

# RELAY DRIVER BOARDS

## xx03DVR

### RELAY DRIVER BOARD FOR ICS'S 40 LINE INTERFACE BOARDS

#### Description

The xx03DVR Board expands the output drive capability of ICS's 40-line Parallel Interface Boards by adding heavy-duty solenoid drivers to each output signal. The xx03DVR is designed so that the user can use 24, 32 or all 40 digital lines with solenoid drivers to operate relays and other heavy loads. When just 32 or 24 lines are used for relay drivers, the remaining eight or sixteen lines can be used as standard board TTL I/O lines. The xx03DVR Board also converts the relay power supply voltage into 5 Vdc for powering itself and the Parallel Interface Board. This eliminates the need for a separate 5 volt power supply. The xx03DVR board works with connector down versions of ICS's 2003, 2303, 4803 and 8003 Parallel Interface Cards.

#### High Current Relay Drivers

The xx03DVR Board is equipped with 40 open-collector darlington type drivers that can sink up to 500 mA to operate relays, solenoids or other heavy loads. The rugged relay drivers can handle voltages up to 48 volts. The xx03DVR's driver circuits have been designed to be glitch free so as to not pulse the external relays at power turn-on or turn-off. The output drivers can be operated by bit commands that toggle one bit at a time, by byte-wide commands that control 8 bits at a time or by string commands which can control multiple bytes at a time.



xx03DVR Relay Driver Board shown with a 4803 Interface Board

#### Compact Assembly

The xx03DVR Board is designed to mate with ICS's xx03 Parallel Interface Cards that have their digital connector mounted on the circuit side so the connector faces down. The Interface Boards plug down into the xx03DVR Board as shown in Figure 1 so the LEDs and I/O connectors are available to the user. This makes a compact assembly that is only 4.5 inches wide by 7 inches long. Height depends upon which board is being used with the xx03DVR Board.

A version of the xx03DVR Board is available for standard xx03 Parallel Interface Cards but it sits on top of the Parallel Interface Card, covers the I/O connectors and adds to the assembly height.

- Provides up to 40 outputs for driving external relays or other heavy loads.  
*Eliminates the need for external drivers and logic circuits.*
- Configurable as 24, 32 or 40 relay driver outputs.  
*Unused driver lines are available as TTL I/O lines to sense inputs, switch closures or to output data.*
- Mates with ICS's 2003, 2303, 4803 and 8003 Parallel Interface boards.  
*Drive relays and digital signals from the GPIB bus, from a Serial source, via USB or over an Ethernet network.*
- Outputs can be pulsed or controlled individually or by 8-bit bytes.  
*Versatile firmware give you full control of the output lines.*
- Provides 5 volts to power the Interface Board.  
*Eliminates the need for a separate 5 volt power supply.*
- All I/O lines have screw terminals.  
*Easy signal connection.*

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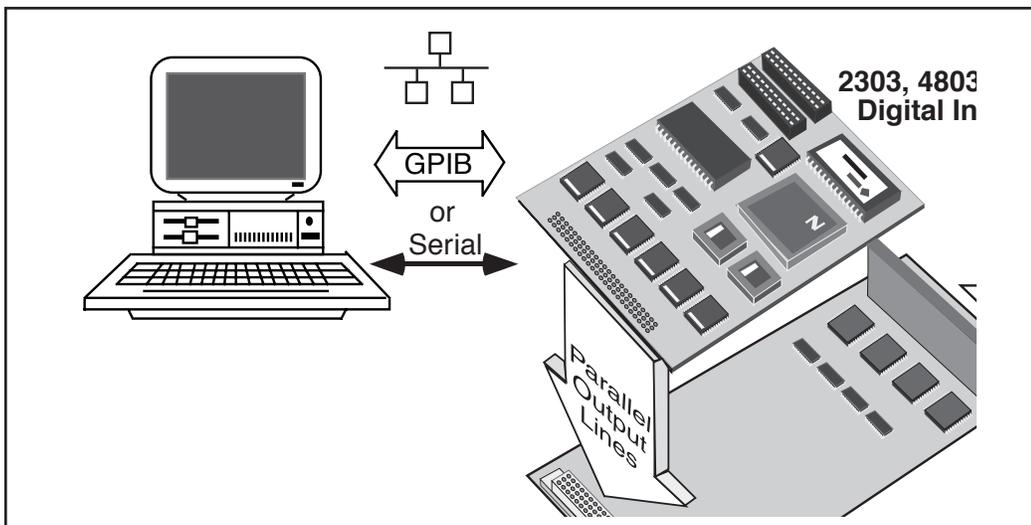


