

I. Specifications :

Transmission Rate : Programmable 1200,2400,4800 or 9600 BPS
Data Transmission : Asynchronous ASCII
Electrical Interface RS232C/RS423A (RS422A,RS485 optional)
Serial Frame : 10 bit (1 Start bit, 7 Data bits,
1 Parity bit = 0 and 1 stop bit)
Parity : None

II. Transmission Rate Inspection And Program :

The "B" key of the iPLC-1 keyboard is used to inspect or modify the Transmission rate of the serial interface. Pressing the "B" key will change the iPLC-1 display to :

XX00 BAUD * XX = 12,24,48,96

To modify the current Baud rate in Program mode press the "B" key and the display of the iPLC-1 will show :

XX00 BAUD * XX = 12,24,48,96 (* blinking)

Use any numeric key to sequence through the available Baud rates and when the desired number is reached, press 'ENTER' key. The programmed Baud Rate is the same for all 4 programs, and can be altered in any one of them.

If you CLEAR Program #4 then the Baud Rate will be set to the default Rate of 1200 BPS.

III. Functional Description :

The serial interface of iPLC1 provides the user with the ability to remotely read, modify and execute any of the four programs residing in its nonvolatile EEROM memory. It is physically realized with the use of two twisted wire pairs and electrically complies with the EIA standards RS232C/RS423A (RS422A and RS485 are optional).

The communication protocol of the serial interface is of a master / slave type with the Host system (computer , programmable controller or an ASCII terminal) acting as a master. There are three occasions when the iPLC-1 will transmit data without a request to do so :

On Power Up / Hardware Reset: < \$ > ASCII 24H

New Program loaded through the keyboard : < * > ASCII 2AH

New Scale Factor entered through the keyboard : < * > ASCII 2AF

The communication firmware of iPLC-1 is executed as a background task and does not affect its normal operation with the following exception :

At any time when the iPLC-1 receives a character through the serial interface its display will change to :

XX00 BAUD * XX = 12,24,48,96

The Keyboard will become inactive for about 2.6 seconds , and will stay inactive for as much time after the last character of the Serial communication. If iPLC-1 was in Program mode, the Program mode will be terminated.

There are three modes of operation within the iPLC-1 communication protocol :

1. Command mode.

On power up the iPLC-1 enters Command mode and waits for commands originating from the Host system. The received commands are checked and executed if recognized as legal , otherwise an error message is transmitted :

ERS*

where < * > is ASCII 2AH

All of the iPLC-1 serial interface commands are 4 characters long and terminate with < / > ASCII 2FH.

Every character received by iPLC-1 in Command mode is echoed, thus allowing error checking.

The characters < CR > (ASCII 0DH) and < LF > (ASCII 0AH) are just echoed and not included in the context of the received command.

The character < * > ASCII 2AH when received by the iPLC-1 is interpreted as a enter Command mode character. It causes the reset of the iPLC-1 receive buffer and character counter and activates the Command interpreter.

2. Read Mode.

In Read mode the information requested by the host system is

transmitted in one block. At the end of the transmission indicated by < * > (ASCII 2AH) the control mode is reentered. During this transmission any characters sent by the Host system are disregarded and not echoed.

3. Write Mode.

This mode of operation allows the host system to write data into the nonvolatile EEROM of iPLC-1. After receiving a write command the iPLC-1 transmits a < * > (ASCII 2AH), indicating that write mode has been established. The host system must wait until receiving this indication, and then transmit the new data in a form of a sequence of properly formatted numeric characters. These characters are checked and buffered. In case of error the iPLC-1 sends < E* > prompting the retransmission of the data. When process of writing in the EEROM is finished the iPLC-1 sends the character < * > (ASCII 2AH). Write mode can be terminated at anytime by sending < * > (ASCII 2AH) except during the actual writing of the data in the EEROM. All characters < CR > (ASCII 0DH) and < LF > (ASCII 0AH) are treated in the same manner as in Command mode.

IV. Commands and Response Format:

1. Set the number of the program accessible through the serial interface. This command must be executed after every power up sequence of iPLC-1 and after the execution of the command XPn/.

Command format : SPn/

iPLC-1 response: SPn/*

Where n is the program number 1,2,3 or 4.

2. Read the number of the program presently exeuted by
iPLC-1.

Command formate : RRP/

iPLC-1 response : RRP/n*

n is running program number 1,2,3, or 4.

3. Execute program 1,2,3, or 4.

Command format: XPn/

iPLC-1 response : XPn/*

* is sent after the loading of the new program is
completed.

n is the program number 1,2,3 or 4

Note: This command causes the number of the program accessible
through the serial port to be set to n .

