TMP3200/470 Marking System – General Arrangement

SYSTEM OVERVIEW

The Telesis® TMP3200/470 PINSTAMP® marking system permanently prints messages into a variety of materials such as steel, aluminum, and plastic.

A hardened pin is 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 controls pin extension and retraction to mark the message.

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

TMP3200 Marking Head. The 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 pin out from and return the pin to the pin cartridge.

The TMP3200 marking head is an X/Y-traversing mechanism. Using two stepper motor drives, it accurately and rapidly positions the pin at coordinate-defined locations in marking window within .03175 mm (.00125 in).

The marker accommodates the rigorous dynamics of impacting, rebounding, and rapid positioning of the marking pin through a system of rigid rails and ball bearing saddles, timing belts, and direct-drive, toothed pulleys.

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.

The internal mechanism is protected from debris by an integral shield. Stainless steel panels slide against one another, constrained

by the cartridge and the high-impact ABS cover, to prevent debris from entering the marking head.

Marker Cable. The marker cable is pre-wired to the marking head and connects the marker to the controller. The highly flexible cable is 4 m (13 ft). Optional extension cables are available for greater distances.

Marking Pins. Marking pins for the TMP3200 include the 25S-, 25L-, 25XL, and the 150SA-series. Refer to the *TMP3200 Marking Head Dimensions* drawing for pin stroke (pin extension) dimensions. Refer to the marking depth tables for pin cone angles and depths.

Filter/Regulator Unit. The filter/regulator unit includes two regulators with pressure gauges to control the drive air and return air. The first regulator contains a filter to help remove contaminants from the supply air. Two air lines connect the regulated air to the marking head. Drive air fires the impact pin; return air pushes it back into the cartridge. The standard air lines are 4 m (13 ft) and are made of 6 mm tubing.

TMC470 Controller. The controller contains an integrated keyboard with an LCD display. It provides a text-only operator interface and allows full operational control of the TMP3200 marking head. The back panel provides the electrical interface for connecting to optional, remote I/O sources. Refer to *TMC470 Controller Specifications* for details.

Optional System Computer. The TMC470 controller can be connected to a PC that runs the Merlin® III Visual Design software. The PC can be supplied by Telesis or by the customer. Refer to *PC-Based Merlin III Software* and *TCP/IP Interface* for details.

SYSTEM OPTIONS

- Tool Post Assembly
- Clip-On Cartridge Adapter Kit
- Marking Head Extension Cables
- Auxiliary Axis Driver Board Kit
- Motorized Z-Axis Tool Post with Programmable Travel
- Motorized Theta-Axis with Programmable Rotary Drive Unit
- TMC470 Controller Wall-Mounting Bracket Kit
- TMC470 Controller Panel-Mounting Bezel/Bracket Kit
- TMC470N NEMA® Enclosure
- Bar Code Scanner or Bar Code Wand with Cable
- Foot Switch (Start Print) or Pushbutton Station (Start/Abort)
- Backup Utility Software
- Upgrade Utility Software
- Logo/Font Generator Software
- Merlin III Visual Design Software
- System Computer (to run the Merlin III software)

SYSTEM SETUP

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

1. Mount the marking head to the optional tool post assembly (or other suitable fixture) using four M6-1.00 x 20 mm bolts.

   Note: The marking head can be mounted in any orientation, but preferred installation is with the pin pointed **downward**.

2. Mount the filter/regulator assembly within 12 ft (3.6 m) of the marker.

3. Connect the drive air and return air lines to the marking head.

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

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

5. Locate the controller as close as practical to the marking head. Standard marker cable length is 4 m (13 ft).

6. Install the controller as a tabletop, wall-mounted, panel-mounted, or enclosure-mounted unit.

7. Ensure the controller power switch is **OFF**.

8. Connect the marker cable to the controller.

9. Connect the power cable to the controller.

10. (optional) For systems that connect to a PC running the Merlin III Visual Design software:
    - Ensure the PC power switch is **OFF**.
    - Connect the cable to the controller Ethernet port and to the PC.
    - Connect the power cable to the PC.
    - Position the PC power switch to **ON**.
    - Install the marking system software (customer-supplied PC).

