RAS0
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IC2A
IC5A
IC6A
IC10A
IC11A
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411000
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MD4
MD5
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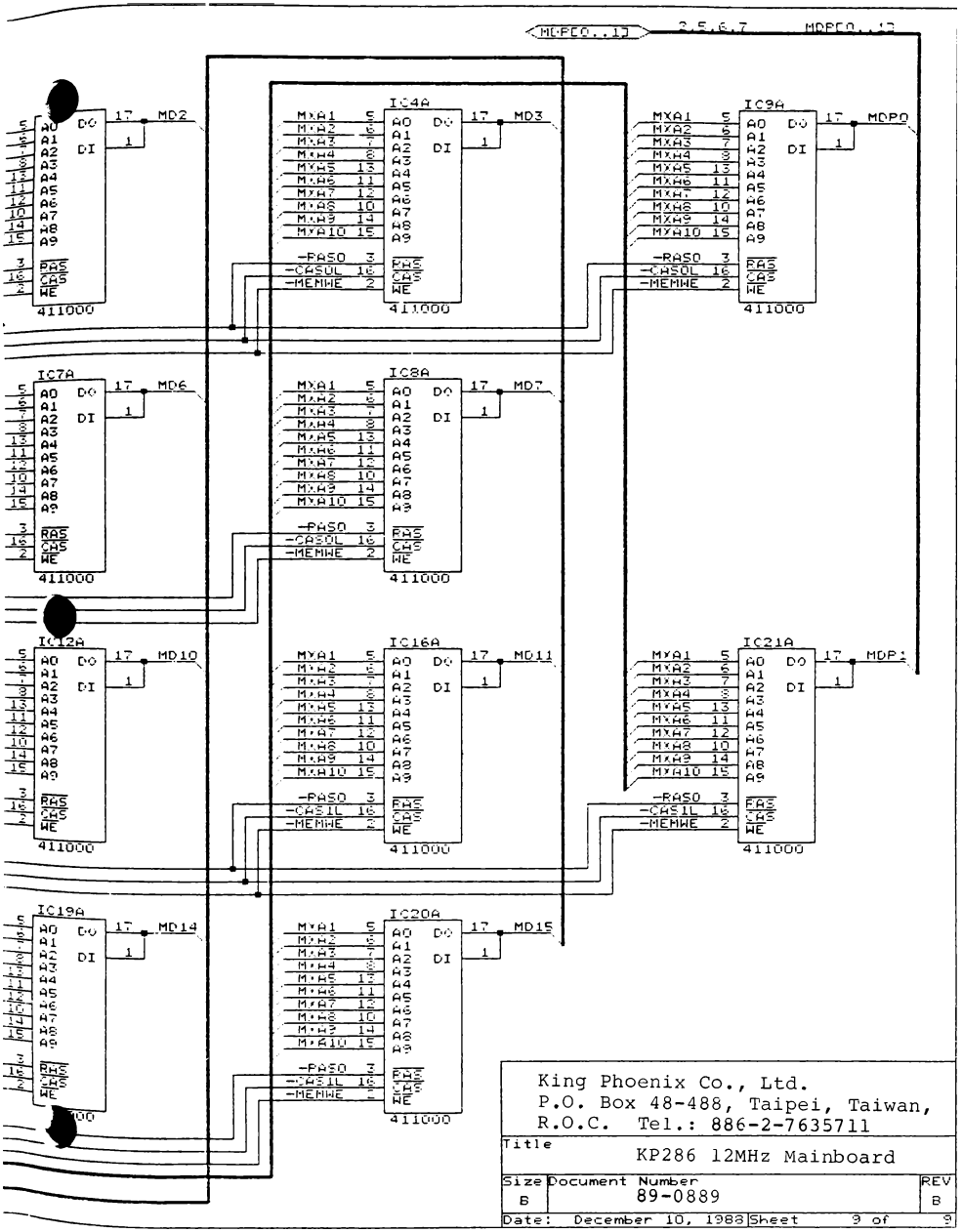
MD9
MD12
MD13
MXA1..10
MD0..15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IC9A
IC7A
IC8A
IC12A
IC16A
IC21A
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IC20A
411000
MXA1
MXA2
MXA3
MXA4
MXA5
MXA6
MXA7
MXA8
MXA9
MXA10
-RAS0
-CAS0L
-CAS1L
-MEMWE
MD2
MD3
MD0
MD6
MD7
MD10
MD11
MD1
MD14
MD15
King Phoenix Co., Ltd.
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R.O.C. Tel.: 886-2-7635711
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Appendix D

Quick Reference On DIP Switch & Jumpers Setting

Note: In the chart following * means default (factory set) setting. The symbol @ means the jumpers are connected to swiches on the front pannel through wires. Users usually operate by these push-button or turning key-lock switch.

1. Jumper Setting (1)

Jumper setting				Keyboard BIOS OUTPUT PIN Encounted
JP1	JP2	JP3	JP4	
Close	Open	Open	Open	Pin # 32
Open	Close	Open	Open	Pin # 27
Open	Open	Close	Open	Pin # 23
*Open	Open	Open	Close	Pin # 30

2. Jumper Setting (2)

Jumper #	Pin #	Setting	Function Description
JP5	1 - 2	Open *Close	Zero wait state One wait state
@JP6	1 - 2	Close *Open	Hardware RESET System run
@JP7	1 - 2	Close Open	Turbo mode (12MHz) Normal mode (6MHz)

Jumper #	Pin #	Setting	Function Description
JP9	2 - 3 *1 - 2	Close Close	Turbo mode set by H/ware Turbo mode set by S/ware
@JP20	4 - 5	Close Open	Keyboard inhibited Keyboard functioning

3. DIP SWITCH Setting (1)

Switch	Function	On	Off
SW1	System speed	Turbo	*Normal
SW2	Display type	Color	*Mono
SW3	Test	*Normal	
SW4	EMS port addr	0E8H	*098H
SW5	PROM type	27128	*27256

4. DIP Switch Setting (2)

Setting			DRAM Installed		Memory Partition	Memory Location	Total On Board Memory
SW6	SW7	SW8	Bank0	Bank1	(KBytes)		
On	On	On	41256	—	512/0	0-7FFFF	512K
On	On	Off	41256	34164	640/0	0-9FFFF	640K
*On	Off	On	41256	41256	640/384	0-9FFFF 10000-15FFFF	1M
On	Off	Off	41256	41256	640/EMS384 (16Kx24Page)	0-9FFFF	1M
Off	On	On	411000	—	640/1408	0-9FFFF 10000-25FFFF	2M
Off	On	Off	411000	—	640/EMS1408 (16Kx88Page)	0-9FFFF	2M
Off	Off	On	411000	411000	640/3456	0-9FFFF 10000-45FFFF	4M
Off	Off	Off	411000	411000	640/EMS3456 (16Kx216Page)	0-9FFFF	4M

May 1989 Release