TMM7200/470 Marking System – General Arrangement

SYSTEM OVERVIEW

The Telesis**®** TMM7200/470 PINSTAMP**®** marking system permanently prints messages into a variety of materials such as steel, aluminum, and plastic. Hardened pins are pneumatically accelerated to indent dot matrix characters into the item being marked. The shape, size, density, and location of characters are determined by the user through the system software. The marking head moves the pin cartridge through X- and Y-axis motions to reach the correct position for each dot of the characters to be marked. The system software automatically controls pin extension and retraction to mark the message.

The system is compliant with UL, CSA, CE, and RoHS specifications.

TMM7200 Marking Head includes the mechanical motion components to position the marking pin at precise X/Y positions and the pneumatic components to drive the marking pins from, and return the pins to, the pin cartridge.

The TMM7200 marking head is an X/Y-traversing mechanism. Using two stepper drive motors, it accurately and rapidly positions the pin cartridge at coordinate-defined locations in marking window. The TMM7200 accommodates the rigorous dynamics of impacting, rebounding, and rapid positioning of the pin cartridge using a system of linear re-circulating ball bearings, support rails, and drive screws.

The floating pin design permits high quality, consistent marks on irregular, slightly curved surfaces. It also accommodates applications where marking surfaces cannot be positioned at a consistent distance from the marker.

Pin Cartridges. Each pin cartridge for the TMM7200 is custom-designed to meet the needs of the marking application.

The marker may use up to 21 impact pins configured in a variety of ways. Configuration options include the number of rows, the number of pins per row, the pin spacing within the row, and the line spacing between the rows. The pin cartridge configuration dictates the size of the marking window along the X- and Y-axes.

Pin cartridges may be made of aluminum, steel, or lightweight engineered plastic. Plastic cartridges and metal cartridges with plastic inserts do not use lubrication since oils will damage these type of cartridge. All-metal pin cartridges do require lubrication.

Marking Pins for the TMM7200 include the 25L-, 101-, 150-, and 150SA-series. See *Marking Head Specifications* for details.

Marker Cable connects the marker to the controller.Typical marker cable lengths are 25 ft. (7.5m) and 50 ft. (15m). Optional cables are available for other distances.

Filter/Regulator Unit includes two regulators with pressure gauges to control the drive air and return air. Drive air fires the impact pin; return air pushes it back into the cartridge. The regulator contains a coarse filter and a coalescing filter to remove finer particles. Two air lines connect the regulated air to the marking head. Standard air lines are made of 3/8-in. tubing and are typically 25 ft. (7.5m) long .

Systems with metal pin cartridges use filter/regulator units with an oil reservoir and an oil delivery control knob. The return air line delivers lubricant to the metal cartridge.

TMC470 Controller provides the electrical interface and software control of the TMM7200 marking head. (Refer to *TMC470 Controller Specifications* for details.)

Custom TMM7200/470 Marking Systems

SYSTEM SETUP

Complete installation procedures are provided in the *TMM7200* and the *TMC470 Installation & Maintenance Manuals*. The following procedures are listed for reference only to provide a general overview of the installation process.

1. When designing a fixture, allow for 3-axis adjustment to aid in horizontal, vertical, and lateral alignment of the marking head.

2. Mount marking head to a suitable, sturdy fixture using four M12-1.75 bolts, M12 lock washers, and M12 flat washers.

   CAUTION

   Mounting bolts must not extend into the marking head more than 0.71 in. (18mm).

3. Mount the filter/regulator assembly using brackets provided – typically within 25 ft. (7.5m) of the marking head; within 15 ft. (4.5m) if a lubricator unit is used.

4. Connect drive air and return air lines to the connectors on back of marking head.

5. Connect supply air to input port on filter/regulator assembly.

   CAUTION

   The TMC470 is not a sealed unit. Protect it from potentially damaging conditions and contaminants. Do not block vents in bottom of case. Ensure the marking system is electrically isolated from any devices that may generate extreme electromagnetic interference (EMI).

6. Locate controller as close as practical to marking head. Typical marker cable lengths are 25 ft. (7.5m) and 50 ft. (15m).

