



*jr*Captain

INSTALLATION MANUAL

TECMAR INCORPORATED
Personal Computer Products Division
6225 Cochran Road
Solon (Cleveland), Ohio 44139
Phone: (216)349-0600 • Telex: 466692

Copyright 1984 by Tecmar, Inc.

#20502 Rev. 1.3

Printed by Tecmar Presses

Limited Warranty

Tecmar, Inc. ("Tecmar") warrants to the original purchaser that boards and cables manufactured by Tecmar will be free from defects in materials and workmanship for one year from the date of delivery to purchasers. Tecmar warrants to the original purchaser that disc controllers and drives, terminals, printers, and any other non-board item not bearing a Tecmar label will be free from defects in materials and workmanship for a period of ninety days from the date of delivery to purchasers. Tecmar warrants to the original purchaser that the media for software will be free from defects in materials and will be readable by the computer system for a period of ninety days from the date of delivery to purchaser. The software is thoroughly tested and thought to be functional when released; at Tecmar's sole option, Tecmar may endeavor to correct any serious problems discovered in the software.

Under the above warranty, Tecmar will, at its option, either repair or replace a non-conforming or defective product, or return to purchaser the purchase price. Tecmar shall have no obligation hereunder if the product has been misused, carelessly handled, defaced (including unauthorized repairs made or attempted by others), modified or altered. The product must be returned with proof of purchase in its original (or other adequate packaging) to the point of purchase or, by prior arrangements with Tecmar, to Tecmar. Claims must be made in accordance with the provisions of this paragraph within the applicable warranty period or they will be barred.

Tecmar reserves the ultimate authority to determine what constitutes warranty repair. If it is determined that the product is not under warranty, it will be repaired using Tecmar's standard rates for parts and labor. Tecmar will use its best efforts to repair the product within three days after receipt thereof. Tecmar shall not be responsible, however, for delays caused by shipping of non-availability of replacement components or other similar or dissimilar causes, events or conditions beyond its reasonable control.

The above warranty is the only warranty authorized by Tecmar. THE ABOVE WARRANTY STATES THE PURCHASER'S EXCLUSIVE REMEDY FOR ANY BREACH OF TECMAR'S WARRANTY AND FOR ANY CLAIM, WHETHER SOUNDING IN CONTRACT, TORT OR NEGLIGENCE, FOR LOSS OR INJURY CAUSED BY THE SALE OF ANY PRODUCT, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING. TECMAR SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS OF BUSINESS OR PROFITS, DOWNTIME OR DELAY, LABOR, REPAIR, OR MATERIAL COSTS, INJURY TO PERSON OR PROPERTY OR ANY SIMILAR OR DISSIMILAR CONSEQUENTIAL LOSS OR DAMAGE INCURRED BY PURCHASER, EVEN IF TECMAR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSSES OR DAMAGES.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY SHALL NOT BE APPLICABLE TO THE EXTENT THAT ANY PROVISION OF THIS WARRANTY IS PROHIBITED BY ANY FEDERAL, STATE OR MUNICIPAL LAW WHICH CANNOT BE PREEMPTED. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

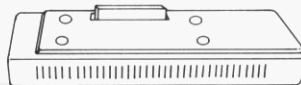
Keep your original sales receipt for the product with this warranty statement.

PRODUCT	SERIAL NUMBER	DATE OF PURCHASE	WHERE PURCHASED

Your IBM PCjr should be set up before installing *jr*Captain. Refer to your IBM Guide to Operations to perform this task.

This carton contains the following:

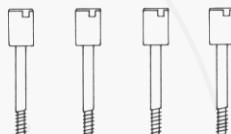
- *jr*Captain



- *jr*Captain Power Transformer and Cable



- Four Mounting Screws



- Treasure Chest Software



- *jr*Captain Installation Manual

- Treasure Chest Users Manual



- Treasure Chest Technical Reference

If any items are missing or damaged, notify your place of purchase.

Lay the four mounting screws aside. You will use them later to attach the *jr*Captain to the IBM PCjr.

FCC Required Instructions to IBM PCjr User

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

“How to Identify and Resolve Radio-TV Interference Problems”.

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

READ THIS FIRST !

This manual gives instructions for installing Tecmar's *jrCaptain* on your IBM PCjr. It also tells you how to add memory to the *jrCaptain*. In order that you can start at the right place for what you are trying to do, read the statements below. Select the one that most nearly matches the options you have purchased and take the appropriate action.

1. If your IBM PCjr has not been set up at this time, do so before installing *jrCaptain*. Your computer must have:

- One disk drive
- 128K bytes of RAM

2. You have purchased a *jrCaptain* and want to install it on your IBM PCjr.

Yes Go to Section 1.

No Go to question 2.

3. You have a *jrCaptain* installed on your IBM PCjr and you have purchased memory to add to your board.

Yes Go to Section 2.

No Go to question 3.

4. You have purchased a *jr*Captain and additional memory and wish to install the memory on the board and then install the board on the IBM PC*jr*.

Yes Go to Section 2.

No Reconsider what you have purchased.
Go to question 1.

Scanned by
MBB

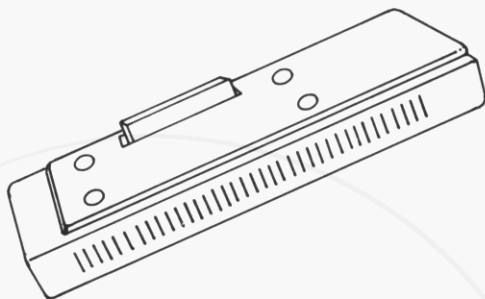
Contents

	Page No.
Checklist	1
Read This First	3
Section 1.	
<i>jr</i> Captain Installation	7
Tools Required	9
Installation Instructions	10
Section 2.	
Tecmar <i>jr</i> Captain Memory Expansion .	21
Tools Required	23
Installation Instructions	24
Section 3.	
<i>jr</i> Captain Technical Reference	39
Software Configuration	43
Recognition of Expanded Memory	43
Video Memory Configuration . . .	45
Configuring Disk Drives	49
Jumpers	50
Jumper Blocks	50
The <i>jr</i> Captain's Jumper Blocks . .	53
I/O Configuration	57

Memory Configuration	58
<i>Jr</i> Captain	58
<i>Jr</i> Cadet	59
Configuration	61
The Parallel Printer Port	62
I/O Address 378	63
I/O Address 379	63
I/O Address 37A	64
Parallel Port Pin Out	65
The Time of Day Chip	66
I/O Addresses	68
Counters and Latches	69
Interrupt Control Register	70
Interrupt Status Register	71
Counter Reset Register	72
Latch Reset Register	72
Rollover Bit Register	72
Go Register	73
Appendix A:	
Specifications	A1
Appendix B:	
<i>Jr</i> Captain Power Requirements	B1
Appendix C:	
Block Diagram Description	C1

Section 1.

***jr*Captain Installation**



Scanned by
MBB

Contents

Tools Required.....9

Installation Instructions.....10

Scanned by
MBB

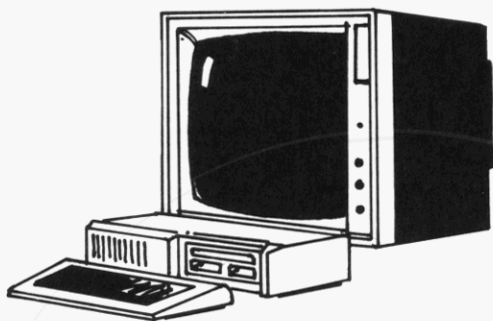
Tools Required

- Medium-size, flat-blade screwdriver.



Scanned by
MBB

Installation Instructions

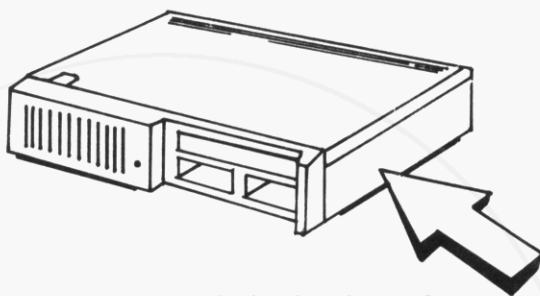


1. Turn your IBM PCjr power off.

Warning: After turning your IBM PCjr power off, allow five minutes for cooling to take place before removing the option attachment cover.

