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Technical Reference—

Mark III, IV, and V Microprocessor Textile Machine Controller

Read the separate Safety Manual before installing, operating, or servicing

PELLERIN MILNOR CORPORATION POST OFFICE BOX 400, KENNER, LOUISIANA 70063-0400, U.S.A.

Please Read

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Table of Contents
for MATDYEOPCE/2007473A
Mark III, IV, and V Microprocessor Textile Machine Controller

Table of Contents, cont.

ABOUT THIS MANUAL

Scope—This reference manual provides commissioning, programming, operating, and troubleshooting information of importance to managerial, supervisory, and technical personnel. It applies to Milnor® Mark III, IV, and V textile controllers.

Other manuals are also furnished with the machine. Refer to the appropriate manual for safety instructions, installation and service procedures, and electrical schematics.

Manual Number/Date Code (When To Discard or Save)—The manual number/date code is located on the inside front cover, upper right corner just above the manual name. Whenever the manual is reprinted with new information, part of this number changes. **If the *date code* after the "/" changes, the new version applies to all machines covered by the old version, but is improved— thus the old version can be discarded. If the *manual number* before the "/" changes, the new manual covers only new machines.** Example: Discard MATMODELAE/8739**C**V when MATMODELAE/8739**D**V is received (minor improvements). Also, discard MATMODELAE/87**39D**V when MATMODELAE/87**46A**V is received (major improvements). But keep MATMODEL**A**E/8746FV when MATMODEL**B**E/8815AV is received, since the new manual no longer applies to machines originally shipped with the old manual.

Documents and Change Bars—The individual documents comprising this manual use the same revision criteria as the manual. Text documents also display change bars. Example: When sectionMSOP0599AE/9135**B**V becomes MSOP0599AE/9135**C**V, change bars with the letter "C" appear next to all changes for this revision. For a major rewrite (e.g., MSOP0599AE/92**26A**V), all change bars are deleted.

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Important Owner/User Information—Machines with a Keypad

Take the following important steps before placing this machine in operation:

1. Ensure safety of laundry personnel.
2. Protect against data loss.
3. Customize data (configure, formula, and productivity data).

1. Ensure Safety of Laundry Personnel

Ensure that all personnel who will operate or maintain this machine read the safety manual **before permitting them access to the machine**. Ensure that all user manuals are available to the appropriate personnel and that all precautions explained in the safety and other user manuals are observed.

2. Protect Against Data Loss

Follow the safeguards listed below to protect against data loss caused by human tampering, electromagnetic interference (EMI), physical damage to the data storage medium, or loss of power to random access memory (RAM).

1. Keep the *Run/Program* keyswitch set to *run* () and secure the keys. Users must understand proper use of this control. See "ABOUT THE USER CONTROLS. . ." (see Table of Contents).
2. Keep all electric box doors closed and locked. Secure the keys.
3. Leave machine power on for 48 hours before customizing data. This fully charges the microprocessor battery, which will then supply power to the RAM for 90 days even if machine power is off.
4. Replace the battery board every five years. A capacitor on the processor board can supply power to the RAM for several hours with the battery removed.
5. Keep electronic back-up data and/or a printed record of all field-programmed data (e.g., wash formulas, configure values, step names, chemical names) in case of data loss. See the instructions for downloading and printing this data if the machine has this capability.
6. For machines that accumulate productivity data (e.g., count of loads processed), transcribe any needed data frequently, as described in the instructions for data accumulation.

3. Customize Data

3.1. When to Customize Data

- When commissioning the machine
- When restoring a machine to service after a lengthy shutdown
- When required by error message
- After replacing the CPU board
- After upgrading software (replacing EPROMs)
- After adding or removing optional equipment

3.2. What Customizing Requires—Verify configuration. Program formulas and clear productivity data, if applicable. See the programming and operating sections in this manual for instructions.

3.3. Data Accessibility—Configure and formula data can only be altered while the keyswitch is in the *program* position (data is keyswitch-protected). Producitvity data, because it is accumulated in the run mode, cannot be keyswitch-protected and is accessible to anyone. Data is accessible to the extent described in the following table:

Table 1: Data Type and Accessibility

			Ways Data Can Be Used and Altered				
			Data can be read	Data can be over-written	Data can be up/downloaded	Data can be cleared	
Type of Data		**Machines Data Applies To**					Contents after clearing
Configure Data		dryer (includes gains)	Yes	Yes	Yes	Yes	example values
		shuttle, single-stage press	Yes	Yes	No	Yes	zeros
		two-stage press, Cobuc, Linear Costo, discharge sequencer	Yes	Yes	No	No	n.a.
		washer (and textile)-extractor, centrifugal extractor	Yes	Yes	Yes	No	n.a
Formula Data	**step, chemical names**	washer (and textile)-extractor	Yes	Yes	Yes	Yes	example values
	formulas	washer (and textile)-extractor, centrifugal extractor, dryer	Yes	Yes	Yes	Yes	empty
Productivity Data		washer (and textile)-extractor, centrifugal extractor, dryer	Yes	No	No	Yes	empty

3.4. If Data Becomes Corrupt—If the microprocessor senses that data is unusable or unreliable, an error message will appear (usually at power-up), possibly preventing machine operation. The consequences and appropriate actions for each error message are explained in the troubleshooting instructions. Follow these instructions exactly to ensure that corrupt data is completely eliminated and replaced with valid data. Failure to do so may result in unsafe operation or machine damage.