7. Install the controller as a table-top, wall-mounted, panel-mounted, or enclosure-mounted unit, as applicable.

8. Ensure controller power switch is OFF.

9. Connect marker cable to marking head and to controller.

10. Connect power cable to controller.

11. Position controller power switch to ON.

12. Start marking system software.

13. Adjust pin stroke, drive air, and return air for impact depth.

SYSTEM OPTIONS

- Custom Cartridges (pin quantity and spacing)
- Custom Standoffs (for precise marker positioning)
- Marking Head Extension Cables
- Custom Gimbal Assemblies and Cable Balancers

- Foot Switch (Start Print)
- Pushbutton Station (Start/Abort)
- Bar Code Scanner
- Bar Code Wand

- TMC470 Controller Panel-mounting Bezel/Bracket Kit
- TMC470 Controller Wall-mounting Bracket Kit
- TMC470N NEMA® Enclosure
- Backup Utility Software
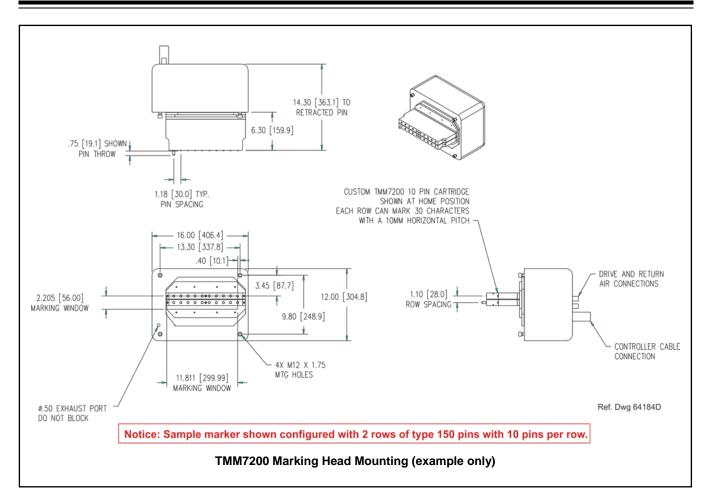- Logo/Font Generator Software
- Upgrade Utility Software

TMM7200 MARKING HEAD

Specifications

The TMM7200 marking head specifications are subject to change without prior notice.

Dimensions (H x W x D)	12 x 16 x 8.75 in. (305 x 406 x 222mm) w/o pins, cartridge, tooling
Weight.............................	approximately 67 lb. (30.4 Kg) w/o pins, cartridge, tooling
Number of Impact Pins.....	*optional (21 max)*
Rows of Pins....................	*optional–custom configuration (8 max)*
Pins per Row....................	*optional–custom configuration*
X-axis Travel	1.75 in (44.5 mm) max.
Y-axis Travel	1.75 in (44.5 mm) max.
Marking Area....................	*dependent on pin configuration*
Pin Type...........................	25L-, 101-, 150-, & 150SA-series
Pin Material......................	Carbide (25L & 101) Powdered metal (25L & 101) Tool steel (150) Tool steel w/ carbide tip (150 & 150SA)
Pin Stroke (max).	25L-series: 0.50 in. (12 mm) 101-series: 1.06 in. (27 mm) 150-series: 0.50 in. (12 mm) 150SA-series: 0.43 in. (11 mm)
Operating Temp.	32° to 104° F (0° to 40° C)
Humidity...........................	10% to 80%, non-condensing
Air Supply	Clean and dry, 80 to 120 psi (5.4 to 8.2 bar)

14.30 [363.1] TO RETRACTED PIN
6.30 [159.9]
.75 [19.1] SHOWN PIN THROW
1.18 [30.0] TYP. PIN SPACING

CUSTOM TMM7200 10 PIN CARTRIDGE SHOWN AT HOME POSITION EACH ROW CAN MARK 30 CHARACTERS WITH A 10MM HORIZONTAL PITCH

16.00 [406.4]
13.30 [337.8]
.40 [10.1]
3.45 [87.7]
12.00 [304.8]
2.205 [56.00] MARKING WINDOW
9.80 [248.9]
1.10 [28.0] ROW SPACING

DRIVE AND RETURN AIR CONNECTIONS
CONTROLLER CABLE CONNECTION

4X M12 X 1.75 MTG HOLES
11.811 [299.99] MARKING WINDOW
ø.50 EXHAUST PORT DO NOT BLOCK

Ref. Dwg 64184D

Notice: Sample marker shown configured with 2 rows of type 150 pins with 10 pins per row.

TMM7200 Marking Head Mounting (example only)

TMM7200 MARKING HEAD *(continued)*

Marking Characteristics

The TMM7200 can produce characters as small as 0.06 in. (1.5 mm). Characters can printed with resolutions from 10 dots per inch to 200 dots per inch for an engraved look. The depth of mark can be adjusted over a significant range by adjusting the pin stroke and, to a lesser extent, by adjusting the drive air pressure.