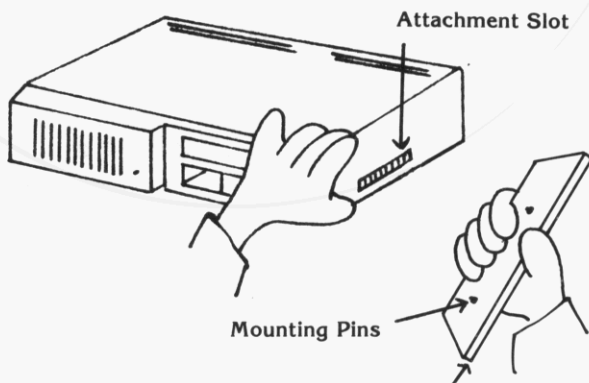
2. Turn power off on everything attached to your IBM PCjr (printers, television, etc.).
3. Unplug your IBM PCjr and your display or television power cords from the wall outlets.

4. Face the front of the computer system. In order to install the *jr*Captain you must first remove the option attachment cover on the right hand side of the computer system.



Option Attachment Cover

5. Remove the option attachment cover by gently pulling until it snaps out of place.



Option Attachment Cover

6. The option attachment cover should be put aside. You will attach it to the side of the installed *jrCaptain* in step 10.
7. You have purchased the *jrCaptain* with the memory configuration you desired already installed and the board switch set as shipped for each memory configuration.

If you purchased *jrCaptain* with **0K bytes of RAM**, the switch settings on the board should be as follows:



If you purchased *jrCaptain* with **64K bytes of RAM**, the switch settings on the board should be as follows:

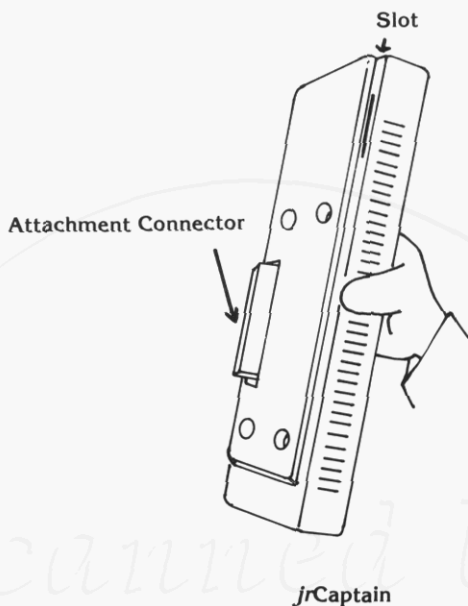


If you purchased *jrCaptain* with **128K bytes of RAM**, the switch settings on the board should be as follows:

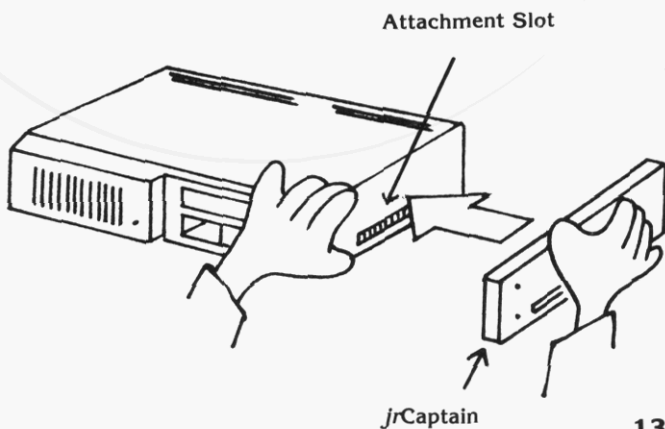


Note: Section 2 of this manual contains instructions for installing additional memory on your *jrCaptain*.

Pick up the *jrCaptain*. Hold it as shown in the picture.



8. Locate the attachment slot on the right side of the IBM PCjr. Plug the attachment connector of the *jrCaptain* into the attachment slot at the side of the IBM PCjr.

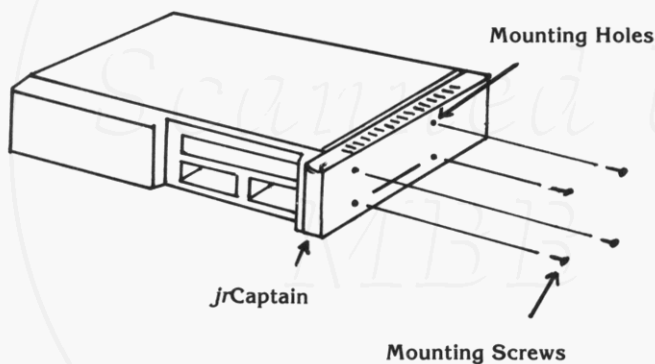


9. Is the *jrCaptain* firmly in place and evenly lined up with the side of the IBM PCjr?

Yes - go to step 10.

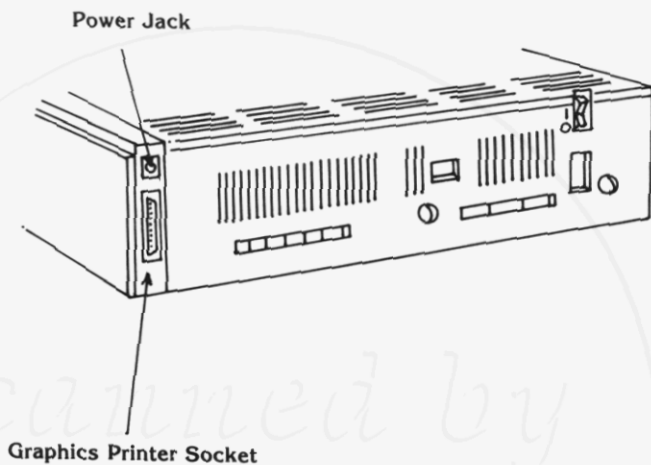
No - go to step 8.

10. Secure the *jrCaptain* to the side of the IBM PCjr using the four mounting screws you put aside. Reinstall the option attachment cover by pressing it firmly into the mounting holes of the *jrCaptain*.



11. Turn your IBM PCjr so the back is toward you.

12. Look at the back of the *jr*Captain. Find the Power Jack and the Graphics Printer Socket.

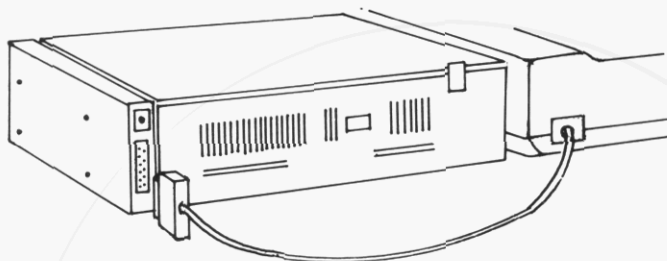


13. Do you have a printer?

Yes - go to step 14.

No - go to step 15.

14. Plug the cable coming from your printer into the graphics printer socket on the back of the *jr*Captain.

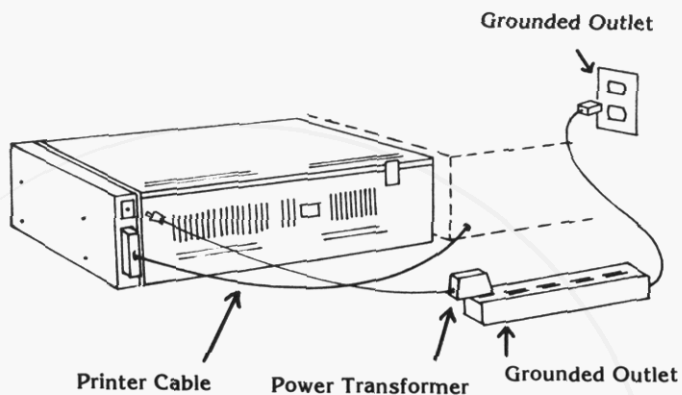


Printer Cable

Note: You must use a shielded cable to connect your printer to the computer in order to comply with FCC regulations.

