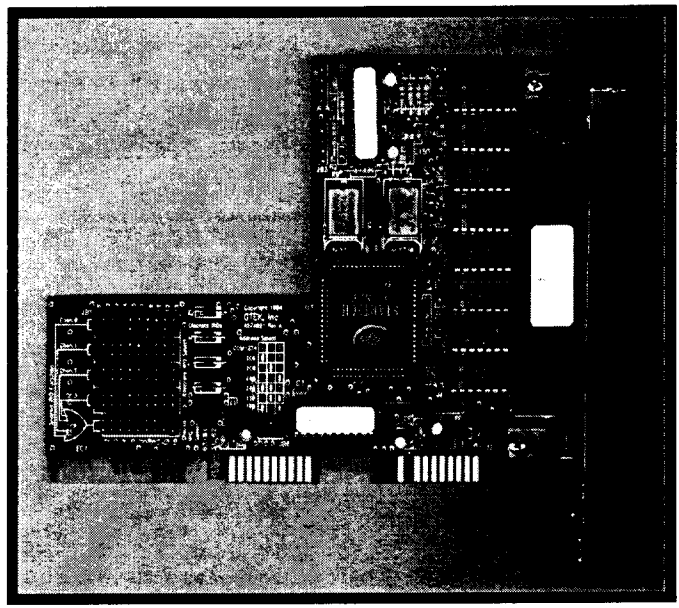
BlackBoard-4™

Equipped With the BBS Guardian Watchdog Circuit



Installation and Reference Manual

GTEK®, INC.

LOOK FOR THIS SYMBOL WHEN SELECTING BBS SOFTWARE

Congratulations!

You've purchased the fastest and most flexible four port serial card available on the market today. Before you install your new BlackBoard-4, please read the following installation instructions.

Address Range Selection

In order to configure your BlackBoard-4, you must first determine where you have available I/O space in your computer. Each port (16550 UART) of the BlackBoard-4 occupies 8 bytes of I/O space. Since there are 4 ports on the BlackBoard-4, each BlackBoard-4 card that you install occupies 32 bytes of I/O space. Below is a list of common uses of I/O space.

Hex Range
100 - 107 PS/2 type programmable option select registers
1F0 - 1FF Hard Dist (AT)
200 - 20F Game/Control Port
210 - 21F Expansion Unit (XT)
238 - 23B Bus Mouse
23C - 23F Alternate Bus Mouse
278 - 27F Parallel printer
2B0 - 2BF EGA Display Port
2C0 - 2CF EGA Display Port (alt)
2D0 - 2DF EGA Display Port (alt)
2E0 - 2E7 GPIB (AT)
2E8 - 2EF Serial Port (COM4)
2F8 - 2FF Serial Port (COM2)
300 - 30F Prototype Card
310 - 31F Prototype Card
320 - 32F Hard Disk (XT)
378 - 37F Parallel Printer
380 - 38F SDLC
3A0 - 3AF SDLC
3B0 - 3BB MDA
3BC - 3BF Parallel Printer
3C0 - 3CF EGA
3D0 - 3DF CGA
3E8 - 3EF Serial Port (COM3)
3F0 - 3F7 Floppy Disk

Use the chart above to help to determine where you have 32 bytes of contiguous I/O space to install your new BlackBoard-4.

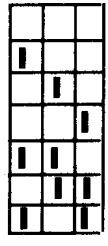
After you have located available I/O space, you may wish to verify that this space is not in use by another I/O device. You can do this by running the IOMAP.EXE program which is on the diskette included with your unit. It is recommended that you back up your original diskette and store in safe place. To run the program, simply type IOMAP followed by the Enter key. The IOMAP program will give you a visual representation of the I/O space in the 100- 3FF range. Each dot on the screen represents an available byte of I/O Colored or tilled in rectangles indicate I/O space which is currently in use by another device.

Note:

The IOMAP program will not function if you have a network card installed in your computer.

The Following address ranges are available on the BlackBoard- and are selectable using the three addr select jumpers. (Located at JB6

JB6 Jumper Settings



Port0	Port1	Port2	Port3
3F8	2F8	3E8	2E8
2E0	2E8	2F0	2F8
2C0	2C8	2D0	2D8
280	288	290	298
200	208	210	218
120	128	130	138
100	108	110	118

I= Jumper installed

A Word About Interrupts...

Not all BBS software uses interrupts for serial communication. If your software does not use interrupts for serial data, remove all jumpers on JB 1.

Note:

MajorBBS by Galacticomm does not use interrupts.

If your software does require interrupts, please read on... In addition to knowing where the UARTS are, your software needs to know which ports are associated with each interrupt. This is so that when the PC receives an interrupt request on a certain IRQ line, it knows from where the interrupt came.