Three marking modes are available to optimize quality and speed. Raster mode prints side-to-side, indexing downward one row at a time. Matrix mode prints up and down, indexing one column at a time. Continuous mode prints with only one pin at a time tracing the character shape.

Marking Depth

The depth of mark can be adjusted over a significant range by adjusting the pin stroke and, to a lesser extent, by adjusting the drive air pressure. Depending on the type of impact pins being used, the TMM7200 is able to obtain marking depths of 0.020 to 0.025 in. (0.50 to 0.63mm) in mild steel.
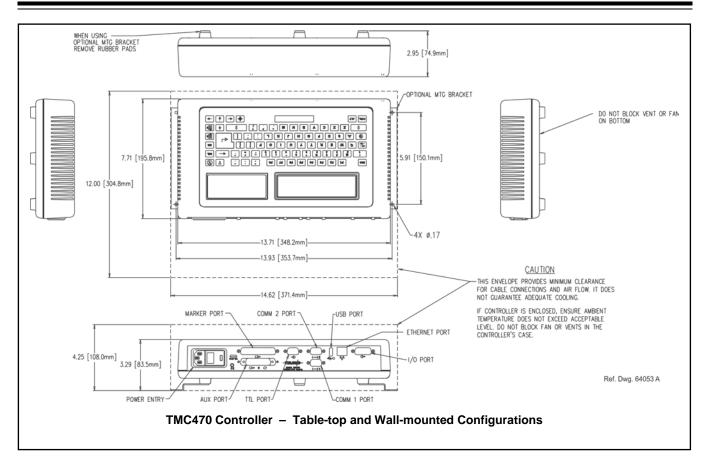
Marking Noise

All TMM7200 markers are equipped with mufflers on the solenoid exhaust to reduce noise. Although every attempt is made to reduce noise, the material being marked significantly influences the noise level. For example, marking a solid lead block produces less noise than marking a thin-walled steel pipe.

Additionally, the quantity and type of impact pins installed in the marker significantly contribute to the noise level. For example, a marker using 10 type 25L pins would typically produce less noise than a marker using 21 type 150 pins.

Pin Life

Pin life depends largely on the type of material being marked, how hard or abrasive it is, and the required marking depth. On typical metals with a hardness of Rockwell Rb47, marking at a depth of .005 in. (.127 mm), powdered steel pins average about 3 million impressions before needing sharpened; carbide pins average approximately 9 million impressions. If carbide pins are used, marking times will increase by approximately 25% due to the increased weight of the pins.

TMC470 Controller – Table-top and Wall-mounted Configurations
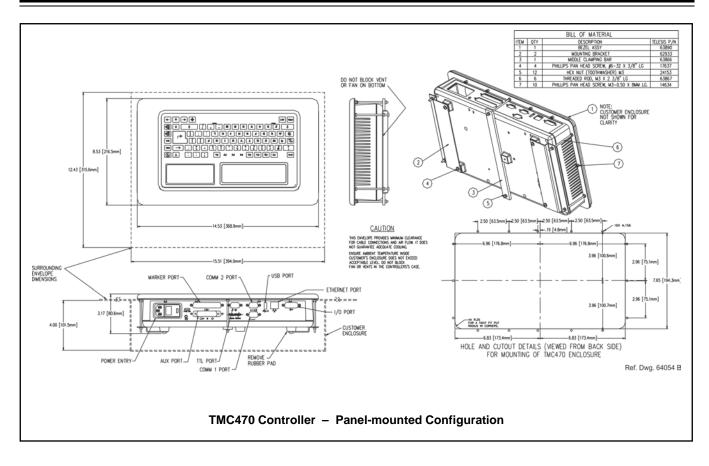
TMC470 CONTROLLER

The TMC470 controller may be installed as a table-top unit, a wall-mounted unit, a panel-mounted unit, or an enclosure-mounted unit. All configurations provide features and connectivity for external communications. Differences occur only in the mounting configuration.

TMC470 Controller Specifications

The TMC470 Controller specifications are subject to change without prior notice.

