SIEMENS

SIMATIC TI505

6MT Channel Controller

User Manual

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2-1 — 2-8	Second		
3-1 — 3-9	Second		
A-1	Second		
Registration	Second		

Contents

List of Figures

List of Tables

Preface

This manual describes the features and capabilities of the SIMATIC®
TI505™ 6MT Channel Controller (6MTCC), a Series 505™ special function
module. The 6MTCC provides an interface for the Series 505 CPU (either a
SIMATIC® TI525™, SIMATIC® TI535™, or a SIMATIC® TI545™) to control a
6MT I/O channel of 256 inputs and 256 outputs. It also can control a
SIMATIC TI505 5MT I/O channel.

Before using the 6MT you must be familiar with the applicable Series 505
programming needed to use this product. Consult the manuals listed below.

- 5TI™ Manual *and* 6MT Data Sheets

- *SIMATIC TI505 Hardware and Installation Manual* **(**PPX:505–8103–3**)**

- *SIMATIC TI505 Programming Reference Manual* (PPX:505–8104–4)

- The *User Manuals* for your release of TISOFT™

Agency Approvals   This module meets the standards of the following agencies.

- Underwriters Laboratories: UL® Listed (Industrial Control
  Equipment)

- Canadian Standards Association: CSA® Certified (Process Control
  Equipment)

- Factory Mutual Approved; Class I, Div. 2 Hazardous Locations

- Verband Deutscher Elektrotechniker (VDE) 0160 Clearance/Creepage
  for Electrical Equipment (Self-Compliance)

Series 505 products have been developed with consideration of the draft
standard of the International Electrotechnical Commission Committee
proposed standard (IEC–65A/WG6) for programmable controllers. Series
505 complies with a list of standards available from Texas Instruments.

Telephone Assistance   If you need information that is not included in this manual contact your
Siemens Industrial Automation distributor or sales office. If you need
assistance in contacting your U.S. sales office, call 1–800–964–4114.

Product Overview

1.1   Features

The 6MT Channel Controller (6MTCC) provides an interface for the Series 505 CPU (either a TI525, TI535, or a TI545) to control a 6MT I/O channel of 256 inputs and 256 outputs in a local/remote base. The 6MTCC can control a 6MT I/O channel of 208 inputs and 240 outputs in a distributed base.

The 6MTCC is a single-wide module that fits any I/O slot of a Series 505 base. See Figure 1-1.

NOTE: The 6MTCC also works with the 5MT.
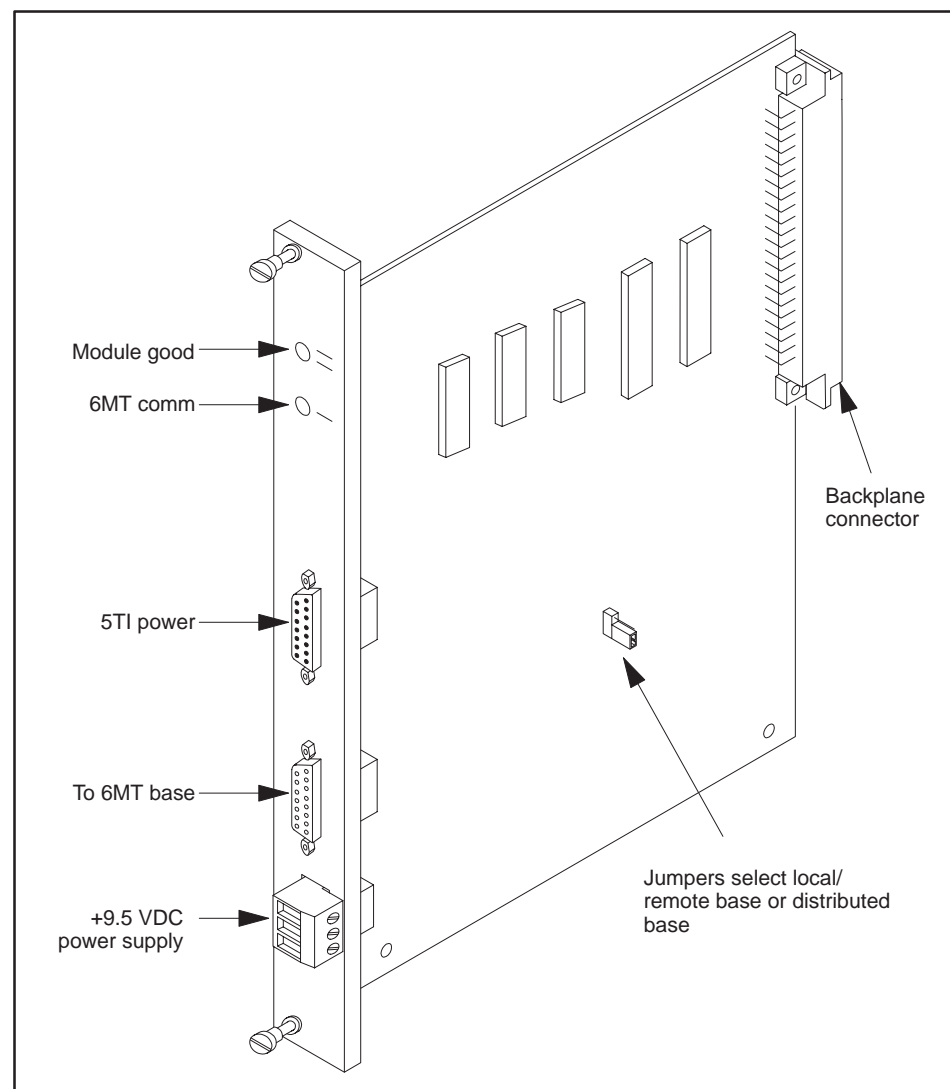
I002029

Figure 1-1   Series 505 6MT Channel Controller

Scan Time
The scan time to update the 6MT I/O points is 10 ms (maximum). If the controller scan time is greater than 10 ms, the data are updated on the same scan. Scan times less than 10 ms are updated every 10 ms.

