

Model HM-501 Dual Serial Interface

Installation and Service Instructions



SENTRY INSTALLATION & SERVICE INSTRUCTIONS

SENTRY MODEL HM-501 DUAL SERIAL INTERFACE CARD Rev. C

1.0 INTRODUCTION

The Sentry Model HM-501 is a dual channel serial interface that provides data communication between Sentry devices. The HM-501 utilizes balanced differential drivers and receivers to comply with the EIA standard for RS-485 communication. This interface is capable of reliable communications over long distances (4000 feet) within electrically noisy environments.

Addressing for each channel is selected independently by a set of dip switches. System controllers shipped with HM-501 cards have all the proper selected jumpers and dipswitch settings. Do not change jumper settings. Section 7, "Jumper Selection" is included below for reference only.

2.0 HM-501 CARD REPLACEMENT

***NOTE: CARDS AND COMPONENTS ARE STATIC SENSITIVE.
USE PRECAUTION TO KEEP YOURSELF, TOOLS, AND CONNECTIONS GROUNDED.***

Turn off the controller's power. Remove cover. Remove data lines from connectors on specific card to be replaced. **Note cable I.D. markings for proper replacement later.**

Remove screw that holds card to rear frame of controller.
Remove card by pulling straight out.

Use the just removed HM-501 card as an example to set switches and jumpers on the replacement card. Set all switches and all jumpers to the exact placement of the original.

Insert card by placing onto edge-card connector and press firmly in a straight down direction, until card is fully inserted into slot. Replace hold down screw on rear frame bracket.

Connect data loop lines to the proper connectors. Use connector screws to hold plugs.
Replace controllers cover. Turn on power.

TEST:

1. Check display for service trouble warnings.
2. Verify loops by testing a Host Panel on each loop that was disconnected, to make sure the proper room number is displayed for that address.

SENTRY MODEL HM-501 DUAL SERIAL INTERFACE CARD Rev. C

3.0 DRIVER / RECEIVER REPLACEMENT

In most cases where one entire data loop fails, the driver and receiver components have failed. This is especially true with cases of lightning.

The Model HM-501 card is usually repaired easily by replacement of the driver/receiver pair. It is highly recommended to always replace both parts.

The driver/receiver parts are 14 pin, DIP integrated circuits, plugged into sockets for easy field replacement. The **driver** is marked with the numbers **SN75175** or **MC3486**.

The **receiver** is marked: **SN75174** or **MC3487**.

A 75175 can replace the 3486 or vice versa, same with the receivers. Be very careful to replace a driver with a driver part and a receiver with a receiver part.

Refer to the board layout diagram (figure 1, below) for component placement.

NOTE: CARDS AND COMPONENTS ARE STATIC SENSITIVE. USE PRECAUTION TO KEEP YOURSELF, TOOLS, AND CONNECTIONS GROUNDED.

With the card removed from the controller, carefully remove the IC with a small screwdriver blade. Carefully insert the new part into the socket, being sure not to bend any leads. Make sure the proper part goes into the right socket, and all the leads are properly inserted into the receptacle holes.

Replace the card into the controller as detailed in section 2.0.