— End of BICM3K01 —

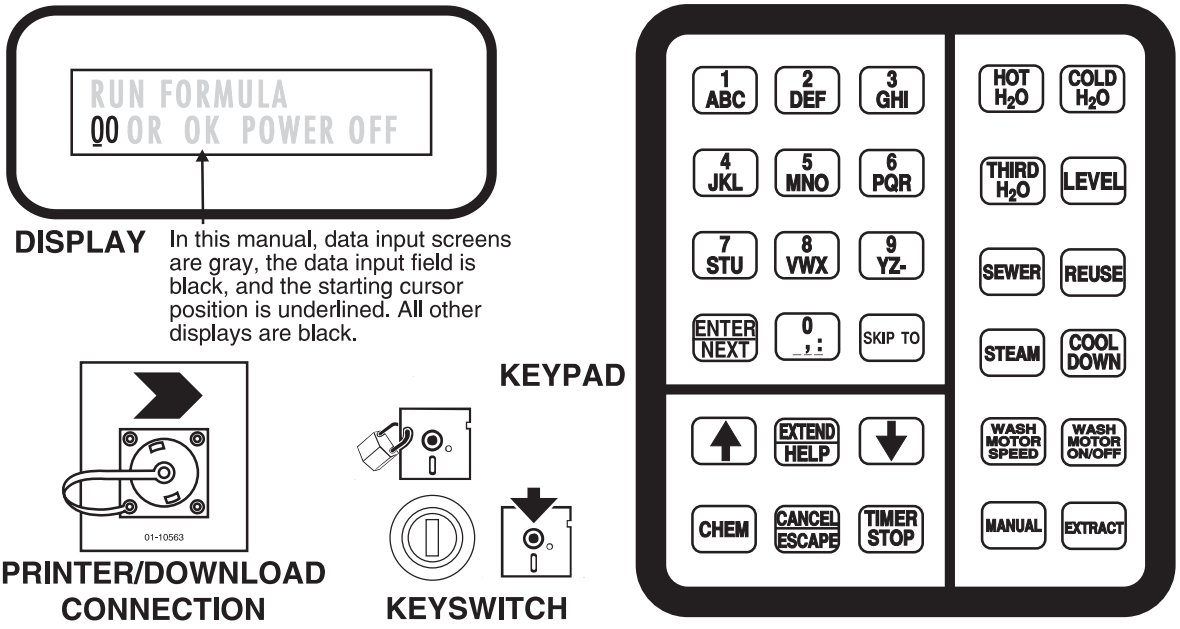
ABOUT THE USER CONTROLS— MACHINES WITH A KEYPAD

User controls are of two types—electro-mechanical controls (switches, buttons, and status lights) and microprocessor interface controls (display, keypad, keyswitch, and printer/download connection). Controls are mounted on one or more nameplates on the machine or a separate electric box.

NOTE: Do not attempt to use your machine merely by referring to the descriptions of controls. Read the operating, programming, and troubleshooting instructions throughout this and the operator manual.

Electro-Mechanical Controls

Electro-mechanical controls vary with machine model and are explained in the machine-specific operator manual furnished with the machine.



Example Key Symbols Used in the Text

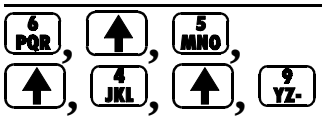
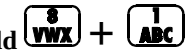
Symbology	What It Means
B 	Turn the *keyswitch* clockwise to *program* (), then press and release the *Enter/Next key*.
	Turn the *keyswitch* counterclockwise to *run* (), then press and release the *Enter/Next key*.
	Press and release the key shown.
	A slash between symbols means use either key shown. The *up* and *down arrow keys* are often shown this way (i.e., scroll up or down the menu choices).
	Typical example of a **word entry** (spells out "POLY"). In *word (alphanumeric)* data fields, press the *up* or *down arrow* key to move right or left to the next character position. Press each key until the desired character appears (e.g., press 6 PQR until "P" appears). A comma between symbols means press and release each key sequentially.
	Typical example of a **number entry** (enters the value 155). In *numeric* data fields, the cursor automatically advances to the next character position when each numeral is entered.
	A " + " between symbols means press *and hold* each key in the order shown until all keys are depressed *at the same time*, then release all keys.
hold 	Key(s) must be held depressed for the intended action to occur. Action will stop when key(s) is (are) released.
<xx> **<response>** **<password>**	This is an alternative way of depicting word and number entries when the exact values are determined by the user. <xx> means enter a two digit number. <response> means enter the value prompted for by the display. <password> means enter the password (or numeric passcode).
	Press and release the *Stop button* ( ).
B 	Press and release the *Start button* ( ).

FIGURE 1 (MSOP0235BE)
Microprocessor Interface Controls and Example Key Symbols

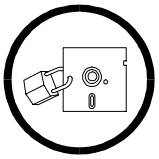
Microprocessor Interface Controls

These controls, shown in FIGURE 1, include the *keyswitch, display,* and *keypad*, located on the main nameplate (position on nameplate varies), and the *printer/download connection*, located on its own nameplate. These controls permit the user to pass data to and from the microprocessor controller.

NOTE: This section folds out so that you may continue to refer to FIGURE 1 as you review the remainder of this manual.

Keyswitch—This key-operated switch provides security for all field-programmed data in memory. With the *keyswitch* set to *run* ( ), this data cannot be changed. The key cannot be removed in the *program* ( ) position.

⚠ CAUTION ⚠



DATA LOSS HAZARD—Improper use of the *keyswitch* may corrupt program data.

