

MP-S2 Dual Serial Interface

Introduction

The MP-S2 dual serial interface is a 5.75" wide x 4.75" high interface board implemented with the 6850 asynchronous communications interface adapter (ACIA). The board has been designed for use in the SWTPC S/09 computer and should be installed in one of the eight I/O card slots. The MP-S2 is used to interface serial type devices such as terminals, printers and modems to the computer system. The board is provided with two separate DB-25 connectors, one for each serial port. All input and output lines are RS-232C compatible - TTY current loop inputs and outputs are not provided.

Using the MP-S2

In most applications the MP-S2 can just be plugged directly into the computer system. The baud rate jumpers are the only items needing to be configured. Persons using the MP-S2 with SWTPC supplied software should pay particular attention to the BAUD RATE PROGRAMMING section and the section of the system documentation concerning the connection of their particular printer. Most of the information contained in this manual is for those persons writing programs directly accessing the ACIA's on the MP-S2.

The MP-S2 has two serial connectors. Each connector is a standard DB-25 25-pin connector. The upper connector is associated with the upper ACIA and is designated as PORT A. The lower connector is associated with the lower ACIA and is designated as PORT B. Both ports are similar in function but have separate addresses.

Baud Rate Programming

The MP-S2 has four sets of jumper blocks which determine the baud rate (transmission speed) of the interface. The TCLOCK jumper sets the rate at which the MP-S2 transmits data and the RCLOCK jumper sets the rate at which the MP-S2 receives data. In most cases the TCLOCK and RCLOCK jumpers should be set at the same rate. An EXT position is also provided on each jumper. When the EXT position is selected the MP-S2 will use an externally applied clock signal as is commonly done when using a CT-82 terminal. This signal is input thru the serial connector on the board (see description of the serial I/O lines).

Interrupts

The interrupt request line of each half of the port is hardwired to the computer system's IRQ interrupt line. Care should be taken when writing custom serial interface driver programs not to inadvertently enable ACIA interrupts.

Serial I/O Line Description

The following is a description of each of the lines available on each of the serial connectors on the board.

DB-25 Connector

| <u>Pin Number</u> | | <u>Function</u> |
|-------------------|----------|--|
| 1,7 | ground | Ground |
| 4,5 | | These pins are electrically connected together on the MP-S2 board and are used to tie together the RTS and CTS lines of the terminal or printer to which it is connected. |
| 2 | R DATA | This is the RS-232C serial data input line to the MP-S2. |
| 3 | T DATA | This is the RS-232C serial data output line of the MP-S2. |
| 8 | DCD | This is the RS-232C DCD (data carrier detect) output line of the MP-S2. This line is the buffered output of the ACIA's RTS line. This line is normally not used. |
| 12 | SDCD | This is the RS-232C DCD (data carrier detect) input line of the MP-S2. This line is the buffered input of the ACIA's DCD line. This line is normally not used. |
| 19 | HOLD DWN | This buffered RS-232C input line is normally used to tell the software driving the MP-S2 that a key on the connected terminal is being held down. This feature will be used only with SWTPC CT-82 terminals. This line can be read thru the Control Line Input Register. |
| 20 | CTS | This line is the CLEAR TO SEND (CTS) input of the MP-S2. When this line is RS-232C low, the transmission of data out of the AC IA will be inhibited. This line is normally connected to the buffer full or data terminal ready line of a terminal or printer. |
| 24 | CLOCK IN | This input line directly feeds the ACIA's receiver or transmitter clock input when the baud rate jumper is in the EXT position. This input is TTL compatible and the clock frequency should be 16 times the desired baud rate. |

Control Line Input Register

The MP-S2 has some special control line inputs which can be read by the computer. The functions of this "register" are as follows.

| Bit # | Input Function |
|-------|---|
| 0 | Hold down input of A side serial connector (pin 19) |
| 1 | Hold down input of B side serial connector (pin 19) |
| 2 | + |
| 3 | |
| 4 | + Reserved for future use. |
| 5 | |
| 6 | |
| 7 | + |

Drive Capability/Input Requirements

All input/output lines to the MP-S2 serial connectors except for the CLOCK IN line are RS-232C level compatible. Each output is nominally +10 volts in the high state and -10 volts in the low state. Outputs are currently limited to approximately 10mA. The CLOCK IN line is a diode protected MOS input that is TTL level compatible.

ACIA Programming

The writing of custom terminal and printer drivers which directly access the ACIA's on the MP-S2 requires a thorough knowledge of ACIA programming as described in the programming documentation. The MP-S2 Register Address Assignments table can be used in conjunction with the programming information to determine the proper ACIA address to use.

