

# customer manual

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## ***SAFETY PRECAUTIONS AVOID INJURY***

Safeguards are designed into this application equipment to protect operators and maintenance personnel from most hazards during equipment operation. However, certain safety precautions must be taken by the operator and repair personnel to avoid personal injury, as well as damage to the equipment. For best results, application equipment must be operated in a dry, dust-free environment. Do not operate equipment in a gaseous or hazardous environment.

Carefully observe the following safety precautions before and during operation of the equipment:

- ALWAYS wear appropriate ear protection.
- ALWAYS wear approved eye protection when operating powered equipment.
- ALWAYS keep guard(s) in place during normal operation.
- ALWAYS insert power plug into a properly grounded receptacle to avoid electrical shock.
- ALWAYS turn off the main power switch and disconnect electrical cord from the power source when performing maintenance on the equipment.
- NEVER wear loose clothing or jewelry that may catch in moving parts of the application equipment.
- NEVER insert hands into installed application equipment.
- NEVER alter, modify, or misuse the application equipment.

## ***TOOLING ASSISTANCE CENTER***

***CALL TOLL FREE 1-800-722-1111 (CONTINENTAL UNITED STATES AND PUERTO RICO ONLY)***

The **Tooling Assistance Center** offers a means of providing technical assistance when required.

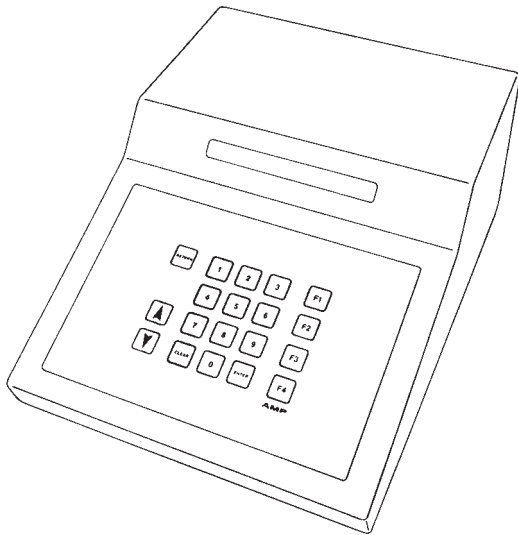
In addition, Field Service Specialists are available to provide assistance in the adjustment or repair of the application equipment when problems arise which your maintenance personnel are unable to correct.

### ***INFORMATION REQUIRED WHEN CONTACTING THE TOOLING ASSISTANCE CENTER***

When calling the Tooling Assistance Center regarding service to equipment, it is suggested that a person familiar with the device be present with a copy of the manual (and drawings) to receive instructions. Many difficulties can be avoided in this manner.

When calling the Tooling Assistance Center, be ready with the following information:

1. Customer name
2. Customer address
3. Person to contact (name, title, telephone number, and extension)
4. Person calling
5. Equipment number (and serial number if applicable)
6. Product part number (and serial number if applicable)
7. Urgency of request
8. Nature of problem
9. Description of inoperative component(s)
10. Additional information/comments that may be helpful



**CONTROL MODULE 852423-[ ]**

-1  
120 Vac  
Single  
Phase

**SPECIFICATIONS**

**Dimensions (approximate)**

Length: 438.15 mm [17.25 in.]  
Width: 285.75 mm [11.25 in.]  
Height: 332.40 mm [6.00 in.]

**Weight (approximate)**

9.55 kg [21 lbs]

**Output Capabilities**

Dedicated connection for CHAMPOMATOR 2.5 Machine – provides power for the machine, as well as controlling all motor and air cylinder functions

Figure 1

**1. INTRODUCTION**

Control Module 852423-[ ] is a user-programmable controller that is used with the CHAMPOMATOR 2.5 Semi-Automatic Terminating Machine. The controller is a plug-compatible replacement for the original CHAMPOMATOR Insertion Machine Control Module, and the controller provides identical, and additional, functions.

The control module must be located adjacent to the applicator module, within easy reach of the operator, to facilitate calibrating and programming the machine operation. The machine should be located directly in front of the operator for inserting and terminating individual wires into the connector to be applied to the cable. The controller, which is connected to the machine by a cable assembly, requires a 120 Vac, 60 Hz, single-phase power supply. The controller supplies the electrical power to the machine.