11. Position the controller power switch to ON.

12. Start the marking system software.

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

TMP3200 MARKING HEAD

Specifications

The TMP3200 marking head specifications are subject to change without prior notice.

Dimensions...................... See *TMP3200 Marking Head Dimensions* drawing

Weight .... 6.8 kg (15 lb), marking head and cable

Operating Temperature.... 0° to 50° C (32° to 122° F), non-condensing

Air Supply....................... Clean and dry, 2.8 to 6.9 bar (40 to 100 psi)

Air Consumption.............. 0.04 SCFM (idle)
0.8 SCFM (marking)

Marking Area .... 150 x 100 mm (6.0 x 4.0 in)

Pin Types........................ 25S-, 25L-, 25XL, or 150SA-series

Pin Material..................... Powdered metal or stainless steel with diamond tip or carbide (25S, 25L, or 25XL-series)

Powdered metal or tool steel with carbide tip (150SA-series)

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 .127 mm (.005 in), 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 increase by approximately 25 percent due to the increased weight of the pins.

Marking Characteristics

The TMP3200 can produce characters as small as .76 mm (.030 in), printed at any angle within the marking window. Printing resolutions range from 4 to 79 dots per centimeter (10 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 the drive air pressure.

Marking 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.

Marking Speeds

The system marks up to four characters per second when marking 3 mm (.118 in) high, 5 x 7 dot matrix characters using a 25S powdered steel marking pin with the standard 25S cartridge, with a pin stroke of 3 mm (.118 in) and the drive air pressure set to 5.5 bar (80 psi).

The marking speed can be adjusted to allow more precisely formed characters. Doing so, under these same conditions, results in reduced marking speeds.

Note that marking speeds vary widely depending on character size, drive air pressure, dot density, pin stroke, pin type and pin cartridge. Increased character size, increased dot density, increased pin stroke, or decreased drive air pressure result in decreased marking speeds.

The use of a heavier marking pin, such as the 25S carbide pin or the 150SA carbide-tipped pin, or the use on non-standard marking pin cartridges also results in decreased marking speeds.

Specific times and speeds can be verified by a Telesis representative.

Marking Depth

The following tables provide sample marking depths. Drive air was set at 5.5 bar (80 psi); return air was set at 1.5 bar (20 psi); pin stroke was set to the maximum allowable distance for each pin type to achieve the maximum depth of mark.

```
┌─────────────┐
│  N O T I C E │
└─────────────┘
```

The recommended nominal drive air pressure is 80 psi (5.5 bar). Lower drive air pressure can be used, but will result in decreased depth of mark and increased cycle time.
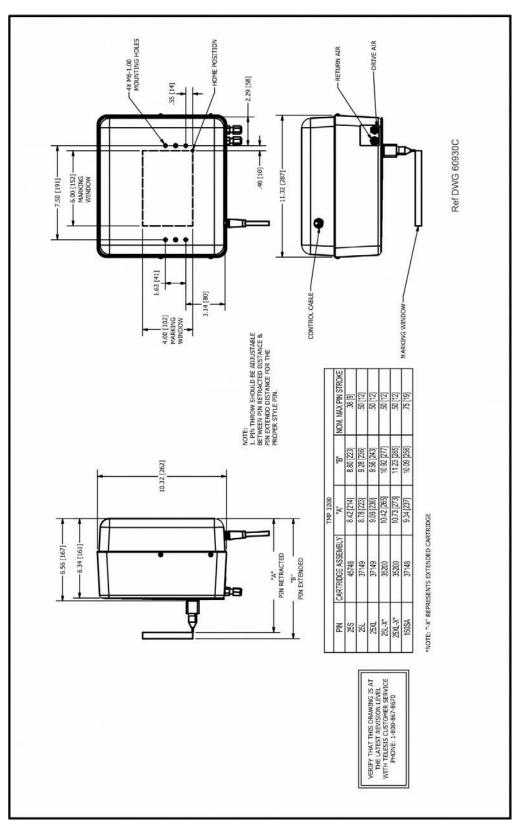
Depths – Type 25S Powdered-Metal Pin