Figure 1 ICS xx03 Parallel Interface Board plugs down onto the xx03DVR Board

## xx03DVR: Description

### Driver Output Lines

The xx03DVR Board can be configured so that all 40 lines are relay driver outputs or the first 8 or 16 digital I/O lines can be connected directly to the Parallel Interface board and used as standard TTL I/O lines. Rocker switches and jumpers on the xx03DVR Board bypass the relay drivers on bytes 1 and 2 and connect the terminal strip signals directly to the interface board.

The configuration choices are:

TTL I/O	Relay Driver Outputs
0	40
8	32
16	24

The driver operation is shown in the partial schematic in Figure 2. A high input to the driver circuit causes it to pull the output to ground and turn the relay or other device on. A low input turns the driver off. The external load pulls the signal high. The xx03DVR does not supply any high side voltage.

When the drivers are bypassed, the output lines are connected directly to the Parallel Interface Board's high current TTL lines. The bypassed lines can be used as inputs or outputs just as it they were directly connected to the Parallel Interface Board connector. The TTL lines do supply a small amount of current from the 5 volt bus and have 33 kohm pullup resistors that pull the lines high to sense open contacts and lines.

### xx03DVR Board Description

The xx03DVR Board terminal strip connections are identified by bytes and bit, so they easily relate to the signals on the companion Interface Board. Standard bit commands like ROUTe:CLOSE or ROUTe:OPEN can then be used to operate the relay drivers. Set the Output polarity to high true for the relay driver signals.

An External Reset input can be used to reset the Interface board.

### Built-in Power Supply

The xx03DVR can be powered from the same power supply that drives the external relays. The relay power is used as the return for the drivers' internal anti-backlash diodes and to power the Parallel Interface Board. The user should still use relays with built-in anti-backlash diodes to minimize RFI. The xx03DVR contains a small switching regulator that converts 4 VA of relay power into 5 Vdc to power the companion digital board. This eliminates the need for a separate 5 volt power supply.

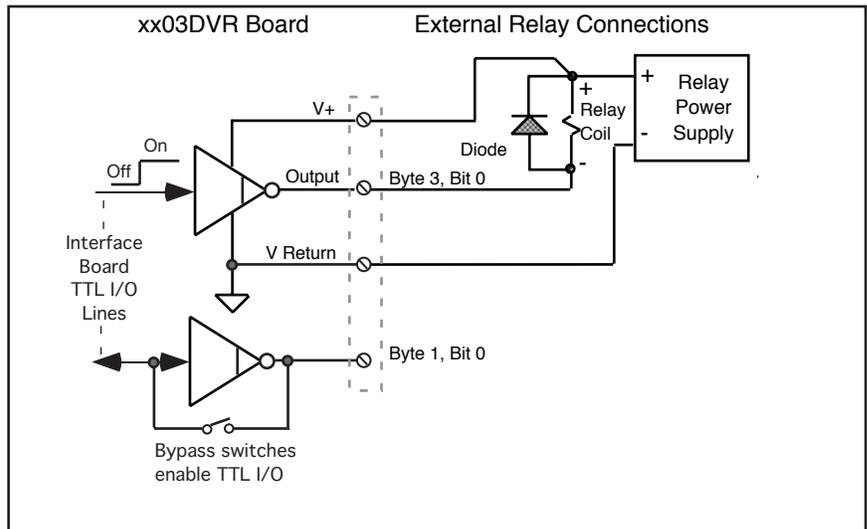
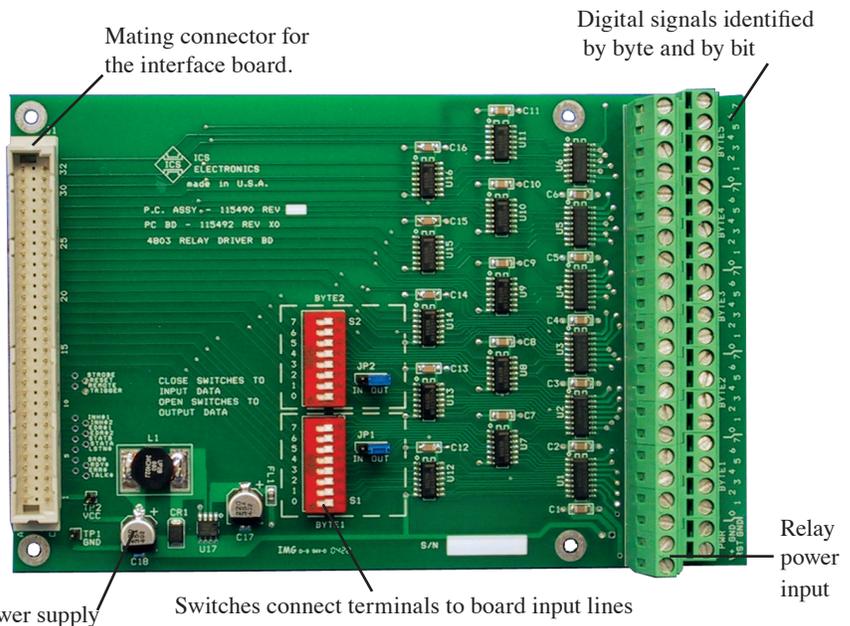


