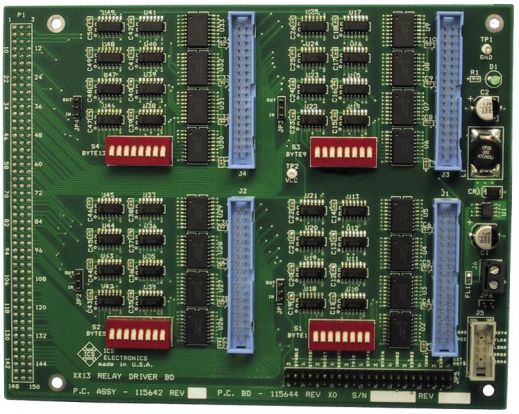
IEEE 488/GPIB BUS INTERFACES

4813DVR

4813/2313/8013 RELAY DRIVER BOARD

Description

The 4813DVR Board expands the 4813's, 2313's or 8013's output drive capability by adding heavy duty solenoid drivers to each output signal. The 4813DVR is designed so that the user can configure all 128 of the output lines with solenoid drivers or use up to 32 lines as inputs or TTL outputs. The relay driver outputs are organized on four headers with 32 lines per header. Each header has male pins and accepts flat-ribbon connectors for easy wiring to the relays or other devices that the board is driving. Applications include building relay matrixes, driving high power displays or any high power load.



4813 Relay Driver Board

Compact Assembly

The 4813 Relay Driver Board fits on top of a 4813, 2313 or 8013 Interface Board to make a compact assembly that is only 1.26 inches high. The 4813 Relay Driver Board is the same size as the xx13 board it mounts on. The assembly is held together with four standoffs that can be used to mount the assembly in the chassis or against a mounting surface. The flat-ribbon headers on top of the 4813 Relay Driver Board are mounted vertically and are easily accessible for plugging in the mating flat-ribbon cables.

The 4813 Relay Driver contains a small switching regulator that supplies 5 volt power to the 4813, 2313 or 8013 Interface Board, eliminating the need for a separate 5 volt power supply. The 4813 Relay Driver accepts 9 to 32 V DC power and can use the same power supply that powers the external relays.

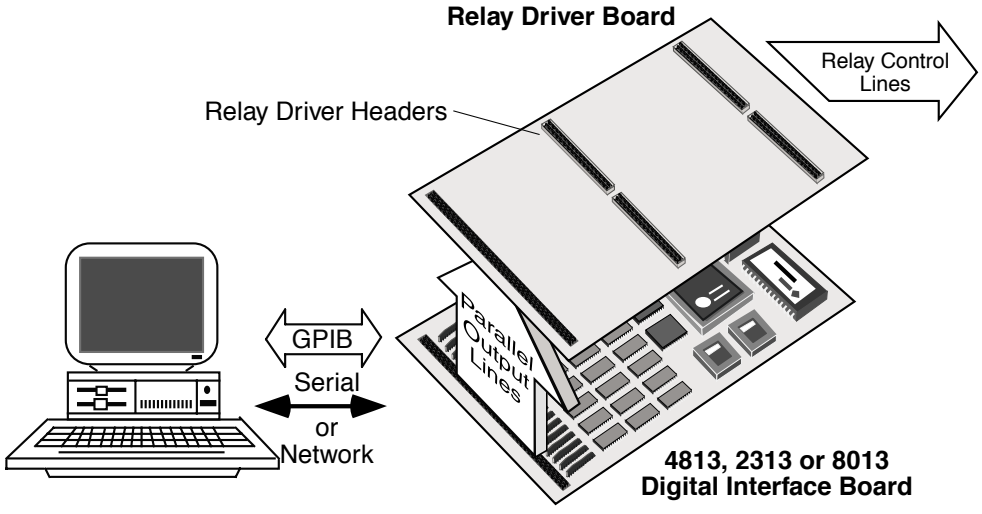
High Current Relay Drivers

The 4813DVR Board is equipped with 128 open-collector darlington type drivers that can sink up to 500 mA to operate relays, solenoids or other heavy loads. The drivers can handle voltages up to 48 volts and include clamp diodes for driving inductive loads. The 4813DVR'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 time.

