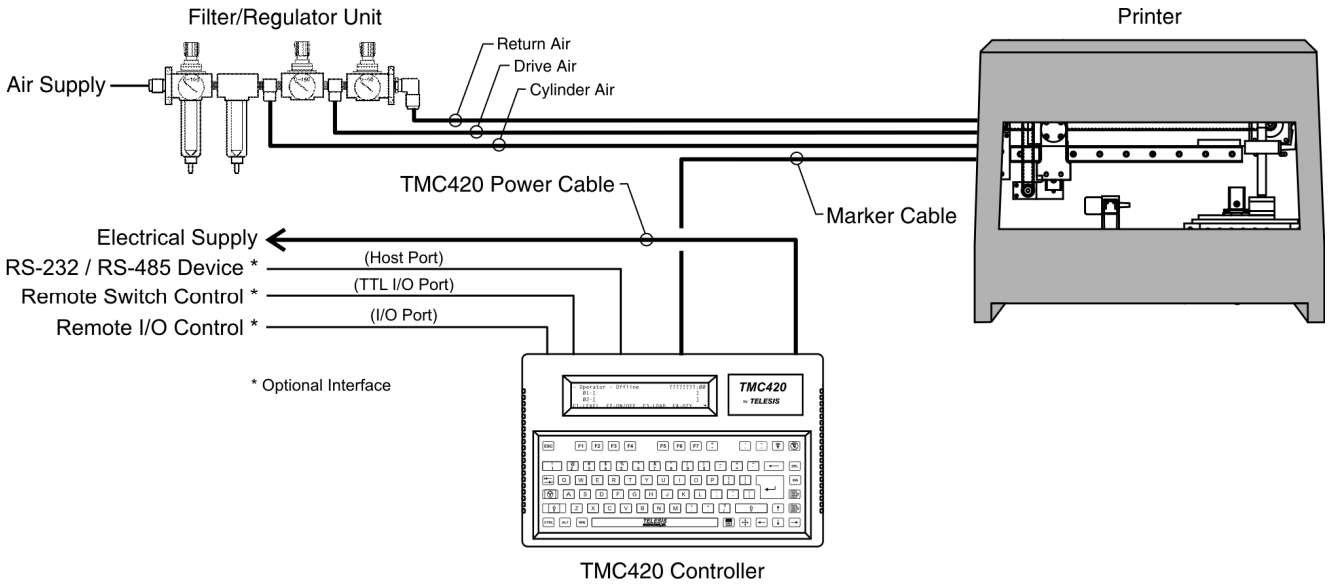


DPP2000/420 General Arrangement Drawing

System Overview

The Telesis® DPP2000 IdentiPlate® is a fully programmable, data plate (tag) printer that automatically extracts data plates from a magazine and positions them before a fixed stylus to print user-defined messages. Printing is accomplished by pneumatically accelerating an impact pin to imprint dots that form characters or shapes in malleable materials such as steel, aluminum, or plastic. Character shapes and locations are determined by the internal software, easily programmed by the user to define X/Y coordinates on the two-dimensional mechanical platform. The DPP2000 can print various fonts and character sizes in .001 in. (.025 mm) increments from .030 to 2.00 in. (.762 to 50.8 mm).

DPP2000 Printer Assembly. Within its enclosure, the printer includes an X and Y traversing mechanism to extract and position the data plate and the pneumatic components necessary to drive the impact pin at the designated X/Y position. Using two stepper motor drives, it accurately and rapidly positions the data plate at coordinate-defined locations in the printing window (within .002 in.). The printer accommodates the rigorous dynamics of impacting, rebounding, and rapid positioning of the data plate through a system of pulleys, belts, and anti-friction bearings.

An adjustable magazine can hold up to 250 data plates ranging in size from .75-in. high x 1.25-in. long to 4.0-in. high x 5.0-in. long (19.05 x 31.75 mm to 101.6 x 127 mm) and ranging in thickness from .020 to .070 in. (0.51 to 1.78 mm). The magazine is removable to simplify adjustment and exchange. No tools are required to remove or adjust the magazine.