Figure 2 Partial xx03DVR Board Schematic



xx03DVR Board Top View (P/N 115490)

## xx03DVR: Description

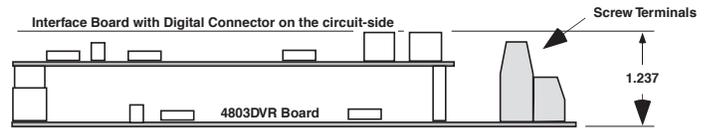
### xx03DVR Board Assemblies

Figures 4 and 5 show how a 2003, 2303, or 4803 Parallel Interface Board with a circuit-side connector mounts on the xx03DVR Board. The Parallel Interface Board is positioned over J1 on the xx03DVR Board and pressed into place. A pair of 0.688 high female-to-male standoffs holds the front portion of the two boards together. The rear portion is held by the mating force of the 64 pin DIN connectors. Signal and power wires are attached to the xx02DVR terminal blocks.

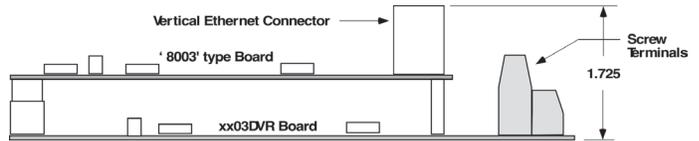
Figure 5 shows the 115848 '8003' type board mounted on the xx03DVR board. Its height is slightly bigger due to the vertical RJ45 connector on the 8003. An 8003H will not mate with the 115490 xx03DVR Board

A version of the xx03DVR Board is available with a female connector on its circuit side so it can sit on top of standard 2003, 2303, 4803 and 8003H boards. Mounting the xx03DVR Board on top of standard boards adds 0.6 inches to the overall assembly height as shown in Figure 3.

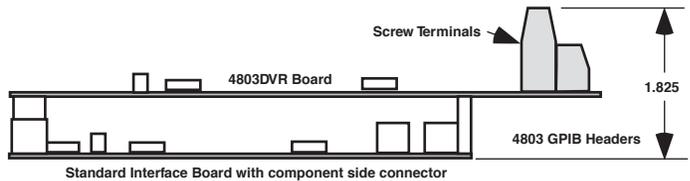
A pair of 0.688 high standoffs holds the two boards together. Standard 8003s with their vertical RJ-45 connector cannot be used with the 115522 xx03DVR Board because the board blocks the RJ45 connector.