15. Pick up the *jr*Captain's power transformer. Place the power transformer box on the table or desk near the IBM PCjr.
16. Plug the power cable from the power transformer into the *jr*Captain at the Power Jack.

17. Plug the *jr*Captain power transformer into a grounded outlet.



CAUTION:
Connect the power
transformer to a prop-
erly grounded outlet.

18. Turn your IBM PC_{jr} to the desired position for use.

19. Does your *jr*Captain have memory on it?

Yes - Go to step 20.

No - This completes the installation.

20. Insert the DOS disk in your disk drive and turn your computer on. Make sure DOS is ready and A > is displayed.

21. Treasure Chest diskette A has one file that must be copied onto your DOS boot disk:

CONPCJR.EXE

Note: This file is a program which **must** be run to enable the expanded memory. It **has to** be run once with all options needed at the time you turn on or reset your computer. The Software Configuration section in this manual contains a full explanation of the program and its options.

22. Refer to your DOS manual for instructions on copying files. Copy the CONPCJR file onto your DOS boot disk.
23. The CONPCJR (Configure the PCjr) file is a program that must be run each time you reset your computer. CONPCJR makes the expanded memory recognizable to your computer.
24. Because the program must be run each time you reset the computer, put the single line:

CONPCJR

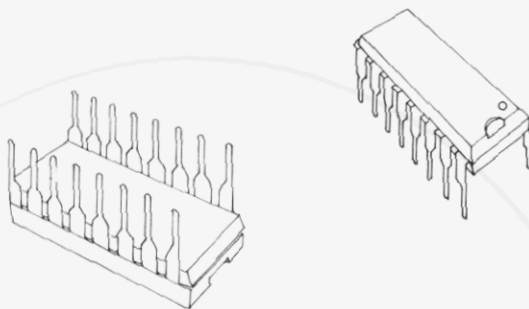
as the very first entry in an AUTOEXEC.BAT file on your DOS disk.

Note: Refer to your DOS manual for instructions on setting up an AUTOEXEC.BAT file. Refer to pages 46-49 for additional options for CONPCJR.

25. Once you have put the CONPCJR in an AUTOEXEC.BAT file, reset your computer.
26. Your computer with expanded memory is ready for use. **Remember, you can only add one *jrCaptain* to the IBM PCjr.** The Tecmar *jrCadet* can be purchased to increase memory to the maximum amount the IBM PCjr will recognize. The *jrCadet* attaches to the *jrCaptain* for increased memory.

Note: The program, 'CHKDSK' (Used to check a disk), may not recognize the memory as it has been set up and may produce incorrect results for the amount of available memory. It is suggested that you ignore that line of the output of the CHKDSK program.

Section 2. Tecmar *jr*Captain Memory Expansion



This section contains instructions for adding memory to the *jr*Captain.

Contents

Tools Required.....23

Installation Instructions.....24

Scanned by
MBB

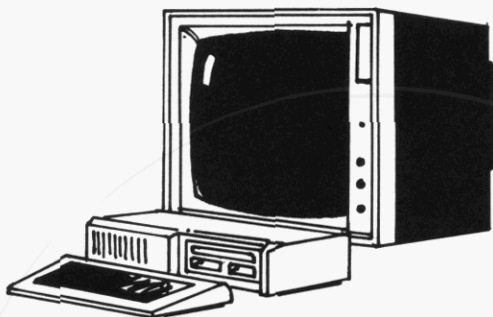
Tools Required

- Medium-size, flat-blade screwdriver.



Scanned by
MBB

Installation Instructions

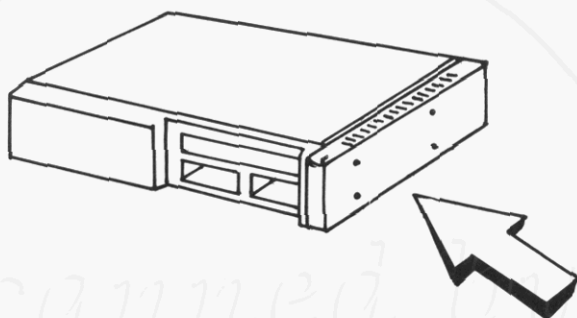


1. Turn your IBM PCjr power off.

Warning: After turning your IBM PCjr power off, allow five minutes for cooling to take place before removing the option attachment cover.

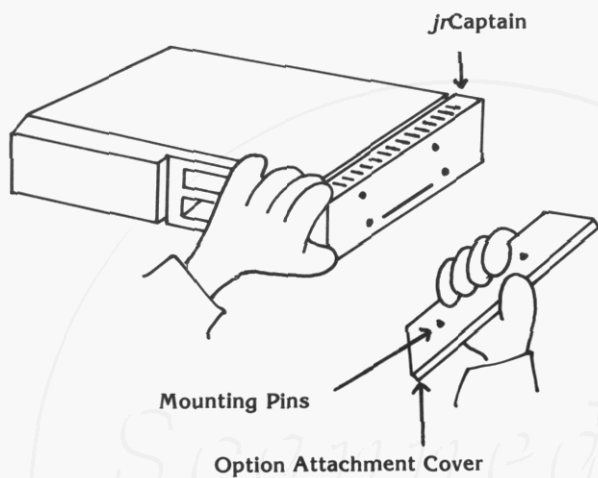
2. Turn power off on everything attached to your IBM PCjr (printers, television, etc.).
3. Unplug your IBM PCjr and your display or television power cords from the wall outlet.

4. The RAM chips must be installed on the *jr*Captain board inside the *jr*Captain.
5. In order to get to the board, the *jr*Captain will have to be removed and taken apart.
6. Find the option attachment cover.



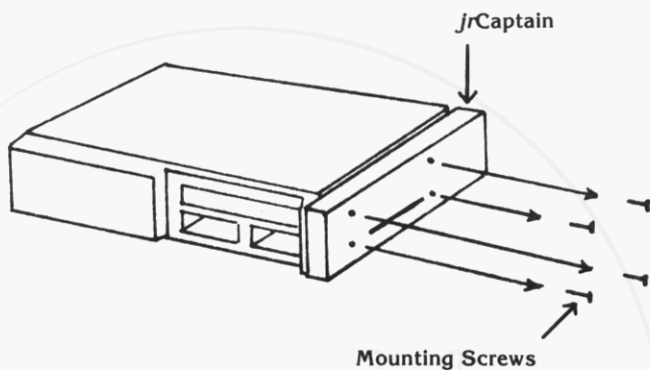
Option Attachment Cover

7. Gently pull on the option attachment cover until it snaps out of place.



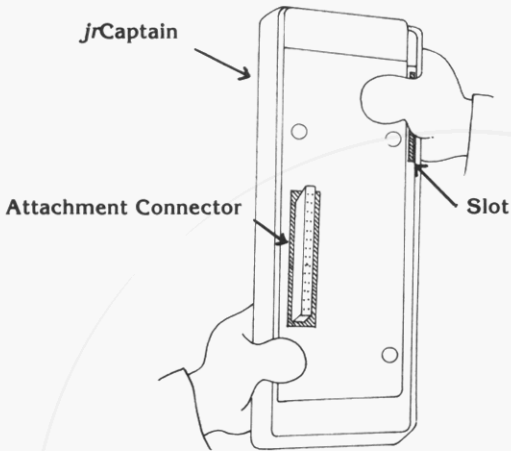
8. Put the option attachment cover aside.