- ☞ **Return to the run mode only when the display says *Ok Turn Key to Run*.**
- ☞ **Only power off or on with the *keyswitch* at *run*.**
- ☞ **Do not leave the key accessible to unauthorized personnel.**

Display—This two- or four-line device displays *messages* and *data entry screens. Messages* inform the user as to the machine's operating status or alert the user to conditions that must be satisfied before operation can continue. ***Message displays* in this manual are normally black.**

Data entry screens prompt the user to enter data at the keypad. As keys are pressed, the data appears in the data input field on the display. A blinking *cursor* always shows where the next character will be entered. ***Data input screens* in this manual are gray, the data input field is black, and the starting cursor position is underlined.**

Keypad—The 12- or 30-key keypad is used for programming, making selections (e.g., selecting formulas in a washer-extractor), responding to display messages, certain normal operating procedures, and manual operation. Applicable procedures are explained in the remainder of this manual and depicted using symbols to indicate pressing keys on the keypad. These symbols are explained in the "Example Key Symbols Used in the Text" in FIGURE 1. Keep FIGURE 1 folded out when reviewing procedures elsewhere in the manual that require the keypad.

NOTE: Some keys on the 30-key keypad are not used on some machines.

Printer/Download Connection (if so equipped)—Connect a Milnor®-supplied printer here to print field-programmed data (e.g., formulas) and accumulated data (e.g., count of loads processed), if applicable. Connect a Milnor®-supplied serial downloader here or interconnect between machines to copy field-programmed data between devices. Printing and downloading, if applicable, are explained elsewhere in this manual.

Section 1

Programming

PROGRAMMING THE MARK III, IV, AND V MICROPROCESSOR TEXTILE CONTROLLER

C

⇦ Fold out FIGURE 1 in "ABOUT THE USER CONTROLS . . ." (see Table of Contents) for the meaning of the display and key symbols used in this section.

Selections on the Program Menu

0 =Ok Turn Key To Run—Safely return to the *run mode*. See caution below.
1 =Add/Change Formula—Add a new formula, change or delete an existing formula, and add/delete steps.
2 =Copy Old To New—Copy existing formula to unused formula number.
3 =Edit Name of Oper—Assign names to step name numbers for use when programming formulas.
4 =Edit Chems—Assign names to chem name numbers for use when programming formulas.
5 =Configure —Tell the controller which model and options it is controlling.
6 =Down Load—Copy data electronically to avoid repetitive programming and provide secure backup.
7 =Clear All Memory (voluntarily)—Clear memory before completely reprogramming the machine.
8 =Print Data—Print formulas, configuration, chemicals and step names.
9 =Calibrate Chemical Flowmeters—Define flow meter counts per unit of each chemical.

To Access the Program Menu

```
FORMULA
00
```

When the *Run Formula menu* and *selection 00* are displayed as shown at left,

, ENTER/NEXT **Accesses the *Program Menu.***

```
PROGRAM 00 MENU
OK TURN KEY TO RUN
```

Program menu with selection 0 displayed

Underline indicates cursor position

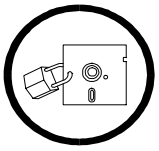
When the *Program Menu* is displayed as shown at left,

SKIP TO + ▲ / ▼ **Scrolls the available *program modes*.**

or <x> **Selects a *program mode***, where <x> is a number from 0 to 8. See following pages for how to access and utilize each program mode.

or (0), , ENTER/NEXT **Returns to the *run mode*.**

⚠ CAUTION ⚠



DATA LOSS HAZARD—Improper use of the *Program/Run keyswitch* may corrupt program data.

- ☞ **Return to the run mode only when the display says *OK Turn Key To Run.***
- ☞ **Only power off or on with the Program/Run keyswitch at run.**
- ☞ **Do not leave key accessible to unauthorized personnel.**

If `FORM xx INCOMPLETE TURN KEY TO PROG` or `CLEAR MEMORY NOW PRESS 4+5+6` **ever appears, data is unreliable and must be deleted.** See "ERROR MESSAGES FOR THE MARK III, IV, AND V TEXTILE CONTROLLER" for more information.

1 = ADD/CHANGE FORMULA

At the start of formula programming, the controller prompts for a *formula number* and *formula name*. At the start of each step (e.g., flush, break, extract), the controller prompts for a *step name* and pauses to permit *deleting or duplicating the step*. You may use or bypass the *help screens*. You may *delete an existing formula.* The last step may be a bath or an extract. When you end a formula, the controller prompts for the *type of rotation* to end with. *Formulas 01* through *50* are available for programming.

```
PROGRAM 01 MENU
ADD/CHANGE FORMULA
```

When the *Program Menu* and *mode 1, Add/Change Formula* is displayed, as shown at left,

ENTER NEXT **Accesses *mode 1* and prompts for a *formula number*.**

To Select a Formula Number and Enter a Name

```
ADD/CHANGE FORMULA
ADD/CHANGE FORMULA
00
```

Formula number

"ADD" or "CHANGE" blinks for unused or existing formula

With the cursor at *formula number* as shown at left,

<xx>, ENTER NEXT **Accesses the desired formula and displays the formula name.** Cursor goes to *formula name field.*

To Name or Rename a Formula—Every formula initially has the *default formula name* "FORMULA xx" where *xx* is the formula number. This may be overwritten with any name up to 16 characters.

With the cursor in the *formula name field*, as shown at left,

```
F05 FORMULA 05
F05 FORMULA NAME:
S00 SHEETS
```

Default formula name

Formula name field (Any name up to 16 characters may be entered)

SKIP TO **Moves the cursor to the next position in the *formula name field.***

<x> **Enters a character at the cursor** where <x> is any letter, number, or symbol on the alphanumeric keypad.

ENTER NEXT **Accepts *formula name*** and prompts for the nominal weight and first step name.