Power Requirements
The module requires user-supplied power. You can use a +9.5 VDC standard Class 2 power supply, or you can provide power with a 5TI. See Figure 1-2.

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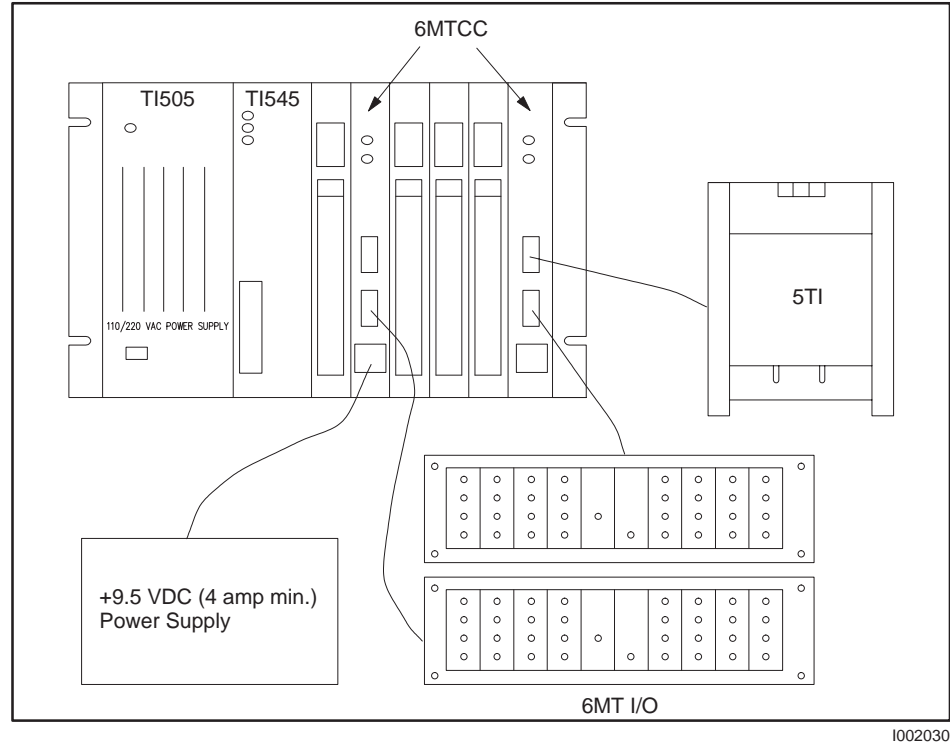
Figure 1-2   System Configuration Example

Chapter 2

Installation

2.1   Installation Tasks

Sequence   Follow the sequence shown in Figure 2-1 to install the module.

```
┌─────────────────────────────────────────────────────────┐
│              Visually inspect the module                  │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│           Select local/remote or distributed base         │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│        Ensure that power is off on all system components   │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│              Insert the module into the base               │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│            Connect the 5TI or power supply                 │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│            Connect module to 6MT I/O system                │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│              Apply power to the system                     │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────┐
│          Set WY8 to zero to lock out the module            │
└─────────────────────────────────────────────────────────┘
```
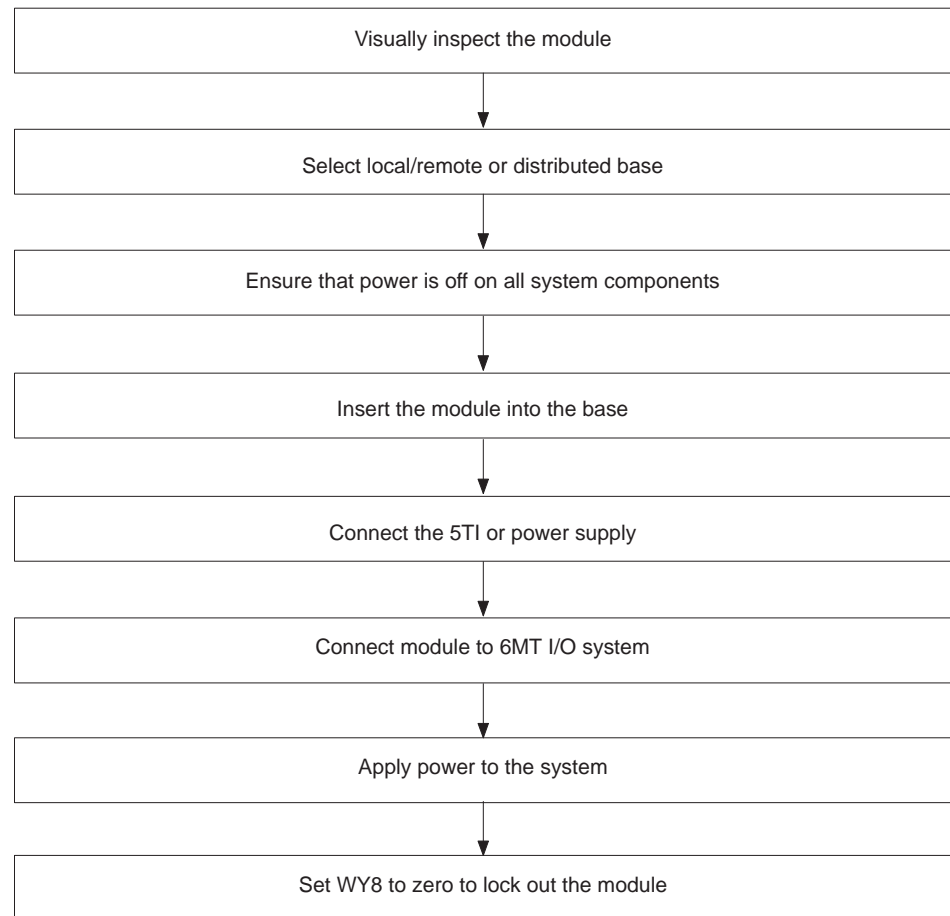
I002031

Figure 2-1   Flow of Installation Tasks

NOTE: The number of 6MT channel controllers you can install in a base is
limited by the size of the image register of the Series 505 controller. The
total number of I/O points (6MT I/O points plus other 505 I/O points) cannot
exceed the total number of I/O points available in the Series 505 system.