Specifications for the control module appear in Figure 1.

This manual covers basic description of the controller, information on the sequence of operations, and information on machine and controller error conditions. For detailed information on programming the machine, refer to the manual supplied with the machine.



*Electrostatic Discharge (ESD) damage can occur during the handling of static sensitive components. The ESD damage is usually caused by electrostatic discharge from a human body or an object.*

The following practices are recommended to minimize damage due to ESD:


11. The operator must use an ESD floor mat which is properly grounded.
12. The machine should rest on an ESD bench mat.
13. The machine should be grounded to the bench mat by means of a cable connected from the machine base plate to the socket on the bench mat.
14. The operator should be grounded using a wrist strap.
15. All grounding should be to a common ground point.




*All ESD equipment is customer supplied.*

When reading this manual, pay particular attention to **DANGER**, **CAUTION**, and **NOTE** statements.


**DANGER** Denotes an imminent hazard which may result in moderate or severe injury.



**CAUTION** Denotes a condition which may result in product or equipment damage.




**NOTE** Highlights special or important information.



Revisions to this manual are provided in Section 6, REVISION SUMMARY.

**NOTE** Measurements are in metric units [followed by U.S. customary units in brackets].



## 2. DESCRIPTION

### 2.1. Physical Description

The control module features a metal cabinet, which houses the electrical and electronic components for the programming system. The cabinet is supported by four rubber feet. The main power switch for the module is located on the rear panel of the module.

The control panel on the front of the module, shown in Figure 2, permits the operator to view and enter information vital to machine operation.