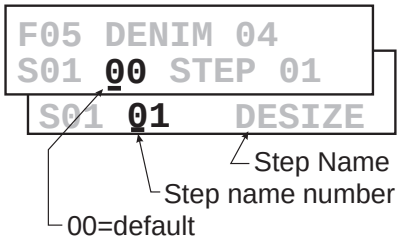
To Specify Nominal Weight—The *nominal weight screen* shown below is available at the discretion of the programmer. If the default value (000) is accepted, then the values programmed for water and chemicals will be used, regardless of the amount of goods loaded in the machine. However, if any value other than 000 is entered for nominal weight, the controller will prompt for actual load weight when the formula is run.

```
NOMINAL WEIGHT ?
000
```

Based on the load weight entered at run time, the controller will admit water equal to the ratio of nominal weight for the formula to the actual load weight entered at run time. All *non-metered* chemicals will also be injected according to this ratio. *Metered* chemicals will always be injected for exactly the wash formula value.

Example: Assume a formula is programmed for a nominal weight of 200 weight units (pounds or kilograms), and a step in this formula calls for 500 units of water, a 60-second injection of *non-metered* chemical 03, and a 75-unit injection of *metered* chemical 12. If a load weight of 150 is entered at the prompt when the formula is started, the controller admits only 375 units of water and injects chemical 03 for 45 seconds in this step, as these values maintain the ratio of nominal (programmed) to actual (run-time) weight. However, because chemical 12 is a metered chemical, the programmed amount of 75 units will be injected. Similar adjustments will occur in each bath step of the formula. Times are not adjusted.

To Select a Step Name—Step names are selected *by number* from the 16 pre-named step names available (see *mode 3, Edit Name of Operation*). The default is *00* which names the step "STEP xx," where *xx* is the *step number*.



With the cursor at the *step name number*, as shown at left,

<xx> **Enters a *step name* by number,** where <xx> is a number from 00 to 15.

ENTER NEXT **Accepts the selected *step name*.** *Page A* of this step appears with *nocursor* to permit deleting or duplicating this step.

or SKIP TO **Only if this is step 1, returns to *formula name.***

To Delete or Duplicate a Step

```
F05 TMMMQFFFHC3LLLLS
S01
```

When *page A*, similar to screen shown at left, first appears *with **no** blinking cursor*, the current step may be *deleted* or *duplicated.*

CANCEL ESCAPE + ENTER NEXT **Deletes this step.** The next higher step becomes the current step. The controller prevents deleting an *End Formula* or a bath between two extracts. To *delete an entire formula*, see "To Abort a New Formula in Step 1 or Delete an Existing Formula" in this section.

or EXTEND HELP + ENTER NEXT **Duplicates this step.** If this is *step 1*, the duplicated step becomes the new *step 1*, and all following steps move one number higher. Controller prevents duplicating an *End Formula* or an extract.

or ENTER NEXT **Advances to *T (Type of Step)* without deleting or duplicating this step.**

To Create or Move Around Steps and Use the Help Screens—Each *step* has a *step name screen* and four *data pages* (*pages A, B, C, and D*). Each data page has several *decisions* (e.g., duration, bath temperature, chemicals) represented by letters on each data page. Create steps for a new formula sequentially as the controller guides you through. **See "The Step Decisions" in this section for a full explanation of each step decision.**

To End a Formula Without a Final Extract (Following a Bath)

```
F05 TMMMQFFFHC3LLLLS
F05 T TYPE OF STEP
S06 0 END FORMULA
```

With the cursor at *page A, decision T*, following the last step, as shown above,

0 or NEXT **commands *End Formula*** and prompts:

```
END FORMULA #05 ?
0 NO [1=YES]
```

1, NEXT confirms ending the formula and prompts *How to End?*

or

(0), NEXT cancels ending the formula and returns to *Type of Step.*

To End a Formula With a Final Extract

```
F05 TMMMQF   RPM DRFE
S06 600501   --- -0--
```

With the cursor at *page A, decision T*, of final extract step, as shown above,

<T> commands one of three types of final extract, where <T> is 4, 6, or 7; and prompts for a *duration (MMMQ)*. See "The Step Decisions."

<MMMQ> commands a duration where <MMMQ> is a four-digit number and prompts for a drain destination if applicable.

At *page D*, as shown above,

<R> commands a drain destination, where <R> is 0 or 1, and prompts *How to End?*

To Abort a New Formula in Step 1 or Delete an Existing Formula

```
F05 TMMMQFFFHC3LLLLS
F05 T TYPE OF STEP
S06 0 END FORMULA
```

Scroll to *step 1, page A, decision T.* When the display is as shown above,

(0), NEXT **commands *End Formula* at step 1** and prompts:

```
END FORMULA #05 ?
0 NO [1=YES]
```

1, NEXT **confirms deleting the formula** and returns to the Program Menu.

or

(0), NEXT **cancels deleting the formula** and returns to *Type of Step.*

After confirmation:

```
**PLEASE WAIT**
PROGRAM 00 MENU
OK TURN KEY TO RUN
```

Note: Whether ending with or without a final extract, decisions continue as explained below.

To Specify Cylinder Rotation at End of Formula (How To End)—When a formula ends *without* a final extract, selections 0, 1, and 2, explained below are available. When the formula ends *with* a final extract, all of the following selections are available:

```
F05 XXX YYY RPM DRFE
F05 E HOW TO END ?
S06 0 FINISHED
```

Operator presses 0 or CANCEL/ESCAPE to silence the signal.