2.2   Selecting the Base Type

Setting the Jumper   The 6MT channel controller operates in a local/remote base or in a distributed base. Configure the 6MTCC by setting jumper E1 to select the base type. See Figure 2-2.

NOTE: The number of I/O points available with the module installed in a distributed base is 448 (208 inputs and 240 outputs). For more I/O points, use a local or remote base. See Chapter 3 for details.
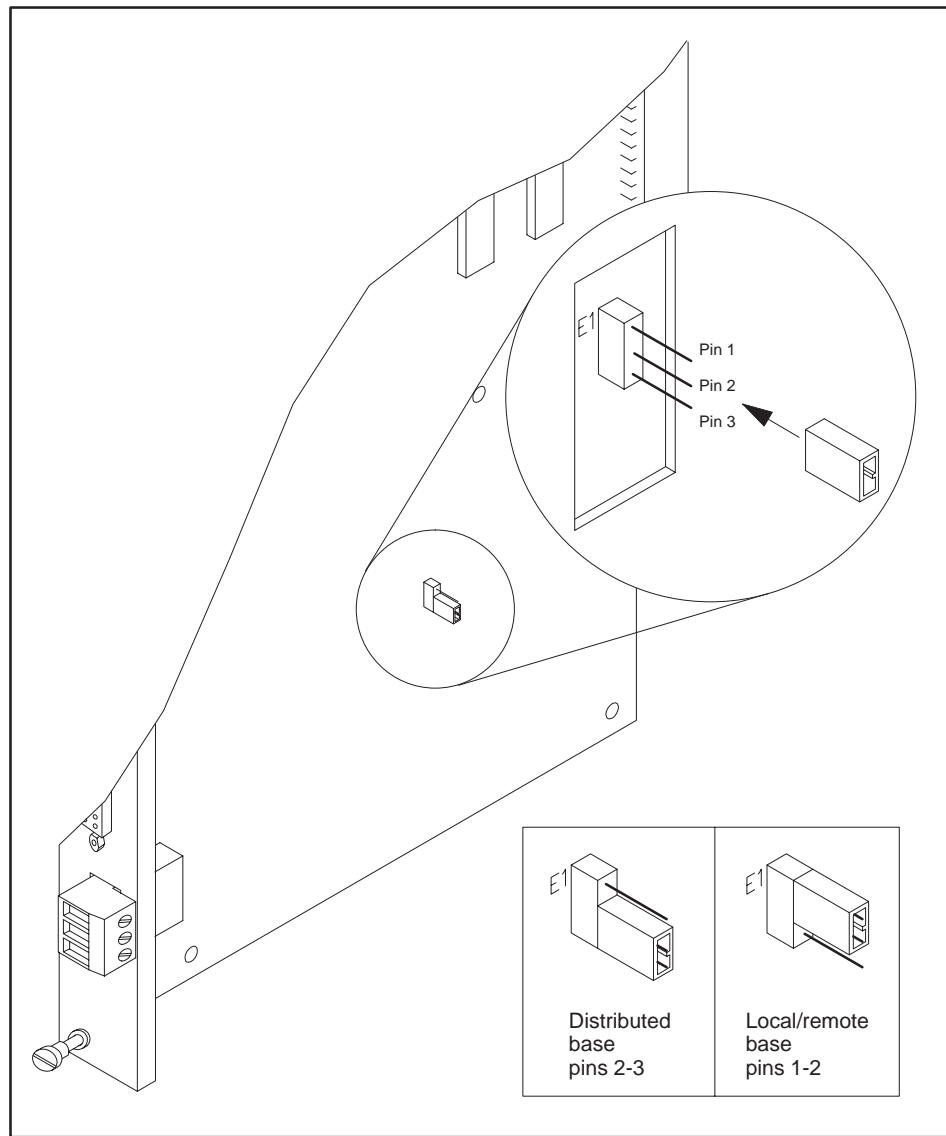

I002032

Figure 2-2   Setting Jumper for Mode of Operation

2.3   Field Wiring Guidelines

⚠ WARNING

Use supply wires suitable for at least 75° C. Signal wiring connected to this module must be rated at least 300 V.

⚠ ATTENTION

Employer des fils d'alimentation pour au moins 75° C. Le cablage de signalisation raccorde dans cette boite doit convenir poir une tension nominale d'au moins 300 V.

Avoiding Noise

To minimize the potential effects of external noise, follow these guidelines.

- Use the shortest possible wires.

- Avoid placing signal wires parallel to high-energy wires. If the two wires must meet, cross them at right angles.

- Avoid bending the wire into sharp angles.

- Use wireways for wire routing.

- When you use shielded wires, ground them only at the source end for better noise immunity.

- Place wires so that they do not interfere with existing wiring.

Selecting a Power Supply

Your user-supplied power can come from one of two sources:

- Standard, Class 2 supply, +9.5 VDC ±5%, 4 A minimum

- 5TI not used for control purposes

For a 5TI, refer to Section 2.4. If you choose a Class 2 supply, refer to Section 2.5.

2.4 Providing User Power with a 5TI

The 15-pin D-connector on the bezel allows you to use a 5TI for the power supply. See Figure 2-3.