Some software (including Wildcat!) packages require that each port on your BlackBoard- has a dedicated interrupt. Most BBS packages which require an external multitasker (i.e. Desqview, OS/2 Windows) require separate dedicated interrupts.

Other software packages (TBBS for example) allow you to assign all ports to only one interrupt. This is called interrupt sharing. If your software allows interrupt sharing, you should use it. Interrupt sharing conserves interrupts and allows them to be used for other devices, i.e. CD ROM's, Hard Disk Drives, Parallel Ports, etc.

Note:

Your BlackBoard- is fully compatible with COMTSR, XOO and the BNU FOSSIL drivers. If you will be running a FOSSIL driver you will use the shared interrupt mode. Consult your FOSSIL driver reference manual for more information.

First, you must determine how many interrupts you will need for your BBS software. (Ask your software Vendor about this.) Then figure out which interrupts are available to you in your PC. As with I/O address space, certain interrupts are already used by your PC and may not be used by your BlackBoard-4. See the following chart and then select the appropriate interrupt selections using the jumpers on JB1.

Common Hardware Interrupts used by an AT class computer:

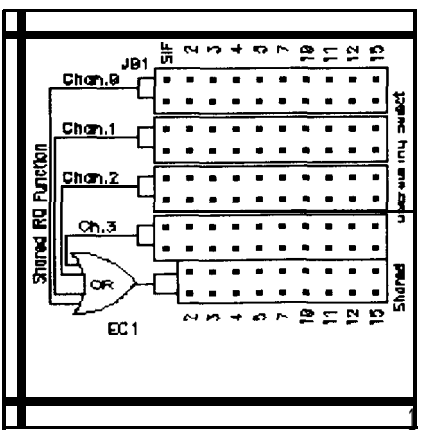
Name	Description
NMI	Parity (Not available on bus)
0	Timer (Not available on bus)
1	Keyboard (not available on bus)
2	Cascade
3	COM2 or SDLC
4	COM1 or SDLC
5	LPT (XT = Hard Disk)
6	Floppy Disk
7	LPT
8	Real Time Clock
9	Re-Directed to IRQ2
10	Unassigned
11	Unassigned
12	Unassigned
13	80x87 Coprocessor
14	Hard Disk
15	Unassigned

Using the interrupt select jumpers

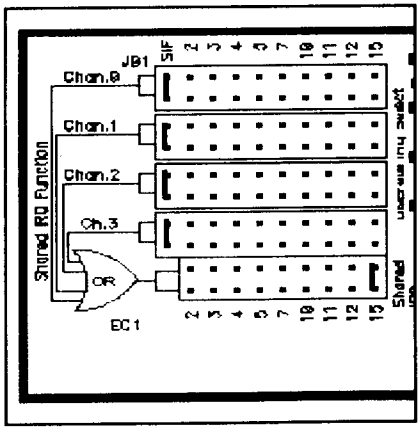
Interrupts on the BlackBoard- are configured via jumpers on JB 1. To set individual interrupts for each port, simply install a jumper for each port under the IRQ which you wish to dedicate to that port. To share an interrupt, install a jumper in the SIF (Shared Interrupt Function) block for the port which you wish to connect to the shared interrupt. Then install a jumper in the Shared IRQ select block corresponding to the IRQ which you wish to share. Only the ports which have the SIP jumper installed will share the interrupt specified by the shared IRQ select jumper.

Interrupt Jumper Programming Examples

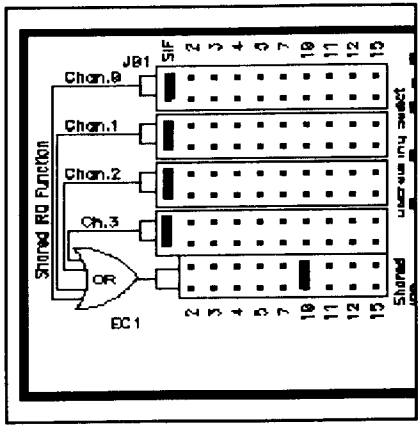
Gtek engineered the BlackBoard- to have total interrupt flexibility. Therefore the possible interrupt assignments are virtually endless. Listed below are examples of some of the more common interrupt selections which demonstrate how to configure your BlackBoard-4.