Compliance	CE, RoHS
Configurations	Table-top, Wall-mounted, Panel-mounted, or Enclosure-mounted
Rating...........................	NEMA 1 (I.P. 30) table-top or wall-mounted
	NEMA 12 (I.P. 65) panel-mounted using customer-supplied panel
	NEMA 12 (I.P. 65) using Telesis-supplied TMC470N enclosure
Dimensions	refer to TMC470 Mounting Drawings
Weight	3.69 lb. (1.68 kg) controller only
	3.90 lb. (1.77 kg) with wall-mount kit
	5.52 lb. (2.51 kg) with panel-mount kit
	28.1 lb. (12.77 kg) with TMC470N enclosure

Op. Temperature	32° to 122° F (0° to 50°C)
Op. Humidity	10% to 80% non-condensing
Cooling........................	Internal, thermostat-controlled fan
Power Requirements....	95 to 250 VAC, 2 amps, 50-60 Hz, single phase
Communications	TTL, Discrete I/O, RS232, RS485, TCP/IP, and USB (data backup and data transfer)
Input Signals	Twelve (12) total, optically isolated: 8 dedicated, 1 programmable, 3 available
	10 VDC (minimum voltage)
	30 VDC (maximum voltage)
	12 to 24 VDC (nominal voltage)
	2.3 mA @ 12VDC; 4.9 mA @ 24VDC (nominal current)
Output Signals	Six (6) total, optically isolated: 4 dedicated, 2 available
	0.25 amps (maximum current)
	0.50 ohms (maximum On resistance)
	40 VDC (maximum line voltage)
	12 to 24 VDC (nominal line voltage)

TMC470 Controller – Panel-mounted Configuration

TMC470 CONTROLLER *(continued)*

Environmental Considerations

The following environmental considerations must be taken into account when installing the TMC470 Controller.

Contaminants. The vented TMC470 is rated NEMA 1 (IP30) and contains a thermostatically-controlled, variable speed fan. Accordingly, in environments where solid and/or liquid contaminants are present, the possibility exists that these contaminants can be drawn into the TMC470 controller and possibly result in failure. For that reason, in these types of environments, the controller <u>must</u> be located in a sealed industrial enclosure. To facilitate such installations, Telesis offers on optional panel mounting kit for use with an appropriate customer-supplied panel or enclosure. Telesis also offers an optional TMC470N NEMA 12 (I.P. 65) enclosure in which the controller can be mounted.

EMI Susceptibility. Although the system has been found to be in compliance with pertinent susceptibility standards, care should be taken when installing near welders and other extreme generators of electromagnetic interference (EMI). Particular care should be taken to ensure welder currents are not injected through the marking head chassis. The marking head chassis is connected to the electrical service earth ground through the marking head cable. The marking head should be electrically isolated from all surfaces which could become part of a welder current path.

Interface Panel

The back panel of the controller provides various ports for connecting the marker, host computers, logic controllers, optional accessories, and remote I/O devices. See below.

Aux Interface. The Aux (auxiliary) Port is provided via the Auxiliary Driver Board. This optional board is required for systems that use more than 8 solenoids.
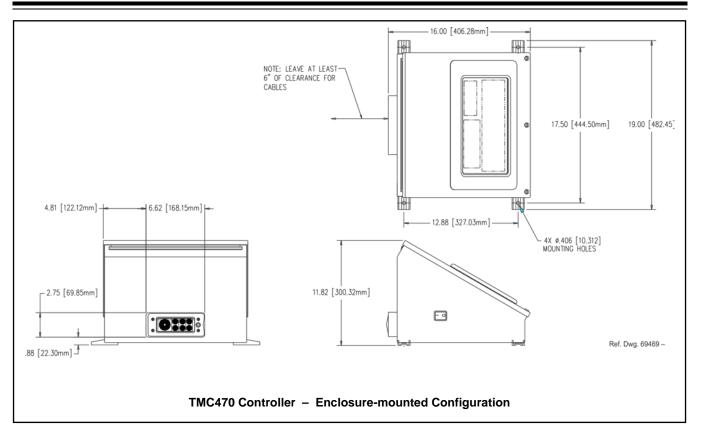
Serial Interface. The Comm 1 and Comm 2 Ports allow connection to remote serial devices such as a host computer or a bar code scanner. See Host Communications for details.

Discrete I/O Interface. The optically-isolated I/O Port allows you to connect a Programmable Logic Controller (PLC) or other DC I/O source for remotely controlling marker operations. See Discrete I/O Controls for details.

TTL Interface. The TTL Port allows the system to connect with a simple contact closure circuit such as a remote push button station or foot pedal switch. These types of devices can remotely control Start Print and Stop Print operations.

TCP/IP Interface. The Ethernet Port typically connects to a PC over a local area network (LAN). It allows you to define the controller as a client or a server socket using Telesis Extended Protocol. See Host Communications for details.