Power supply connection
(15-pin D-cable from 5TI)
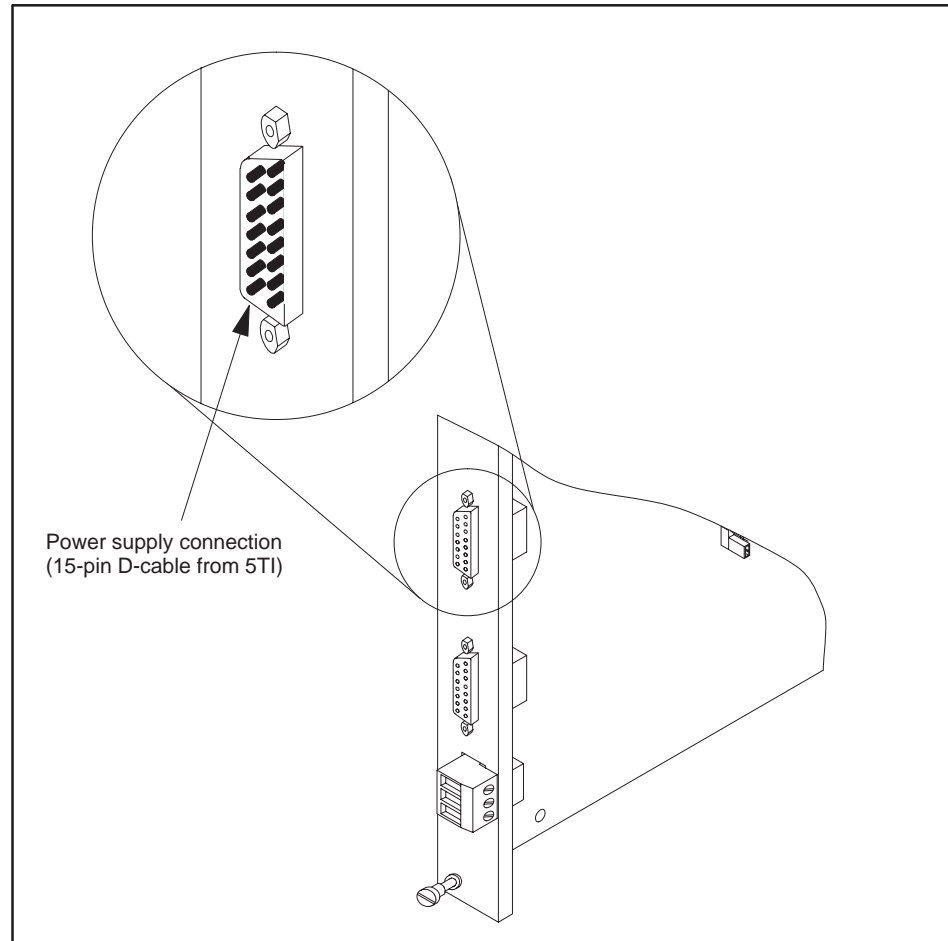
I002033

Figure 2-3   Providing User Power with a 5TI

2.5 Providing User Power with a Class 2 Power Supply

You can use a Class 2 supply to power the first three 6MT bases. Connect the wires from the power supply to the 3-pin connector on the bezel. See Figure 2-4.

NOTE: Consider removing the three-pin connector for ease of wiring.

+9.5V

Logic
ground

Chassis
ground
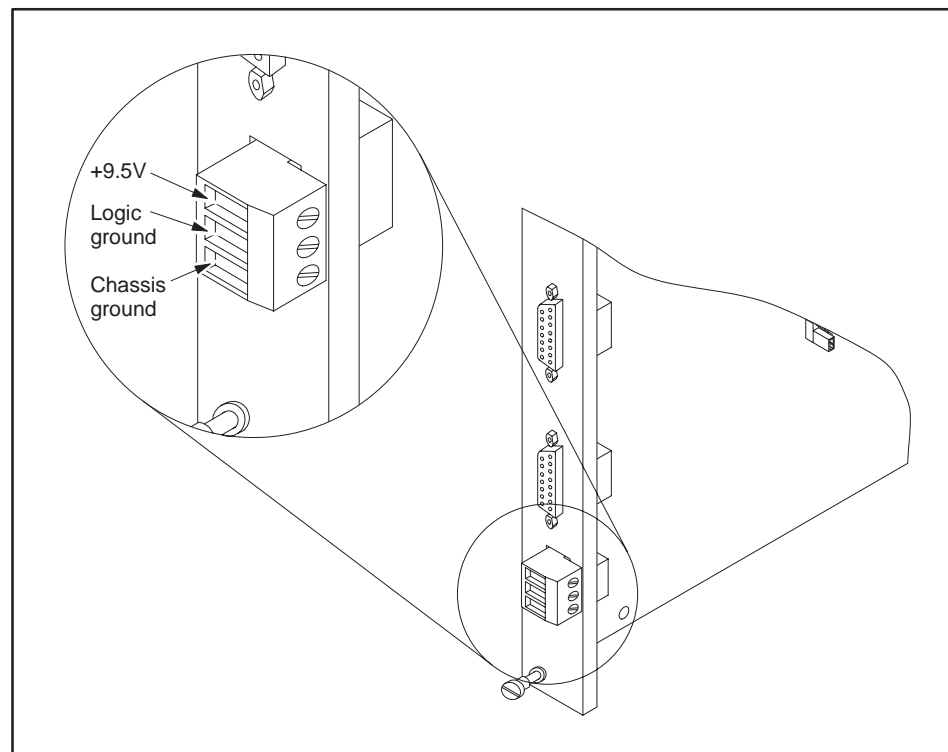
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Figure 2-4   Providing User Power with a Class 2 Supply

2.6 Connecting the 6MT Channel Controller to the 6MT System

To connect the module to the 6MT system, use the existing 6MT-to-I/O base cable (part number 25806–xx, where xx designates length).