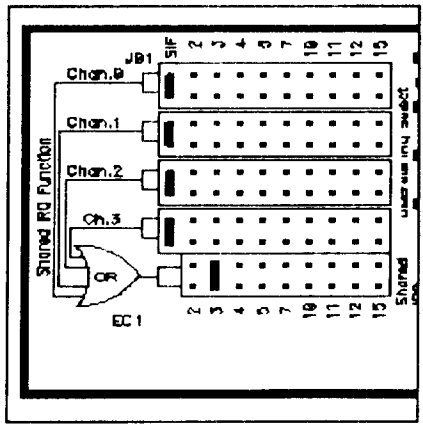
The BlackBoard-4 with no Interrupt jumpers installed (Interrupts configured for MajorBBS)



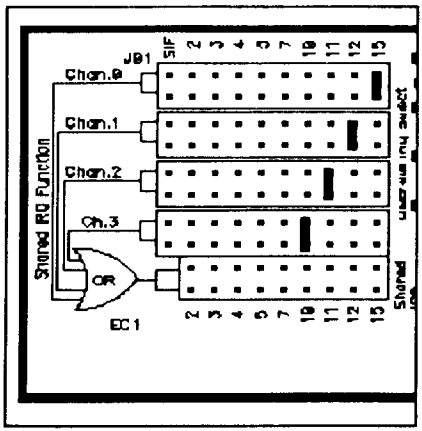
All Ports sharing IRQ 15
(TBBS or FOSSIL)



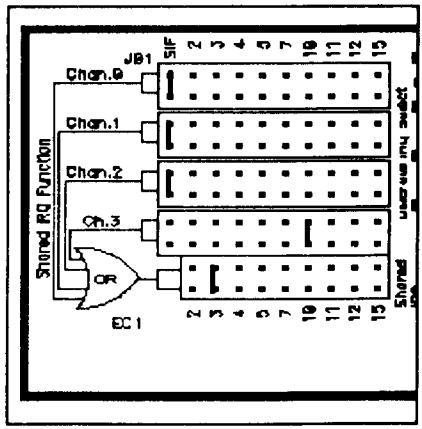
All ports sharing IRQ 10
(TBBS or FOSSIL)



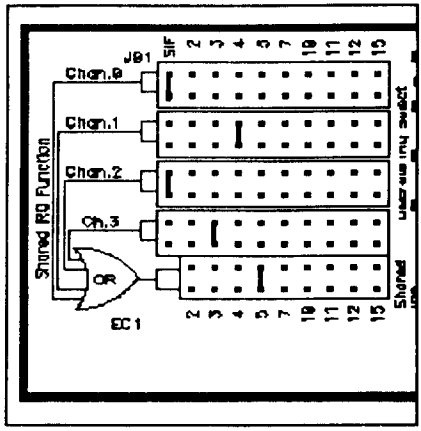
All ports sharing IRQ 3.
(TBBS or FOSSIL)



Discreet Interrupts. Port 0 uses IRQ 15, Port 1 uses IRQ 12, Port 2 uses IRQ 11, Port 4 uses IRQ 10 (Wildcat and other Desqview based BBS software). Note that the SIF jumper is not installe



Ports 0, 1 and 2 sharing IRQ 3.
Port 3 uses IRQ 10



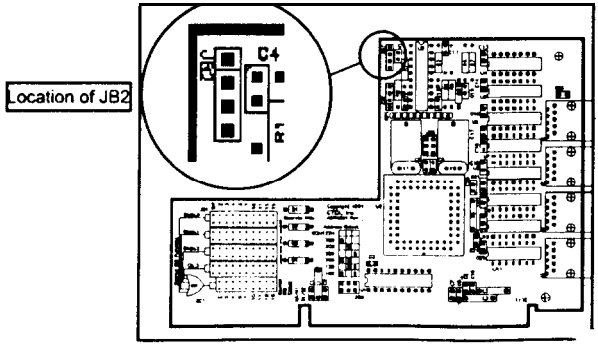
Port 0 and 2 share IRQ 5.
Port 1 uses IRQ 4. Port 3
uses IRQ 3.

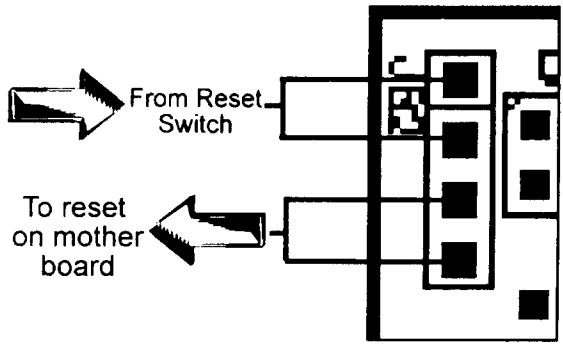
After you have configured the address and interrupt select jumpers, it's time to install the card in your computer.