9. Remove the four mounting screws that secure the *jrCaptain* to the side of the IBM PCjr.

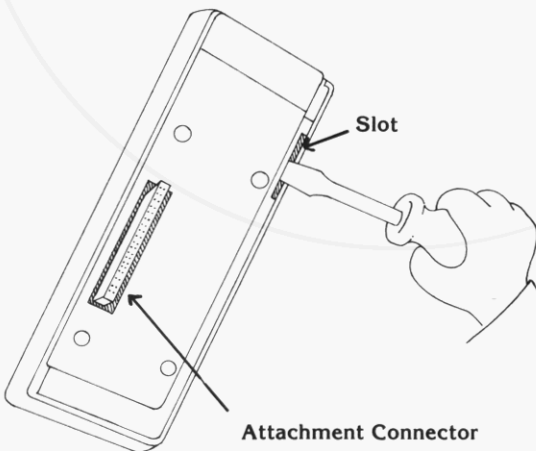


10. Gently pull the *jrCaptain* from the IBM PCjr attachment slot.

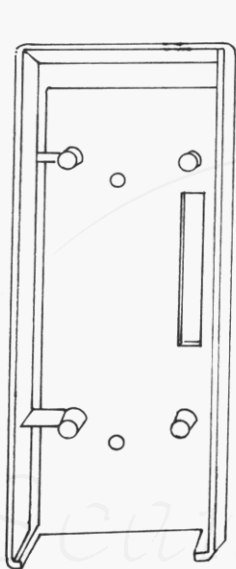
11. Hold the *jrCaptain* as shown below. Find the labeled parts on your *jrCaptain*.



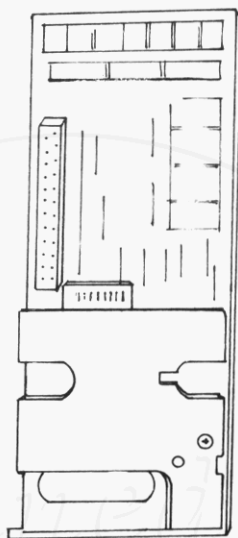
12. Insert a screw driver at the slot just under the *jrCaptain* cover (*insert only about $\frac{1}{4}$ " of the screwdriver tip*) and gently pry upward.



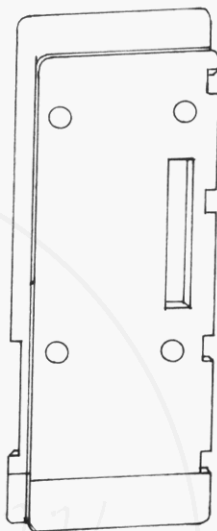
13. The *jr*Captain comes apart in the three pieces shown below.



***jr*Captain Box**

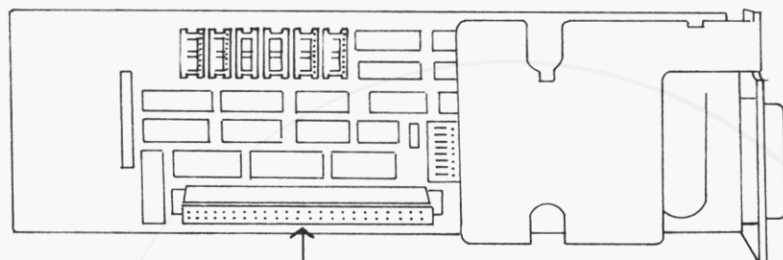


***jr*Captain Board**



***jr*Captain Cover**

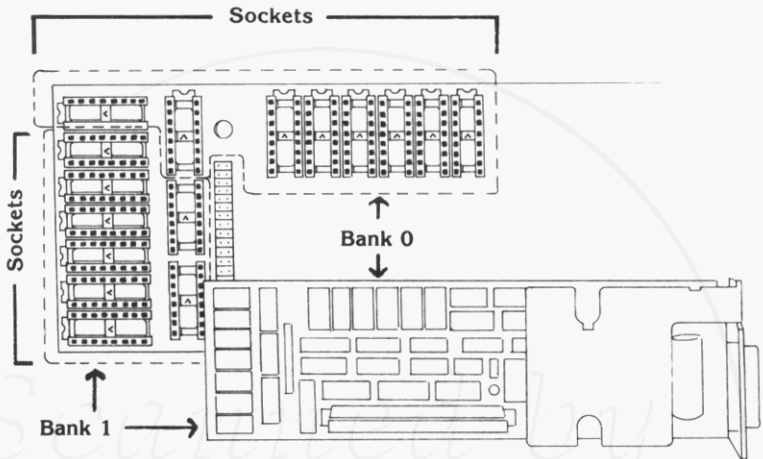
14. Pick up the *jr*Captain board and place it component side up **in the same position** as shown below. Put the *jr*Captain box and cover aside.



Attachment
connector

Component Side of
*jr*Captain Board

15. Look at the diagram below. Find the banks and the RAM chip sockets on your *jrCaptain* board.

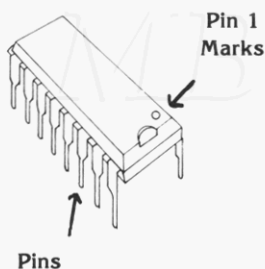


Note: Each socket has eight rows of dots that represent the holes where the pins of the RAM chips will be inserted.

16. Each of the RAM chips must be installed in a socket of a memory bank. When a bank's eight sockets are filled with RAM chips, 64K bytes or 256K bytes of memory have been installed depending on the setting of jumper 4.

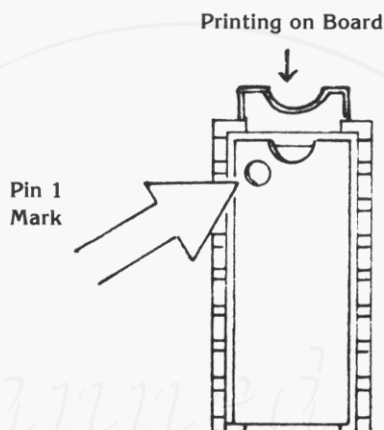
You may install either 64K byte RAM chips to a maximum of 128K bytes if jumper 4 is jumpered or 256K byte RAM chips to a maximum of 512K bytes if jumper 4 is not jumpered.

17. The RAM chip has eight sets of pins. You **MUST** know the location of Pin 1 to correctly install the RAM chip. Find the markings for Pin 1 shown below on one of your RAM chips.



Your particular chip
may have only one of the marks.

18. There is a printed outline on the *jr*Captain board at each socket position to indicate the position of Pin 1 of the socket once the RAM chips have been installed.



Serious damage will result if you install the chips backwards.

19. If you have your board component side up with the attachment connector at the bottom, when the RAM chips are installed:

- Pin 1 should be at the top of the RAM chips that are installed vertically.
- Pin 1 should be to the left of the RAM chips installed horizontally.

20. To install the RAM chips:

- In the table on the following page, find the amount of memory that you are adding.
- Insert the RAM chips as directed below in the sockets of the *memory* banks on your *jrCaptain* board.
- Gently press the pins of the RAM chips into the pin holes of each socket of the bank you are filling.
- Make certain that each of the pins of the RAM chip fits into a pin hole of the socket.
- Be sure that each RAM chip fits snugly in the socket of the bank.
- If you bend a pin or miss a socket plug, pull the RAM chip out, straighten pins, and reinsert.

Note: If you are using 256K RAM chips, jumper 4 should not be jumpered (see Page 56).