1. Unplug the cable from the 5TI (or PM550™).

2. Plug the cable into the module. See Figure 2-5.
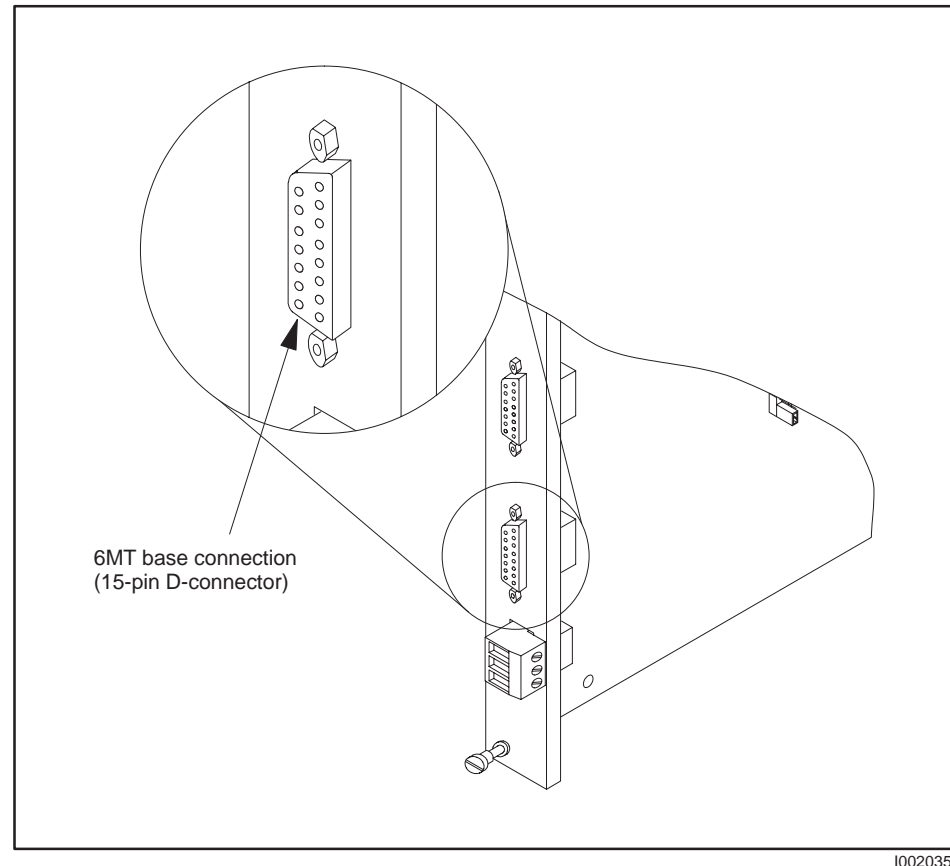

I002035

Figure 2-5   Connecting to 6MT

⚠ WARNING

Be sure that the 6MT I/O cable is securely fastened at both ends. If the cable is detached from either end while the 6MTCC is updating, all 6MT inputs will be reported to the Series 505 CPU as being in the "on" state. Do not use 6MT input points to control safety-critical systems using other Series 505 I/O modules.

2.7   Inserting the Module into the Base

To minimize potential shock, turn off power to the I/O base and to any modules installed in the base before inserting or removing a module, communication cable, or installing a terminal block. Failure to do so may result in potential injury to personnel or damage to equipment.

Insert Module   You can insert the 6MTCC into any available I/O slot on any Series 505 base. Refer to Figure 2-6.

Minimum torque: 2.6 in-lb (0.3N-m)
Maximum torque: 4.12 in-lb (0.6N-m)

I002394
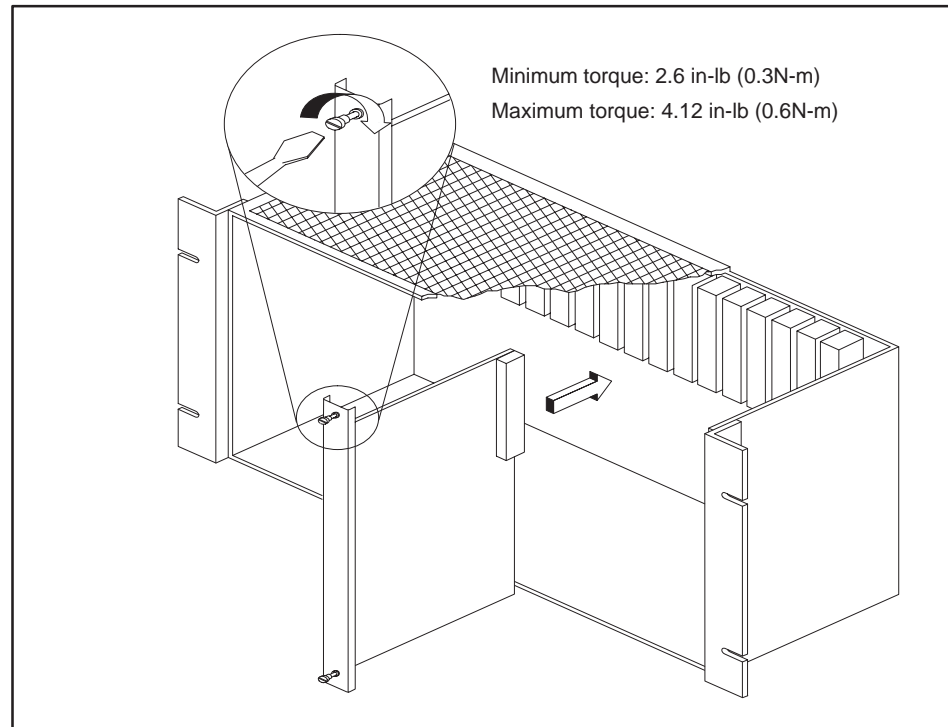
Figure 2-6   Inserting the Module into the Base

Power Up   See your Series 505 Installation Manual for power-up procedures.

Checking Status
Indicator   Within four seconds of power-up, the MOD GOOD LED on the bezel comes on, indicating that the module is good. If the LED fails to light, remove the module, and follow the steps to configure I/O again. Reinstall the module; if the LED still fails to light, return the 6MTCC to Siemens Industrial Automation for repair.

NOTE: The COMM LED may also come on if the module has not been configured in the I/O Table. It should go out when the module is configured.