MATERIAL (HARDNESS)	30° CONE	45° CONE	60° CONE
Aluminum (Rb2)	.178 mm .007 in	.229 mm .009 in	.279 mm .011 in
Brass (Rb22)	.152 mm .006 in	.178 mm .007 in	.203 mm .008 in
Cast Iron (Rb47)	.127 mm .005 in	.152 mm .006 in	.178 mm .007 in
Cold Rolled Steel (Rb53)	.102 mm .004 in	.127 mm .005 in	.152 mm .006 in

Depths – Type 25S Carbide Pin

MATERIAL (HARDNESS)	30° CONE	45° CONE	60° CONE
Aluminum (Rb2)	.178 mm .007 in	.229 mm .009 in	.305 mm .012 in
Brass (Rb22)	.152 mm .006 in	.203 mm .008 in	.254 mm .010 in
Cast Iron (Rb47)	.127 mm .005 in	.178 mm .007 in	.203 mm .008 in
Cold Rolled Steel (Rb53)	.102 mm .004 in	.152 mm .006 in	.178 mm .007 in

Depths – Type 150SA Carbide-Tipped Pin

MATERIAL (HARDNESS)	30° CONE	45° CONE
Aluminum (Rb2)	.356 mm .014 in	.457 mm .018 in
Brass (Rb22)	.229 mm .009 in	.330 mm .013 in
Cast Iron (Rb47)	.203 mm .008 in	.279 mm .011 in
Cold Rolled Steel (Rb53)	.203 mm .008 in	.254 mm .010 in

TMP3200 Marking Head Dimensions

TMC470 CONTROLLER

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

TMC470 Specifications

The TMC470 controller specifications are subject to change without notice.

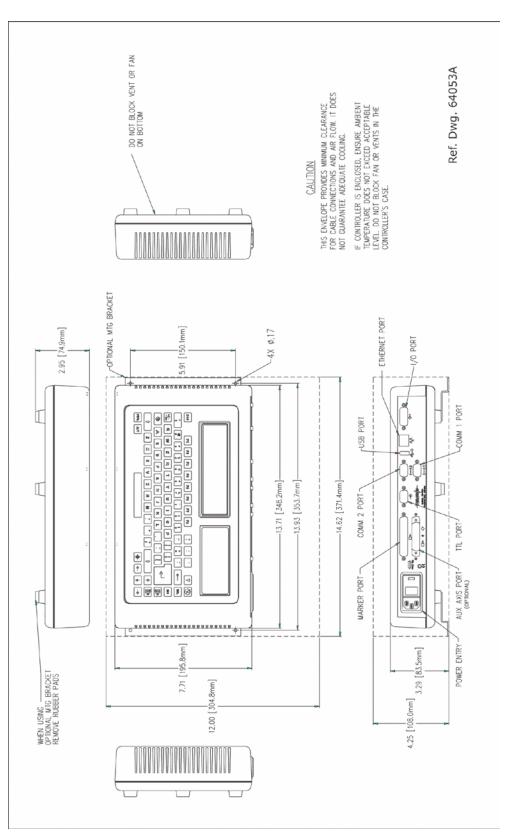|	
Compliance	CE, RoHS
Configurations	Tabletop, wall-mounted, panel-mounted, or enclosure-mounted
Rating	NEMA 1 (I.P. 30), tabletop or wall-mounted
	NEMA 12 (I.P. 65), panel-mounted using appropriate customer-supplied panel
	NEMA 12 (I.P. 65), enclosure-mounted using Telesis-supplied TMC470N enclosure
Dimensions	Refer to the appropriate TMC470 Controller Dimensions drawing
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
Operating Temperature	32° to 122° F (0° to 50°C)
Operating Humidity	10% to 80% non-condensing
Cooling	Internal, thermostatically 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 & 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)