I/O Lines

Up to 32 of the mating xx13 board's heavy-duty TTL I/O lines can be switched to bypass the relay drivers and used as inputs or outputs. As outputs they source up to 24 mA or sink up to 48 mA. As inputs, they can sense contact closures or input TTL or CMOS signal levels.

- Provides up to 128 outputs for driving external relays or other heavy loads.
  Eliminates the need for external drivers and logic circuits.
- Provides up to 32 I/O lines
  Input TTL/CMOS data, sense contact closures or use as TTL outputs
- Powers 4813, 2313 or 8013 Interface Board from user's relay power supply.
  Eliminates a separate 5 volt power supply.
- All I/O lines on four flat ribbon headers
  Easy signal connection.
- Mates with standard 2313, 4813, and 8013 Boards.
  Drive relays and digital signals from the GPIB bus, a Serial source or from the company network.



Adds Relay Drivers to a 2313, 4813 or 8013 Board

ICS ELECTRONICS
division of Systems West Inc.
7034 Commerce Circle
Pleasanton, CA 94588
Phone: **925.416.1000**
Fax: **925.416.0105**
Web: **www.icselect.com**

Header Organization

The 128 output lines are organized into four 36-pin headers with 32 driver output lines per header. Eight drivers on each header can be by-passed and the lines used as a normal 4813 I/O lines. These optional use lines are shown grayed in Table 1. Each 4813 I/O line has a 33 kohm pullup to +5 Vdc to handle TTL, CMOS and contact closure inputs and can sink 48 mA when used as a TTL output. Bypassing the drivers is done by changing a jumper on the 4813DVR Board and setting 8 rocker switches to their on position.

Each header also has an unused signal that goes to a signal jumper strip. The jumper strip is arranged so that any xx13 control, strobe or handshake signal line can be routed out to any header by inserting shorting pins on the header.

Table 1 on the right shows the signal pin assignments for Header #1. Byte 1 is the optional TTL I/O lines, bytes 2 to 4 are fixed relay driver outputs. The remaining three headers have similar signal-pin assignments.

Relay Connections

Figure 2 shows a typical relay connection. The Relay Drivers sink current to ground to actuate the relay coils. A high level from the xx13 board turns on the relay driver.

Relay Controlling Commands

The signals on each Header correspond to four I/O bytes on the xx13 board and can be controlled with the xx13 board's SCPI or Short Form commands. Table 2 is a partial list of the commands that control the I/O lines in the 4813, 2313 or in the 8013. All three interface cards respond to the SCPI syntax and to their corresponding Short Form commands. The command formats can be used interchangeably.

The ROUTe command branch lets you control individual bits which corresponds to a single relay driver. ROUT:CLOSe actuates the relay driver which grounds the relay coil and energizes the relay. ROUT:OPEN turns the relay driver off. Latching relays can be switched by pulsing the relay driver on with the ROUT:PULSe or ROUT:PULS:CHANnel command. Use the ROUT:PULS:WIDTh command to set the pulse width when initializing the xx13 card.

The SOURce branch lets you control all 8 lines in a byte with one command. Use the SOURce:DATA:PORTn command or the short form BOn command to control the I/O lines. The BOn? query returns the last value written to the output latch.

4813 Relay Driver Connections

Figure 2 shows how a 4813DVR Board mounts on any standard 4813, 2313 or 8013 Board. The 4813DVR Board is positioned over J1 on the 4813 Board and pressed into place. A pair of 0.750 high female-to-male standoffs holds the front portion of the two boards together.

The 4813DVR board has four 36-pin headers that mate with a 36-conductor flat-ribbon cable. Mount a similar header on your relay PCB board and use the 115656-L cable or your own cable to connect to the 4813DVR board. The 115656-L cable is available in lengths from 10 to 60 cm. L = cable length in cm.