Programming and Assigning I/O Points

3.1   Configuring the 6MT Channel Controller into Series 505 Memory

I/O Points Available

The number of I/O points available with the 6MTCC installed in a distributed base is 448 (208 inputs and 240 outputs). The number of I/O points available in a remote/local base is 512 (256 inputs and 256 outputs). Refer to Section 2.2 to select the base.

Configuring I/O

The points associated with the 6MT I/O system are consecutive starting at the number represented by the value in word WY5. You must determine the following information:

- How to use the 6MT I/O points in the ladder logic program

- How to manually configure the I/O table. (See the appropriate Series 505 PLC manual)

You must also understand the following:

- That 6MT inputs and outputs are consecutive points in the discrete image register

- That the first X point is always Xp, where p is the value of word 5

- That the first Y point immediately follows the X inputs—number this output with the first number after the inputs (multiple of 8 + 1)

- That all 6MT I/O points previously used in 5TI ladder logic programs, must be renumbered

- That two points cannot have the same number: e.g., you cannot have X1 and Y1

NOTE: Input points must be allocated in even multiples of eight. (i.e., 16, 32, 48, 64 . . . .)

Selecting the I/O Definition Chart

Configuring the 6MTCC as a 4WX/4WY special function module affects Series 505 word memory configuration. Otherwise, the 6MTCC has no effect on Series 505 word memory. Figure 3-1 shows a I/O definition chart with a 6MTCC installed in slot 1 with the first word beginning at WX513. Refer to your TISOFT manual for detailed instructions on selecting the chart.

	I/O		NUMBER OF BIT AND WORD I/O			SPECIAL
SLOT	ADDRESS	X	Y	WX	WY	FUNCTION
1	0513	00	00	04	04	YES
2	0000	00	00	00	00	NO
3	0000	00	00	00	00	NO
4	0000	00	00	00	00	NO
5	0000	00	00	00	00	NO
6	0000	00	00	00	00	NO
7	0000	00	00	00	00	NO
8	0000	00	00	00	00	NO

I/O MODULE DEFINITION FOR: CHANNEL 1   BASE .. 00

Figure 3-1   I/O Definition Chart

NOTE: Points within the 6MT I/O system do not appear in the Series 505 PLC I/O configuration table. The 6MT interface module appears in the Series 505 I/O configuration table only as a 4-word in, 4-word out, special function module. It is your responsibility to document which Series 505 I/O points are occupied by the 6MT I/O system and to ensure that Series 505 I/O modules are not configured to use points in the 6MT system.

Viewing the I/O Configuration Chart

Use SHOW or a similar menu selection to display the I/O Configuration Chart. The configuration in Figure 3-1 appears as shown in Figure 3-2.

```
        I/O CONFIGURATION CHART FOR CHANNEL . . . 1  BASE . . . . . 00
                                I/O POINTS
            1        2        3        4        5        6        7        8
SLOT 1   WX0513   WX0514   WX0515   WX0516   WY0517   WY0518   WY0519   WY0520

SLOT 2

SLOT 3

SLOT 4

SLOT 5
```

Figure 3-2   I/O Configuration Chart

Configuring 6MT I/O Points

After you configure the 6MTCC into the Series 505 controller I/O space, you must then write data to the word I/O points to configure the 6MT I/O points.

3.2 Mapping 6MT I/O into Series 505 Memory

Map Example

If the 6MT I/O system contains 236 Xs and 140Ys—starting at point number 1 (X1), and the 6MTCC 8-word values are configured at word number 513 (WX 513) in the Series 505 controller, the controller I/O configuration table is mapped as shown in Figure 3-3. Refer to Section 3.3 for values used in the WY setup words.
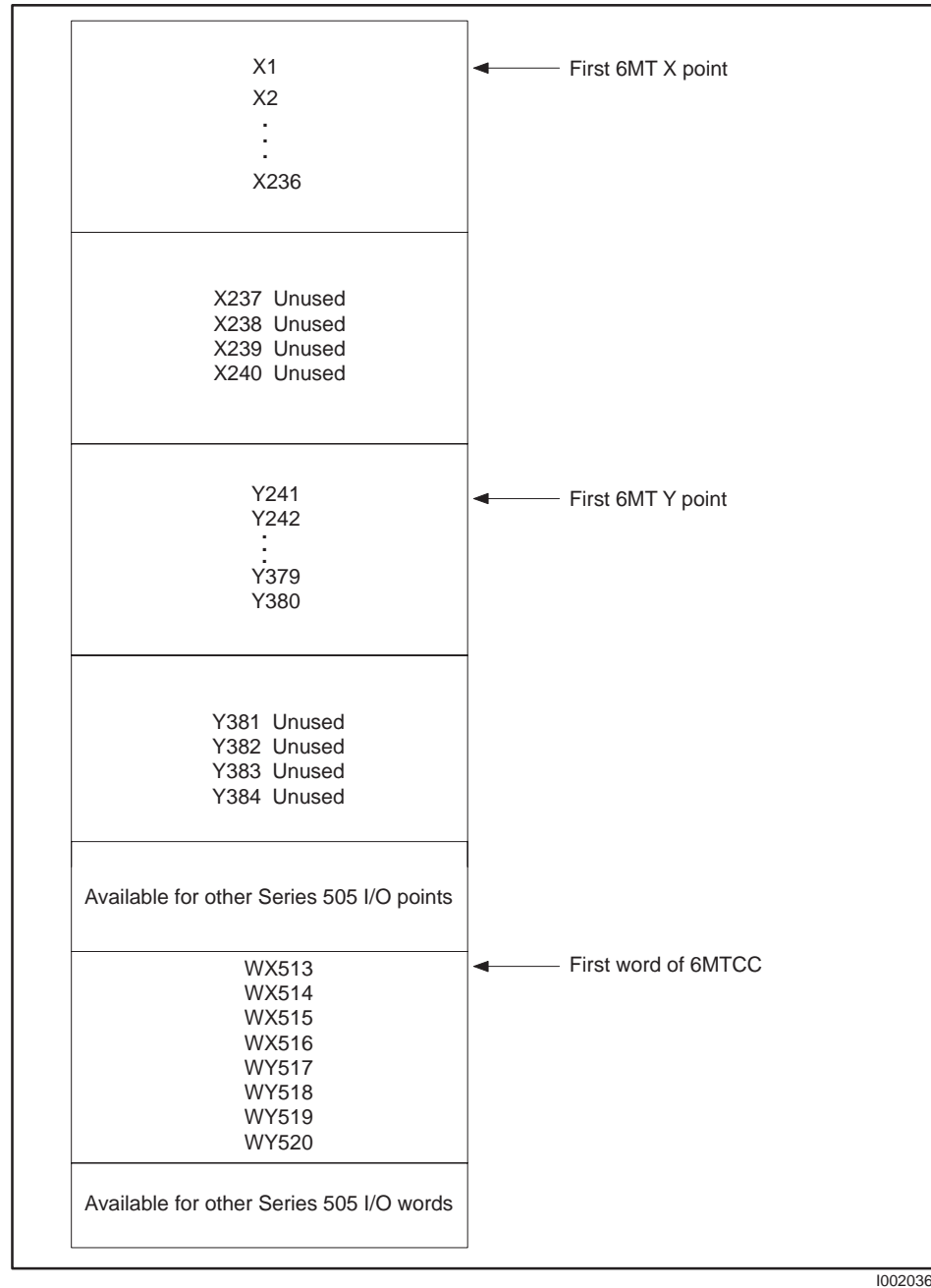