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. In environments where solid or liquid contaminants are present, the contaminants can be drawn into the TMC470 controller and cause the equipment to fail. For that reason, in these types of environments, the controller **must** be located in a sealed industrial enclosure.
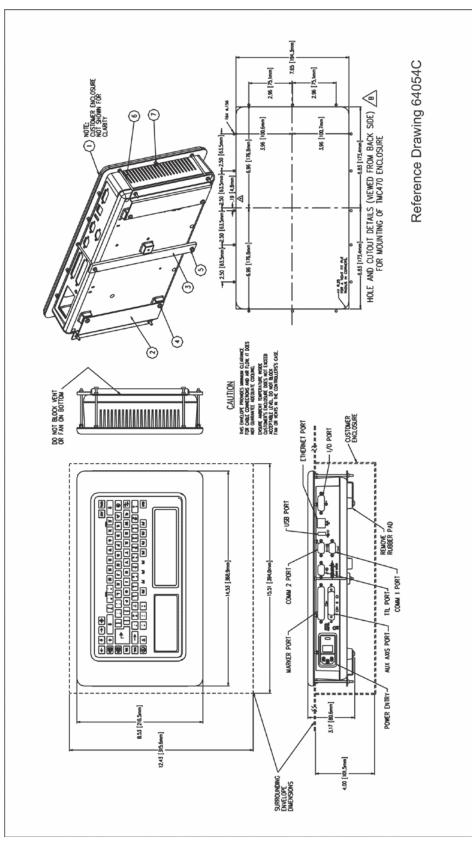
To facilitate such installations, Telesis offers on optional panel mounting kit for use with an appropriate customer-supplied panel or enclosure. Telesis also offers an optional TMC470N NEMA 12 (I.P. 65) enclosure in which the controller can be mounted.

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.
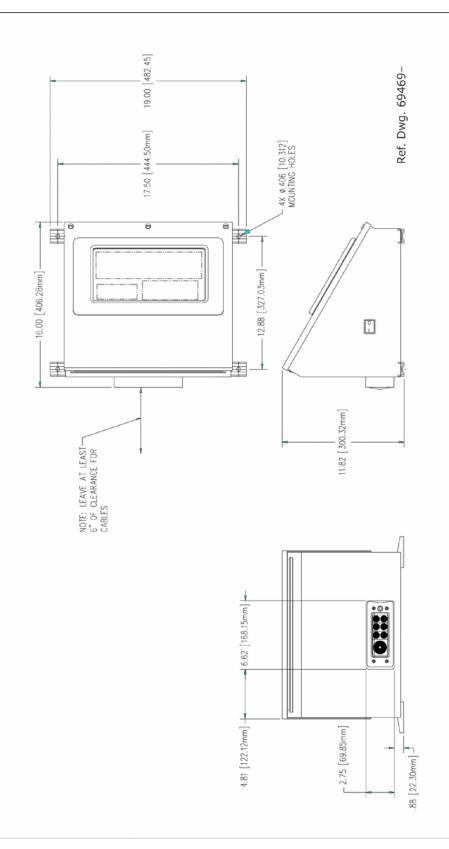
Ref. Dwg. 64053A

DO NOT BLOCK VENT OR FAN ON BOTTOM

CAUTION

THIS ENVELOPE PROVIDES MINIMUM CLEARANCE FOR CABLE CONNECTIONS AND AIR FLOW. IT DOES NOT GUARANTEE ADEQUATE COOLING.

IF CONTROLLER IS ENCLOSED, ENSURE AMBIENT TEMPERATURE DOES NOT EXCEED ACCEPTABLE LEVEL. DO NOT BLOCK FAN OR VENTS IN THE CONTROLLER'S CASE.

OPTIONAL MTG BRACKET

2.95 [74.9mm]

5.91 [150.1mm]

4X Ø.17

13.71 [348.2mm]

13.93 [353.7mm]

14.62 [371.4mm]

7.71 [195.8mm]

12.00 [304.8mm]

WHEN USING OPTIONAL MTG BRACKET REMOVE RUBBER PADS

ETHERNET PORT

I/O PORT

USB PORT

COMM 1 PORT

COMM 2 PORT

TTL PORT

MARKER PORT

AUX AXIS PORT (OPTIONAL)

POWER ENTRY

3.29 [83.5mm]

4.25 [108.0mm]

TMC470 Controller Dimensions – Tabletop and Wall-Mounted Configuration

Reference Drawing 64054C

TMC470 Controller Dimensions – Panel-Mounted Configuration

TMC470 Controller Dimensions – Enclosure-Mounted Configuration

TMC470-Based System Software

The system software is permanently installed in the controller and 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 can be created to define text strings, arc-text strings, geometric shapes, graphics, and machine-readable data matrix symbols. Non-printable objects can be defined to specific commands to the marker (for example, Pause, Go to, Input, or Output).

