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1. Introduction

The H-series PLC is a family of small, low cost, single-board Programmabl
Logic Controllers (PLCs). Presently, the series spans from the T20H with 1
inputs, 8 outputs to the T64H with 40 inputs and 24 outputs. Members of th
H-series controller family differ mainly in the number of I/Os (inputs/outputs
and the type of I/Os they carry (relay or transistor outputs, PNP or NPI
types, opto-isolator inputs or high voltage inputs, etc). Since each differer
PLC model has different wiring requirements, please refer to the
respective Installation Guide on the wiring methods and installation detail:
The number of I/Os, timers, counters, internal relays as well as th
maximum allowable program steps are also stated in the Installation Guide.

This manual is to be used with all the current and future H-series PLC:
Presently they include the T20H-npn, T28H-Relay, T44H-pnp, T44H-np
and the T64H-Relay. New models may be introduced as and whe
determined by market demand. The following table summarizes the numbe
of I/Os, timers, counters and internal relays for each existing model:

No. of Model	Inputs	Outputs	Internal Relays	Timers	Counters	Maxim Program
T20H-npn	12	8	128	20	20	400
T28H-Relay	16	12	128	20	20	400
T44H-npn/pnp	28	16	128	20	20	400
T64H-Relay	40	24	256	40	40	800

Position of Locating Pin for H-series PLCs
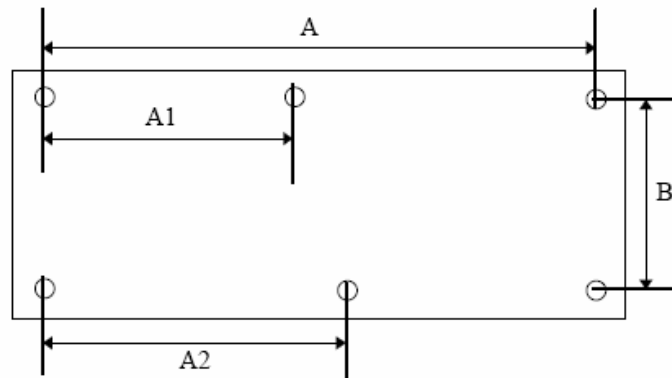
Model	A(mm)	B(mm)	A1(mm)	A2(mm)
T20H-npn	78.11	83.19	-	-
T44H-npn	139.7	106.68	-	-
T28H-Relay	159.39	87.00	-	-
T40H-Relay	186.06	93.98	83.82	83.82
T64H-Relay	182.25	113.67	-	-

2. Programming

Section 2   Host Communication

While a H-series programmable logic controller is running, a host computer may send commands in the form of ASCII strings to the controller to read or write to the inputs, outputs, relays, timers and counters. These ASCII commands are known as the "host-link commands" and are to be serially transmitted (via RS232C or RS485 port) to and from the controller. The standard serial port settings for communication are: 9600 baud, 8 data bit, 1 stop bit, no parity. Some models of PLC allow the serial port to be configured to another baud rate using the "BW" command described in Section 3.

All H-series PLCs support both point-to-point (one-to-one) and multi-point (one-to-many) communication protocols and hardware. Each protocol has a different command structure as described below:

1. Point-to-point Communication

In a point-to-point communication system, the host computer's RS232C serial port is connected to the PLC. At any one time, only one controller may be connected to the host computer. The host-link commands do not need to specify any controller ID code and are therefore of simpler format, as shown below:

Command/Response Block Format (Point to Point)
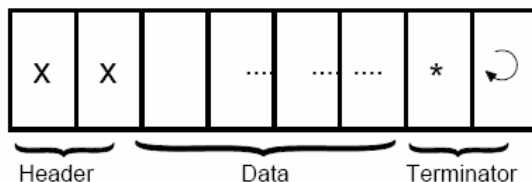
Each command block starts with a two-byte ASCII character header, followed by a number of ASCII data and ends with a terminator which comprises an '*' character and a carriage return (ASCII value = 13_{10}). The purpose of the command is denoted by the header, e.g. RI for Read Input, WO for Write Output, etc. The data are usually the hexadecimal representation of numeric data. Each byte of binary data is represented by two ASCII characters (00 to FF).

To begin a communication session, the host computer must first send one byte of ASCII character: Ctrl-E (=05Hex) via its serial port to the controller. This informs the controller that the host computer wishes to send a (point-to-point) host-link command to it. Thereafter, the host computer must wait to receive an echo of the Ctrl-E character from the controller. Reception of the echoed Ctrl-E

Section 3   Command/Response Format

This section describes the detailed formats of the command and response blocks for the entire H-series PLC host-link commands. Only the formats for the point-to-point communication system are presented, but all these commands are available to the multi-point system as well. To use a command for multi-point system, simply add the device ID (@nn) before the command header and the FCS at the end of the data (See Section 2 for detailed description of multipoint communication command format).

Since different models of PLCs have different maximum number of inputs, outputs, internal relays, timers and counters, attempts to send commands to an invalid address will result in an error response from the controller. For commands that read ALL the channels such as "RIAL", the response string will contain up to the maximum number of channels available on that PLC. The maximum channel numbers stated in the subsequent parts of this manual is based on the *assumption* that the PLC has 96 inputs, 64 outputs, 256 internal relays, 64 timers and 64 counters. The actual limits on your PLC can be observed during the transfer of your TRiLOGI program into the controller. You should work with the actual limit of the PLC model you are using and not what's stated in the following sections.

1. Device ID Read

Command Format

I	R	*	↵

Response Format

I	R	16	160	*	↵
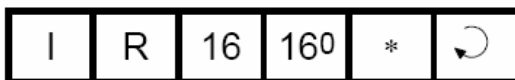
Device ID (00 to FF)

The device ID is to be used for multi-point communication protocol where the host computer can selectively communicate with any controller connected to a common RS485 bus (see Section 2 for details). The ID has no effect for point-to-point communication.

The device ID is stored in the PLC's EEPROM and therefore will remain with the controller until it is next changed.

2. Device ID Write

Conditions of Sale and Product Warranty

Triangle Research International Pte Ltd (Singapore) and the Buyer agree to the following terms and conditions of Sale and Purchase:

1. The H-series Ladder Logic Programmable Controllers which includes T20H/T28H/T44H/T40H/T64H etc is guaranteed against defects in materials or workmanship for a period of one year from the date of registered purchase. Any unit which is found to be defective will, at the discretion of Triangle Research, be repaired or replaced.

2. Triangle Research will not be responsible for the repair or replacement of any unit damaged by user modification, negligence, abuse and mishandling, or improper installation.

3. Triangle Research is not responsible to the Buyer for any loss or claim of special or consequential damages.

4. Products distributed, but not manufactured by Triangle Research, carry the full original manufacturers warranty. Such products include, but are not limited to: power supplies, sensors, I/O modules, and battery backed RAM.

5. Triangle Research reserves the right to alter any feature or specification at any time.