TABLE 1 RELAY DRIVER HEADER SIGNAL-PIN ASSIGNMENTS

Pin	Signal	Pin	Signal
1	Vin		
2	Unused signal	21	Byte 3 Bit 7 MSB
3	Byte 1 Bit 7 MSB	22	Byte 3 Bit 6
4	Byte 1 Bit 6	23	Byte 3 Bit 5
5	Byte 1 Bit 5	24	Byte 3 Bit 4
6	Byte 1 Bit 4	25	Byte 3 Bit 3
7	Byte 1 Bit 3	26	Byte 3 Bit 2
8	Byte 1 Bit 2	27	Byte 3 Bit 1
9	Byte 1 Bit 1	28	Byte 3 Bit 0 LSB
10	Byte 1 Bit 0 LSB	29	Byte 4 Bit 7 MSB
11	Byte 2 Bit 7 MSB	30	Byte 4 Bit 6
12	Byte 2 Bit 6	31	Byte 4 Bit 5
13	Byte 2 Bit 5	32	Byte 4 Bit 4
14	Byte 2 Bit 4	33	Byte 4 Bit 3
15	Byte 2 Bit 3	34	Byte 4 Bit 2
16	Byte 2 Bit 2	35	Byte 4 Bit 1
17	Byte 2 Bit 1	36	Byte 4 Bit 0 LSB
18	Byte 2 Bit 0 LSB	Note: Grayed lines show relay driver outputs that can be by-passed and used as TTL I/O lines	
19	Ground		
20	Ground		

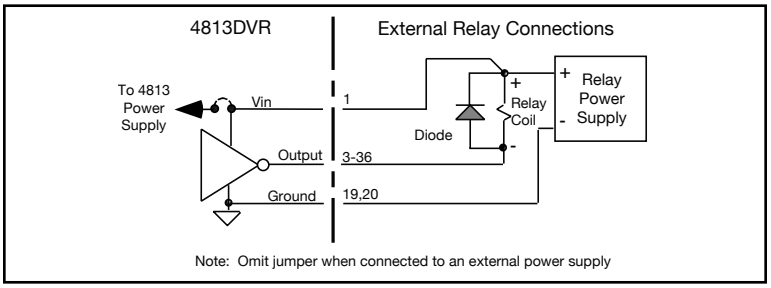


Figure 2 Typical Relay Driver Connections

TABLE 2 PARTIAL XX13 SCPI COMMAND TREE

SCPI Commands		Short Form Cmds
ROUTe	**Bit Commands**	
:CLOSe	byte, bit	CLOSE
:OPEN	byte, bit	OPEN
:RESET	byte	BRESET
:PULSe	byte,bit	PL
:CHANnel	number or channel list	PC
:WIDTh	10-30000 [50]	PW
SENSe	**Input Data**	
[:DIGital]		
:DATA		
[:VALue]?		PI?
:PORT?	number or <channel list>	BI?
:PORTn?		BIn?
:POLarity?		IPn
:RESet:EDR		ER
:BIT?	0-1	READ?
:BYTe?	0-255	BREAD?
[SOURce]	**Output Data**	
[:DIGital]		
:DATA		
[:VALue]	0-255	PO
:PORTn	0-255	BOn
:POLarity	0-255	OPn
:STRobe		SP

4813 Interface

4813DVR supplies a female 150-pin connector for mounting on a standard 4813, 2313 or 8013 board with its Digital I/O connector on the component side. Board power is supplied by a switching power supply on the 4813DVR board. All 4813DVR specifications apply equally to the 2313 and 8013 boards unless specifically excluded.

Supplied Power
Voltage +5 ± 0.2 Vdc
Current 500 mA max

4813DVR Connections

The following 4813 lines are used by the 4813DVR Board:
128 Digital I/O lines
Stable Signal
External Reset Input

LED Drive Signals

The 4813 LED signals and Vcc are available on a 10-pin header to drive remote LEDs. The LED Drive Signals are low going. Limit LED current to 15 mA per LED.