Pin cartridges are available for the 25L-series or the 150S-series impact pins. Formed of a self-lubricating plastic material, the pin cartridge offers long life with little maintenance. Clasps are used to attach the pin cartridge to the cartridge base for easy pin replacement.

Marking Pins for the DPP2000 include the 25L-series and 150S-series. The 25L-series pin is used for high speed printing of up to four characters per second, providing depths to .008 in. (0.20 mm). The 150S-series pin is used for speeds of up to three characters per second and depths to .012 in. (.25 mm).

TMC420 Controller includes an integrated keyboard with a four line LCD display. It provides the electrical interface and software control of the DPP2000 printer. (Refer to *TMC420 Controller Specifications* for details.)

Filter-Regulator Assembly. This unit provides filtered/regulated air to the printer. It includes two filters, three air lines, and three regulators with pressure gauges to control the Drive air, Return air, and the lift cylinder/gripper mechanisms. The standard 1/4-in. (6.35 mm) air tubing is provided in 10-ft. (3 m) lengths.
Note: Drive air drives the impact pin from the cartridge; Return air pushes it back in.

System Options

The following options are available for use with the DPP2000.

- Magazine Assembly
- Re-stacker Unit (first in / first out)
- Bar Code Scanner or Bar Code Wand with Cable
- Foot Switch (Start Print) or Pushbutton Station (Start/Abort)
- Marking Head Extension Cables
- TMC420 Controller Mounting Bracket Kit
- Backup Utility Software
- Upgrade Utility Software
- Logo/Font Generator Software

System Setup

1. The printer is a tabletop device that may be located on any flat, sturdy surface.

2. Mount the filter-regulator assembly using the brackets provided. The filter-regulator assembly should be located within 10 ft. (3 m) of the printer; optionally on the side or rear panel of the printer.

Note: The TMC420 is not a sealed unit. Protect it from potentially damaging conditions and contaminants. Do not block case vents. Ensure the marking system is electrically isolated from any devices that may generate extreme electromagnetic interference (EMI).

3. Locate the controller as close as practical to the marking head. The standard head cable length is 12 ft. (3.6m).

4. Connect the respective air lines to the CYL (cylinder), DRV (drive), and RTN (return) ports on the rear panel of the printer.

5. Connect clean, dry supply to the input port on the filter-regulator assembly.

6. Adjust pin stroke and/or the Drive and Return air regulators, as needed, for proper pin impact depth:
   40 to 80 psi (3 to 5 bars) for Drive Air;
   15 to 30 psi (1 to 2 bars) for Return Air;
   65 to 120 psi (4 to 8 bars) for Cylinder Air.

7. Turn the TMC420 controller on using the off/on switch located on the back panel of the controller.

DPP2000 Printer

Specifications. The DPP2000 printer specifications are subject to change without prior notice.

Weight	75 lb. (34 Kg)
Printer (HxWxD)	19.0 x 23.0 x 13.0 in. (483 x 584 x 330 mm)
Data Plate (HxW)	4.0 x 5.0 in. (101.6 x 127 mm) max. overall
Printable Area (HxW)	3.75 x 5.0 in. (97.8 x 127 mm) max.*
Pin Type	25L-series or 150S-series
Pin Material	Powdered Metal or Stainless Steel with Diamond Tips or Carbide (25L-series) Powdered Metal or Tool Steel with Carbide Tips (150S-series)
Air Supply	60 to 120 psig (4.2 to 8.3 bars) clean and dry
Air Consumption	0.04 SCFM (at idle) 0.80 SCFM (printing)
Air Pressure at Inlet	dependent on printing force 60 to 120 psi (4.2 to 8.3 bars) permitted 80 psi (5.5 bars) minimum recommended
Operating Temp.	32° to 105° F (0° to 40° C), non-condensing

* The top, left corner of the tag is not available for marking due to the gripper mechanism. The unusable area extends 0.25" down from the top edge of the tag and extends 2.0" inward from its left edge.