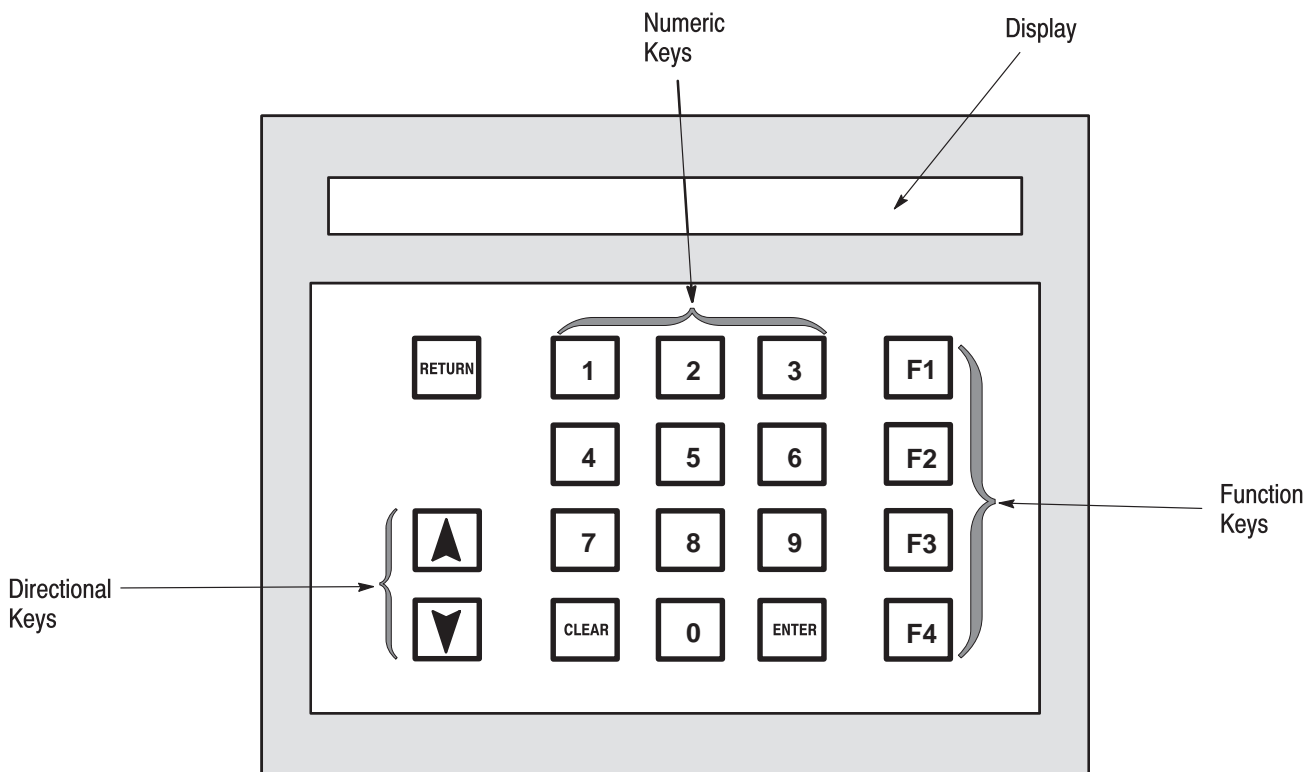


Figure 2

Information is relayed to the operator through a display window located on the control panel. The module is operated through a keypad on the front panel of the module. This keypad includes two directional keys, four function keys (marked F1 through F4), ten numeric keys, a RETURN key, a CLEAR key, and an ENTER key.

## 2.2. Control Panel Functional Description (Figure 2)

### A. Display

The display window consists of a two-line by forty-character alphanumeric LCD screen. The right half of the display defines the current function of the four function keys on the front panel of the module.

The left half of the display describes the current mode of operation, displays data, and allows the operator to see the data being entered. During normal operation, every operator action will cause a change in the display's state.

### B. ENTER and CLEAR Keys

While entering data into the module, the operator can erase all digits typed prior to pressing the ENTER key by selecting the CLEAR key. Depressing the ENTER key informs the controller that the last digit has been entered. Until ENTER is selected, typed digits will have no effect on the operation of the controller.

### C. Function Keys

The four function keys allow the operator to switch the controller from one mode of operation to another. At any particular moment, at least one of the function keys is operative, and the current function of any active key is shown on the right side of the display window.

### D. RETURN Key

The RETURN key is used only during the production mode. Pressing this key causes the inserter to return to the last pair-position that it occupied (serving as a back-up function). If the RETURN key is selected after pressing the LOAD switch on the machine, the inserters are moved to the last termination point.

### E. Directional Keys

The two directional keys are used to move the inserter forward and backward along the axis of the connector during the adjust mode. Both the upper (backward) and lower (forward) keys can cause the inserter to single-step or travel continuously. Depressing and immediately releasing either key causes the inserter to move one step ( 0.0254 mm [0.001 in.] ), while holding either key causes the inserter to travel until the key is released or until the inserter reaches the its travel limit.

## 2.3. Interface Connection (Figure 3)

The applicator module is connected to the control module through a 37-position Circular Plastic Connector (CPC) and cable assembly. This cable carries the control signals to and from the applicator.

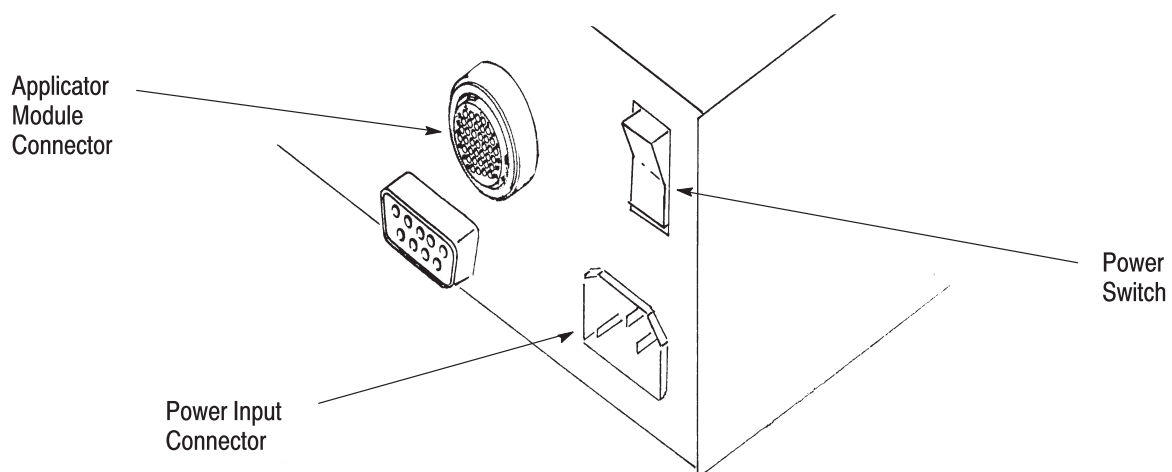


Figure 3

Connect the motor wire (with the five-position connector) to driver board J3, on the inside of the control module. See Figure 4.

