

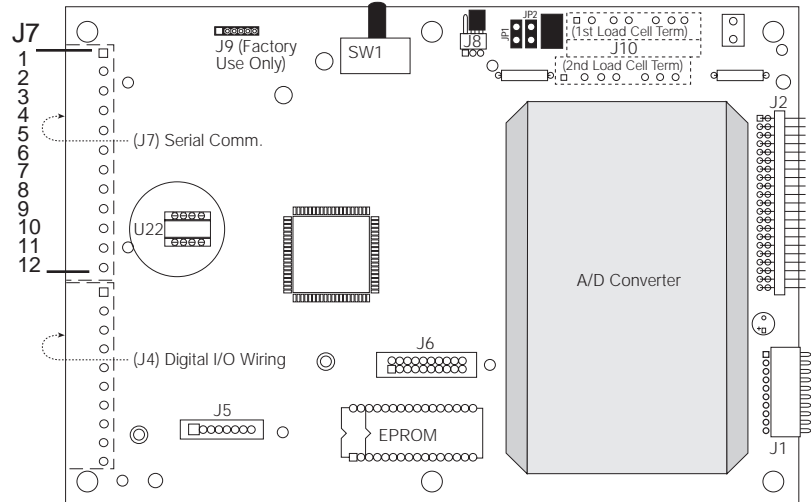
Expanded Serial Communication Options

1. Adding Duplex 20 mA Current Loop to EDP Serial Port

In standard form, the EDP port has duplex RS-232 serial and simultaneous output-only 20 mA Current Loop (CL) communication. To change the simplex 20 mA CL to duplex, optional equipment integrated chip U22 must be installed in the proper connection on the main board. Integrated Chip U24 must not be installed with this application. When used for duplex 20 mA CL communication, main board connections on the J7 terminal are: J7-7 (I+ IN), J7-8 (I- IN), J7-10 (I- OUT), AND J7-12 (I+ OUT).

EDP Port RS-232	20mA (U22)*
J7-7	I+ IN
J7-8	I- IN
J7-9	RS-232 IN
J7-10	I- OUT
J7-11	RS-232 OUT
J7-12	GND I+ OUT

*Integrated chip U22 must be installed; U24 must NOT be installed.



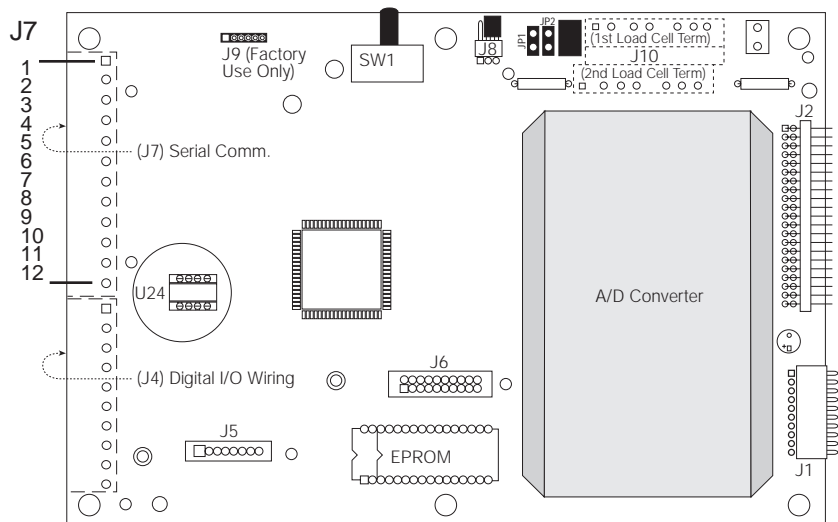
Main Board Location of Duplex 20 mA CL Chip, U-22

2. Adding RS-485 to EDP Serial Port

When used for RS-485 applications, the EDP port can be configured to operate as a transceiver on a multi-drop twisted-pair line. Optional integrated chip, U24 must be installed in the proper socket on the main board to configure the EDP port for RS-485 format. Before installing U24, make certain that U22 is NOT installed. J7-7 (RS-485-A) and J7-8 (RS-485-B) are used for RS-485 applications.

EDP Port	RS-485 (U24)*
J7-7	485-A
J7-8	485-B
J7-9	RS-232 IN
J7-10	RS-232 OUT
J7-12	GND

*Integrated Chip U24 must be installed; U22 must NOT be installed.