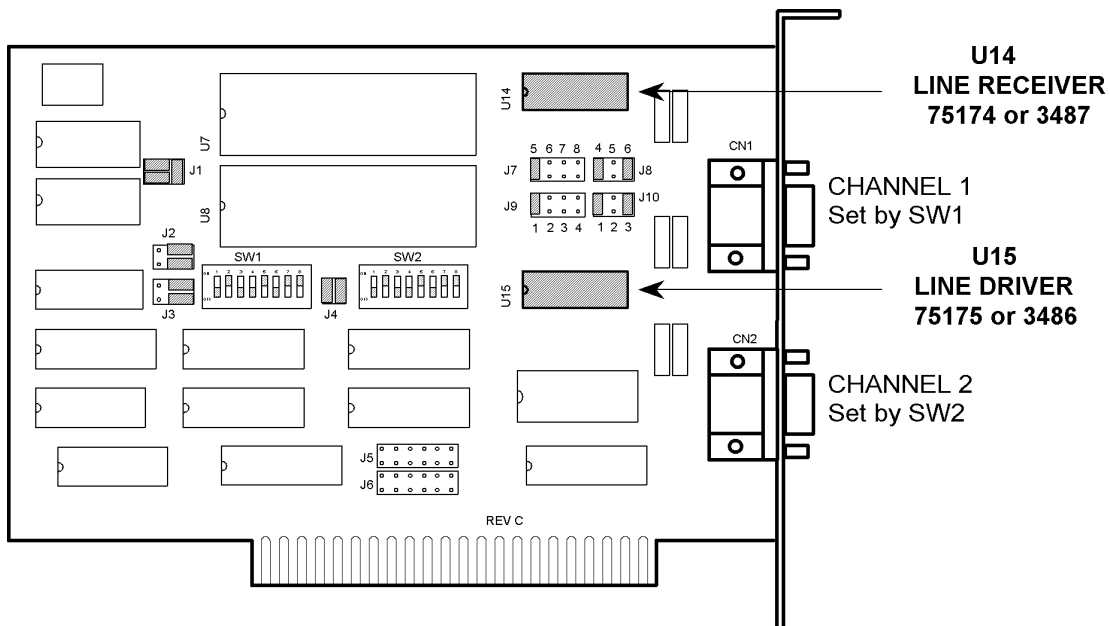


Figure 1.HM-501 Board Layout diagram
(Jumpers shown in Half Duplex mode)

**SENTRY MODEL HM-501
DUAL SERIAL INTERFACE CARD
Rev. C**

4.0 ADDRESSING

The Model HM-501 card has a dipswitch for address selection of each data channel. The channel address is the computer's internal address buss location represented with a hexadecimal number. Sentry simplifies this by labeling data lines from 1 to 16.

SWITCH DESCRIPTIONS:

Using **Data Line 8** as an example, at address **0258**.

First character is always 0.

The other numbers are entered in their binary form, each with 4 bits.

The lower 3 bits of the 2nd character (the number 2) are set on switches 1,2,& 3.

The 4 bits of the 3rd character (the number 5) are set on switches 4,5,6,& 7.

The Most Significant Bit of the last character (the number 8) is set on switch 8.

Example: Data Line 8 must be selected for address **0 2 5 8**

The switch position "ON" equals a "0" bit

The switch position "OFF" equals a "1" bit

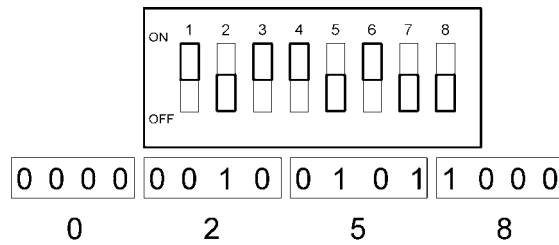


Figure 2 Address switch descriptions



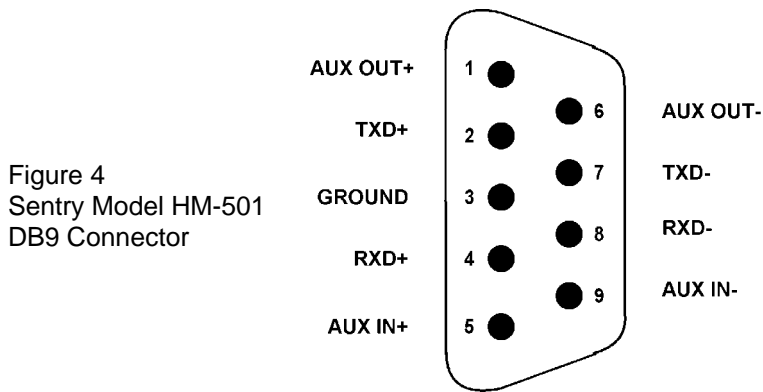
Figure 3 Typical HM-501 Serial Interface switch settings

5.0 BOARD DESCRIPTION

A component diagram of the HM-501, Rev C, showing the locations of the components, configuration jumpers, and DB9 connectors is shown in figure 1, (on page 2). Communication channel 1 is controlled by switch SW1 for addressing and is accessed through the connector labeled CN1. Channel 2 uses switch SW2 for addressing and is accessed through the connector labeled CN2.

6.0 CONNECTORS

Connections to the data loops are made via a female DB9 connector on the card. A pin-out of the DB9 connector and a detailed description of each output signal is illustrated in figure 4.



