

TELEMETRY EPROM FOR REMOTE I/O NETWORKS

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Introduction

The RT1xx telemetry EPROM upgrade for Remote Digital bricks is a replacement for the standard EPROM on the brain board. All features and functions of the multifunction digital brick are retained with the added capability of becoming the master on a serial telemetry network. Commands have been added for downloading, uploading, and clearing a scan-transfer table. A telemetry system of up to 256 bricks (digital and/or analog) may be configured.

System Configuration

The telemetry network is configured the same as any remote **Mistic** I/O network. Data is transferred via a two-wire RS-485 communication link and each brick must have a unique address. An IBM-PC/AT compatible computer equipped with an RS-485 interface (Opto 22's AC37, AC24 or AC422) is used to download the scan-transfer table and check network. Once the scan-table is downloaded it can be stored in EEPROM on the master brick. The PC can then be removed from the link. Upon power-up, the master brick will configure all inputs and outputs according to the scan-transfer table and begin data transfers.

Scan Transfer Table

The telemetry master brick must have a scan-transfer table downloaded before it can transfer data between bricks. The table contains entries which specify the addresses of the bricks, the brick type (analog or digital), and which channels on each brick to transfer. The table may contain up to 256 entries, and can be saved to EEPROM for automatic power-up-run capability.

Each entry can specify two data transfers between two bricks. Each valid entry must specify two brick addresses and the brick type (analog or digital). The same addresses cannot be specified within the same entry. The telemetry master brick may be any digital brick in the system and may be included in any scan table entry. Multiple entries may specify the same brick for data transfers to different bricks, however care should be taken to assure multiple input channels are not mapped to the same output channel.

Telemetry Master Jumper

Jumper 6 of the group labeled BAUD is used to indicate whether the brick is to be a slave to a host PC or controller, or become the master and begin transferring telemetry data. This jumper will only affect the brick which has the RT1xx telemetry EPROM installed.

When jumper 6 is NOT INSTALLED, the brick will function as a slave in exactly the same manner as any other digital brick. This is the configuration which is necessary to download the scan-transfer table.

When jumper 6 is INSTALLED and the scan-transfer table contains at least one entry, the brick will configure and begin to scan and transfer telemetry data to-and-from other bricks on the network

Network Error Indication

If at any time during telemetry operation, a brick does not respond to a command or any other error occurs, the master brick will illuminate its IRQ LED and activate the IRQ RS-485 line. The master brick will then try to reconfigure the brick which caused the error and continue the scan-transfer operation. If all is successful, the IRQ LED will be turned off.

Installing and Initializing a Remote Telemetry Network

1. Assemble the network as any other remote **Mistic** link. Initially, an IBM PC/AT with an RS-485 interface will need to be connected to the link. Any convenient digital brick may become the telemetry master by replacing the standard EPROM (which is labeled RD1xx), with the RT1xx EPROM supplied with this kit.

When configuring RS-485 communication lines, it is important to remember that it must be terminated at each END of the link and that each link may have **only** two ends. Wiring RS-485 communication lines in a 'star' configuration is not permitted.

2. Using the PC/AT, enter the telemetry system transfer configuration with the utility program (TELEM.EXE), provided with the RT1xx EPROM. This utility will test the network for communication problems, download the scan-transfer table and save the entries in EEPROM. **Jumper 6 of the BAUD group must not be installed on the master brick during the download procedure.** Refer to the following section on using the Telemetry Network Configurator program.
3. Remove the PC/AT from the network; it is no longer needed. If the PC/AT was at one end of the RS-485 link, be sure to install termination and biasing resistors which may have been on the interface card.
4. Install jumper 6 of the group labeled BAUD on the digital brick which has the RT1xx EPROM installed. The master should immediately begin to configure the I/O and start transferring data.