***jr*Captain Board** (Using 64K RAM Chips)

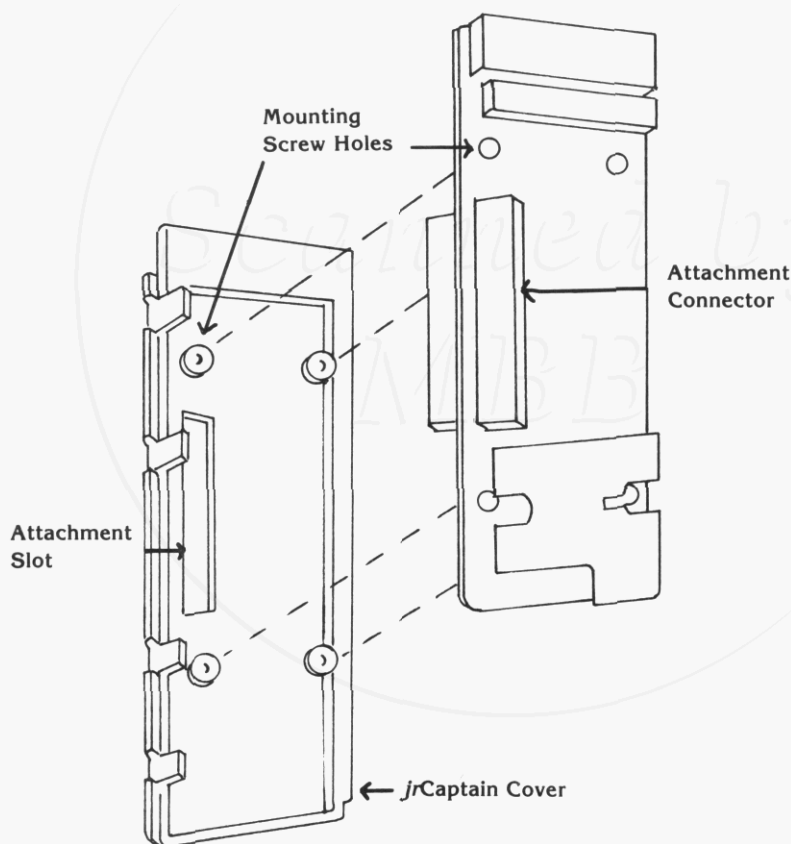
Current <i>jr</i>Captain Memory	Memory To Be Added	Action To Take
0K bytes	64K bytes	Fill Bank 0
0K bytes	128K bytes	Fill Banks 0 and 1
64K bytes	64K bytes	(Bank 0 should already be filled) Fill Bank 1

***jr*Captain Board** (Using 256K RAM Chips)

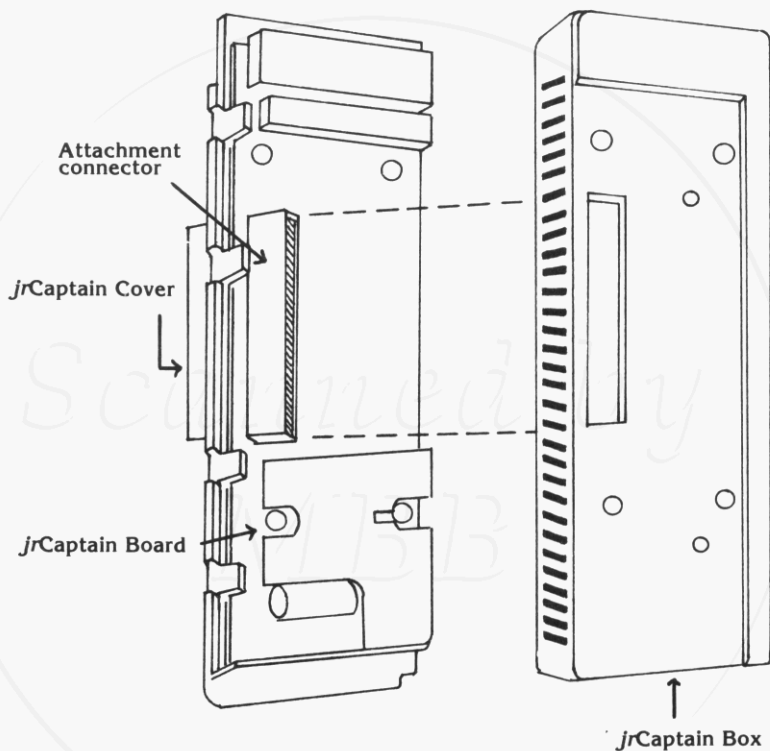
Current <i>jr</i>Captain Memory	Memory To Be Added	Action To Take
0K bytes	256K bytes	Fill Bank 0
0K bytes	512K bytes	Fill Banks 0 and 1
256K bytes	256K bytes	(Bank 0 should already be filled) Fill Bank 1

21.

It is easy to put the *jr*Captain back together. Pick up the *jr*Captain cover and the *jr*Captain board. Place the board on the cover component side up. Be sure that the attachment connector is in the right place. Align the four mounting screw holes. Press the two pieces together at the holes until they snap into place.



22. Snap the *jrCaptain* box onto the board. Make sure the attachment slot is aligned correctly with the attachment connector.



23. Go to step 8 in Section 1 of this manual to reinstall the *jrCaptain*.

Scanned by
MBB

Section 3. ***jr*Captain Technical Reference**

This technical reference section is here for your information as it is needed. You do not have to read this section to use the *jr*Captain.

Scanned by
MBB



Scanned by
MBB

Contents

Software Configuration.....	43
Jumpers	50
I/O Configuration.....	57
Memory Configuration.....	58
The Parallel Printer Port.....	62
The Time of Day Chip.....	66
Appendix A: Specifications.....	A1
Appendix B: Power Requirements.....	B1
Appendix C: Block Diagram Description...	C1

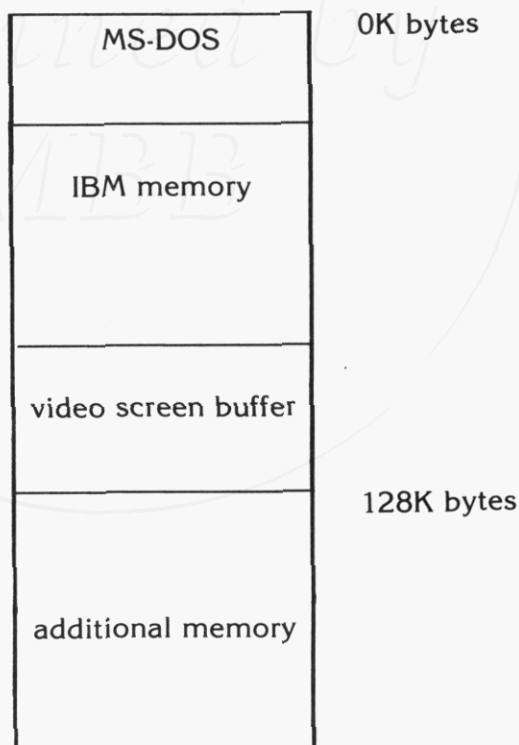


Scanned by
MBB

Software Configuration

Recognition of Expanded Memory

When the IBM PCjr is running MS-DOS, DOS will not automatically recognize more than 128K bytes of memory. The problem exists because the IBM PCjr uses up to the last 32K bytes of the first 128K bytes of memory for the video screen buffer. Additional memory is placed after the first 128K bytes and therefore, after the video screen buffer. Alas, the screen buffer proves too hard a problem to overcome and the additional memory is left abandoned and unused.



A program has been developed to allow the additional memory to be used. It exists on your Treasure Chest diskette A. The program is stored in a file called

CONPCJR.EXE

This file must be copied onto your DOS boot diskette. The single line,

CONPCJR

must be placed as the first line in an AUTOEXEC.BAT file to cause the program to be executed whenever DOS is booted.

Note: This program must not be run directly. It must be run from the AUTOEXEC.BAT file. It also must be the very first entry in the AUTOEXEC.BAT file.

Video Memory Configuration

The above scheme segments memory into 2 parts; the usable IBM memory somewhere below 128K bytes and the additional memory above 128K bytes. Sometimes, programs find it useful to have a large amount of continuous memory.

The video screen buffer takes up 16K bytes of memory if only alphanumeric mode is being used and 32K bytes of memory if graphics mode is used. If only alphanumeric mode is being used, the video screen buffer may be moved to any 16K byte boundary in the first 128K bytes of memory. If graphics mode is used, the video screen buffer may be moved to any 32K byte boundary in the first 128K bytes of memory.

The first 128K bytes of memory are divided into 8 pages, each containing 16K bytes. The pages are numbered from 0 to 7.

Video Memory Pages

page 0	0K bytes
page 1	16K bytes
page 2	32K bytes
page 3	48K bytes
page 4	64K bytes
page 5	80K bytes
page 6	96K bytes
page 7	112K bytes
	128K bytes

If you are using only alphanumeric mode, the video screen buffer will take up one page. If you are using graphics mode, the video screen buffer will take up two pages.

As you may wish to use graphics mode at some point while using the IBM PCjr, CONPCJR automatically reserves two pages for the video screen buffer. The pages reserved by default are 6 and 7.