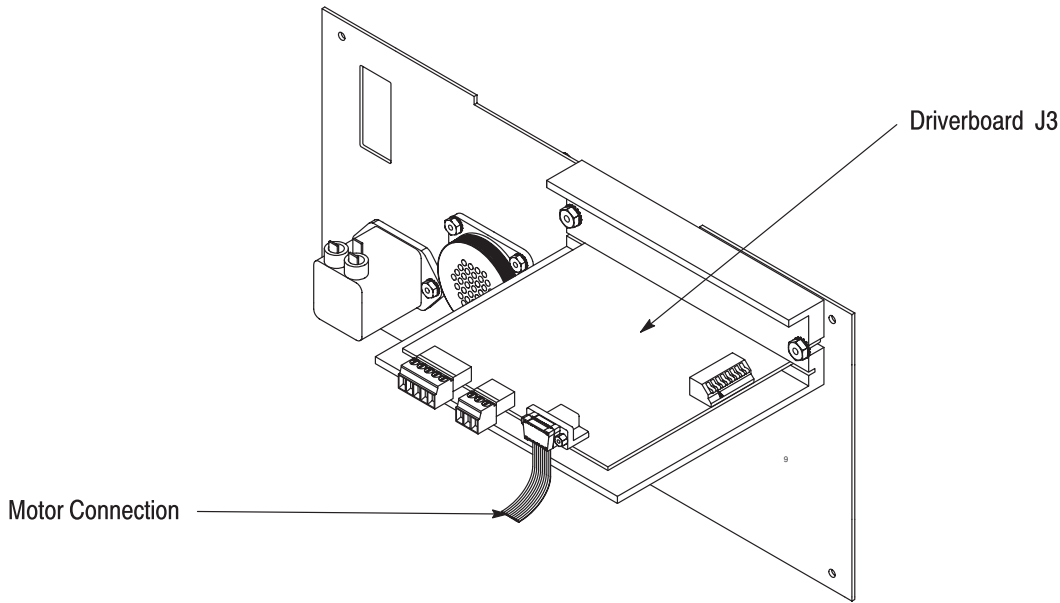


Figure 4

The operator may return to successively higher levels of the control hierarchy at any time by pressing the F4 function key, as prompted by the display. From the main menu, the following modes may be selected: F1 (SELECT) part selection mode, F2 (PROD) production mode, F3 (ADJUST) adjustment mode, and F4 (EDIT) part editing mode.

## 2.4. Internal Controls

Access to an internal display contrast adjustment is provided through a small adjustment shaft in the base of the controller, near its left-front corner. The contrast of the LCD display can be varied by turning the shaft CLOCKWISE or COUNTERCLOCKWISE.

## 2.5. Applicator Module Generated Signals

### A. Index

The index signal is an output from the applicator module that instructs the controller to cause the inserter to advance to the next connector position. If the inserter is at the last position, the index signal initiates a movement to the load position. If the inserter is in the load position, the signal causes the inserter to move to the first connector position.

### B. Load

The load signal is an applicator output that commands the controller to move the inserter to the load position, regardless of the inserter's present position.

## 3. SEQUENCE OF OPERATIONS



*Each time the machine is turned on, it must be homed. Homing the machine informs the controller of the position of the carriage, and permits the accurate control of carriage movement. The machine may also require homing when the operator enters the machine's production or adjust modes.*

### 3.1. Main Menu

The first menu displayed on the controller is the main menu. From this point, the operator may follow a path down the hierarchy of control functions to any controller operation by pressing the appropriate function key. Figure 5 shows a block diagram of the sequence of operations for the controller.