CAUTION:

Make sure that power is removed from your computer before proceeding with the installation of your BlackBoard-4

1. Turn off your computer and unplug the power cord..
2. Remove the cover to your computer (see your computer manufacturers instructions.
3. Locate an available 16 bit l/O slot and remove the bracket which covers the opening in the rear of the computer.
4. If you wish to use the BBS Guardian Watchdog Circuit, locate the two conductor wire which connects your reset switch to your computer mother board. Remove the wire from the mother board (remember where you removed it from so that you will be able to install the new wire) and plug the connector into the first two pins on JB2 of the BlackBoard-4 Using the 2 conductor 15 inch cable supplied with your BlackBoard-4, connect the last two pins of JB2 on the BlackBoard- to the reset pins on the mother board where you removed your original cable.





The BBS Guardian Watchdog Circuit

The most unique feature of your new BlackBoard-4 is the revolutionary BBS Guardian. The BBS Guardian constantly monitors the state of your BBS computer. If your computer fails to respond to the Guardian within 1/2 second, the Guardian assumes that your computer has crashed and performs a hardware reset on your computer. If you wish to use the BBS Guardian watchdog feature, follow these instructions.

1. Included in your BlackBoard-4 Software diskette is a TSR program called WDOG.COM. To enable the Guardian Watchdog circuit, type WDOG [addr] followed by the <ENTER> key. (Where [addr] is the address of the first port of your BlackBoard-4 as set by JB6.)

2. To test the Guardian Watchdog, a program which will actually "Crash" your computer has been included on your diskette. To execute this program type HALT followed by the <ENTER> key. If your BlackBoard-4 has been correctly installed and you have enabled the Guardian, your computer will reboot within 10 seconds after executing the CRASH program.

3. To remove the Guardian watchdog TSR, type WDOG U followed by the <ENTER> key.

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GTEK, INC., warrants to the original purchaser of this GTEK, INC., product that it is to be in good working order for a period of one year from the date of purchase from GTEK, INC., or an authorized GTEK, INC., dealer. Should this product, in GTEK, INC.'s opinion, malfunction during the warranty period, GTEK will, at its option, repair or replace it at no charge, provided that the product has not been subjected to misuse, abuse, or non–GTEK authorized alterations, modifications, and / or repairs.

Products requiring Limited Warranty service during the warranty period should be delivered to GTEK with proof of purchase. If the delivery is by mail, you agree to insure the product or assume the risk of loss or damage in transit. You also agree to prepay the shipping charges to GTEK.

All Express And Implied Warranties For This Product Including, But Not Limited To, The Warranties Of Merchantability And Fitness For A Particular Purpose, Are Limited In Duration To The Above 1 Year Period. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

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GTEK, Inc. does not warrant that the functions contained in the program will meet your requirements or that the operation of the program will be uninterrupted or error free. However, GTEK, Inc. warrants the diskette(s) on which the program is furnished, to be free from defects in materials and workmanship under normal use for a period of ninety (90) days from date of delivery to you as evidenced by a copy of your receipt.

Licensee herein acknowledges that the software licensed hereunder is of the class which inherently cannot be tested against all contingencies by Licensor. Licensee acknowledges Licensee's obligation to test all programs produced by the licensed software to determine suitability and correctness prior to use.

3.3 LIMITATIONS OF REMEDIES

GTEK, Inc.'s entire liability and your exclusive remedy shall be:
1. the replacement of any diskette(s) not meeting GTEK's "Limited Warranty" and which is returned to GTEK, Inc. with a copy of your receipt, or
2. if GTEK, Inc. or the dealer is unable to deliver a replacement diskette(s) which is free of defects in materials or workmanship, you may terminate this Agreement by returning the program and your money will be refunded

In No Event Will GTEK, INC. Be Liable To You For Any Damages, Including Any Lost Profits, Lost Savings Or Other Incidental Or Consequential Damages Arising Out Of The Use Or Inability To Use Such Program Even If GTEK, INC. Has Been Advised Of The Possibility Of Such Damages, Or For Any Claim By Any Other Party.

Some States Do Not Allow The Limitation Or Exclusion Of Liability For Incidental Or Consequential Damages So The Above Limitation Or Exclusion May Not Apply To You.

3.4 GENERAL

You may not substitute, assign or transfer the license or the program except as expressly provided in this Agreement. Any attempt otherwise to sublicense, assign or transfer any of the rights, duties or obligations hereunder is void.

This Agreement will be governed by the laws of the State of Mississippi.

Should you have any questions concerning this Agreement, you may contact GTEK, Inc. by writing to:

GTEK, Inc. Sales and Service
P. O. Box 2310
Bay St. Louis, MS 39521-2310

— Notes —

4 – SERVICE

For warranty service or non warranty service, contact GTEK, INC. at (601) 467-8048 to obtain an RMA (Return of Material Authorization number). We will need the serial number and date of purchase. Send the BBS550, freight prepaid to:

GTEK, INC.
RMA #####
399 Highway 90
Bay St. Louis, MS 39520

Be sure to include the RMA number on and in the package so we will know what to do with it. Out of warranty service charges are determined on an hourly labor plus materials basis.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Information to user: The user is cautioned that changes or modifications not expressly approved by GTEK, Inc. could void the user's authority to operate the equipment.