You may specify which pages you wish CONPCJR to reserve. You specify which alphanumeric page you wish to reserve and the appropriate adjacent page will also be reserved to make up the graphics screen buffer. Since the graphics screen buffer must start on a 32K byte boundary, the next page is reserved if the alphanumeric page number is even, otherwise the previous page is reserved.

To specify the page number for CONPCJR to reserve, you should use the following line.

CONPCJR - Pn

where n is the page number you wish to reserve. Page n will be reserved for the alphanumeric screen buffer. The extra page reserved to make up the video screen buffer will be n + 1 if n is even or n - 1 if n is odd. This page is only used when you go into graphics mode.

Pages 0 and 1 may not be reserved as DOS uses them. If you know that you will never go into Graphics mode, you may make CONPCJR reserve only the alphanumeric screen buffer. Only 16K bytes of memory will be reserved for the screen buffer, thus giving you an extra 16K bytes of usable memory.

To reserve only the alphanumeric screen buffer, use the following line:

CONPCJR - A - Pn

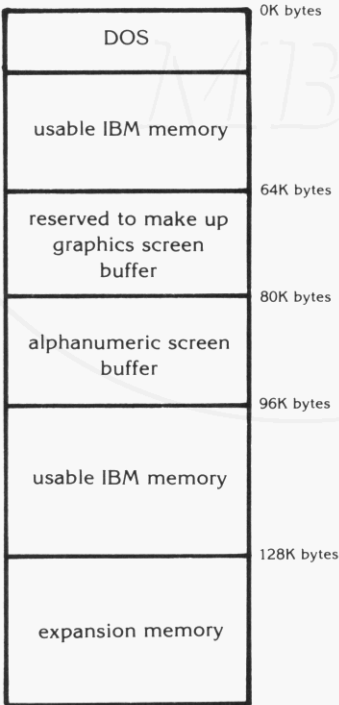
where n is the page number you wish to reserve for the alphanumeric screen buffer. No other pages are reserved. Only the page that you specified is reserved for the alphanumeric screen buffer.

Reserving only alphanumeric memory is not recommended for the novice user. You might use a program that uses graphics mode and confused results will occur.

An example will show the area of memory reserved. The line,

CONPCJR – P2

will reserve page 2 for the alphanumeric screen buffer. Page 3 will also be reserved to make up the graphics screen buffer if graphics mode is ever used.



Configuring Disk Drives

PCjr is configured to recognize only one disk drive. There are times when it is useful to configure PCjr to recognize more than one drive. An example is when using the Treasure Chest program MEMDISK. MEMDISK will simulate a second drive in memory but it is necessary to configure the PCjr to know about two drives. To configure the PCjr to have more than 1 drive, place the line

CONPCJR - Dn

as the first line of the AUTOEXEC.BAT file where n is replaced by the number of drives you wish to configure for the IBM PCjr. By placing the line

CONPCJR - D2

as the first line of the AUTOEXEC.BAT file, the PCjr will come up recognizing 2 drives.

You may use any or all of the options for CONPCJR simultaneously, the line

CONPCJR - A - P2 - D2

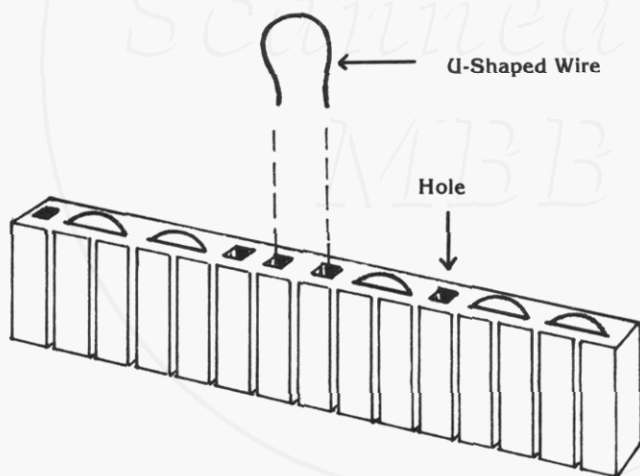
will reserve page 2 as the alphanumeric screen buffer. No graphics memory will be reserved. The PCjr will come up recognizing 2 drives.

Jumpers

Jumper Blocks

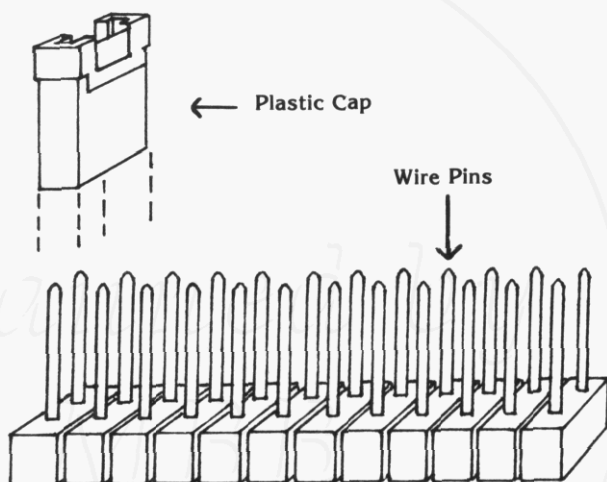
Tecmar uses two kinds of jumper blocks. Either one or both may be found on a board.

One kind of jumper block is a plastic rectangle with small holes on the top surface. Positions in this type of jumper block are connected by placing a preformed U-shaped wire in two adjacent holes. The two holes represent one position of the jumper block.



To disconnect a position, remove the U-shaped piece of wire with a pair of tweezers or needle-nose pliers.

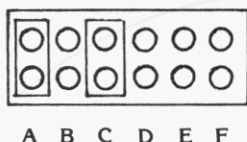
The other kind of jumper block is a plastic block with perpendicular wire pins protruding from its top surface. Positions in this type of jumper block are connected by placing a plastic cap over two adjacent pins. The two pins represent one position on the jumper block.



To disconnect a position, remove the plastic cap by hand or with a pair of tweezers or needle-nose pliers.

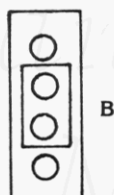
When the U-shaped wire or plastic cap is in place, a connection has been made and that position is jumpered. In the diagrams below, Jumper Block JPR1 is jumpered in positions A and C and Jumper Block JPR5 is jumpered in position B.

JPR1



Jumpered

JPR5



Note:

The jumper blocks shown above are examples only. They do not appear on your *jr*Captain board.

The *jr*Captain's Jumpers Blocks

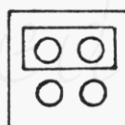
Jumper 1

Exists for engineering purposes only. This block is always jumpered.

Jumper 2

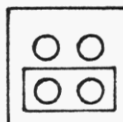
Jumper 2 selects the I/O address port that addresses the parallel port and the time of day chip.

When jumpered in the high position,



the printer port is addressed through addresses 378, 379, and 37A. The time of day is addressed through addresses 37D and 37F. When Jumper 2 is jumpered in the high position, the printer port address is referred to as LPT1, while the time of day port address is referred to as TIME1.

When jumpered in the low position,



the printer port is addressed through addresses 278, 279, and 27A. The time of day is addressed through addresses 27D and 27F. When Jumper 2 is jumpered in the low position, the printer port address is referred to as LPT2, while the time of day port address is referred to as TIME2.

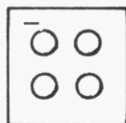
More specific information about Jumper 2 can be found in the I/O Configuration discussion in this section.

Scanned by
MBB

Jumper 3

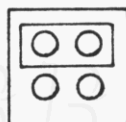
Jumper 3 selects the interrupt line on which an interrupt may be generated from the time of day chip.

If jumper 3 is not jumpered,



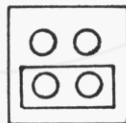
no interrupt is generated.

If jumper 3 is jumpered in the high position,



an interrupt may be generated on IRQ1.

If jumper 3 is jumpered in the low position,



an interrupt may be generated on IRQ2.

Jumper4

Jumper 4 selects the kind of RAM chips that are to be installed and used on the *jr*Captain Board. Jumper 4 is jumpered as shipped.