Using the Telemetry Network Configurator Utility

Before a telemetry network can be configured with the configurator program, a file containing the scan-transfer information must be created. This file is a simple text file, each line of which will represent one entry in the scan-transfer table to be downloaded. The format for information on each line must be as shown here:

Board Type, Brick A Address, Brick B Address, <A to B>, <B to A>

Each field must be separated by commas and each line must end with a carriage return and a line feed.

Board Type

This field must be an 'A' or 'a' for an analog data transfer. Any other character will be interpreted as a digital data transfer.

Brick A Address

The address of one of the two bricks involved in this data transfer must be a decimal number from 0 to 255 inclusive.

Brick B Address

The address of one of the two bricks involved in this data transfer must be a decimal number from 0 to 255 inclusive and must not be the same as Brick A Address.

<A to B>

This field lists the channel(s) to transfer from brick A to brick B. Each channel number must be separated by a space character and must be a decimal number in the range of 0 to 15. If no channels are to be transferred from A to B, the word 'NONE' may be used in this field. If all channels are to be transferred from A to B, the word 'ALL' may be used.

<B to A>

This field lists the channel(s) to transfer from brick B to brick A. Each channel number must be separated by a space character and must be a decimal number in the range of 0 to 15. If no channels are to be transferred from B to A, the word 'NONE' may be used in this field. If all channels are to be transferred from B to A, the word 'ALL' may be used.

Brick A Address and Brick B Address may not be equal. The same channels may not be specified as being transferred from A to B and B to A within the same entry (line).

EXAMPLES

Example 1

A, 12, 36, 0 1 2 3 4 5 6 7, NONE

The line above instructs the telemetry master to transfer data from input channels 0 through 7 on analog brick 12 to corresponding output channels on analog brick 36. No data is to be transferred from brick 36 to brick 12.

Example 2

D, 127, 255, 0 1 2 3 4 5 6 7, 8 9 10 11 12 13 14 15

The line above instructs the telemetry master to transfer data from input channels 0 through 7 on digital brick 127 to corresponding output channels on digital brick 255, and input channels 8 through 15 on brick 255 to corresponding output channels on brick 127.

Example 3

D, 0, 4, NONE, ALL

The line above instructs the telemetry master to transfer data from input channels 0 through 15 on digital brick 4 to corresponding output channels on digital brick 0. No data is to be transferred from brick 0 to brick 4.

Once the scan-transfer file is created, the Telemetry Network Configurator utility can be used to test the network and download the scan-transfer table. The utility is on the diskettes included with the RT1xx EPROM. It will be the executable file named TELEM.EXE. Follow the steps below:

1. Copy TELEM.EXE to the working directory and run it.
2. Set the correct COM port and baud rate using the 'P' and 'B' commands.
3. Select correct protocol, ASCII or Binary, using command '5'. (The bricks are factory configured for Binary. Change to ASCII if using modems.)
4. Enter the address of the telemetry master brick using command '4'.
5. The above selections may be saved to disk using command 'C'. This command will save the current settings to disk in a file named TELEM.CFG. The next time this utility is run, it will read these settings from the .CFG file and steps 2 through 5 can be skipped.
6. Load the scan-transfer file using command 'R'. This command will read the file from disk and check for errors such as the same address being used twice in one entry.
7. Test the network using command '2'. This command will scan the network to verify that all brick addresses specified in the scan-transfer table are indeed on the link. It will also identify brick types as analog or digital and ensure agreement with the scan table.
8. Download the scan-transfer table using command 'D'. This command will clear all previous entries from the telemetry master's scan table and download the new table just read from the disk. After downloading the new scan table, a "store System Configuration" command is issued to save the table in EEPROM.
9. If no errors are indicated, the PC/AT may be removed from the link. Upon installing jumper 6 of the BAUD group, the master brick will start scanning and transferring data. If any error in communications occurs at this point, the IRQ LED of the master brick will be illuminated. If the table is scanned with no problems, the IRQ LED will be turned off.