1 REVERSING (at wash speed)–Operator press 0 or CANCEL/ESCAPE to end.

2 FINAL DRAIN Operator presses 0 or CANCEL/ESCAPE to end.

3 BREAK CAKE Cylinder sequences through various motions for three minutes, then stops. Use to loosen goods that remain plastered to the cylinder after the formula ends. Operator presses 0 or CANCEL/ESCAPE to silence the signal.

<x> **Enters a valid choice**. <x> is 0, 1, or 2 when following a final bath step. <x> is 0, 1, 2, or 3 for a final extract.

ENTER/NEXT **Accepts the selected choice. This ends programming for this formula.**

```
**PLEASE WAIT**
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

Program Menu reappears.

The Step Decisions

Several programming decisions on *pages A, B, C, and D* vary with configuration, as shown in FIGURE 1. For example, *bath temperature* may be configured for Fahrenheit *(FFF)* or Celsius *(CCC)* units, and *Third Water (3)* only appears if enabled. Additionally, certain programming decisions are affected by prior decisions. Most decisions following *Type of Step (T)* only apply to bath steps, not extract steps. Applicable step decisions repeat for each step. **Up to 200 *formulas* with a total of 4000 *steps* may be programmed. However, no formula may contain more than 62 steps.**

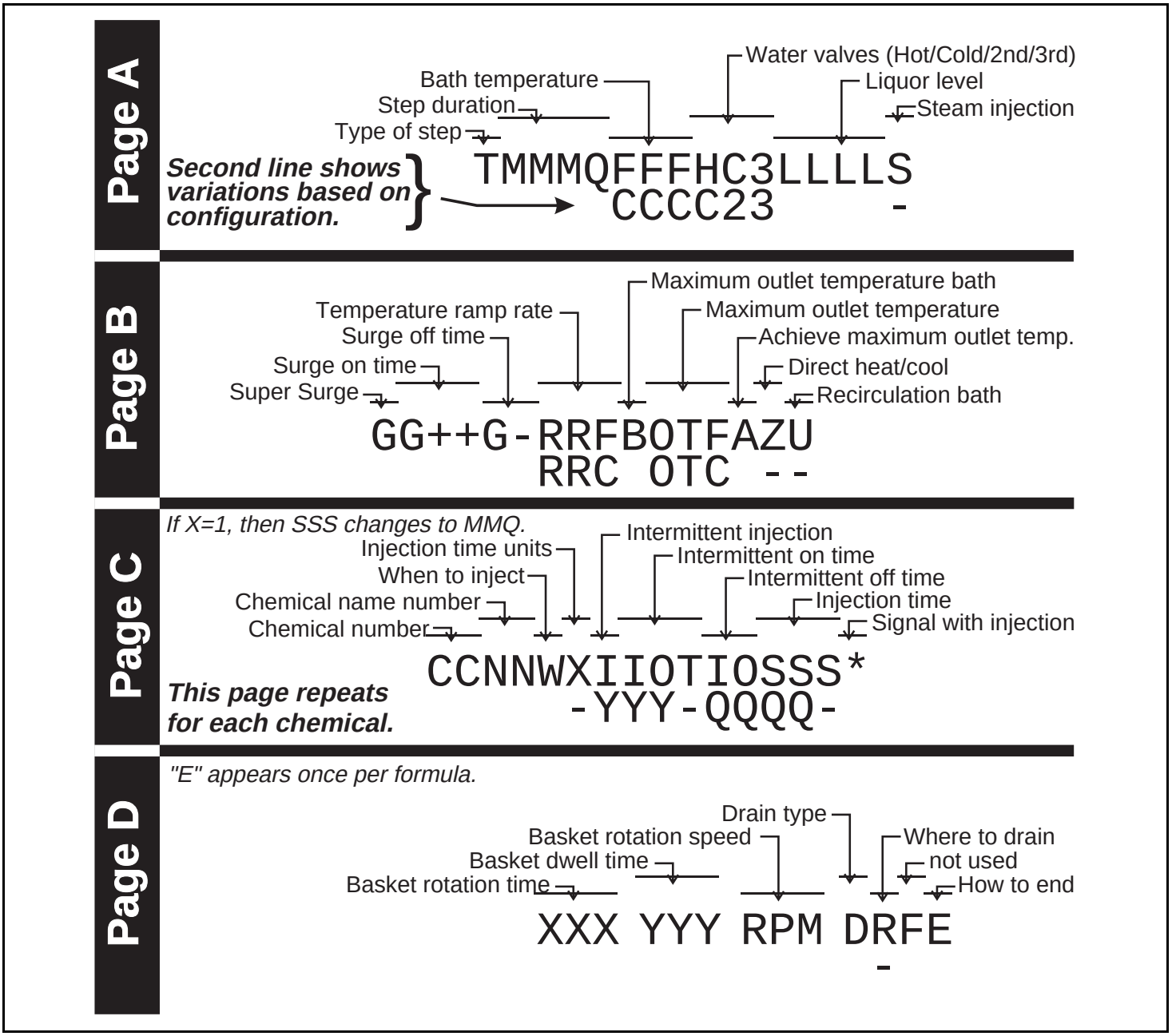


FIGURE 1 (MSOP0D10CE)
The Step Decisions At a Glance

Type of Step: Types of Baths and Extracts Available—*End Formula*, three types of *bath* steps, and four types of *extract* step are available. The control prevents an extract as step 01, or as step 02 if step 01 is a no water bath. It also prevents two successive extract steps.