If jumper 4 is jumpered,



64K byte RAM chips can be installed and used with the *jr*Captain.

If jumper 4 is not jumpered,



256K byte RAM chips can be installed and used with the *jr*Captain,

More specific information about jumper 4 can be found in the Memory Configuration Section.

I/O Configuration

As mentioned previously, the I/O addresses used to address the parallel port and time of day chip may be selected by jumper 2.

When jumper 2 is jumpered in the high position, the following applies.

Address	Function	Read/ Write	None
888 Dec (378 Hex)	Printer Data	R/W	LPT1
889 Dec (379 Hex)	Printer Status	R	
890 Dec (37A Hex)	Printer Control	R/W	
893 Dec (37D Hex)	Clock Address latch	W	TIME1
895 Dec (37F Hex)	Clock data	R/W	

When jumper 2 is jumpered in the low position, the following applies.

Address	Function	Read/ Write	None
632 Dec (278 Hex)	Printer Data	R/W	LPT2
633 Dec (279 Hex)	Printer Status	R	
634 Dec (27A Hex)	Printer Control	R/W	
637 Dec (27D Hex)	Clock Address latch	W	TIME2
639 Dec (27F Hex)	Clock data	R/W	

In this manual, most examples assume that the jrCaptain board is configured as TIME1 and LPT1. If an example contains the board addressed differently, use the corresponding addresses.

Memory Configuration

JrCaptain

The *JrCaptain* may not be installed unless the IBM PCjr has the IBM 64K byte expansion board installed, bringing the total amount of memory on the IBM PCjr to 128K bytes. Memory on the *JrCaptain* will be placed in physical memory starting at 128K bytes.

The *JrCaptain* has two banks of RAM. The banks may each contain 64K bytes of memory or 256K bytes of memory depending on the setting of jumper 4. Each bank consists of eight sockets, each of which must be filled with RAM chips to enable the particular bank. Each bank of memory is also placed in a specific address range in physical memory.

There is a switch module on the board consisting of eight switches. The first switch on the switch module enables the first bank of memory while the second switch enables the second bank of memory.

Each bank of memory may be independently enabled or disabled. Since each bank of memory is associated with a particular physical address range, it is possible to configure memory such that memory is not continuous. For example, disabling bank 0 and enabling bank 1 will cause a gap to exist where bank 0 should have been.

jrCadet

For further expansion, Tecmar provides a companion to the *jrCaptain*, the *jrCadet*. The *jrCadet* is a separate board which plugs into the IBM PCjr. You must have a *jrCaptain* before installing a *jrCadet*.

The *jrCadet* has 6 banks of RAM. Each bank may contain 64K bytes of memory. The total memory capacity of the *jrCadet* is 384K bytes.

On the *jrCaptain* board, the first two switches enabled the two banks of memory on the *jrCaptain* board. The other 6 switches each enable a bank of memory on the *jrCadet* board.

Again, each bank of memory on the *jrCadet* has a physical address range associated with it. Also each bank of memory on the *jrCadet* may be independently enabled or disabled by setting or resetting the corresponding switch on the *jrCaptain*.

Configuration

Remember that if jumper 4 is set, each bank of memory on the *jr*Captain contains 64K bytes of memory. If jumper 4 is not set, each bank of memory contains 256K bytes of memory.

Jumper 4 does not affect the banks of memory on the *jr*Cadet board. Each bank of memory on the *jr*Cadet board always contains 64K bytes of memory.

The chart on the next page describes the function of each switch on the *jr*Captain board in combination with the state of jumper 4. The amount of memory enabled by the switch along with the address where the memory resides in physical memory is given.

Note: By using 256K RAM chips instead of 64K RAM chips, it is possible to have more than 640K bytes of memory on the IBM PCjr. It is, however, not advisable to add more than 832K bytes of memory to the IBM PCjr. The physical addresses corresponding to memory above 832K bytes may be used by the cartridge ROM and ROM BIOS.

SW1	Selected Bank	JPR4 Setting	
		Jumpered	Unjumpered
1	<i>jr</i> Captain Bank 0	64K 20000-2FFFF	256K 20000-5FFFF
2	<i>jr</i> Captain Bank 1	64K 30000-3FFFF	256K 60000-9FFFF
3	<i>jr</i> Cadet Bank 0	64K 40000-4FFFF	64K A0000-AFFFF
4	<i>jr</i> Cadet Bank 1	64K 50000-5FFFF	64K B0000-B7FFF (32 KBytes usable only)
5	<i>jr</i> Cadet Bank 2	64K 60000-6FFFF	64K C0000-CFFFF
6	<i>jr</i> Cadet Bank 3	64K 70000-7FFFF	(has no effect)
7	<i>jr</i> Cadet Bank 4	64K 80000-8FFFF	(has no effect)
8	<i>jr</i> Cadet Bank 5	64K 90000-9FFFF	(has no effect)

The Parallel Printer Port

The printer port on the *jr*Captain has a parallel interface which allows it to be easily used with an IBM printer or an EPSON MX80 or RX80. It is directly compatible with the parallel port provided for the IBM PC and may be accessed using IBM software. It may also be used as a general parallel port for input and output.

There are three I/O addresses associated with the parallel printer port. Depending on how jumper 2 is jumpered, the addresses are 378, 379 and 37A or, 278, 279 and 27A. For description here, we will assume that jumper 2 has been jumpered in the high position so that the addresses used are 378, 379 and 37A.

I/O Address 378 (printer data)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

The eight bit value written to this port address appears on the eight data pins of the parallel printer port. If this port is read, the last value that was written to this port is returned.

I/O Address 379 (printer status)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
BUSY	ACK	PE	SEL	ERROR	Unused	Unused	Unused

This port address is read only and may not be written to. The value read is the current value of the above pins.

I/O Address 37A (printer control)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Unused	Unused	Unused	INTERRUPT ENABLE	SELECT INPUT	INIT	AUTO FEED	STROBE

This port address may be written to set the value of any of the above pins. You may also read the port address to get the current value of the above pins.

Parallel Port Pin Out

The parallel port has 12 buffered output pins which are latched and can be written to or read from at any time. There are 5 steady state input pins which may be read at any time. The other 8 pins are unused.

The pin out of the parallel port is given below.

Pin	Signal Name	Description
1	– STROBE	Strobe
2	D0	Data bit 0
3	D1	Data bit 1
4	D2	Data bit 2
5	D3	Data bit 3
6	D4	Data bit 4
7	D5	Data bit 5
8	D6	Data bit 6
9	D7	Data bit 7
10	– ACK	Acknowledge
11	+ BUSY	Busy
12	+ PE	Parity enable
13	+ SEL	Select
14	– AUTOFEED	Automatic feed
15	ERROR	Error
16	– INIT	Initialize
17	SELINP	Select input
18	GROUND	Unused
19	GROUND	Unused
20	GROUND	Unused
21	GROUND	Unused
22	GROUND	Unused
23	GROUND	Unused
24	GROUND	Unused
25	GROUND	Unused

The Time Of Day Chip

The time of day chip keeps track of the current time and date. Because it is powered by its own battery, it will still remember the time when the *JrCaptain* is turned off. The chip may also be used to cause an interrupt when the current time and date match a previously set time and date.

There are two I/O addresses associated with the time of day chip. Depending on how jumper 2 is jumpered, the addresses are 37D and 37F or the addresses 27D and 27F. For description here, we will assume that jumper 2 has been jumpered to the high position so the addresses used are 37D and 37F.

Scanned by
MBB

Replacing Your Battery

The battery for the clock/calendar on your *jr*Captain may need to be replaced once each year. Return your *jr*Captain to your dealer or to Tecmar for a replacement.

The battery must be replaced by a factory trained technician.

Scanned by
MBB

I/O Addresses

There are 22 registers inside the time of day chip. Each of the registers is 8 bits wide. There are 16 read/write registers, 2 read/only registers and 4 write/only registers. They are described in the following chart.