6.1 EXTERNAL CONNECTIONS

6.1.1 HALF DUPLEX

Connections to data lines are usually made with the Model HM-801-121 Pigtail assembly. This arrangement is referred to as Half Duplex and used with devices such as Host Panels. Wiring in the plug connects the transmit-out to the receive-in pins as shown below in figure 5.

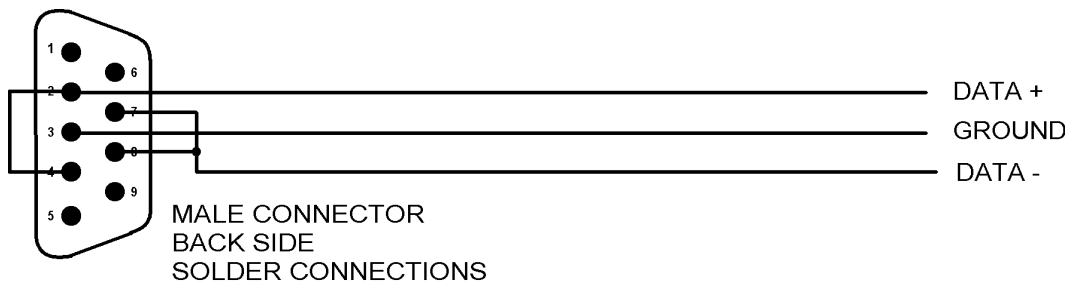


Figure 5

Half-Duplex Pigtail Connections
Typically To Panels

**SENTRY MODEL HM-501
DUAL SERIAL INTERFACE CARD
Rev. C**

6.1.2 FULL DUPLEX

FOR HOST / REMOTE CONFIGURATIONS

The connection between consoles and expansion chassis is a special, high speed, full duplex, data line. This line requires 4 wire connections (2 pairs) with a shield or drain wire. The 2 pairs are necessary since the controllers will transmit and receive simultaneously.

Most installations with a Host/Remote setup require special wiring to be installed and it usually is for long distances. Most of these special setups require the connectors to be installed in the field. NOTE: the cable wiring on one end is opposite to the connections at the other end. The cable connections must perform the changeover between the transmit-output to the receive-input.

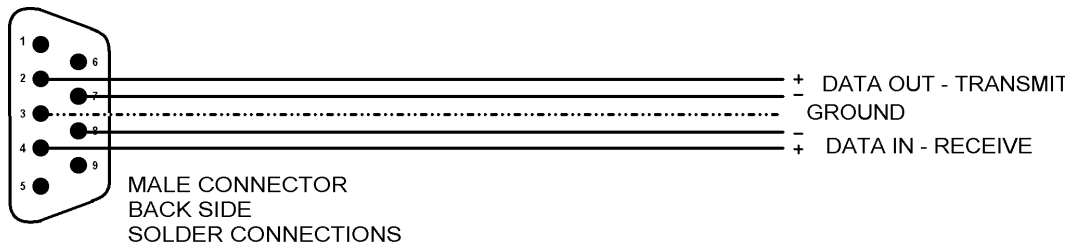


Figure 6

Full-Duplex Wiring Connections - Four Wire hookup

7.0 JUMPER SELECTIONS

JUMPER J1 - BAUD RATE SELECTION

The Sentry software automatically determines the baud rate of the serial output and also uses a combination of the clock input frequency selected by J1. For use on all Sentry products, J1 must be configured as shown in figure 6.

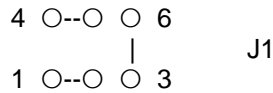
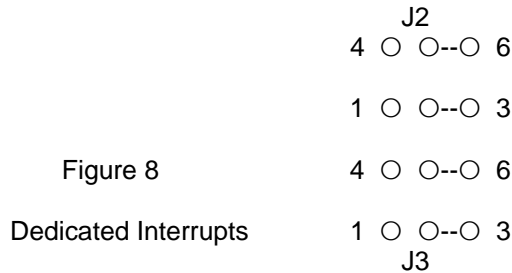


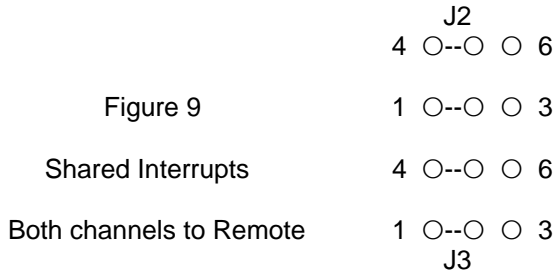
Figure 7

JUMPERS J2 & J3 INTERRUPT SHARING

These jumpers select interrupt sharing with the 2 channels on the board and between other serial interface boards that might be in the same computer. Two jumpers at J2 control the interrupt sharing feature for channel 1. The two jumpers at J3 controls channel 2. In most cases the jumpers must be set for the DEDICATED mode where all jumpers are to the right, (jump pins 5-6, and pins 2-3).



