

# AR-2S RELAY INTERFACE

(with status inputs)

## TECHNICAL REFERENCE

Click to see photo: [www.eeci.com/ar-2sp.htm](http://www.eeci.com/ar-2sp.htm)

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## SPECIFICATIONS

Power Supply.....	12 volts DC (100ma)
Relays.....	2
Relay Contacts.....	SPDT
Contact Rating (AC).....	12 amp 240 VAC
Contact Rating (DC).....	12 amp 30 VDC
Contact Rating (tungston)....	3 amp 360 watt
Contact Rating (horsepower)	1/3 HP 240 VAC
Status Inputs.....	2
Status Input Voltage Range..	6 to 18 volts DC
Weight.....	4 ounces
Size.....	3.25 inches by 3.75 inches

## DESCRIPTION

The AR-2S relay interface provides software control of (2) relays which are included and mounted on the AR-2S circuit assembly. The relays are energized or de-energized by using the RS-232 control signals DTR and RTS. The AR-2S relay interface is useful when only 1 or 2 relays are required. The AR-2S is for use with RS-232 and is not expandable. A terminal block is provided for connection to the power supply, status inputs and relay contacts. The AR-2S inputs are turned on by applying a voltage (5 to 18 volts DC) to the input terminals. The status inputs are monitored by reading the modem control register for the RS-232 port (DCD, DSR & CTS). The status inputs may be configured to generate an RS-232 interrupt by setting the proper bit in the interrupt enable register for the COM port. RS-232 connections are made via a DB-9 connector which is pin to pin compatible with the standard RS-232 nine pin connector.

## TECHNICAL SUPPORT

Technical support for our products is available by calling (937) 349-6000. If a technical adviser is not available, please leave your name, phone number and a time that you can be reached. Your call will be returned as soon as possible and within 24 hours.

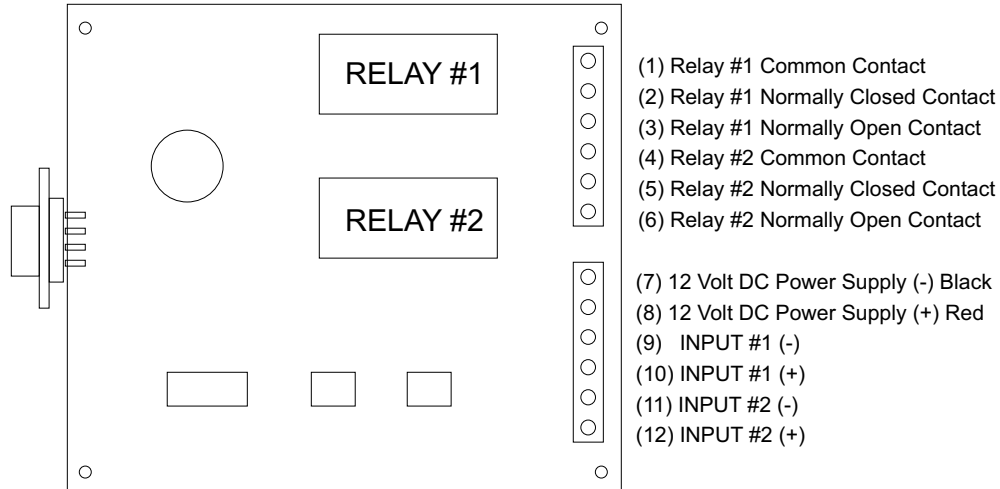
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## WARRANTY AND CARE OF THE AR-2S

The AR-2S Relay Interface is warranted against factory defects for a period of 90 days from the date of purchase. The AR-2S has proven to be extremely reliable in actual operation during field tests. We recommend that the AR-2S and associated hardware be installed in a suitable enclosure (4 mounting holes are provided on the circuit board).

### CONNECTION DIAGRAM

#### AR - 2S RELAY INTERFACE



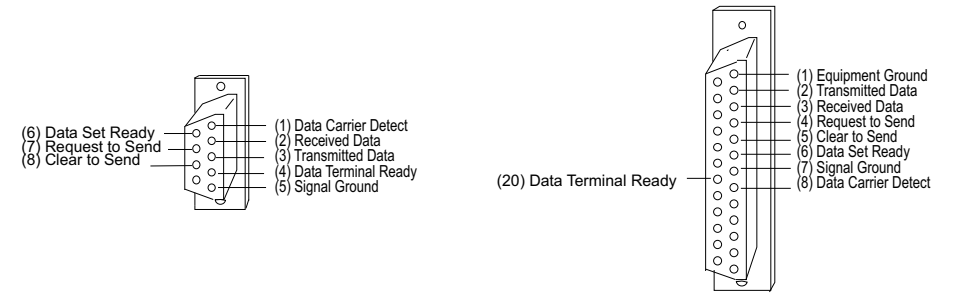
NOTE: The terminal assignments are also shown on the underside of the AR-2S Relay Interface. The RS-232 connections are made to the DB-9 connector on the AR-2S as shown on the following page.