USB Interface. The USB Port allows you to connect a memory stick/flash drive for pattern storage/retrieval and for software upgrades.

TMC470 Controller – Enclosure-mounted Configuration

SYSTEM SOFTWARE

The system software is permanently installed in the controller. It provides the user interface for the operator to control the marker. The software also provides a library for storing, loading, and editing user-defined patterns. Patterns are files stored in the controller's memory. Depending on the size of the pattern files, the controller can store up to 200 patterns. Each pattern contains one or more fields; each field defines a single object. Printable objects may be created to define text strings. Non-printable objects may be defined to specific commands to the marker (e.g., Pause, Go to, Input, or Output). Printable text fields may include alphanumeric characters, symbols, and special message flags. Message flags automatically insert data into the text string, such as serial numbers, times, dates and user-defined codes.

Discrete I/O Controls

The TMC470 is configured for 12 VDC to 24 VDC I/O only and is provided to connect a PLC or other DC I/O source. The optically-isolated I/O Port allows you to remotely select and load patterns, start printing, stop printing, place the marker online, and monitor the system output signals. Cable connectors and connector pins are supplied with the controller for constructing appropriate interface cables.

Input Signals. These input signals provide the following controls:

INPUT COMM..................	For all inputs (+ or – supply)
START PRINT	Begins print cycle
STOP	Stops the print cycle
SEL_0 thru _6 *...............	Remotely selects & loads up to 127* pattern files
SPARE_1, 2, 3.................	Three (3) spares for custom applications

　* System software allows SEL_6 signal to be configured for remotely selecting patterns or for remotely placing the marker online. If used for marker online, pattern selection is reduced to 63 patterns (max).

Output Signals. These output signals indicate the following states:

OUTPUT COMM..............	For all outputs (+ or – supply)
DONE	Print cycle is complete
READY	System ready for message or for start print command
PAUSED	System paused (waiting timeout or command)
NO FAULT	System status (normal or fault detected)
SPARE_1, 2....................	Two (2) spares for custom applications

SYSTEM SOFTWARE *(continued)*

Host Communications

The marking system software allows you to configure communication parameters to transmit and receive data to and from a host computer. To provide maximum integration flexibility, the system software supports RS-232 and RS-485 serial interfaces and Ethernet TCP/IP interfaces. The system software also provides two protocol choices: Programmable Protocol and Extended Protocol.

RS-232 Interface. The serial (RS-232) communications interface is most often used with remote devices such as host computers, terminals, or bar code scanners. The Comm 1 RS-232 interface supports both Telesis Extended Protocol and Telesis Programmable Protocol. The Comm 2 RS-232 interface supports only Telesis Programmable Protocol.

RS-485 Interface. The RS-485 interface is normally used for long transmission distances or multi-drop networks of up to 31 TMC470 controllers. <u>You must use Telesis Extended Protocol with the RS-485 interface</u>.

The following describes the serial data character format on all transmissions to and from the TMC470 Controller.

- Asynchronous
- 1200, 2400, 4800, 9600, 19200, 38400, or 115200 Baud
- 1 or 2 Stop Bits
- 7 or 8 Data Bits
- None, Even or Odd Parity

TCP/IP Interface. The Ethernet (TCP/IP) interface is most often used with host computers communicating over a local area network (LAN). <u>You must use Telesis Extended Protocol with the TCP/IP interface</u>.

The Port parameter identifies the host computer socket that is assigned to the marking system. If more than one marking system is installed in a network configuration, each system must use a separate and unique port number. The Address parameter identifies the IP address of the host computer. The marking system software supports both fixed addressing and dynamic addressing.

Programmable Protocol. Use this protocol where very simple one-way communications are required (such as with bar code scanners). Programmable Protocol provides no error checking or acknowledgment of the transmitted data. Note that XON/XOFF Protocol applies even when Programmable Protocol is selected.

Starting Character specifies where the software begins to count character positions. This number must be entered in decimal format (e.g., "2" for ASCII Start of Text "STX").

Terminating Character identifies the end of transmitted string (usually "13" for ASCII carriage return character).

Character Position counted from the starting character ignoring all characters preceding it.

Character Length accepts variable length messages (if set to 0) or messages of a pre-specified, fixed number of characters.

Ignore Character identifies the character to ignore when sent from the host (usually "10" for ASCII line feed character)).

Message Type allows message-type recognition which defines how the marking system will use data it receives from the host.