Printable text fields can include alphanumeric characters, symbols, and special message flags. Message flags insert data, such as serial numbers, times, dates, and user-defined codes, into the text string.

PC-Based Merlin III Visual Design Software

The TMC470 controller can be optionally connected to a PC that runs the Telesis Merlin III Visual Design software.

The software is a 32-bit Windows®-based WYSIWYG application that provides a graphical user interface to make pattern design quick and easy. "Click and drag" to adjust field size, location, or orientation.

The Merlin III software includes tools to create and edit text, arc text, rectangles, circles, ellipses, and lines. Existing DXF files can also be imported for marking.

After downloading patterns to the controller, the PC can be disconnected from the controller to allow the TMC470 to control marking operations. The PC can also remain connected to the controller and allow the Merlin III software to fully control the marking system.

Interface Panel

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

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 or retrieval and for software upgrades.

Auxiliary Axis Interface (optional). The Auxiliary Axis port allows the system to connect with up to four optional motion devices such as motorized tool posts, rotational drive units, and linear slides or actuators.

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. 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 to place the marker online, pattern selection is reduced to a maximum of 63 patterns.

Output Signals. 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

Host Communications

The marking system software allows you to configure communication parameters to transmit 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 Programmable Protocol and Extended protocols.

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. **You must use Telesis Extended Protocol with the RS-485 interface.**

The serial data character format on transmissions to and from the TMC470 controller is described below:

- 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). **You must use Telesis Extended Protocol with the TCP/IP interface.**

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.

The Ethernet port can optionally be connected to a PC running the Merlin III Visual Design software. Any computer that runs the Merlin III software must satisfy the following requirements:

- Windows® Operating System: 2000, XP, Vista® (Business), 7 (Professional), or 8 (Professional)
- Pentium® 4 Processor
- Sufficient RAM as per operating system requirements
- Video board
- 2GB hard drive
- One available Ethernet port
- SVGA color monitor, mouse, and keyboard

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 (for example, "2" for ASCII Start of Text "STX").

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

Character Position counts from the starting character and ignores 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 the ASCII line feed character).

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

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

   Tnn<string>

where:

T	1, P, Q, or V indicates the message type.
nn	two-digit field number or query text buffer where data will be placed. **Note**: Not used with Message Type P.
<string>	For Message Type P, indicates the pattern name to be loaded. For Message Type 1, Q, or V, indicates the data to be inserted into the field or the query text buffer.

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

C clears the error from the screen.

G initiates a print cycle to mark the currently loaded pattern.

I requests the marker return the status of standard output and input signals. The system returns 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

* Input SEL_6 can be configured to place the machine online (default) or to remotely select a pattern.

O resets the marker and places it online.

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

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

S requests the error status.

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

[##] 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 **00** is reserved for applications where only one controller is used. In such applications, this field can be eliminated and **00** is assumed.

STX ASCII Start of Text Character (002H).

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

Data is typically sent in the format:

   nn<string>

where:

nn = two-digit field number or query text buffer where data will be placed.

Note: Not used with Message Type P.

<string> = For Message Type P, indicates the pattern name to be loaded. For Message Type 1, Q, or V, indicates the data to be inserted into the field or the query text buffer.

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

Telesis, **PINSTAMP**, and **Merlin** are registered trademarks of Telesis Technologies, Inc. in the United States.

NEMA is the registered trademark and service mark of the National Electrical Manufacturers Association.

Pentium is a registered trademark of Intel Corporation in the United States and other countries.

Windows and **Vista** are registered trademarks of Microsoft Corporation in the United States and other countries.