### POWER SUPPLY REQUIREMENTS

The AR-2S may be powered from any DC voltage source which will supply 100 ma within a voltage range of 9 to 14 volts. The recommend power supply for use with a single AR-2S Relay Interface is the PS-GP-1 wall transformer supply. **IMPORTANT:** Use caution when connecting the power source, reversed polarity may cause damage. The heat dissipation of the relay coils on the AR-2S will be greatly reduced with an unregulated 300 ma, 9 volt power source.

**POWER SUPPLY FUSING:** A 500 milliamp (.5 amp) in-line fuse should be installed in series with the (+) power supply lead to protect the power supply and the AR-2S from damage.

## RS-232 CABLE CONNECTIONS & PIN-OUTS



NOTE: The DB-9 and DB-25 connector pin-outs shown above are viewed from the solder side of the connector. The illustration shown is that of a socket (female connector). The pin assignments for a plug (male connector) will be the same but the illustration will appear backwards.

**CONNECTING TO A 9 PIN RS-232 CONNECTOR:** The AR-2S Relay Interface may be plugged directly into a serial port which uses a 9 pin RS-232 connector if space allows. You may prefer to connect the AR-2S to your serial port using a short cable (for the sake of neatness or more practical mounting). When using a cable to connect the AR-2S to your serial port, only 6 of the nine pins are used. Connect pins #1, #4, #5, #6, #7 and #8 on your 9 pin serial port to the corresponding pins on the AR-2S connector.

**CONNECTING TO A 25 PIN RS-232 CONNECTOR:** Connect the nine pin AR-2S connector to a 25 pin RS-232 connector as follows (only 6 of the 25 pins are used):

AR-2S connector (DB-9)	to	25 pin RS-232 socket (DB-25)
pin #1	goes to	pin #8
pin #4	goes to	pin #20
pin #5	goes to	pin #7
pin #6	goes to	pin #6
pin #7	goes to	pin #4
pin #8	goes to	pin #5

### SET-UP AND TESTING

Upon receiving your AR-2S, you should connect and test the operation of the hardware to verify proper operation. Please set-up and test the AR-2S as follows (IBM and Compatibles):

(1) Plug the serial cable into COM 1 of your computer and plug the other end into the DB-9 connector on the AR-2. If you did not order a serial cable, a cable may be fabricated by soldering the wires to the proper connector as shown above. Use caution not to set the AR-2S on a metal surface or damage could result.

(2) Connect the power supply to the AR-2S at the terminal block. Be sure to observe the (+) and (-) connections on the AR-2S (reversed polarity may cause damage).

(3) Windows users should install the Windows test program provided on CD (Windows 95, 98, ME, 2000, XP and Vista) Run setup.exe in the folder Windows Test Program (on CD supplied). If prompted about an older file, keep your newer file. Once installed, run the AR-2 program. The program defaults to Com 1, other Com ports may be selected if required. Click on the buttons to verify that each relay energizes one at a time and in the correct sequence (the relay # should correspond with the relay # shown on the screen). If the relays do not energize, verify that you have the

correct voltage and polarity on terminals #7 and #8 on the AR-2S by using a voltmeter. Also check for the proper cable connections.

(4) Test each of the two inputs by applying a voltage to the input terminals. The input will light up in red when a voltage is applied. You may use the AR-2S power supply for this purpose.

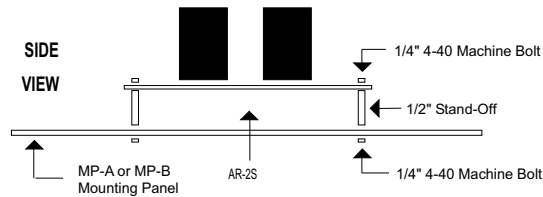
(5) If operation of the relays and inputs are normal, than testing is now complete and the AR-2S may be placed in service.