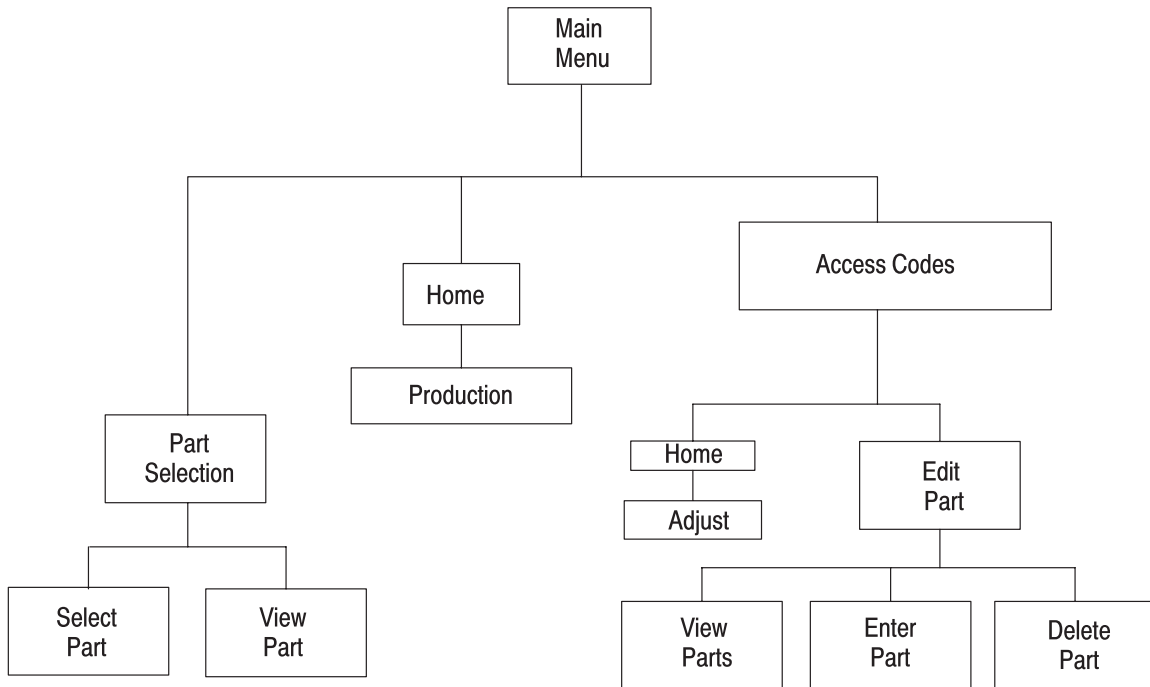


Figure 5

**3.2. Select Part (F1, SELECT)**

In the part selection menu, the operator may select a part by typing in the part number, if known. If the part number is not known, the operator may view (F3) the parts currently stored in the controller’s memory, and then select the desired part.

**A. Select Parts**

The operator may select a part from those currently stored in the part file by entering the part number that has been previously assigned to that part. The part must be keyed in by number, and then the ENTER key must be pressed. This part then becomes the part used in the production mode, and remains so until another part is selected. This and other information is stored in non-volatile memory, and is retained when the controller is turned off.

**B. View Parts (F3, VIEW)**

When the operator presses the F3 (VIEW) key, the controller will begin to show all of the parts currently stored in the controller’s non-volatile memory. The parts are presented in increasing order by part number, and the operator views the next part by pressing the F1 (NEXT) key. For any part, the controller first displays the part number and connector type.

Pressing F2 (DATA) one or more times displays additional data about the part being examined. The first time that the F2 key is pressed, the controller will display the number of connector pairs. The next time that the F2 key is pressed, the cable dress style is displayed. Each successive depression displays skipped pairs until all have been displayed.



*The F2 (DATA) key will cause the controller to display information associated with one part number until the F1 (NEXT) key is pressed.*

When the last part has been displayed, the controller informs the operator that the end of the part file has been reached, and that the operator may start again at the beginning by pressing the F1 (REPEAT) key. The part being viewed may be selected by pressing the F3 (SELECT) key. Once selected, the part number will remain current until another part number is selected.