— NOTE —

5 – Uart Programming

PROGRAMMING THE 16550 UART:

In this section, references to the uart I/O addresses are abbreviated to "ba" which stands for "Base Address". In the case of Com1:, it is at 3F8h. In the case of COM2: it is at 2F8h. Other common settings for GTEK I/O cards are 200h, 2C0h, 280h, etc. When addressing these uarts, you can get to certain registers at the "base address" plus an offset from that base address. If the card is at 200h, then the base address of the first uart is 200h. The transmit and receive buffer are at that address. The Interrupt Enable Register (IER) is at the next address or as we will call it, "Base Address plus 1". We will abbreviate this as ba + 1. Interrupt ID Register (IIR) is at "Base Address plus 2", or ba + 2.

Registers Accessible to the Programmer:

Transmit Buffer	ba + 0	(write)
Receive Buffer	ba + 0	(read)
Divisor Latch	ba + 0	(read/write LSB, dlab = 1)
Divisor Latch	ba + 1	(read/write MSB, dlab = 1)
Interrupt Enable	ba + 1	(dlab = 0, read/write)
Interrupt ID	ba + 2	(dlab = 0, read/write)
Line Control	ba + 3	(dlab = 0, read/write)
Modem Control	ba + 4	(dlab = 0, read/write)
Line Status	ba + 5	(dlab = 0, read/write)
Modem Status	ba + 6	(dlab = 0, read/write)
Scratch	ba + 7	(dlab = 0 read/write)

(Note that you can't really get to the scratch register on a GTEK board because of the hardware logic involved.)

Transmit buffer at ba + 0 (write only, DLAB = 0):
Bits 0–7 equal your output data bits 0–7.

Receive buffer at ba + 0 (read only, DLAB = 0):
Bits 0–7 equal your input data bits 0–7

Divisor latch at ba + 0 (write/read, DLAB = 1)

Bits 0-7 equal your byte for the LSB of the baud rate word during a write. During a Read, Bits 0-7 equal the present state of the LSB of the baud rate word.

Divisor latch at ba + 1 (write/read, DLAB = 1)

Bits 0-7 equal your byte for the MSB of the baud rate word during a write. During a Read, Bits 0-7 equal the present state of the MSB of the baud rate word.

To program the baud rate, write the LSB and MSB of the Baud Rate Word to ba + 0 and ba + 1 while bit 7 of the Line Control Register is high. To determine the bytes to write to the Divisor Latches, use this Algorithm.

$$BRW = \frac{1,843,200}{(\text{desired baud rate} * 16)}$$

Example: Note 1.8432 is crystal frequency. Crystal may be changed to 4 x 1.8432 = 7.3728 and baud rates will be 4X the original frequency for a particular value.

To determine the Baud Rate Word for 9600 baud:

Baud_rate_word = 1,843,200 ÷ (9600 x 16)
Baud_rate_word = 1,843,200 ÷ 153,600
Baud_rate_word = 12
or Baud_rate_word = x000C hex (MSB = 00, LSB = 0C)

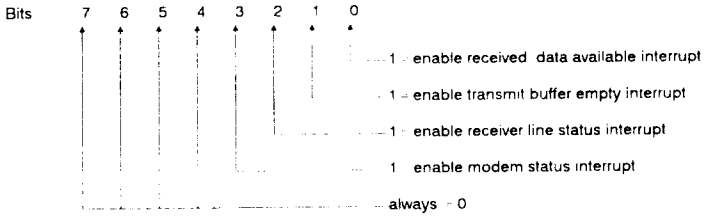
To determine BRW for 300 baud:

BRW = 1,843,200 ÷ (300 x 16)
BRW = 1,843,200 ÷ 4800
BRW = 384
or BRW = x0180 hex (MSB = 01, LSB = 80)

It looks like the highest baud rate is 115,200 baud (BRW = 0001) and the lowest is 2 baud (BRW = E100). Remember that due to hardware speed limitations, you may not be able to use 115,200 baud or 2 baud. Typically a 6 MHz computer might be able to use 57,600 baud, while an 8 or 12 MHz computer might be able to use 115,200. The 16550 makes it more likely to work on any particular computer, due to the extra buffering. Using the 4X crystal yeilds 430,800 baud, etc...