4. Read the Position and the Tachometer of the presently
executed Program :

Command format : RPT/

iPLC-1 response : RPT/xxx/yyyy/*

xxx is the Position in Scale factor counts

yyyy is the Tachomter in RPM

5. Read the Scale Factor and Offset of the program
accessible through the serial port:

Command format : RSC/

iPLC-1 response : RSO/xxxx-yyy/*

xxxx is the Scale Factor

yyy is the Offset

6. Read the limits of the motion detector of the program accessible through the serial port:

Command format : RMD/

iPLC-1 response : RMD/xxx-yyy/*

xxx is the "FROM" limit point of the motion detector

yyy is the "TO" limit point of the motion detector

- is ASCII 2DH

7. Read the set points of limit switch number N of the program accessible through the serial interface.

Command format : Rnn/

iPLC-1 response : There are no programmed limits:

 Rnn/xxx/*

 One pair of set points:

 Rnn/xxx/yyy-zzz/*

 Multiple set points:

 Rnn/xxx/yyy-zzz/...../yyy-zzz/*

xxx is the "REPEAT" number

yyy is a "FROM" setpoint

zzz is a "TO" setpoint

nn is the limit switch number

8. Write the Scale Factor and the Offset of the program accessible through the serial interface.

Command format: Step 1: WSO/

iPLC-1 response : WSO/*

Data format - Step 2: xxxx/yyy/

iPLC-1 response : xxxx/yyy/*

Error message in the form of < E* > indicates improper format or data, and sets command mode. In this case the total command must be retransmitted.

xxxx is Scale Factor with maximum value of 1000

yyy is the Offset.

Note: The user must select an Offset less than the value of the Scale Factor. This condition is not checked by the communications software of iPLC-1.

9. Write the limits of the motion detector of the program accessible through the serial interface:

Command format: Step 1: WMD/

iPLC-1 response : WMD/*

Data format - Step 2: xxx-yyy/

iPLC-1 response: xxx-yyy/*

xxx is the "FROM" limit point of the motion detector

yyy is the "TO" limit point of the motion detector

- is ASCII 2DH

The error message and recovery are the same as with WSO/ command.

10. Write the setpoints of Limit Switch number N of the program accessible through the serial interface:

Command format: Step 1: Wnn/

iPLC-1 response: Wnn/*

Data format - Step 2: xxx/

iPLC-1 response: xxx/* ; at this time all previous limit set points have been erased. This process takes approximately 20 ms per limit set point.

Data format - Step 3: yyy-zzz/

iPLC-1 response: yyy-zzz/*

Data format - Step 4: repeat step 3 with the next setpoints.

To terminate this command the Host must send : < * > ASCII 2AH.

nn is the limits switch number.

xxx is the "REPEAT" number with minimum value 001.

yyy is a "FROM" setpoint.

zzz is a "TO" setpoint.

Error message in the form of < E* > indicates improper format or data and the user must retransmit the correct data up to the last < * >.

Error message in the form of < F* > indicates that the memory space allocated for setpoints within this program is full. The user must terminate the command at this point.

Note: This command is not self terminating, and the Host system must transmit < * > ASCII 2AH after the last setpoint sent to iPLC-1 is accepted.

EXAMPLE:

Host system: W01/


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iPLC-1:      W01/*
Host system:  001/
iPLC-1:      001/*
Host system:  000-010/
iPLC-1:      000-010/*
Host system:  020-030/
iPLC-1:      020-030/*
Host system:  *                ; end of command.
iPLC-1      *

```

V. Application Notes.

1. Any Serial communication with iPLC-1 should start with the Host sending < * > and waiting for the iPLC-1 echo of the same, this will insure the attention of the iPLC-1 being devoted to the Serial interface and not to its Keyboard and Display.

2. The beginning of a transmission from the Host must specify the Program number (n) of the addressed Program by using the command < SPn/ >.

3. When an error message in the form of EPS* is received by the Host, it must send < * > ASCII to force iPLC-1 in Command mode and reset its receive buffer and character counter, and retransmit the previous command.

Example:

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Host system:  SP1/
iPLC-1:      SPmERS/*                ; < 1 > received as < m >,
                                           < / > missed.

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Host system: *SP1/

iPLC-1: *SP1/*

4. The difference between the Keyboard and the Serial interface of iPLC-1 when used to modify a currently executed program are as follows:

a. Any changes made through the Keyboard of iPLC-1 affect its EEROM, RAM and Microprocessor data memory.

b. The changes made through the Serial interface will affect only the EEROM of the iPLC-1.

Transferring the modified contents of the EEPOM to the RAM and the Microprocessor data memory can be accomplished through the Serial interface by the command XPn/. Where (n) is the number of the affected program.

Example: 1. The currently executed program is number 1.

2. Program number 1 was modified through the Serial Interface.

3. Send command XP1/.

4. Examine the modified program 1 through the Keyboard of iPLC-1.

Alternately using the Keyboard of iPLC-1, the modified contents of the EEROM can be examined with the following procedure:

1. Currently executed program number is 1.

2. Program 1 is modified through the Serial interface.

3. Using the Keyboard enter one of the programs 2,3, or 4.

4. Exit program 2,3, or 4.

5. Enter program number 1 and examine the modifications made through the serial port.

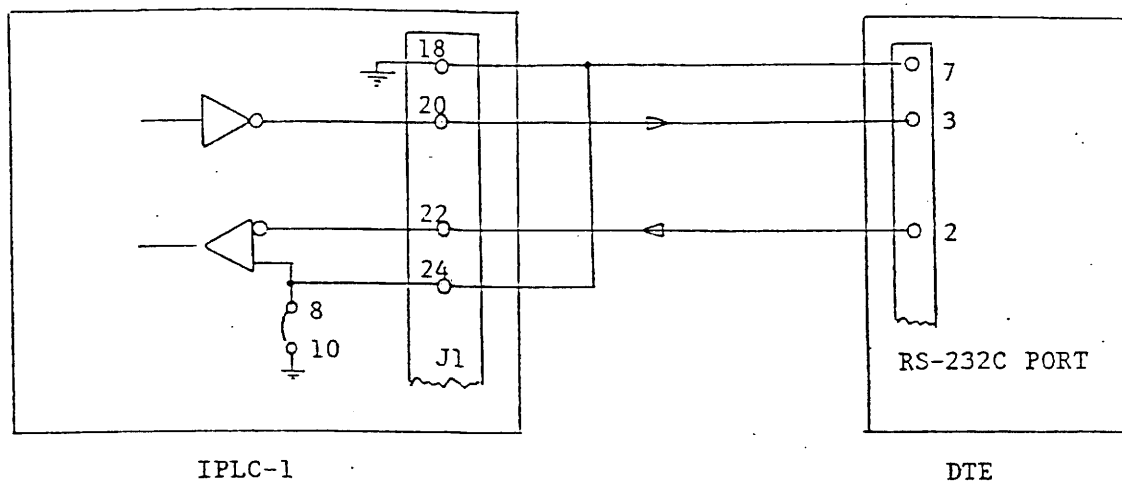


Fig.1 Connecting IPLC-1 to DTE equipment

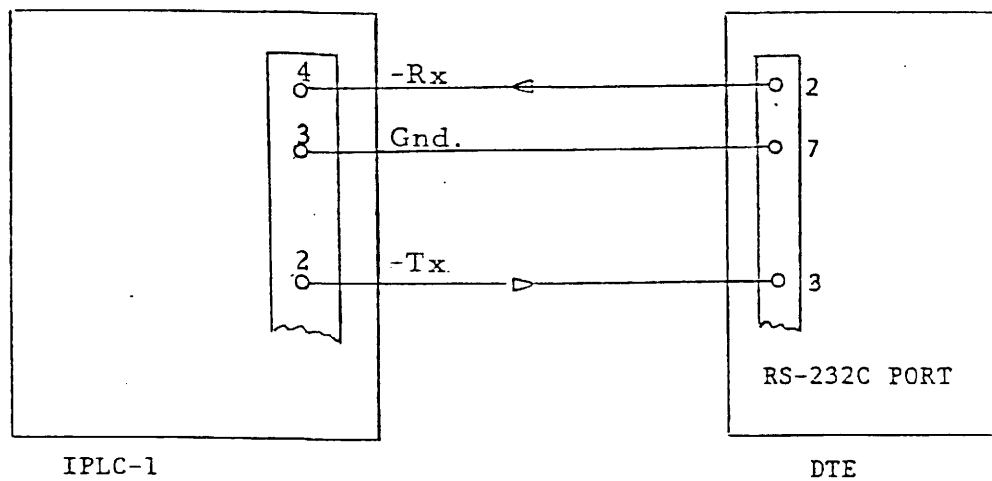


Fig.2 Connecting the relay board of IPLC-1 (RB-1) to DTE