Only Full-Duplex data lines that connect between Host/Remote, and data lines for LCD's require interrupts. And only when more than one data line goes out of a Host is the SHARED position used. In this case, both channels use the same interrupt, and the jumpers must be placed in the SHARED position. The two jumpers at J2 and the two jumpers at J3 must be on pins 1-2 and 4-5, (all four to the left). In this case the IRQ jumpers MUST be on the same selection, (usually 5).



If one channel is used for Remote/Host communication, the jumpers all stay to the DEDICATED position (right side).

However if one channel is used for Remote/Host communication along with a channel or channels on another interface card, that channel must be set to the SHARED position, along with the channel on the other card.

If a data line is used for LCD, an interrupt must be selected but is usually only one data line, so the jumpers stay in the DEDICATED position (right side).

JUMPER J4 PORT ENABLE

Each channel is enabled through J4. Connecting pins 1 to 3 will enable Port 1. Connecting pins 2 to 4 will enable Port 2. A channel may be disabled by removing its respective jumper. For most cases leave both jumpers in.

**SENTRY MODEL HM-501
DUAL SERIAL INTERFACE CARD
Rev. C**

JUMPERS J5 & J6 INTERRUPT SELECT

Jumpers J5 and J6 select special interrupts when used. Interrupts are used on Full Duplex data lines between Host and Remote, and when LCD display panels are used. Do not install jumpers to connect pins at J5 and J6. Place unused jumpers on a single pin.

On Full Duplex, Host/Remote setups, interrupt 5 is usually used, (sometimes 3). The interrupt selection must match the definition in the program's Configuration Table. In the case where a Host is Communicating with 2 Remote, both channels must use the same interrupt. See the Programming Guide under .HOST and .REMOTE for more information.

Computers use most of the available interrupts for operation. Sentry applications can usually use interrupt 5 or 3. Interrupt 5 (usually written as IRQ5 for Interrupt Request 5) is commonly reserved for Printer Port #2, (labeled LPT2). Before using IRQ 5, it is important to make sure that if a LPT2 selection exists, that it is turned off, either in the BIOS setup or on the I/O card. Interrupt 5 is usually the best to use since most computers do not have a second Printer Port.

Interrupt 3 is commonly reserved for serial channel COM 2 at address 02F8. **DO NOT USE IRQ 3 IF THE SYSTEM IS USING THE COM 2 SERIAL PORT.** Also before using IRQ 3, it is important to make sure that COM 2 is turned off, either in the BIOS setup or on the I/O card.

Sentry systems often use a COM port for pocket pagers, voice alarms, and Host/Remote configurations. Seldom are both COM ports used.

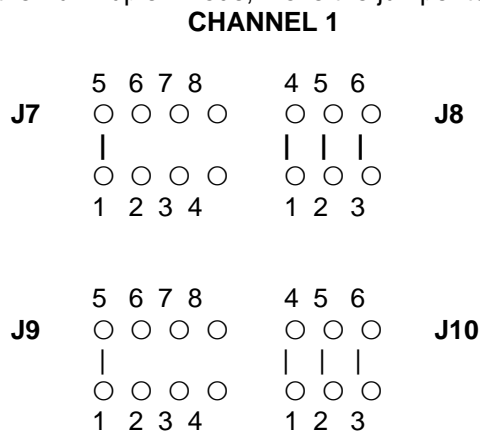
JUMPER J7 & J9 DATA LINE TRANSMITTER CONTROL