Miscellaneous Signals

The following 4813 Signals are brought to a jumper pin header and may be jumpered to the unused signal line on each 36-pin Relay Driver Header.

EDR#1 and EDR#2 inputs,
Inhibit #1 and #2 outputs,
Status A and Status B inputs,
Data Strobe, Trigger, Remote, Reset and Stable outputs.

Driver Characteristics

High power outputs for driving relays or other loads. Output lines controlled by 4813 Source commands with polarity set to high true.

Number :	128 Lines
Driver Form	Open collector with clamping diode.
Current	500 mA max per line 2.5 A total for all 8 lines in a byte.
Vout low	1.1 volts at 100 mA 1.3 volts at 200 mA 1.6 volts at 350 mA
V max	48 Vdc

Input Signal Characteristics

TTL inputs with pullups for CMOS signals and contact closures. The number of input signals subtracts from the number of available outputs. Inputs read by 4813 Sense commands or monitored by the Questionable Register.

Number :	32, 24, 16, 8, or none
High	> 2.4 Vdc or open
Low	< 0.5 Vdc at 200 μA
Pullup resistor	33 kohms to +5 Vdc on 4813 board.

External Reset Input

TTL input signal that resets the 4813 board when pulled to ground. Pullup provided by the 4813 board.

External Power Input

Use either the two-screw terminal block or Vin on Header #1

Physical

Size, L x W x H
177.8 x 139.7 x 14.3 mm
(7.0 x 5.5 x 0.562 inches)

Assembled dimensions with 4813/2313/8013
177.8 x 114.3 x 32.3 mm
(7.0x 4.5 x 1.265 inches)

Weight 0.38 lbs (0.17 kg)

Connectors and Headers

4813	150-pin, 3 row female connector.
Relays	36-pin male header, 0.3 inch high pins. (2 rows x 18 pins on 0.2 inch centers)

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 when powering a 4813 or 8013 board.)

Included Accessories

Instruction Sheet
4 0.75 inch 4-40 standoffs and hardware.
Shorting jumpers

Available Accessories

115656-60 Flat-ribbon cable, 36-cond, 60 cm long.
902334 Female flat-ribbon connector, 36-pin
902333 Male header, 36-pin, PCB tails

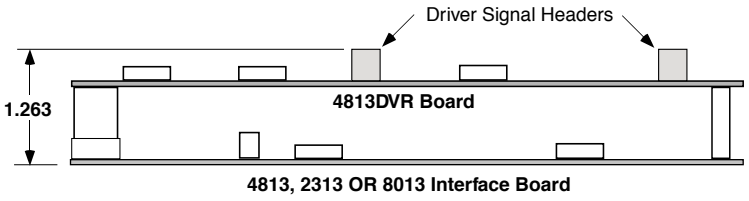


Figure 3 4813 Board with a 4813Dvr Board installed on top

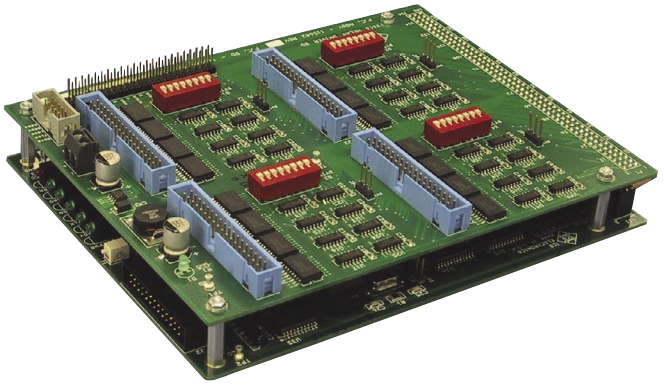


Figure 4 4813 with Relay Driver Board

ORDERING INFORMATION

	Part Number
4813 Relay Driver Board for standard 4813/2313/8013s with component-side connectors.	115640
Flat-ribbon Cable, 36-conductor. L = cable length in cm from 10 to 90 cm, 60 cm standard	115656-L
Header connector, 36-pin (2 rows x 18 pins) header with PCB solder pins	902333