Address	Access	Function
0	R/W	Thousandth second counter
1	R/W	Tenth and hundredth second counter
2	R/W	Second counter
3	R/W	Minute counter
4	R/W	Hour counter
5	R/W	Day of the week counter
6	R/W	Day of the month counter
7	R/W	Month counter
8	R/W	Thousandth second latch
9	R/W	Tenth and hundredth second latch
10	R/W	Second latch
11	R/W	Minute latch
12	R/W	Hour latch
13	R/W	Day of the week latch
14	R/W	Day of the month latch
15	R/W	Month latch
16	R	Interrupt status register
17	W	Interrupt control register
18	W	Counter reset
19	W	Latch reset
20	R	Rollover bit
21	W	Go register

To read or write to one of the 22 registers in the time of day chip, first write the value of it's address to I/O address 37D. The address will be a number between 0 and 21. Then, by reading or writing to I/O address 37F, you will read or write the corresponding register in the time of day chip.

Counters and Latches

All of the values for the counter or latch registers in the time of day chip are encoded in BCD or binary coded decimal. In BCD, an 8 bit byte is divided into 2 nibbles, each of which is 4 bits in length. Each nibble may contain a value between 0 and 9. These two numbers are put together to form the decimal number. For example, the decimal number 27 is represented by the BCD binary number 0010 0111. The high order nibble is the 2 and the low order nibble is the 7. This number is 27 in hexadecimal or 39 in decimal. Thus the decimal number 27 when converted to BCD becomes the decimal number 39.

The thousandths of second register contains a value from 0 to 9. The tenth and hundredth of second register contains a value from 0 to 99. The second register and minute registers contain a value from 0 to 59. The hour register uses the 24 hour clock. Midnight is represented by 0 while 11 p.m. is represented by 23. The day of the week register contains a value from 1 to 7. Sunday is represented by 1 while Saturday is represented by 7. The day of the month register contains a value from 1 to 31. The month register contains a value between 1 and 12. January is represented by 1 while December is represented by 12. Remember that these values are stored in BCD.

Interrupt Control Register

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
month	week	day	hour	minute	second	tenth of second	latch alarm

By setting any one of the bits from 1 to 7, you may cause an interrupt to be generated when the corresponding counter rolls over to it's minimum value. If more than one bit has been set, the lowest order bit takes effect. Note that the board must be jumpered for interrupts in order for the interrupt to be generated.

If bit 0 is set, an interrupt will be generated when the values of each of the counter registers match the corresponding values of each of the latch registers.

Interrupt Status Register

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
month	week	day	hour	minute	second	tenth of second	latch alarm

This register is used to determine the source of an interrupt. When an event occurs that would trigger an interrupt, the corresponding bit will be set in this register. Reading this register will clear it.

Note that the interrupt status register will contain valid information whether or not the board has been jumpered for interrupts. This allows you to use a board that has not been jumpered for interrupts as a timer. Rather than having an interrupt routine, you must poll the interrupt status register until one of the bits is set.

Counter Reset Register

You may set all the counter registers to their minimum values by writing a hexadecimal FF to this register.

Latch Reset Register

All the latch registers may be set to their minimum values by writing a hexadecimal FF to this register.

Rollover Bit Register

This register is set to 1 anytime any of the counters change their value. As the thousandths second counter is set every thousandth of a second, this register is set to 1 at that rate. Reading this register will clear it.

Before reading the counters, you should read the rollover bit register to clear it. Read all the counter registers you wish to read and then read the rollover bit register again. If the rollover bit register has been set, you must go through this operation again.

The reason that the above procedure should be followed is that should the time of day chip be in the process of updating the counters while you are reading them, you may get some of the old values and some of the new values. This could result in an incorrect time.

Go Register

If a 1 is written to this register, the thousandths second counter and the tenth and hundredth second counter is reset. The purpose of this register is to allow you to set the other counter registers, wait until the thousandth second counter and the tenth and hundredths second counter should be zero and then setting this register to 1.

The reason for setting the time in this way is that it may take a longer time to set the thousandths second counter and the tenth and hundredth second counter than it takes for those counters to update. Using the above procedure allows the time to be set very quickly.

Scanned by
MBB



Scanned by
MBB

Appendix A: Specifications

Memory Capacity: 0K byte to 512K bytes

Parallel Printer Port

I/O Address: Jumper selectable between the addresses 378, 379, 37A and the addresses 278, 279, 27A.

Clock/Calendar

I/O Address: Jumper selectable between the addresses 37D and 37F and the addresses 27D and 27F.

Load:

1 TTL load/bus line max.

RAM Chips:

Intel 4164-20 or equivalent (or 256K bytes).

Battery Life:

Approximately one year.

Power:

(with 128K bytes)
800 mA @ +5V max



Scanned by
MBB

Appendix B:

***jr*Captain Power Requirements**

The *jr*Captain contains its own on-board power supply. A power transformer with a wall plug is connected to side of the *jr*Captain.

The *jr*Captain on-board power supply produces + 5 Volts dc.

Shown below are the current power requirements for *jr*Captain with 0, 1 and 2 banks of memory.

***jr*Captain Banks of Power**

0	630 mA
1	750 mA
2	780 mA



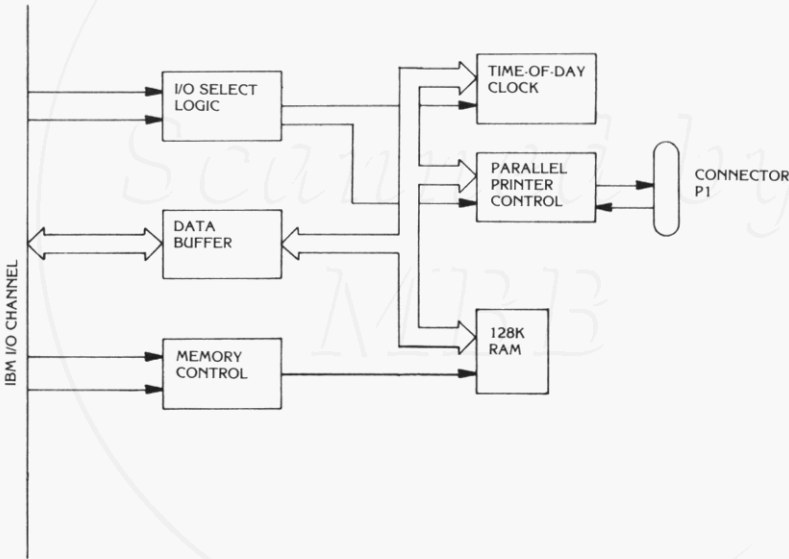
Scanned by
MBB

Appendix C:

Block Diagram Description

- 1. Data buffer:** A bidirectional buffer transfers data between the IBM data lines and the RAM and I/O sections on the board.
- 2. Memory control:** This section controls the selection, refresh and address timing of the 128K bytes of RAM. Using the settings of the switches, this section determines which 64K byte sections of memory will be addressed. The refresh provides the signals to the memory necessary to maintain the integrity of the memory. It is user transparent.
- 3. 128K bytes RAM:** An array of RAM modules providing 128K bytes by 8 bits.
- 4. I/O select logic:** When the address is correct, this section selects one of the I/O sections for I/O read or write operations.

- 5. Time of day clock:** The real-time clock is made up of an address latch, the clock itself (MM58167) and the battery for stand-by power.
- 6. Parallel printer port:** The printer port is completely compatible with all IBM software and is meant to connect to an IBM, EPSON, or equivalent printer. The parallel printer port is available through connector P1.



Product Comment Form

jrCaptain

20502

Your comments are a vital tool in assisting us in our efforts to continue the improvement of PC-Mate products and the accompanying manuals.

Suggestions may be used or distributed by Tecmar in any form it believes appropriate without any obligation whatever. This does not limit your use of the information that you originate and supply to Tecmar.

Comments:

Scanned by
MBB

Name _____

Address _____

City _____ State _____

Zip Code _____

Scanned by
MBB

TECMAR INCORPORATED

PERSONAL COMPUTER PRODUCTS DIVISION

6225 COCHRAN ROAD

OLON (CLEVELAND), OHIO 44139-3377

TELEPHONE - (216) 349-0600, TELEX - 466692