Printing. Printing is accomplished by indenting dots into the data plate using a pneumatically accelerated and returned piston/pin. Characters can be rotated in 1° increments and printed at resolutions from 10 to 200 dots per inch for an engraved look. The text may also be printed as a mirrored image to produce an embossed message. The depth of mark can be adjusted over a significant range by adjusting the pin stroke distance and, to a lesser extent, by adjusting the Drive air pressure. On thin, soft plate materials, use minimal pin stroke and air pressures to prevent distortion of the plate while marking.

Pin Life. Pin life depends largely on the type of material being printed, how hard or abrasive it is and the depth required. On typical metals with a hardness of Rockwell 20C, at a depth of .005 in. (.127 mm), the 25-series, powdered metal pins average about three million impressions before requiring sharpening, while carbide pins average approximately nine million impressions. If carbide pins are used, printing times will increase by approximately 25% due to the increased weight of the pin.

Noise. In addition to being housed in an enclosure, all DPP2000 printers are equipped with mufflers on the solenoid exhausts to reduce noise. Although every attempt is made to reduce noise, the material being printed influences the noise level significantly. For example, printing a thick, soft aluminum plate produces less noise than printing a thin, steel plate.

DPP2000 Printer *(continued)*

Marking Depth. The following tables provide sample marking depths using different materials marked with various pin types and cone (tip) angles. Drive air was set at 80 psi (5.52 bars) and Return air was set at 20 psi (1.38 bars). The pin stroke was set to the maximum allowable distance for each pin type to achieve the maximum depth of mark (i.e., 0.5-in. (12.7 mm) for 25-series pins and 0.25 (6.4 mm) for 150S-series pins).

Marking Depths Using Type 25 Powdered-Metal Pin

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb2)	0.0040 in 0.1016 mm	0.0045 in 0.1143 mm	0.0080 in 0.2032 mm	0.0110 in 0.2794 mm
Brass (Rb22)	0.0025 in 0.0635 mm	0.0030 in 0.0762 mm	0.0055 in 0.1397 mm	0.0080 in 0.2032 mm
Cast Iron (Rb47)	0.0025 in 0.0635 mm	0.0030 in 0.0762 mm	0.0055 in 0.1397 mm	0.0080 in 0.2032 mm
Cold Rolled Steel (Rb53)	0.0025 in 0.0635 mm	0.0030 in 0.0762 mm	0.0055 in 0.1397 mm	0.0080 in 0.2032 mm

Marking Depths Using Type 25 Carbide Pin

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb2)	0.0040 in 0.1016 mm	0.0050 in 0.1270 mm	0.0080 in 0.2032 mm	0.0065 in 0.1651 mm
Brass (Rb22)	0.0025 in 0.0635 mm	0.0035 in 0.0889 mm	0.0060 in 0.1524 mm	0.0040 in 0.1016 mm
Cast Iron (Rb47)	0.0025 in 0.0635 mm	0.0035 in 0.0889 mm	0.0060 in 0.1524 mm	0.0040 in 0.1016 mm
Cold Rolled Steel (Rb53)	0.0025 in 0.0635 mm	0.0035 in 0.0889 mm	0.0060 in 0.1524 mm	0.0040 in 0.1016 mm

Marking Depths Using Type 150S Pin

MATERIAL (HARDNESS)	30° CONE	45° CONE	45° CONE *	60° CONE
Aluminum (Rb2)	0.0110 in 0.2794 mm	0.0150 in 0.3810 mm	0.0170 in 0.4318 mm	0.0220 in 0.5588 mm
Brass (Rb22)	0.0080 in 0.2032 mm	0.0120 in 0.3048 mm	0.0135 in 0.3429 mm	0.0160 in 0.4064 mm
Cast Iron (Rb47)	0.0060 in 0.1524 mm	0.0100 in 0.2540 mm	0.0115 in 0.2921 mm	0.0115 in 0.3937 mm
Cold Rolled Steel (Rb53)	0.0060 in 0.1524 mm	0.0100 in 0.2540 mm	0.0110 in 0.2794 mm	0.0150 in 0.3810 mm

***** Denotes Carbide Pin (all other 150S-Powdered Metal)

TMC420 Controller

Specifications. The TMC420 controller specifications are subject to change without notice.