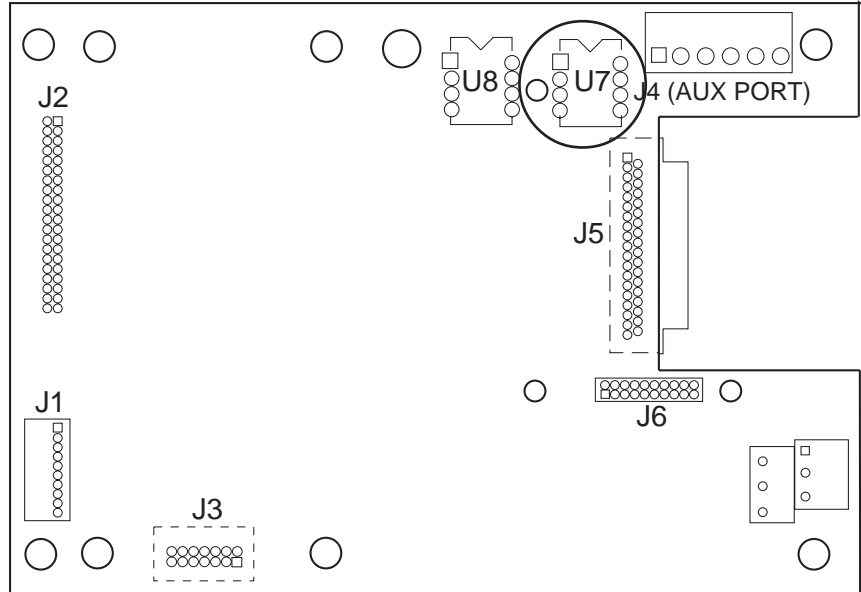
Main Board Location of RS-485 Chip, U-24

3. Adding RS-485 to Auxiliary Communication Port on Expansion Board

When used for RS-485 applications, the auxiliary serial port can be configured to operate as a transmitter on a multi-drop twisted-pair line. Integrated Chip U7 must be installed in the proper socket on the expansion board to configure the AUX port as a 485 transceiver. Before installing U7, make certain that U8 is not installed. Terminal J4 on the expansion board is used for the AUX serial port connections. J4-1 (RS-485-A) and J4-2 (RS-485-B) are used for RS-485 applications.

AUX Port RS-485 (U7)*	
J4-1	485-A
J4-2	485-B
J4-3	RS-232 IN
J4-4	
J4-5	RS-232 OUT
J4-6	GND

*Integrated Chip U7 must be installed; U8 must NOT be installed.



Expansion Board Location of RS-485 Chip U7

4. Setting Up and Using RS-485 Communications

Use of the indicator's expanded serial options allows multiple indicators on a single serial communications line. Usually this is done on an RS-485 interface, and the indicator has the provisions to adapt to this interface. This is done by installing the RS-485 transceiver chip in the appropriate IC socket.

In order to turn on the RS-485 protocol, you must assign an address to the appropriate serial port. The indicator has two ports that may be configured RS-485 ports; the EDP port found on the main board and the AUX port found on the expansion board.

Note:

Use of bidirectional serial commands is not currently supported for the indicator's AUX serial port.

Assigning an address to the indicator's EDP port changes the serial output that is expected. Now all communications must be initiated by an address. Indicators that have addresses other than the one sent simply ignore any information following that address. This is especially helpful in a situation where more than 1 indicator exists. If you want the current gross weight from indicator #1, it would be very inconvenient to have indicator #2 send its communication simultaneously with the communication sent by indicator #1. RS-485 protocol demands that each device have one unique address, and that no device speak unless directly addressed.

Demand Printing (PRNDEST = EDP)

When the EDP port is set up as the demand print destination (PRNDEST = EDP) and the EDP port has a non-zero address, a demand print output will resemble the following pattern:

```

<STX> <ADDRESS> <First line of printout> <EOL>
                   < 2nd line of printout> <EOL>
                   < 3rd line of printout> <EOL>
                   < Last line of printout> <EOL>

<ETX>
    
```

The beginning of any RS-485 packet of information always includes the (STX) ASCII character 02 Decimal. The end of any RS-485 packet of information always includes the (ETX) ASCII character 03 Decimal. Notice that the address is passed immediately following the STX character. This address is the ASCII equivalent to the decimal number that was keyed in for the EDP port address parameter.

As an example of setting up the EDP port ADDRESS parameter to the address of 65, perform the following:

- (1) Put the indicator into the CONFIG mode.
- (2) Navigate to the SERIAL-EDP-ADDRESS prompt.
- (3) Press the "DOWN-ARROW" key to enter a new EDP port address.
- (4) The indicator will display the current EDP port address. This is 0 as a factory default.
- (5) Press the following key sequence to set the address to 65 Decimal.

<6><5><Enter>

- (6) Press the "UP-ARROW" key to lock in the new EDP port address.