MP-S2 Address Assignments

The MP-S2 serial interface should only be used in computer systems which have 16 addresses assigned per I/O card slot, such as the SWTPC S/09 system. Below are the address-register assignments for the MP-S2.

| <u>Register Address</u> | <u>Register</u> |
|-------------------------|--|
| 0 | Upper ACIA (A port) status/control register |
| 1 | Upper ACIA (A port) data register |
| 2 | - - |
| 3 | - - |
| 4 | Lower ACIA (B port) status/control register |
| 5 | Lower ACIA (B port) data register |
| 6 | - - |
| 7 | - - |
| B | - - |
| 9 | - - |
| A | - - |
| B | - - |
| C | - - |
| D | - - |
| E | Control Line Input Register-multiply decoded |
| F | Control Line Input Register-multiply decoded |

All addresses not indicated are not decoded

For example, an MP-S2 board installed in port #2 of a S/09 system with I/O addresses at E000 would have the following assignments:

| | |
|------|--|
| E020 | A port control/status register (E020 is the base |
| E021 | A port data register address for port #2) |
| E024 | B port control/status register |
| E025 | B port data register |
| E02F | Control Line Input Register |
| | |

port No ++ Register address

| <u>Port #</u> | <u>Base Address</u> |
|---------------|---------------------|
| 0 | E000 |
| 1 | E010 |
| 2 | E020 |
| 3 | E030 |
| 4 | E040 |
| 5 | E050 |
| 6 | E060 |
| 7 | E070 |

Serial Interface Handshaking

When operating at high baud rates, many serial printers and terminals require that transmission from the computer be halted for short periods of time in order for the device to perform some type of "catch up" service, such as generating carriage returns, form feeds or other functions which take longer than the device's buffer memory can accommodate. The CTS line on the MP-S2 can be used for this purpose. When CTS is RS-232 high, characters will be continuously transmitted from the computer at the rate selected by the baud rate jumper. Characters are output at one tenth the baud rate speed. For example 1200 baud means characters are transmitted at the rate of $1200 \div 10$ or 120 characters per second. When the CTS line is RS-232 low, character transmission will be inhibited. Note that this just holds up the computer and does not cause any characters to be lost. The signal in most terminals or printers that should be connected to the CTS line is normally called BUFFER FULL or DATA TERMINAL READY. Documentation supplied with the particular device should be referenced for details.

MP-S2 Dual Serial Interface

Parts List

Resistors

R1 4.7K ohm 1/4 watt resistor (optional)
R2 4.7K ohm 1/4 watt resistor

Capacitors

| | | | |
|-----|---------------------------------------|-----|------------------------|
| C1* | 47 mfd 16-volt electrolytic capacitor | C8 | 0.1 mfd disc capacitor |
| C2 | 0.1 mfd disc capacitor | C9 | 0.1 mfd disc capacitor |
| C3 | 0.1 mfd disc capacitor | C10 | 0.1 mfd disc capacitor |
| C4 | 0.1 mfd disc capacitor | C11 | 0.1 mfd disc capacitor |
| C5 | 0.1 mfd disc capacitor | C12 | 0.1 mfd disc capacitor |
| C6 | 0.1 mfd disc capacitor | C13 | 0.1 mfd disc capacitor |
| C7 | 0.1 mfd disc capacitor | | |

Semiconductors

D1* 1N4148 silicon diode (optional)
D2* 1N4148 silicon diode (optional)
D3* 1N4148 silicon diode
D4* 1N4148 silicon diode

Integrated Circuits

| | | | |
|------|--------------------------------------|-------|--------------------------------------|
| IC1* | 74LS02 quad NOR gate | IC8* | 1489 quad RS-232 receiver |
| IC2* | 74LS10 triple 3-input NAND | IC9* | 1489 quad RS-232 receiver (optional) |
| IC3* | 6850 ACIA (MOS) (optional) | IC10* | 7805 5-volt regulator |
| IC4* | 6850 ACIA (MOS) | IC11* | 78L12 12-volt regulator |
| IC5* | 74LS240 octal buffer | IC12* | 79L12 -12-volt regulator |
| IC6* | 1489 quad RS-232 receiver (optional) | | |
| IC7* | 1488 quad RS-232 transmitter | | |

All components flagged with a (*) must be oriented as shown in the component layout drawing

NOTE: Those parts, except for IC9, designated as "optional" are the ones necessary to expand the MP-S2 to dual port capability and are contained in the MP-SX expansion kit. IC9 is an optional integrated circuit for special applications and will not be supplied on most units.