DIMENSIONS	*refer to TMC420 Mounting Drawing*
RATING	NEMA 1 (I.P. 30)
WEIGHT	2.15 kg (4.75 lb.)
OPERATING TEMP.	0° to 50°C (32° to 122° F), non-condensing
POWER REQUIREMENT	95-130 VAC, 2 amps, 50-60 Hz single phase 200-250 VAC, 1 amp, 50-60 Hz single phase
I/O VOLTAGE	12 to 24 VDC (customer-supplied)

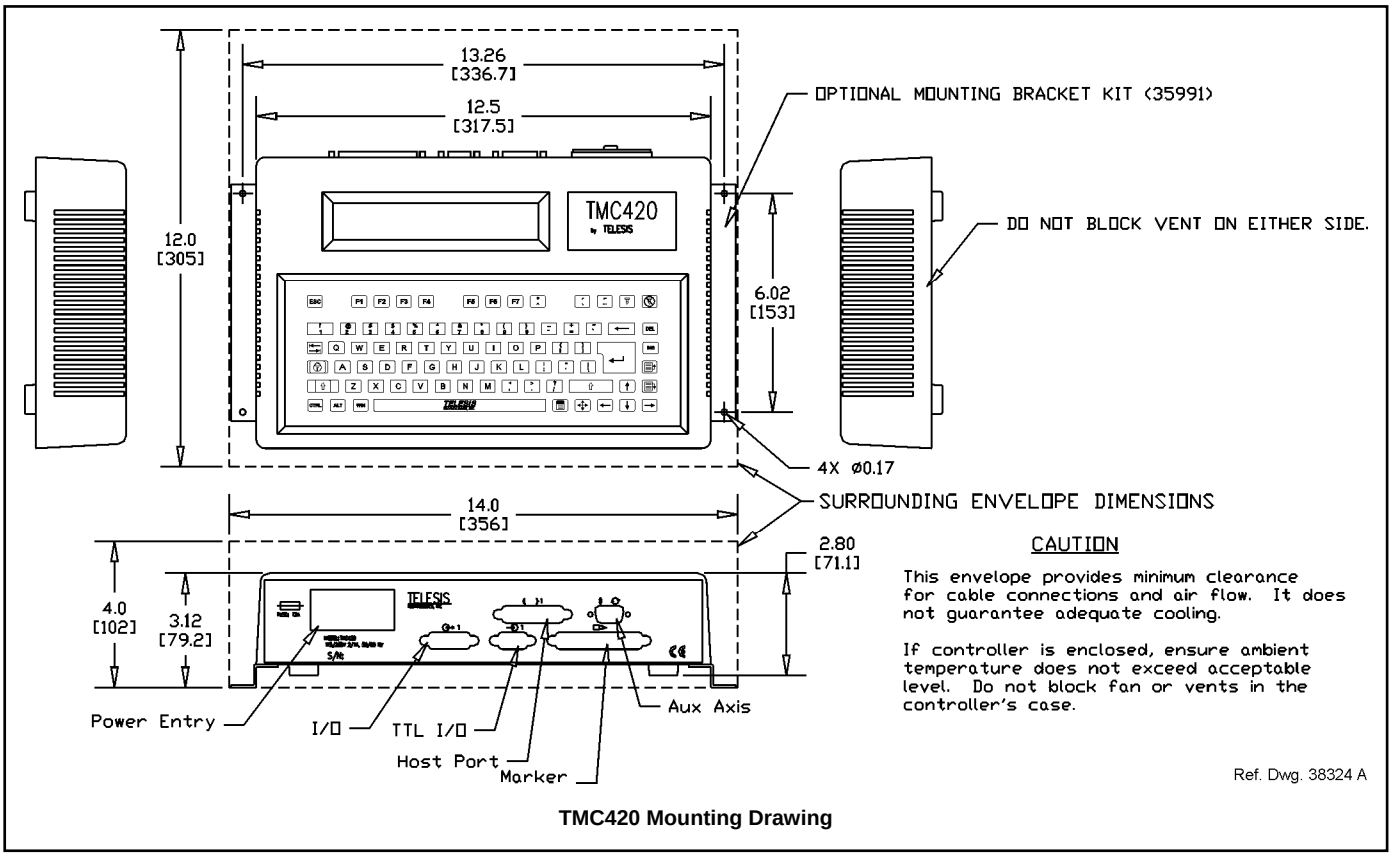
Environmental Considerations. The following environmental considerations must be taken into account when installing the TMC420 controller.