As an example of how a simple demand print output will change because of the RS-485 protocol, let's look at an actual printout provided by an indicator where the EDP port is assigned to address 65 Decimal, and the EDP port is the Print Destination, (PRNDEST = EDP). Given the preceding setup information, once the "PRINT" key is pressed, the following serial response is transmitted.

```
(STX)A      SCALE #1
              GROSS  1713 LB
              01/01/92 05:23 PM
(ETX)
```

Notes:

- <STX> is the ASCII "Start of Text" character 02 Decimal. On most monitors and terminals, it would appear to be a "happy face" character.
- <ADDRESS> in this case is 65 Decimal, which looks like the Capital "A" character.
- <ETX> is the ASCII "End of Text" character 03 Decimal. On most monitors and terminals, it would appear as a "heart" character.
- The <EOL> characters will be as set up under the EDP TERMIN parameter. The choice is either CR/LF or CR only.

For your convenience, an ASCII chart is located in the appendix of this manual. It can be used to select the appropriate ASCII code for any address you choose.

Continuously Streaming Information (STREAM = EDP)

When the "STREAM" parameter is selected for a destination of either "EDP" or "AUX" and if the appropriate port "ADDRESS" is not zero, the indicator will transmit continuously information in the following format:

<STX><ADDRESS><STREAM DATA FORMAT><ETX>

The Stream Data Format uses the following serial output data format:

<STX><POL>wwwwwww<L/K><G/N><S><EOL>

Where <STX> is ASCII 02 Decimal
 <POL> is a space if positive polarity

	is "-" if negative polarity
wwwwwww	7 digits of weight information padded with spaces
<L/K>	is "L" if pounds is "K" if kilograms
<G/N>	is "G" if gross weight data is "N" if net weight data
<S>	is a space if valid data is "I" if invalid data is "M" if in motion is "O" if over/under range

An example using an indicator with an EDP port address of 65 Decimal and the STREAM = EDP parameter set, is shown below:

```
(STX)A<STX> 1713LG<EOL><ETX>
(STX)A<STX> 1713LG<EOL><ETX>
(STX)A<STX> 1713LG<EOL><ETX>
(STX)A<STX> 1713LG<EOL><ETX>
(STX)A<STX> 1713LG<EOL><ETX>
```

Note that there are two STX characters per data frame. One is for the beginning of an RS-485 transmission, and the other is part of the STREAM data format.

EDP Serial Commands (Bi-directional Communications)

When sending serial commands to an indicator that is set up for RS-485 protocol (EDP port ADDRESS not zero), all commands must be prefaced according to the following protocol.

<STX><ADDRESS><COMMAND><EOL>

Where

<STX>	is ASCII 02 Decimal character
<ADDRESS>	is the ADDRESS of the indicator to receive command
<COMMAND>	is the EDP Serial Command desired
<EOL>	is either a <CR> or a <CR><LF>

If the address sent matches the EDP port address setting of any indicator listening on the RS-485 network, the corresponding indicator responds in the following way:

```
<STX> <ADDRESS> <First line command response> <EOL>
                  <additional lines of response> <EOL>
                  <last line of response> <EOL>
<ETX>
```

Where

<STX>	is ASCII 02 Decimal character
<ADDRESS>	is the ADDRESS of the indicator port transmitting
<EOL>	is CR or CR/LF as set in EDP-TERMIN
<ETX>	is ASCII 03 Decimal character

For example, assume that an indicator is set up as EDP port address 65 Decimal. The EDP port serial command to execute a demand print would consist of the following:

<STX>AKPRINT<EOL>

This is easier to decipher if broken up into its parts:

<STX> A KPRINT <EOL>

STX is the ASCII 02 Decimal start-of-text character. One would key this in at a monitor or terminal by holding down the CTRL key and pressing the B key simultaneously. The ASCII chart in the appendix shows that the STX character is equivalent to pressing the CTRL-B character.

A is once again the ASCII equivalent to 65 Decimal. If one presses the "A" key, he would be sending out the Address 65.

KPRINT is the EDP remote serial command to execute a demand print.

The <EOL> is an ASCII end of line sequence. This may be either <CR/LF> or <CR>. It really depends on your terminal or computer. The TERMIN parameter on the indicator only affects the output EOL characters. It has no bearing on input end of line sequences.

In order to send the previous command to an indicator with address 65, the following key sequence would be keyed in on an ASCII terminal or programmed in through the use of a PC program:

To send this: <STX>AKPRINT<EOL>

Type this: <CTRL-B><A><K><P><R><I><N><T><ENTER>

If this is done correctly, the indicator with address 65 will respond like the following::

```
<STX> A      SCALE #1      <EOL>
             GROSS 1699 LB      <EOL>
             01/26/91 01:19 AM      <EOL>
<ETX>
```

Note:

Normally when using a terminal or monitor in order to key in commands to the indicator, the indicator echos the received characters back. This is characteristic of a device using full duplex communications. In the case of using RS-485 protocol with the indicator, it is not desired to echo back any characters. In fact, the indicator will not echo back any characters while the EDP port address is non-zero. Therefore one needs to put his monitor or terminal into half-duplex mode. When in half-duplex mode, all characters are then echoed locally in addition to being sent out the serial port.