HALF DUPLEX

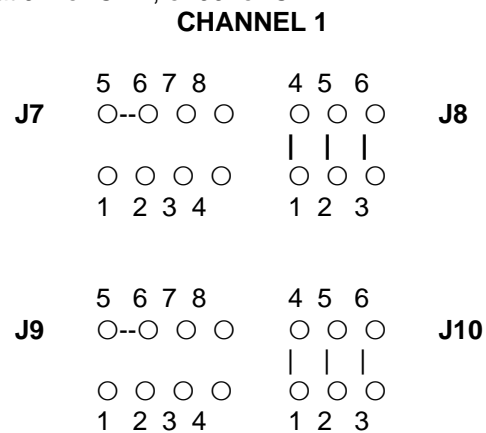
These jumpers are provided to maintain compatibility with all previous serial interface cards. It allows a choice on each channel of which signal and its level will enable the transmitter. Most Sentry systems connect pins 1 and 5 to select DTR=0 (same as DTR=Low). To select DTR=1, install the jumpers on pins 2 and 6. This jumper selection must match the setting in the software. See the .LOOP definition in the program's configuration table. Older Sentry systems did not allow changes to the DTR setting. They always ran the cards with DTR=0 and the jumpers were placed over pins 1 and 5.

FULL DUPLEX

For full duplex operation the drivers on the HM-501 card are always enabled. To operate a channel in the Full Duplex mode, move the jumper to pins 5 and 6, at J7 for Ch 1, or J9 for Ch 2.



CHANNEL 2
Figure 10
Jumper Placement - Half Duplex



CHANNEL 2
Figure 11
Jumper Placement - Full Duplex

**SENTRY MODEL HM-501
DUAL SERIAL INTERFACE CARD
Rev. C**

JUMPERS J8 & J10

These two sets of jumpers control the source of the data exchanged on the auxiliary communication lines.

J8 controls channel 1 and J10 controls channel 2. In all Sentry applications, the three jumpers remain installed at both J8 and J10.

RCLK is the input to the UART which controls the shift rate for the receive portion of the chip. For Sentry communications, the RCLK input is connected to the XCLK output by placing a jumper to connect pins 3 and 6 of the jumper block. This jumper must always be present for operation.

The RTS output is looped back to the CTS input by connecting pins 1 & 4.

The card will communicate without a jumper on pins 1-4 and 2-5, but we usually leave them on.

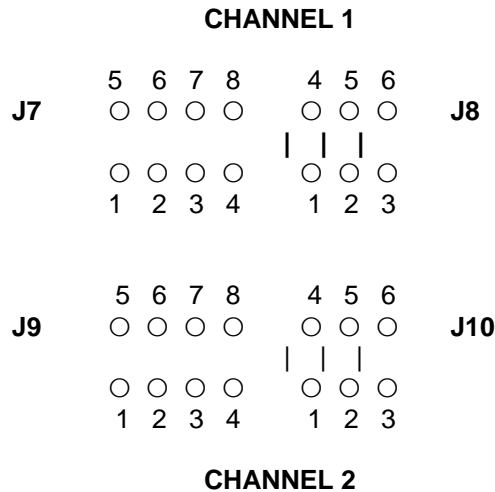


Figure 12
Jumper Placement - Auxiliary

Ch 1	Ch 2	Jumper Connection	Function
J8	J10	1 - 4	RTS / CTS Loopback
J8	J10	2 - 5	AUXOUT / AUXIN Loopback
J8	J10	3 - 6	RCLK / XCLK Loopback
J7	J9	1 - 5	Half Duplex Transmit Control, DTR=0
J7	J9	2 - 6	Half Duplex Transmit Control, DTR=1
J7	J9	5 - 6	Full Duplex, (Transmitter always enabled)

Table 1. Sentry Output Control Functions

8.0 SYSTEM OPERATION

The Sentry system uses only two wires for data transmission to most devices. This Half-Duplex method meets the standards for RS485 data communication. The common term for this arrangement is "multi-drop". A diagram of a partial connection is shown in figure 9. All devices in the system are configured for half duplex operation.