Contaminants. The vented and fan-cooled TMC420 is rated NEMA 1 (IP30). Accordingly, in environments where solid and/or liquid contaminants are present, the possibility exists that these contaminants can be drawn into the TMC420 controller and possibly result in failure of a number of electronic components. For that reason, in these types of environments, the controller must be located in a sealed industrial enclosure.

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 interface panel provides various ports for connecting the printer, host computers, logic controllers, or optional accessories.

Serial Interface. The Host Port is used for RS-232 and RS-485 communications with serial devices such as a host computer or bar code scanner. Up to 31 controllers may be used in a multi-drop configuration using the RS-485 interface. The host computer can load patterns, download messages, place the printer on/offline, and monitor system errors. (See *Serial Communications* for details.)



TMC420 Mounting Drawing

System Software. The system software is permanently installed in the controller. It provides the user interface for the operator to control the printer. The software also provides a library for storing, loading, and editing user-defined patterns. Patterns are files stored in the controller's memory. The controller can store up to 75 patterns. Each pattern contains one or more fields. A field defines a single object and how it will be printed. Fields may define text strings or machine-readable data matrix symbols. Text fields may include alphanumeric characters, symbols, and special message flags. The message flags automatically insert data into the text string, such as serial numbers, times, and dates.

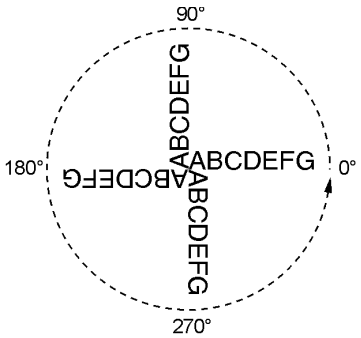
Message Flags. Certain "flags" may be included in the text to automatically insert data at the location of the flag within the pattern field. For example:

%C	Date and Time (MM/DD/YY HH:MM)
%F	Single-digit checksum for PS-OCR®
%J	Julian Day of the Year (001 - 366)
%R	Week Number (01 contains *January 1*)
%r	Week Number (01 contains *first Thursday* of new year)
%#S	Serial Number Insertion
%#V	Variable Text Insertion

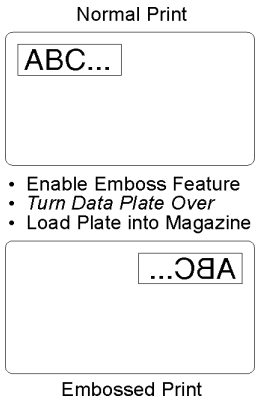
User Parameters. Define shift starting times, user shift codes, single character year tables, and single character month tables.

%E	User Year Code
%U	User Month Code
%Z	User Shift Code

Rotated Text. Characters can be rotated in 1° increments, although selections other than 0°, 90°, 180°, or 270° may increase the marking cycle time. The text will be rotated about the anchor point, which is defined by the justification setting (e.g., bottom, left).



Embossing. The printer can also emboss a printed message. This allows you to print a mirror image of the message when printing from the back side of a data plate.