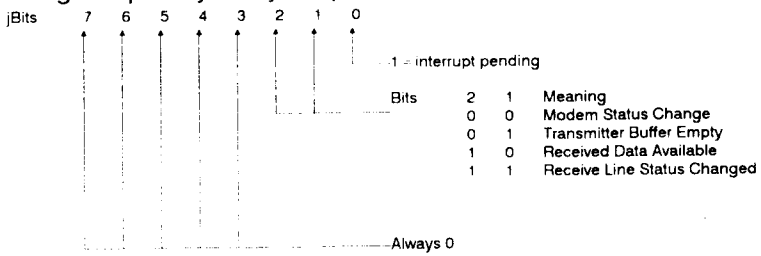
Interrupt Enable Register ba + 1 (write/read, DLAB = 0):

Reading the IER will give you the current state of the bits. Writing to the IER will cause certain things to happen:



Interrupt Identification Register at ba + 2 (read):

Reading the IIR will give you the status of the interrupts, if one occured. This is prioritized, so that if more than 1 interrupt occured, you are vectored to the interrupt service routine with the highest priority. They are prioritized in the following manner:



Priority	Service
1	Receiver Line Status (highest priority)
2	Received Data Ready
3	Transmit Buffer Empty
4	Modem Status Change (lowest priority)

The Modem Status Change (lowest priority- 00) indication is reset by reading the Modem Status Register. This interrupt can be caused by the Clear To Send, Data Set Ready, Ring Indicator, or Received Line Signal Detect (CD) signals.

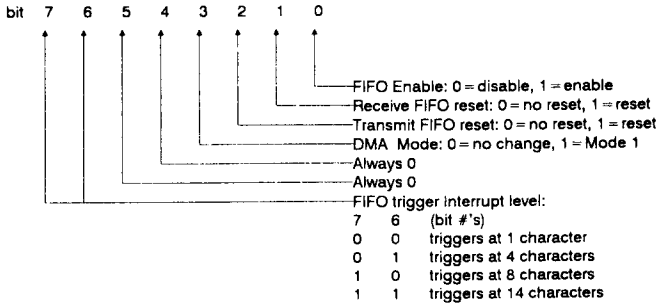
The Transmitter Buffer Empty indication (01). Read the IIR or write to the Transmitter buffer to Reset this Interrupt. This interrupt is caused by the Transmit Buffer becoming Empty.

The Received Data Available indication (10). Read the Receive Buffer Register to Reset this Interrupt. It's caused by the Receive Buffer Register becoming Full.

The Receiver Line Status changed indication (highest priority 11). Read the Line Status Register to reset this Interrupt. It's caused by an Overrun, Parity, or Framing Errors, or the Break Interrupt.

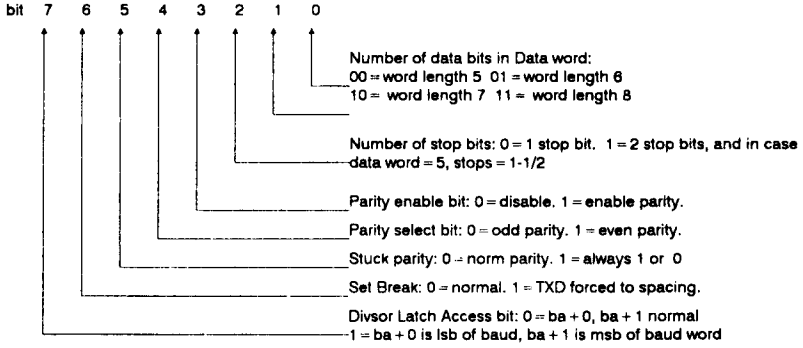
On an interrupt from the uart, the highest priority interrupt has precedence. All other pending interrupts are held until the action that clears the current interrupt is performed.

Fifo Control Register ba + 2 (Write):
Writing this register controls fifo functions:



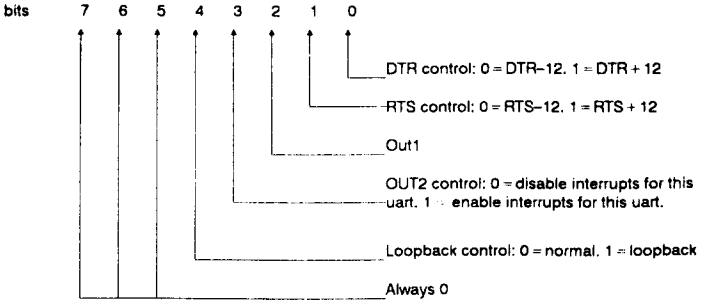
Line Control Register ba + 3 (read/write):

Reading this register gives you the current settings of the uart as specified below. Writing to it will change the current settings.