```
F05 TMMMQFFFHC3LLLLS
F05 T TYPE OF STEP
S01 0 END OF FORMULA
```

1 1-WAY WASH	Increases mechanical action and saves energy. Use for small pieces which cannot tangle.
2 2-WAY WASH	Use for sheets or other large pieces which tangle unless cylinder reverses.
3 SOAK WASH	**Cylinder does not turn.** Use for delicate fabrics and overnight bath soak (see below).
4 PRE+FIN EXT (pre+final extract)	Minimum time =180 seconds. Machine extracts for 90 seconds, then the timer stops while the cylinder stops, jogs, and redistributes. Then machine extracts (with a 90-second low speed extract before accelerating to E2 if the machine has E1 and E2) for the remaining commanded extract time. Use only with goods that tend to plaster, as this function may cause unwanted extract recycles.
5 INT EXTRACT (intermediate extract)	For extracts between baths. Also for final extract at low (E1) speed if machine is equipped with two-speed extract.
6 FINAL EXT	E1 duration dictated by *configure decision G* (see *mode 5, Configure*) then E2 for remainder of commanded extract time.

Duration of Step

```
F05 TMMMQFFFHC3LLLLS
F05  MMMQ BATH TIME
S01  0001=00.25 MIN
```

MMMQ indicates minutes (*MMM*) and quarter minutes (*Q*).

0001=00.25 MIN	0 minutes and 15 seconds (minimum)
0010=01.00 MIN	1 minute (default)
0113=11.75 MIN	11 minutes and 45 seconds (example)
9993=999.75 MIN	999 minutes and 45 seconds (maximum)

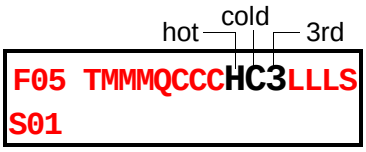
Bath Temperature—Requirements: Appears if *temp probe* enabled (*configure decision T*=1 or 2) and this is a *bath step*. *FFF* (Fahernheit) or *CCC* (Centigrade) appears per *configure decision A*. If a temperature is commanded, thermo modulation or steam is required; otherwise, the cursor returns here for temperature correction.

```
F05 TMMMQFFFHC3LLLLS
F05      FFF
S01      000 TEMP _F
```

000 TEMP _F	No temperature requirement for this bath. Value displayed reverts to "---."
050 TEMP _F	50° F or **010 TEMP _C** 10° C (default and minimum, if 000 not commanded)
235 TEMP _F	205° F or **095 TEMP _C** 95° C (maximum).

Water Valves: Available Valves and Ways To Control Them—*Configure decision K* determines which water valves are displayed. Valves are accessible if this is a bath step.

When *hot, cold*, (and *3rd*) water valves are configured



Each water valve is a separate decision. 3rd water appears only if enabled. Unless stated otherwise, all selections apply to each valve.

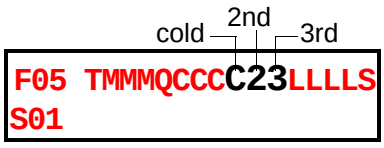
OFF 0	*Off* for this bath
ON 1	*On* during fill
2 ON=RAISE TEMP	*On* during fill if actual temperature is *below* commanded (*raises* temp). Not available for *cold* water valve.
3 ON=LOWER TEM	*On* during fill if actual temperature is *above* commanded (*lowers* temp). Not available for *hot* water valve.

Examples:

Split *hot/cold*

001 *3rd* only

When *cold, 2nd*, (and *3rd*) water valves are configured



OFF 0.....	*Off* for this bath
ON 1.....	*On* during fill

Split *cold/2nd*

001..... *3rd* only

Water Valves: Regulating Incoming Water Temperature

Prerequisite: Hot water valve enabled (*configure decision K*). *Thermo-modulation* regulates incoming water temperature by turning the water valve(s) on and off during fill to maintain commanded temperature. When programming, it is helpful to know the *split water temperature* (temperature achieved by opening hot and cold simultaneously).

Hot and cold both modulate. Use this method when desired temperature is *near split* or when split water temperature is unknown or varies significantly.

130 *Hot=on, cold =modulates*. This provides a faster more accurate fill (fewer temperature swings) when the commanded temperature is known to be *hotter than split*.

210 *Hot =modulates, cold=on*. This provides a faster more accurate fill (fewer temperature swings) when the commanded temperature is known to be *colder than split*.

NOTE 1: If desired, modulate *hot* and *3rd* when *3rd* is *cold* water, or *cold* and *3rd* when *3rd* is *hot* water.
NOTE 2: Modulation controls the *average* temperature of the *incoming* water. Bath temperature may vary due to inconsistent incoming water temperature/pressure and because it is influenced by the temperature of the preceding bath.

Water Valves: Lowering Bath Temperature with *Cooldown* —Any bath in which a *cooldown* occurs consists of two bath steps with *no drain* between them. In the second step, specify the desired *cooler* temperature, *all water valves off*, and *any* bath level. The controller will automatically insert a one minute duration *(MMQ=010)* in the current (second) step and *Do Not Drain (D=2)* in the first step. **The cooldown temperature must always be 15°-20°F (8°-11°C) higher than the hottest ambient or cold water temperature that will be encountered, or it may take a long time or be impossible to achieve the commanded cooldown temperature.** Commanding *no water* (all water valves *off*) in a step following an extract will result in the error:

```
F05 COOLDOWN ILLEGAL
S01 PRESS NEXT
```

If the display at left appears,

ENTER NEXT **Returns the cursor to the first water valve decision.**

Liquor Level: Methods of Level Control—The *level decision* is accessible if this is a *bath* step. The controller will determine level according to *hardware-dependent configure decision W* .

Liquor Level: Specifying Inches or Centimeters (Electronic Level Sensing)