1	Message type 1 overwrites the *first line of the first text field* with data extracted from the host
P	Message type P loads a specific pattern identified by data extracted from host
Q	Message type Q updates the text in the *first query buffer* with data extracted from the host
V	Message type V updates the *first variable text flag* found in the pattern with data extracted from the host
0	Message type 0 (zero) indicates that host will provide message type, field number (if applicable), line number (if applicable), and data; delegates message type selection to the host on message-by-message basis. The host message must use the format:

   Tnn;L<string>

where:

T	=	1, P, Q, or V to indicate message type
nn	=	two-digit field number or query text buffer where data will be placed. **Note**: Not used with Message Type P.
;L	=	semi-colon and one-digit line number to identify which line of the specified field where the data will be placed. If no line number is supplied, the system assumes line 1 of the specified field **Note**: Used *only* with Message Type 1 and Message Type V.
<string>	=	For Message Type P, indicates the pattern name to be loaded. For Message Types 1, Q, or V, indicates the data to be inserted into the field or the query text buffer, as applicable.

Host Communications *(continued)*

Extended Protocol. This protocol selection includes error checking and transmission acknowledgment. It should be used in applications where serial communication is a vital part of the marking operation. All communications are carried out in a parent/child relationship with the host being the parent. Only the host has the ability to initiate communications. If the host does not receive a response within three seconds, it should re-transmit its original message. If no response is received after three tries, it should declare the link to be down.

The following describes the Extended Protocol message format as sent from the host to the TMC470 controller.

SOH TYPE [##] STX [DATA] ETX BCC CR

where:

SOH ASCII Start of Header character (001H). The controller ignores all characters received prior to the SOH.

TYPE A single, printable ASCII character that defines the meaning (type) and content of the message downloaded from the host, where:

1 Message Type 1 overwrites a specific field in currently loaded pattern with data supplied in the host message. See [DATA] for details.

P Message Type P specifies the pattern name to be loaded for printing. See [DATA] for details.

Q Message Type Q updates a specific query buffer with data supplied in the host message. See [DATA] for details.

V Message Type V updates the variable text in a specific text field of the currently loaded pattern with data supplied in the host message. See [DATA] for details.

O Message Type O resets marker and places it online

G Message Type G initiates a print cycle to mark the currently loaded pattern

I Message Type I requests the marker return the status of standard output and input signals. The system will return a hexadecimal code for the 6 output signals and 12 input signals in the following format:

O O ; I I I

where:

bit 1	READY	0x01
bit 2	DONE	0x02
bit 3	PAUSED	0x04
bit 4	NO_FAULT	0x08
bit 5	SPARE_1	0x10
bit 6	SPARE_2	0x20
bit 1	START	0x001
bit 2	STOP	0x002
bit 3	SEL_0	0x004
bit 4	SEL_1	0x008
bit 5	SEL_2	0x010
bit 6	SEL_3	0x020
bit 7	SEL_6 *	0x040
bit 8	SEL_4	0x080
bit 9	SEL_5	0x100
bit 10	SPARE_1	0x200
bit 11	SPARE_2	0x400
bit 12	SPARE_3	0x800

Note: Input SEL_6 may be configured to place machine online (default) or for Remote Pattern Selection.

[##] Optional two-digit ASCII number that specifies the Station ID of the controller when used in multi-drop network applications. The Station ID may range from 00-31. Note that "00" is reserved for applications where only one controller is used. In such applications, this field may be eliminated and "00" will be assumed.

STX ASCII Start of Text Character (002H).

[DATA] Optional character string that may be required for certain message types (e.g., Type 1, P, Q, and V).

Typically, data is sent in the format:

nn;L<string>.

where:

nn = two-digit field number or query text buffer where data will be placed.
Note: Not used with Message Type P.

;L = semi-colon and one-digit line number to identify which line of the specified field where the data will be placed. If no line number is supplied, the system assumes line 1 of the specified field
Note: Used *only* with Message Type 1 and Message Type V.

<string> = For Message Type P, indicates the pattern name to be loaded.

For Message Types 1, Q, or V, indicates the data to be inserted into the field or the query text buffer, as applicable.

ETX ASCII end of text character (003H).

BCC Optional Block Check Code that is generated and sent to improve link reliability by providing fault detection. The BCC is calculated by taking an eight bit addition of the TYPE and DATA TEXT characters and transmitting them as a three digit ASCII decimal number in the range from 000 to 255. If the sum is greater than 255, the most significant bit overflows and is discarded.

CR ASCII Carriage Return Character (00DH).

TRADEMARKS

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