Figure 3-3   Sample Image Register Mapping

The 6MTCC automatically maps X points followed by Y points in the 6MT I/O. You must renumber all X and Y points associated with the 6MT I/O system; the renumbered points are the only ones you can use in your ladder logic program. If you use one of the unused points shown in Figure 3-3, the 6MT I/O may operate unpredictably.

⚠ WARNING

To help minimize the risk of personal injury or property damage, renumber all the points that are associated with the 6MT I/O system. Using any of the unused points in the 6MT I/O system may result in an unpredictable operation of the application.

⚠ WARNING

To help minimize the risk of personal injury or property damage, you must enter the I/O configuration table into the Series 505 PLC manually, and you must reserve the space in the table for the 6MT I/O points. Configuring a Series 505 I/O module into the space reserved for 6MT I/O points, may result in unpredictable operation of the application.

NOTE: The 6MTCC module supports up to 512 6MT I/O points in a local/remote base. The 6MTCC supports up to 208 X inputs and 240 Y outputs in a distributed base.

3.3 Programming Guidelines

Status Words

Table 3-1 and Table 3-2 describes words that are not part of the 6MT I/O points; you can place them in any WX/WY location in the Series 505 I/O configuration. In these examples, 6MTCC word points begin at point number 513 in the Series 505 controller I/O configuration table.

Table 3-1   Status Words

Word	Point	Status
WX 1	WX 513 = 1	Module good (0 = configuration error or module is faulty)
WX 2	WX 514 = 0	No I/O error (1 = 6MT I/O configuration error)
WX 3	WX 515 = 0	Not used
WX 4	WX 516 = 0	Not used

Setup Words

Set these words to the values required for your 6MT I/O.

Table 3-2   Setup Words

Word	Point	Status
WY5*	WY 517 = 1	Point number of first 6MT point Multiple of 8 = 1 (1,9,17, . . .)
WY6*	WY 518 = 240	Number of inputs, X, in 6MT I/O, even multiple of 8; e.g., if there are 118 X inputs, load 128 in word 6
WY7*	WY 519 = 140	Number of outputs, Y, in 6MT I/O, multiple of 8; e.g., if there are 79 Y outputs, load 80 in word 7
WY8	WY 520 = 1	Module unlocked, allows 6MT I/O update; no other value unlocks the module
* Word 6 and 7 cannot both equal 0; the sum of words 5, 6, and 7 cannot exceed the last point number of the program.		

Disabling Inputs and Outputs (Word 8)

The lockout word disables inputs and outputs in the 6MT I/O system. Locking out the module causes the following conditions:

- No communications between the PLC and the module

- No inputs are read by the PLC

- All outputs are turned off

- No outputs are subsequently updated by the PLC

⚠ WARNING

To help avoid potential property damage or injury to personnel, always reset the lockout word (word WY8) before entering program (PGM) mode. Output points can be forced on when the PLC is in programming mode if the lockout word was not reset prior to entering the programming mode.

Ladder Logic Restrictions

The 6MTCC restricts your ladder logic programs in the following manner:

❏ You must write information concerning the 6MT I/O system to the following setup words:

- Write the starting X point number to setup word WY5

- Write the number of inputs (Xs) to setup word WY6

- Write the number of outputs (Ys) to setup word WY7

❏ Your ladder logic program must service the 6MTCC through lockout output word (word WY8).

❏ Your program must monitor the status of the 6MTCC, and any other system parameters, to determine whether or not to shut down the 6MT I/O system.

3.4   Setup Procedure

Sample Setup

This example shows a setup procedure with a 6MT system consisting of 32 X inputs and 16 Y outputs, with the 6MTCC installed in slot 1 of base 0. Figure 3-4 provides a sample setup program for this configuration. (When calculating setup parameters for your 6MT system, remember to round all I/O points up to multiples of 8.)

NOTE: Before starting the setup, ensure that the system power is off.

---

1.   Initialize I/O configuration of the controller:

   The I/O address of 6MTCC = 513.
   Load this value into I/O address of base 0, slot 1.