I/O Control Signals. The TMC420 is configured for DC I/O only. The TTL I/O Port may be used to connect a remote pushbutton control for Start Print and Abort commands. The I/O Port may be used to connect a PLC or other DC I/O source. The I/O Port allows remote control of pattern selection, printing, aborting, placing the printer online, and monitoring of the Ready and Done output signals. Cable connectors and connector pins are supplied with the controller for constructing appropriate interface cables.

START PRINT	Input signal, begins print cycle
SEL_0, 1, 2, 3 *	Input signals, remote pattern selection (15* max.)
SEL_3 *	Input signal, printer online
ABORT	Input signal, aborts print cycle
INPUT COMM	For all inputs (+ or – supply)
READY	Output signal, ready for message or start print
DONE	Output signal, print cycle complete
OUTPUT COMM	For all outputs (+ or – supply)

∗ System software allows SEL_3 signal to be configured for remotely selecting patterns or for remotely placing the printer online. If used for printer online, pattern selection is reduced to 7 patterns (max).

Serial Communications. The Host Port may be used for either RS-232 or RS-485 communication. The RS-232 interface is most often used with remote devices such as bar code readers or host computers. The RS-485 interface is normally used for long transmission distances or multi-drop networks of up to 31 TMC420 controllers. The serial port may be configured to communicate using either the Telesis Programmable Protocol or Telesis Extended Protocol. The following describes the serial data character format on all transmissions to and from the TMC420 controller.

- Asynchronous
- 1200, 2400, 4800, 9600, or 19200 baud-host
- One Start Bit
- One or Two Stop Bit(s)
- Seven or Eight Data Bits
- None, Even or Odd Parity

Programmable Protocol is used 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 ASCII decimal format such as 2 for STX.

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

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 ASCII line feed character, decimal 10).

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

- **P** loads a specific pattern identified by data extracted from host
- **V** updates first variable text field with data extracted from host
- **1** overwrites first text field with data extracted from the host
- **Q** updates text in first query buffer with data extracted from host
- **0** (zero) indicates that host will provide message type, field 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<string>** where:
  - **T** = P, V, 1, or Q to indicate the message type.
  - **nn** = two-digit number to indicate field number or query text buffer where data will be placed. Note that a number is not used with Message Type P.
  - **<string>** = pattern name (Message Type P) or field data (Message Types V, 1, or Q), as applicable.

Extended Protocol includes error checking and transmission acknowledgment. It should be used in applications where serial communication is a vital part of the marking operation. Extended Protocol must be used in multi-drop applications. All communications are carried out in a master-slave relationship with the host being the master. Only the master 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 message format as sent from the master to the TMC420 controller.

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

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 polls or overwrites the specified field of current pattern.

V polls or updates specified variable text field of current pattern.

Q updates specified query buffer with the data received from host.

P polls or supplies pattern name to be loaded for printing

O resets printer and places it online

G initiates a print cycle to mark the currently loaded pattern

I requests the printer output status; returns a two-digit hexadecimal value to report state of READY and DONE:

Returned Value	DONE	READY
00	off	Off
01	off	ON
02	ON	Off
03	ON	ON

S requests the printer error status; returns a value that represents a particular type of error:

Returned Value	Type of Error
0x0000	no error
0x0001	ONLINE_ERROR
0x0002	PATTERN_LOAD_ERROR
0x0004	DISALLOWED_NO_PATTERN
0x0008	DISALLOWED_OFFLINE
0x0010	PATTERN_FIELD_ERROR
0x0020	MARKER_ABORTED_ERROR
0x0040	FILE_TRANSFER_ERROR
0x0080	PIX_OUT_OF_RANGE_ERROR
0x0100	RAM_ERROR
0x0200	SN_RANGE_ERROR
0x0400	PRINT_COUNT_RANGE_ERROR
0x1000	INTERLOCK_ERROR
0x2000	TAG_SENSE_ERROR
0x4000	BATCH_STOP_ERROR

Y polls or overwrites the number of time the pattern is to be printed using the batch print feature.

[##] Two optional ASCII decimal digits that specify the Station ID number for use in multi-drop network applications. The 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 TEXT] Optional field that may be required for certain message types.

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).