### 3.3. Production (F2, PROD)

Pressing the F2 (PROD) key on the main menu allows the operator to start producing the currently selected part *after the machine is homed*. If the inserters are not in the load position when this mode is entered, the controller prompts the operator to hit the LOAD button to move the inserters to this position.

After loading the connector, the operator must hit the INDEX button to move the inserters to the first connector pair. Each index signal thereafter causes the inserters to advance to the next connector pair, provided that the controller has not been programmed to skip that connector pair for that part number. If the inserters are at the last connector position, the index signal causes the inserters to move to the load position, at which point the operator may remove the terminated connector and place a new connector into the fixture.

**NOTE**

*If the part has been programmed for a 180° cable dress, the inserters will move FORWARD before moving to the load position. This allows the operator to open the cable clamp. Once the clamp is opened, pressing the LOAD button, as prompted by the controller, will cause the inserters to return to the load position*

During production, the selected part number, the number of the connector pair being terminated, and the expected connector side (L, R, or LR) are continually displayed, and the RETURN key is always active.

### 3.4. Position Adjustment (F3, ADJUST)

To adjust the position of the inserters, the operator must first enter the proper access code. If you do not have the proper access code, check with your supervisor or contact your Tyco Electronics Representative for assistance.

**NOTE**

*When the F3 (ADJUST) key is pressed, and the access code is entered, the inserters will move to the first termination position of the current part. It is best to have the connector properly mounted in the mandrel BEFORE the operator starts the adjustment.*

By using the directional keys on the keypad, the operator may move the offset position from the previously-set location. After each inserter movement, the number of 0.0254 mm [0.001 in.] steps from the nominal position is displayed.

To make an offset adjustment, enter a value for the left inserter and the right inserter. To make both inserters extend simultaneously, set the right side offset value to zero (0).

A positive number indicates that the inserters are offset toward the front, and a negative number indicates that the inserters are offset toward the rear. This offset affects all subsequent inserter motions until the offset is re-adjusted.

The old offset can be permitted to remain, even if the inserter was adjusted by pressing the F4 (MENU) key.

### 3.5. Edit Files (F4, EDIT)

From the part-editing menu, the operator may perform one of three editing functions by pressing the appropriate function key. Pressing the F3 (VIEW) key permits viewing the existing part file, as explained in Paragraph 3.2, B of this manual.

To edit the part file, the operator must first enter the proper access code. If you do not have the proper access code, check with your supervisor or contact your Tyco Electronics Representative for assistance.

Once the correct code is entered, the operator may then edit the part file.

Pressing the F1 (ENTER) key allows the operator to enter a new part, and pressing the F2 (DEL) key causes an existing part to be deleted.



## A. Enter Part (F1, ENTER)

To enter data on a new part number, the operator must first enter a non-zero part number (less than 65520) that does not already belong to the current part file. This arbitrarily assigned part number is used subsequently to identify the configuration of parameters that the operator is about to enter for the particular part.

Next, the controller successively displays the name of each of the connector types currently in its type file, and prompts the operator whether the connector type displayed is to be used for the part number to be entered. Pressing the F1 (YES) key causes the part to assume all of the parameters associated with that particular connector type, while pressing the F2 (NO) key causes the controller to display the next connector type.

**NOTE**

*If the required connector type is not available, contact your Tyco Electronics Representative for assistance.*



Once a connector type is selected, the operator is prompted to enter the number of connector pairs, which may range from 1 to 65, depending on the connector type.

The controller will then ask what type tooling is being used. End-location tooling is used only when applying AMPLIMITE\* .050 Series Connectors using CHAMPOMATOR 2.5 Machine 762734-3. If using this combination, select F1 (YES). In all other cases, select F2 (NO).

If 180° cable dress is optional for the connector type being used, then the controller will ask the operator if the 180° dress is to be used. If the cable dress is set for 180°, then the carriage will move to the full-forward position BEFORE it moves to the load position, thus allowing the operator to open the cable clamp.