```
F05 TMMMQFFFHC3LL  S
F05 LL LEVEL
S01 00
```

Requirements: *Metered water* disabled, *electronic level sensing* enabled, machine not equipped with a heat exchanger. Units are *inches* or *centimeters* as specified in *configure decision A*. Value is two digits.

<xx> Minimum level for a bath not preceding an extract, where <xx> is the value specified in the *Low Level configure decision.*

<yy> Minimum level for a bath preceding an extract, where <yy> is the value specified in the *Med Level configure decision*. If a value lower than <yy> is entered and an extract is programmed for the next step, the controller will automatically replace this lower value with <yy>.

<zz> Maximum level for any bath, where <zz> is the value specified in the *High Level configure decision*.

Note: Liquor levels desired and achieved using electronic level sensing can not be viewed during operation, although the machine will fill as desired. The display will show only metered water data (see below), which should remain at 0 if electronic level sensing is enabled.

Liquor Level: Specifying Quantity of Water (Metered Water)

```
F05 TMMMQFFFHC3LLLLS
F05 LEVEL      LLLL
S01            0000
```

Requirement: *Metered water* enabled. Value is four digits.

Units used (e.g., gallons, liters, pounds, etc.) are established by the *Counts Per 100 configure decision*. Enter the quantity of water desired for this bath.

0000 No water

0150 150 units of water (gallons, liters, etc.)—example.

9999 Largest number that can be entered (see caution).

⚠ CAUTION ⚠

MACHINE MALFUNCTION HAZARD—Because any units can be used, the control permits entering any number up to 9999. Machine will overflow if too high a number is entered.

☞ **Make sure number entered here corresponds to the units established by the Counts Per 100 configure decision and is within the machine's capacity.**

Steam Injection and How To Select the Steam Code—Requirement: Steam enabled (*configure decision H*). Accessible if this is a *bath step* . No steam and six steaming choices are available. Each steaming choice specifies the value shown in the list of choices below left, for each of three conditions (*early*, *after*, and *timer*) explained in the box below right.

```
F05 TMMMQFFFHC3LLLLS
EARLY AFTER TIMER  S
   NO STEAM        0
 NO    YES   RUNS  1
 NO    NO    STOPS 2
 NO    YES   STOPS 3
 YES   YES   RUNS  4
 YES   NO    STOPS 5
 YES   YES   STOPS 6
```

Early: Yes starts steaming at lowest level. Use *yes* when machine has only cold water valve or when plant has only low-temperature hot water. ***No*** starts steaming when commanded level achieved. Use *no* when machine has both hot and cold water valves if commanded temperature is lower than hot water temperature.

After: Yes resumes steam in this bath if temperature falls below commanded, once initially achieved. ***No*** prohibits further steam once temperature is achieved. Use *no* if chemicals or goods may be harmed by steam after chemical injection (as in bleach baths), otherwise use *yes*.

Timer: Runs while steaming or ***stops*** until temperature first achieved. Use *runs* if temperature need not be exactly maintained throughout bath and/or when it is certain that commanded temperature will be nearly achieved while filling. Use *stops* if temperature must be achieved before adding chemicals; otherwise the *start chemical injection when level and temperature are achieved* selection will be unavailable for this bath.

Super Surge—Super Surge provides a method for thoroughly dispersing chemicals throughout the bath liquor. When Super Surge is activated, the basket rotates at 100 percent wash speed (approximately 30 RPMs) for the number of seconds programmed in decision G++, then reverts to the programmed bath speed for the number of minutes programmed in decision G-.

```
F05 GG++G-RRFBOTFAZU
F05 G SUPER SURGE
S01 1 YES [0=NO]
```

This decision determines whether Super Surge is allowed for this bath.

```
F05 GG++G-RRFBOTFAZU
F05 G++ SURGE ON TIM
S01 010 SECONDS
```

This decision determines the number of seconds for which the basket will operate at “surge” speed (100 percent wash speed). Enter 000 to 999 seconds.

```
F05 GG++G-RRFBOTFAZU
F05 G- SURGE OFF TIM
S01 03 MINUTES
```

This decision determines the number of minutes that the basket will rotate at the programmed wash speed (*decision RPM* later in the programming sequence). Enter values from 1 minute to the total number of minutes for the bath.

Temperature Ramp Rate—The temperature ramp rate (*decision RRF* if configured for Fahrenheit; *RRC* for Celsius) determines the rate at which the bath temperature will be raised or lowered.

```
F05 GG++G-RRFBOTFAZU
F05 RRF RAMP RATE
S01 000 = 00_F/MIN.
```

Requirements: Machine is equipped and configured for indirect heating or cool-down; step is a bath. The value entered is in tenths of degrees; the actual ramp rate will be displayed to the right of the data entry area after the last digit is entered.

Maximum Outlet Temperature—The maximum outlet temperature decisions are used to control the temperature at which the recirculating bath liquor leaves the heat exchanger and returns to the machine cylinder.

```
F05 GG++G-RRFBOTFAZU
F05 B MAX OUTLET BTH
S01 1 YES [0 = NO]
```

This decision determines whether the temperature probe at the heat exchanger will be monitored and used to control the temperature of the bath liquor.

```
F05 GG++G-RRFBOTFAZU
F05 OTF OUTLET TEMP
S01 190
```

This decision determines the maximum temperature at which bath liquor will exit the heat exchanger. The desired bath temperature is the lowest value that can be entered; the maximum value is 250° Fahrenheit (120° Celsius).