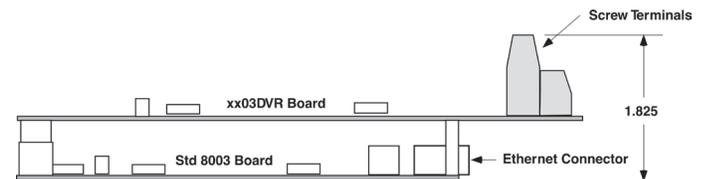
**Figure 4** xx03DVR Board (P/N 115490) with a 2003, 2303 or 4803 type board. Order connector down versions for the 115490 xx03DVR Board



**Figure 5** xx03DVR Board (P/N 115490) with a 115848 '8003' board.



**Figure 6** xx03DVR Driver Board (P/N 115522) on top of a 4803, 2003 or 2303 Parallel Interface Board



**Figure 7** xx03DVR Driver Board (P/N 115522) on top of a 8003H Parallel Interface Board

## xx03DVR: Specifications

### Parallel Interface

Standard xx03DVR supplies a male DIN connector for mounting a 2003, 2303, 4803 or 8003 Interface Board with its Digital I/O connector on the circuit side. Power supplied by a switching power supply on the xx03DVR board.

Supplied Power:

Voltage	+5 ± 0.2 Vdc
Current	500 mA max

### Parallel Interface Boards

The xx03DVR board supports the following Parallel Interface Boards

	xx03DVR Part Number	
Model	115490	115522
2003	116038	2003
2303	114732	2303
4803	114648	4803
8003	115848	8003H

### xx03DVR Connections

The following companion Interface Board lines are used by the xx03DVR Board:

40 Digital I/O lines  
Stable Signal  
External Reset Input

### Other Interface Board Signals

The following companion Interface board signals are brought to pads on the xx03DVR Board and are available to the user:

LED drive signals:

PWR, RDY, TALK, LSTN, SRQ  
and ERR

EDR and Inhibit pairs #1 and #2

Status A and Status B inputs

Trigger, Remote and Reset outputs

Data Strobe

### Driver Characteristics

High power outputs for driving relays or other loads. Relay driver outputs controlled by SOURce or ROUTe commands with polarity set to high true. Number of lines is 40 less the number of lines that by-pass the relay drivers and connect directly to ports 1 and 2 on the digital board.

Number	24, 32 or 40 Lines
Driver Form	Open collector with anti-backlash diode.
Current	up to 300 mA
Vout low	1.3 volts at 500 mA
V max	32 Vdc

### TTL Signal Characteristics

TTL signals have the same characteristics as the companion Interface Board's digital signals. Inputs typically have 33 Kohm pullups for sensing CMOS signals and contact closures. Outputs sink up to 48 mA. Signals controllable by Interface Board commands or are monitored by the Questionable Register.

Number	16, 8 or none
As inputs:	
High	> 2.4 Vdc or open
Low	< 0.5 Vdc at 200 $\mu$ A
Pullup resistor	33 kohms to +5 Vdc

As outputs

High =	>3 V with 3 mA source
High =>	2 V with 24 mA source
Low =	0.0 to +0.55 Vdc, 48 mA sink

### External Reset Input

TTL input signal that resets the Interface Board when pulled to ground. Pullup provided by a resistor on the companion Interface Board.

### Physical

Size, L x W x H

177.8 x 114.3 x 14.3 mm  
(7.0x 4.5 x 0.562 inches)

Assembled dimensions

115490	177.8 x 114.3 x 32.3 mm 7.0x 4.5 x 1.265 inches)
115522	177.8 x 114.3 x 46.36 mm (7.0x 4.5 x 1.825 inches)

Connectors and Headers

Digital 96-pin, 3 row male DIN connector using rows A & C.

Relays Screw terminals for #16 - #30 AWG wire.

Temperature

Operation -10° C to +70° C  
Storage -20° C to +85° C

Humidity

0-90% RH without condensation

Power

+7 to + 32 Vdc @ 4 VA (typical)

### Included Accessories

Instruction Manual  
2 Standoffs and locknuts

### Available Accessories

None

## ORDERING INFORMATION

	Part Number
xx03DVR Board for 2003, 2303, 4803 and 8003 boards with circuit-side connectors. Includes Instruction Sheet.	115490
xx03DVR Board for standard 2003, 2303, 4803 and 8003H boards Includes Instruction Sheet.	115522