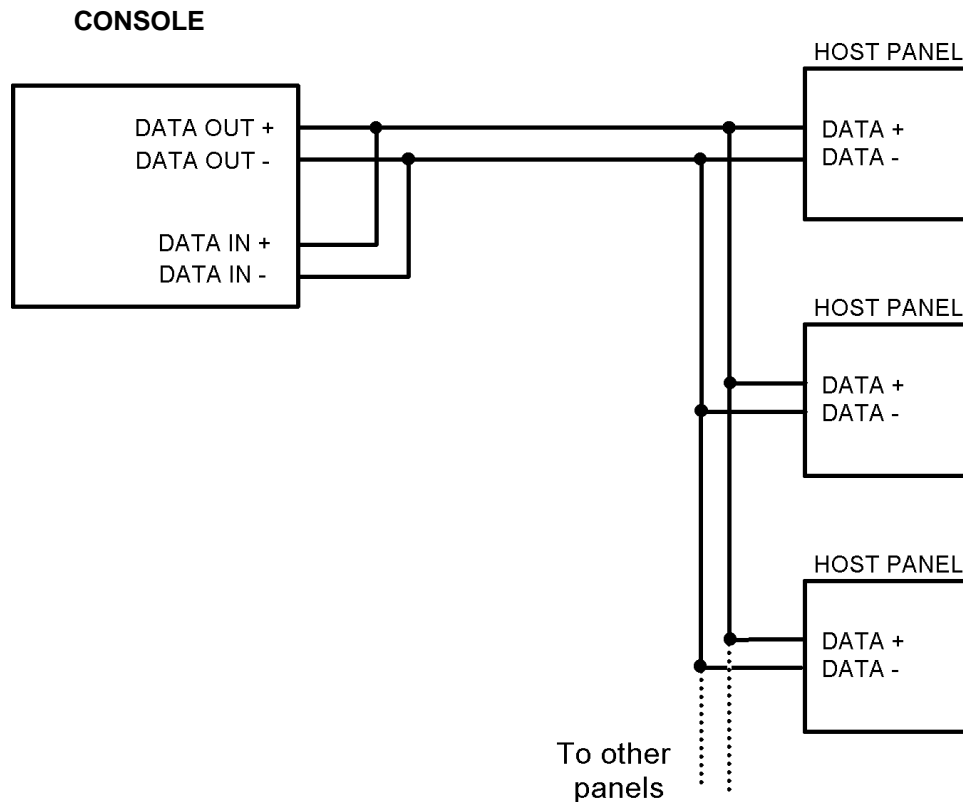


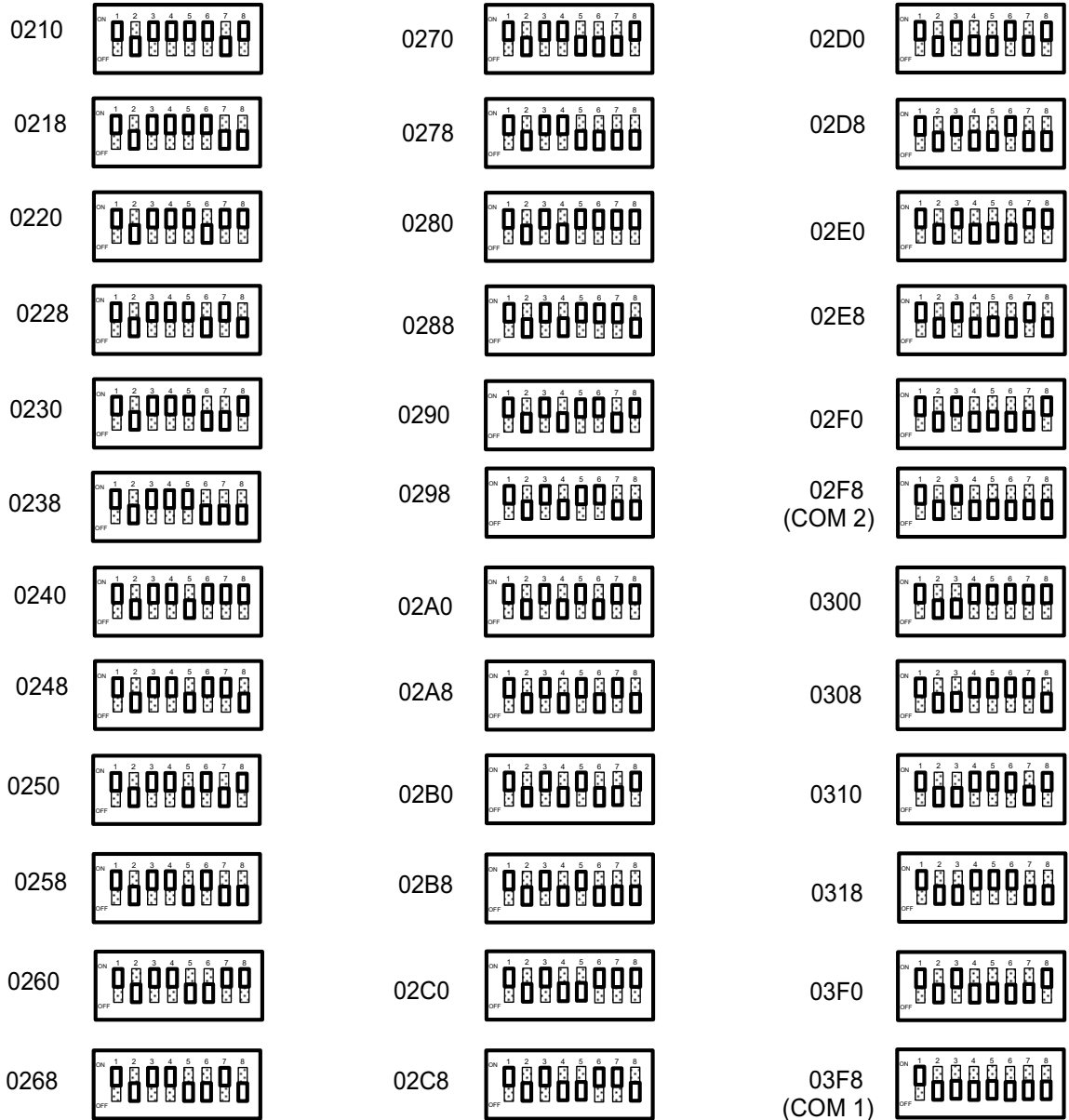
Figure 11 Data Line Hook-up

8.1 PANEL COMMUNICATION

All Sentry panels will receive all serial addresses. When a panel recognizes it's own address, it will input the data information. A transmit time delay of 3mS is built into all peripheral panel's before the transmitter is activated and data is sent back to the controller.

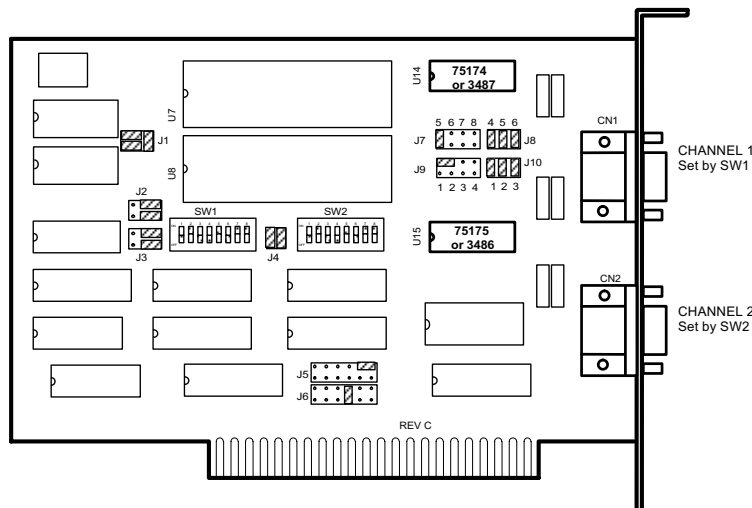
8.2 TERMINATION RESISTORS

The serial data communication protocol was carefully selected to be used on Sentry for the ease of making connections in a multi-drop system. The baud rate is kept low to increase reliability and to eliminate the need for special terminations. All Sentry host panels include a data line termination resistor. The HM-501 dual serial interface card is pre-configured with line end resistors. No other termination devices are required in a Sentry installation.



J2 (CH1) & J3 (CH2)
 INTERRUPT SHARING
 SHOWN IN *DEDICATED* POS.
 MOVE LEFT FOR *SHARED*.

J5 (CH1) & J6 (CH2)
 IRQ SELECT
 J5 SHOWN AS NO IRQ
 J6 SHOWN AS IRQ5



J7 SHOWN IN HALF
 DUPLEX POSITION
 (TYPICAL USE)

J9 SHOWN FOR
 FULL DUPLEX
 OPERATION
 (HOST / REMOTE)

J8 & J10 AUX CH
 ALL JUMPERS ON