2.   Since the first point is 1, initialize Word 5:

   WY 517 = 1

3.   Since the number of X inputs is 32, initialize Word 6:

   WY 0518 = 32

4.   Since the number of Y outputs is 16, initialize Word 7:
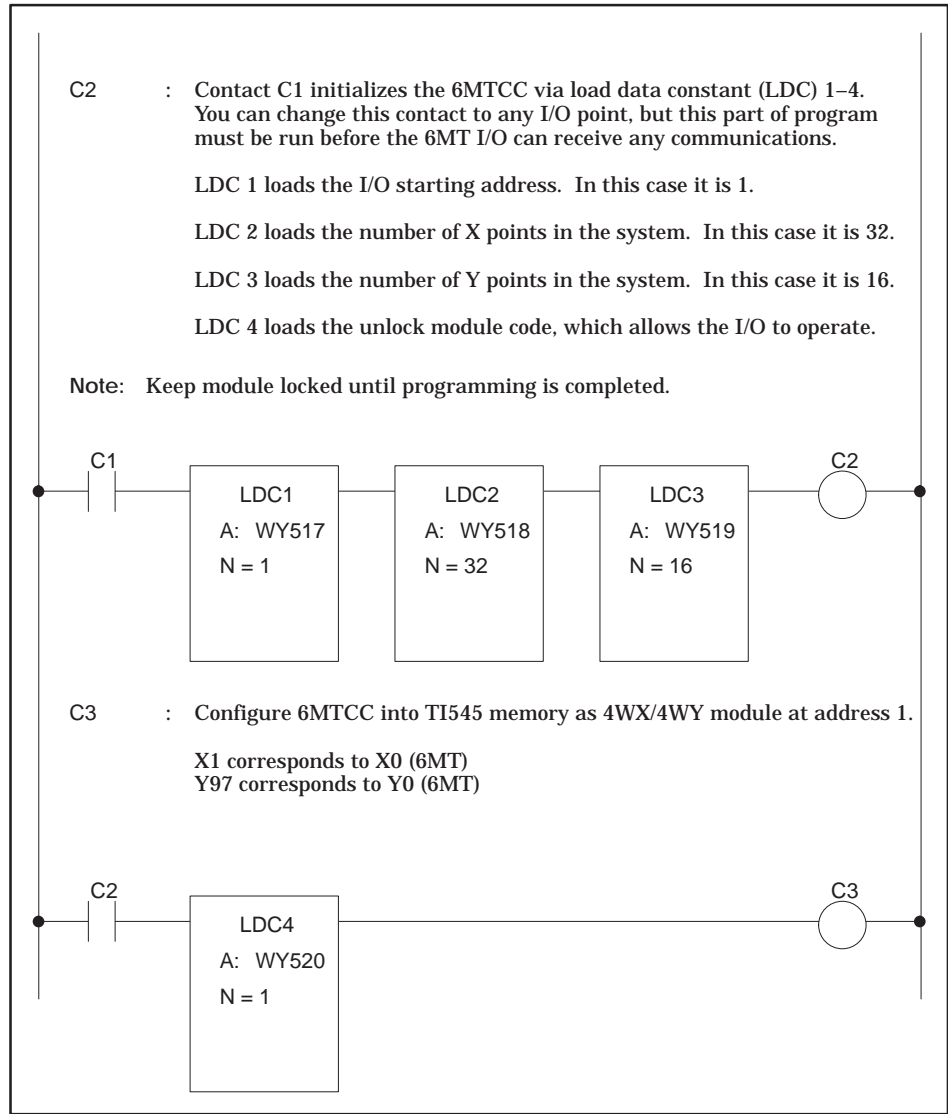
   WY 519 = 16

5.   Write 0001 to Word 8 of the 6MTCC to unlock the module.

   WY 520 = 1

After programming is completed, the 6MT I/O changes state when word 8 is unlocked.

NOTE: This set-up logic needs to be executed only once at the beginning of the ladder program.

C2 : Contact C1 initializes the 6MTCC via load data constant (LDC) 1–4. You can change this contact to any I/O point, but this part of program must be run before the 6MT I/O can receive any communications.

LDC 1 loads the I/O starting address. In this case it is 1.

LDC 2 loads the number of X points in the system. In this case it is 32.

LDC 3 loads the number of Y points in the system. In this case it is 16.

LDC 4 loads the unlock module code, which allows the I/O to operate.

Note: Keep module locked until programming is completed.

| C1 | LDC1
A: WY517
N = 1 | LDC2
A: WY518
N = 32 | LDC3
A: WY519
N = 16 | C2 |

C3 : Configure 6MTCC into TI545 memory as 4WX/4WY module at address 1.

X1 corresponds to X0 (6MT)
Y97 corresponds to Y0 (6MT)

| C2 | LDC4
A: WY520
N = 1 | C3 |

I002037

Figure 3-4   Sample RLL Setup Program

Environmental Specifications

Table A-1   Environmental Specifications

Maximum power required from base	4.0 W
Operating temperature	0 to 60° C (32 to 140° F)
Storage temperature	−40 to +70° C (−40 to 158° F)
Relative humidity	5% to 95% noncondensing
Pollution degree	2, IEC 664, 664 A

Vibration	Sinusoidal
	   IEC 68-2-6, Test Fc
	   0.15mm peak-to-peak, 10–57Hz;
	   1.0g, 57–150Hz
	Random
	   IEC 68-2-34, Test Fdc,
	   equivalent to NAVMAT P–9492
	   $0.04g^2$/Hz, 80–350Hz

Electrostatic discharge	IEC 801, Part 2, Level 4, (15kV)
Shock	IEC 68-2-27; Test Ea
Noise immunity, conducted (or use power lines)	IEC 801, Part 4, Level 3
Noise immunity, radiated	IEC 801, Part 3, Level 3, MIL STD 461B RS01, and RS02
Corrosion protection	All parts of corrosion-resistant material or plated or painted as corrosion protection
Agency Approvals	UL Listed (UL508 industrial control equipment) CSA Certified (CSA142 process control equipment) FM Approved (Class I, Div. 2, Haz. Location)

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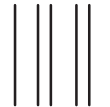
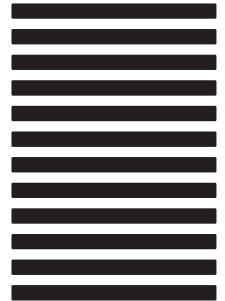**BUSINESS REPLY MAIL**

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