**NOTE**

*Certain connector types REQUIRE the 180° cable dress to be used. In such cases, the controller will NOT prompt the operator to select the 180° cable dress.*



The operator is then asked if any of these connector pairs is to be skipped. If no pairs are to be skipped, pressing the F2 (NO) key will bypass this procedure.

If skips are required, pressing the F1 (YES) key will cause the controller to repeatedly prompt for the operator to enter the skipped-pair numbers. The operator keys in the number of the pair, then presses the ENTER key. The controller will then prompt the operator to enter the connector side (F1 for LEFT, F2 for RIGHT, or F3 for BOTH) to skip for that pair. After selecting the desired connector side, pressing the ENTER key will cause the controller to again prompt for a skipped-pair number.

Depressing the F3 (DONE) key when finished entering the skipped pairs will cause the procedure to end.

Finally, the operator is prompted whether to save the data in the part file that resides in the controller's non-volatile memory, to discard the part, or to review the data that has been entered for that part.

Pressing the F1 (YES) key retains the part in the part file, pressing the F2 (NO) key discards the part, and pressing the F3 (REVIEW) key displays the data entered for that part in the same format that an individual part is displayed in the "view parts" mode.

If the operator chooses to review the part, pressing the F1 (DONE) key will cause the controller to prompt again whether to save the part.

## B. Delete Part (F3, DEL)

The operator may delete a part from the part file by first entering the part number assigned to that part. The controller will then prompt the operator to confirm the deletion. Pressing the F1 (YES) key will delete the part from the part file, and pressing the F2 (NO) key will leave the part file unchanged.

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#### 4. ERROR CONDITIONS

Should there be an error, the display will indicate one of the following conditions. Follow the prompts indicated on the display.

- |                             |  |
|-----------------------------|--|
| – <i>INCORRECT CODE!</i>    | The operator failed to enter the proper access code.   |
| – <i>PART NOT FOUND</i>     | The part that the operator is attempting to select, produce, or delete is not in the part file.  |
| – <i>PART NOT SELECTED</i>  | The operator has tried to enter production or adjust with no part selected. This may happen when the non-volatile memory is damaged.   |
| – <i>INVALID NUMBER</i>     | The number entered by the operator is either too large or too small. All numbers must be between 0 and 65520.  |
| – <i>P/N ALREADY USED</i>   | The part number that the operator is attempting to enter into the part file has already been assigned to another part.   |
| – <i>MECHANICAL JAM</i>     | When the inserters move to the load position, the controller verifies the accuracy of the position. If the motor has lost steps due to friction or a jam, the inserters will have to be re-homed. Clear the jam and re-home the inserters by going into the main menu and back to the production mode. |
| – <i>DID NOT TERMINATE</i>  | When the controller tried to terminate, the inserters did not extend. Air was not attached to the applicator, the inserter is jammed, or the vane on the inserter is out of alignment.   |
| – <i>DID NOT RETRACT</i>    | The inserters did not retract, and are most probably jammed, or the vane is out of alignment.  |
| – <i>WIRE SENSOR ON</i>     | The sensor that detects the presence of wire and triggers the inserters has jammed in the ON position. Clear the jam and the controller will continue.   |
| – <i>INSERTERS EXTENDED</i> | The machine attempted to move with the inserters extended; this condition may cause a jam. Air may not be attached to the machine, or the vane on an inserter is out of alignment.   |
| – <i>BAD VANE SWITCH</i>    | The rear home vane switch has given a false reading. The vane is faulty, or there may be a jam in the carriage. Clear the jam or replace the switch.   |
| – <i>OUT OF ADJUSTMENT</i>  | This error occurs when the controller tries to move the inserters forward more than six inches. This may happen if a part is incorrectly programmed, there are too many pairs, or the adjust is too far forward.   |
| – <i>EPROM ERROR!</i>       | This indicates that the non-volatile memory may be damaged. Attempt the action again. If the error recurs, the EPROM needs to be replaced. Contact your Tyco Electronics Representative for assistance.  |

**5. DIAGNOSTICS MODE**

The CHAMPOMATOR 2.5 Machine Control Module is equipped with a self-diagnostic feature. This feature allows the machine to be diagnosed with relative ease in the event a problem should occur.