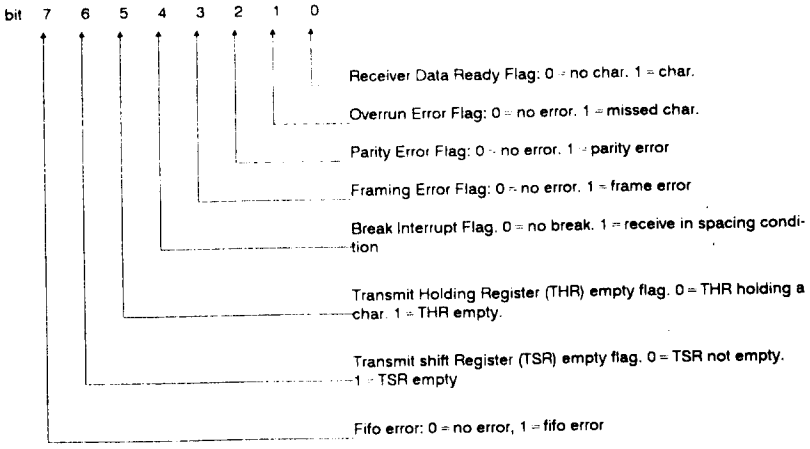
Modem Control Register ba + 4 (write/read):

Reading this register gives you the current settings. Writing this register controls the desired function.



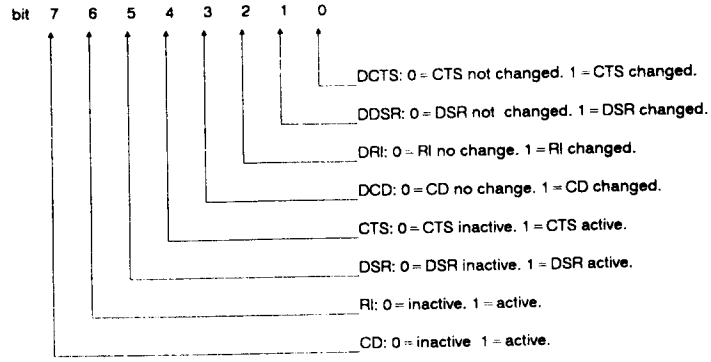
Line Status Register ba + 5 (read/write):

Reading this register will give you the current line status. You read this register in the interrupt mode to find which item caused the interrupt. The interrupt is the highest priority interrupt. You must enable interrupts for these registers to work properly.



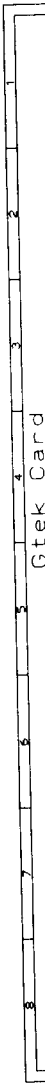
Modem Status Register ba + 6 (read/write):

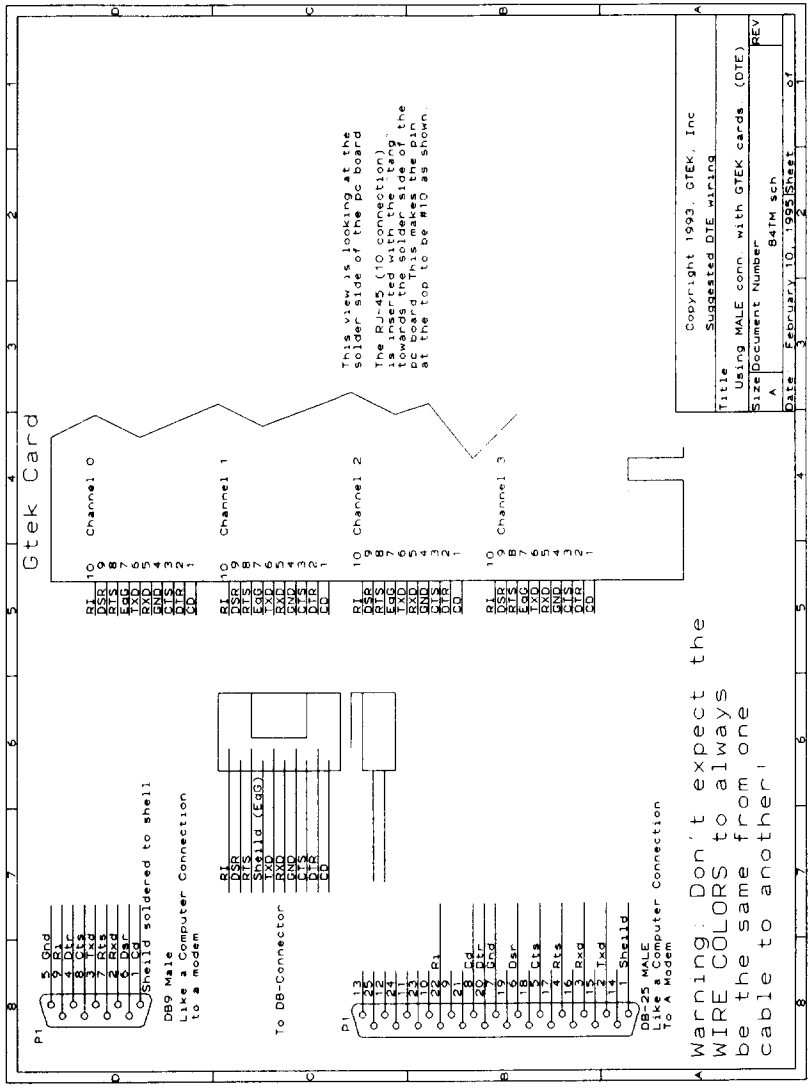
This Register indicates the current state of the external devices (modems, programmers, emulators, terminals).