### SHARED USE OF THE RS-232

The AR-2S may share an RS-232 port with the AR-16, ADC-4, ADC-16 or STA-16 (or other device, if the device does not use the RS-232 control lines in use by the AR-2S). The AR-2S may not be used with the PS-4 port selector.

### MOUNTING OF THE AR-2S

Four mounting holes are provided on the AR-2S for mounting to stand-off hardware and an enclosure. The MT-1 stand-off kit is available for this purpose.



### CONTROL SOFTWARE

The relays on the AR-2S are controlled with RTS and DTR which are RS-232 control lines that are primarily used for controlling a modem (RTS=request to send and DTR=data terminal ready). The number 1 relay is energized by placing RTS high by setting bit 1 in the modem control register. The number 2 relay is energized by placing DTR high by setting bit 0 in the modem control register. The status inputs are monitored by reading the modem control register for the RS-232 port (DCD, DSR & CTS). The third input (CTS) may be used as a supervisory signal to sound an alarm on your PC in the event that the AR-2S is disconnected or if there is a loss of power to the AR-2S. When the AR-2S is connected to the computer and power is supplied to the AR-2S, CTS should be high. Software examples in G W Basic and Turbo C are provided on the disk supplied with your order. The AR-2S may be used with any RS-232 COM port on your PC (provided that you know the correct I/O port for the modem control register and modem status register). In the event that DCD, DSR or CTS are not available, you may connect one of the inputs to the received data line and generate an RS-232 interrupt with the input. The received data line is pin #3 on a DB-25 connector or pin #2 on a DB-9 connector.

Standard modem register I/O ports for COM 1 through COM 4 are shown in the Basic program on the following page.

### SOFTWARE EXAMPLE IN G W BASIC or QUICKBASIC

```

10 CLS : KEY OFF
20 BYTE = &H3FC: 'COM 1   Set Com Port
30 'BYTE = &H2FC: 'COM 2
40 'BYTE = &H3EC: 'COM 3
50 'BYTE = &H2EC: 'COM 4
60 PRINT "                AR-2S RELAY INTERFACE TEST  COM 1"
70 PRINT : PRINT "(1) Energize relay #1"
80 PRINT "(2) De-energize relay #1"
90 PRINT "(3) Energize relay #2"
100 PRINT "(4) De-energize relay #2"
110 PRINT "(5) Exit"
120 PRINT : PRINT "Press key to test relay": PRINT "": PRINT ""
130 PRINT "                0 = VOLTAGE NOT APPLIED TO INPUT"
140 PRINT "                1 = VOLTAGE APPLIED TO INPUT"
150 D = INP(BYTE + 2)                                :'Read modem status register
160 IF (D AND 128) > 0 THEN A = 0 ELSE A = 1          :'Read bit 7 (DCD)
170 IF (D AND 32) > 0 THEN B = 0 ELSE B = 1          :'Read bit 5 (DSR)
180 IF (D AND 16) > 0 THEN C = 0 ELSE C = 1          :'Read bit 4 (CTS)
190 LOCATE 12, 1: PRINT "INPUT #1..."; A
200 PRINT "INPUT #2..."; B
210 PRINT "CTS....."; C
220 K$ = INKEY$: IF K$ = "" THEN 150                 :'Check for key pressed
230 A = VAL(K$)                                       :' Convert string to a number
240 GOSUB 260                                         :'Go to subroutine to control relays
250 GOTO 220                                         :'Return to loop
260 X = INP(BYTE)                                     :'Read modem control register
270 IF A = 1 THEN X = X AND (NOT 2)                   :'Set bit 1 to zero
280 IF A = 2 THEN X = X OR 2                          :'Set bit 1 to one
290 IF A = 3 THEN X = X AND (NOT 1)                   :'Set bit 0 to zero
300 IF A = 4 THEN X = X OR 1                          :'Set bit 0 to one
310 IF A < 1 OR A > 4 THEN CLS : END                  :'Exit program
320 OUT BYTE, X                                       :'Write to modem control register (set relays)
330 RETURN

```

#### MODEM CONTROL REGISTER

COM 1	3FC hex
COM 2	2FC
COM 3	3EC
COM 4	2EC

#### MODEM STATUS REGISTER

3FE hex
2FE
3EE
2EE

**NOTE:** CTS should be 1 when the AR-2S is powered up and properly connected to the PC. CTS should be 0 if the AR-2S is disconnected or if power is lost to the AR-2S.