The Diagnostics Mode may be accessed in either of two ways:

- Press and hold the RETURN key as the controller is turned ON. This action will cause the controller to enter the diagnostics mode at that time only.
- Turn switch no. 2 in the control module's CPU board ON. This action will cause the controller to enter the diagnostics mode each time the controller is switched on.

When the diagnostics mode is entered, the controller will display the diagnostics menu, as shown below.



The diagnostics menu displays options numbered from 0 to 9. The numbers on the display correspond directly with the numeric keys on the control panel, and each number displayed represents a diagnostic test that may be selected.

The top line of the menu lists all of the selectable test numbers. To view a short description of the test associated with one of these numbers, press the corresponding key. The description will appear on the bottom line of the menu.

Once the description of the desired test is displayed on the bottom of the menu, pressing the ENTER key will cause the controller to begin that test.

The tests are:

- 0. Inserter Counts*      Displays the number of times each inserter has been extended and retracted. This number will return to zero (0) at the count of 10,000,000. Pressing the F4 key returns the controller to the diagnostics menu.
- 1. Keyboard Tests*      Indicates when any key on the controller or the machine is pressed. All numeric and function keys, as well as the CLEAR and ENTER keys on the control panel are indicated when released. The directional keys on the control panel and the LOAD and INDEX buttons on the machine are indicated when held down. Pressing the RETURN key returns the controller to the diagnostics menu.
- 2. Display Tests*      Checks all of the pixels, the addressing, and the commands associated with the display. If the F1 key is pressed repeatedly, the controller displays all characters. One-half of the screen will be filled with the character, then the other half will be filled. Pressing the F4 key returns the controller to the diagnostics menu.
- 3. Input Tests*      Displays the status of all inputs to the controller. This test is especially useful when debugging a wiring problem. The inputs are listed, two per screen, by input number, description, and status (OFF or ON). Pressing the F1 or F2 keys causes the display to scroll upward or downward, respectively, permitting the operator to view all 11 inputs. If desired, a metal object, such as a feeler gage, can be used to activate any proximity switch. The corresponding input should then toggle on this test display. Pressing the F4 key returns the controller to the diagnostics menu.
- 4. Output Tests*      Allows the toggling of all outputs to the machine. The outputs are listed, two per screen, by output number, description, and status (OFF or ON). Pressing the 1 or 2 (numeric) key toggles the top or bottom output listed on the display, respectively. Pressing the F1 or F2 keys causes the display to scroll, permitting the operator to view and toggle all available outputs. Pressing the F4 key resets the outputs and returns the controller to the diagnostics menu.

**DANGER**

Use care when toggling outputs, as the action may result in machine movement. For example, toggling the VALVE A and VALVE B outputs will cause the inserters to extend if the air supply is connected. Keep hands away from the machine when toggling outputs.

5. *Motor Position Tests*

Checks the relationship between machine movement and controller. The operator enters the desired number of steps (less than 6000) for the carriage motor to move. Each step of the motor moves the carriage 0.0254 mm [.001 in.]. All values entered are absolute, and represent the number of steps to move forward from the home position. Pressing the F3 key causes the motor to re-home, and pressing the F4 key returns the controller to the diagnostics menu.

6. *Motor and Vane Tests*

Confirms the integrity of the motor drives, vane switch, and the mechanical movement of the machine. Pressing the F1 key starts the test. The controller first attempts to home the carriage by searching for the vane switch. If the vane switch is not found, the carriage will hit the rear stop, and the controller will display the appropriate failure message.

When the machine is re-homed, it will then move forward 2.5 inches to perform a slow-speed search for the vane switch. If the vane is found within 0.0254 mm [.001 in.] from the home position, the test is successful. If the vane is found beyond the 0.0254 mm [.001 in.] limit, the number of steps from the home position will be displayed, along with the appropriate failure message.

7. *Serial Port Test*

Allows the serial port to be tested (at 300 baud) with a dummy terminal.

8. *(not used)*

9. *Exit Diagnostics*

Causes the controller to exit to the main menu.

## 6. REVISION SUMMARY

Since the previous release:

- the document format was updated; and
- the Tyco Electronics logo was updated.