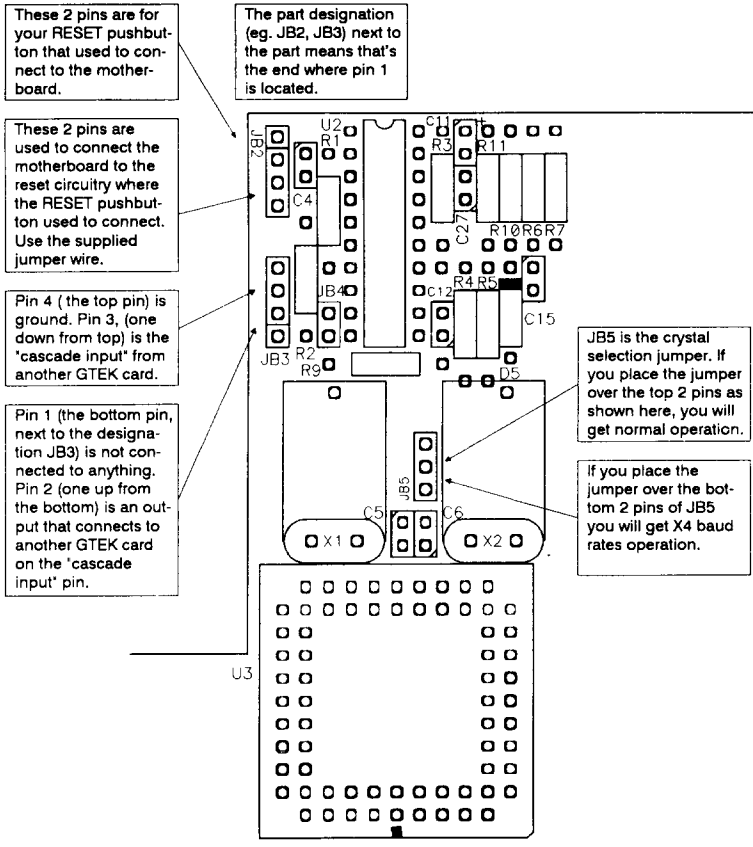


Suggestion: If you need more information on programming the 16550, then we suggest that you invest in the *IBM TECHNICAL REFERENCE PERSONAL COMPUTER AT* manual. It has more detailed information about programming the uart, and the BIOS routines make a good example.

Technical information and specifications provided in this document are SUBJECT TO CHANGE WITHOUT NOTICE.




Gtek Card
Channel 0
Channel 1
Channel 2
Channel 3
This view is looking at the solder side of the pc board
The RJ-45 (10 connection) is inserted with the tang towards the solder side of the pc board. This makes the pin at the top to be #10 as shown.
Copyright 1993, GTEK, Inc
Suggested DTE wiring
Using MALE conn with GTEK cards (DTE)
Document Number 84TM sch
February 10, 1995
Sheet
DB9 Male
Like a Computer Connection
to a modem
Shield soldered to shell
To DB-Connector
DB-25 MALE
Like a Computer Connection
To A Modem
Warning: Don't expect the
WIRE COLORS to always
be the same from one
cable to another!


These 2 pins are for your RESET pushbutton that used to connect to the motherboard.
The part designation (eg. JB2, JB3) next to the part means that's the end where pin 1 is located.
These 2 pins are used to connect the motherboard to the reset circuitry where the RESET pushbutton used to connect. Use the supplied jumper wire.
Pin 4 (the top pin) is ground. Pin 3, (one down from top) is the "cascade input" from another GTEK card.
Pin 1 (the bottom pin, next to the designation JB3) is not connected to anything. Pin 2 (one up from the bottom) is an output that connects to another GTEK card on the "cascade input" pin.
JB5 is the crystal selection jumper. If you place the jumper over the top 2 pins as shown here, you will get normal operation.
If you place the jumper over the bottom 2 pins of JB5 you will get X4 baud rates operation.
U2
R1
C4
JB2
JB4
JB3
R2
R9
C11
R3
R11
C2
R10
R6
R7
R4
R5
C12
C15
D5
JB5
C5
C6
X1
X2
U3