```
F05 GG++G-RRFBOTFAZU
F05 A SAT OUTLET TEM
S01 0 NO [1 = YES]
```

This decision determines whether the maximum outlet temperature should be achieved if the desired bath temperature was achieved earlier. If 1=Yes is entered for this decision, the maximum outlet temperature set for the heat exchanger will be achieved, as described below:

The microprocessor monitors the liquor temperature in the cylinder and at the outlet of the heat exchanger. If the liquor temperature at the heat exchanger outlet reaches the programmed maximum outlet temperature before the temperature in the cylinder reaches the desired bath temperature, then the steam admitted into the heat exchanger will be modulated to keep the liquor temperature below the programmed maximum outlet temperature until the desired bath temperature is achieved.

When the desired bath temperature in the cylinder is achieved, the ramp temperature is set to the maximum outlet temperature, and the heat exchanger is controlled to maintain maximum outlet temperature.

When the liquor in the cylinder is at the desired bath temperature and the temperature at the heat exchanger outlet is at the maximum outlet temperature, the ramp valve (the modulating steam valve on the heat exchanger steam inlet) is opened to a value of 100 (slightly less than half open), and the non-modulating steam valve supplying the heat exchanger is controlled to maintain maximum outlet temperature. Because the outlet temperature is measured when the bath liquor is under pressure and unable to boil, temperatures up to boiling may be accurately maintained in the cylinder.

Applications of *Maximum Outlet Bath Sequence*

The function of the *maximum outlet temperature* decisions is to accurately monitor bath liquor temperature at the outlet of the heat exchanger. By programming a maximum outlet bath, the controller monitors the bath liquor temperature as it exits the heat exchanger and returns to the cylinder. Monitoring the temperature at the heat exchanger outlet ensures that the liquor in the heat exchanger—where it is at its highest temperature—never exceeds the maximum outlet temperature (OTF or OTC).

In some cases it may be necessary to heat the liquor in the cylinder to very nearly the maximum outlet temperature without exceeding this temperature at any point in the system. This is achieved by setting the maximum outlet temperature just below the highest allowable temperature and commanding Satisfy Outlet Temperature (A=1). The control maintains the programmed outlet temperature in the liquor at the heat exchanger outlet. As the non-modulating steam valve cycles on and off to maintain maximum outlet temperature, the bath liquor in the cylinder gradually approaches maximum outlet temperature without exceeding it.

Direct Steam and Cooldown—Requirements: machine must be equipped and configured for a heat exchanger and direct heat/cool.

```
F05 GG++G-RRFBOTFAZU
F05 Z DIR. HEAT/COOL
S01 0 INDIR [1=DIR]
```

Direct heat/cool causes the machine to raise or lower the temperature of the bath liquor by injecting steam or cold water directly into the cylinder. Indirect heat/cool (Z=0) requires that the machine be equipped with a heat exchanger, preventing steam or cold water from mixing with the bath liquor.

NOTE: Use Direct Steam and Cooldown with a stone step or if stones are in the machine.

Recirculation—Requirements: machine must be equipped and configured for recirculation. Recirculation pumps the bath liquor out of the bath cylinder, through the heat exchanger if the machine is equipped with one, and back into the cylinder. This process maintains liquor temperature if a heat exchanger is present, and helps keep the bath liquor agitated.

```
F05 GG++G-RRFBOTFAZU
F05 U RECIR. BATH
S01 1 YES [0 = NO]
```

If recirculation is enabled (decision U=1), the recirculation pump runs throughout the bath. Recirculation is automatically enabled if indirect heat or cool is programmed for this step.

NOTE: Do not use the recirculation pump in a stone step or if stones are in the machine. Stones will damage the pump and impeller. Flush out the pump (by running it without stones) periodically so rock debris does not collect in the pipes and plug the pump inlet hose.

Chemical Decisions—Chemical decisions are only accessible if this is a *bath* step. Any number of available chemicals can be commanded in the same bath. The available chemicals are those enabled in the *# of Chem Valves* or *# of Chem Tanks configure decision*. **For *each* chemical desired, the controller repeats each decision that applies to that chemical;** including *chemical number (CC), chemical name (NN),* and *when to start injection (W).* If *chemical number 29 (signal only)* is selected, the control skips *SSS* and *.

This Chemical: Number (*CC*) and Name (*NN*)

```
F05 CCNNWXIIOTIOSSS*
CCNN CHEM# AND NAME
0000 NO CHEMICAL
```

Although *chemical number* and *chemical name* are separate decisions, they share the same help screen, so both are explained here.

No chemicals (or no additional chemicals) in this bath (default).

0200 CHEMICAL 02 — *Chemical 02* (example). Cursor advances to *NN* from any valid *chemical number*.

2900 CHEMICAL 29 — Signal *without* chemical. Cursor advances to *NN*, then *W*, but skips all other decisions for this chemical. If an invalid chemical number is entered, the control assumes a signal without chemical.

0100 CHEMICAL 01 — Names *chemical 01* (example) by chemical number (default).

0301 ALKALI — Gives *chemical 03* the name *Alkali* (example). See *mode 4, Change Chem Names.*

ENTER NEXT — **In the help screen, accepts the *chemical number and name*.** The cursor advances to *W* for a valid chemical or to the next decision following the chemical decisions for *chemical 00 (no chemical).*

When To Start Chemical Injection

```
F05 CCNNWXIIOTIOSSS*
F05 W WHEN TO INJECT
S01 0 AT BEGINNING
```

Use this decision to ensure that chemicals are injected into the bath safely (e.g., acceptable concentrations and bath temperatures). To avoid injecting two or more *non-metered* chemicals simultaneously, use *Do Not Drain* (see *programming decision D=drain type*) to combine two or more bath steps into one bath, with one injection in each.

`0 AT BEGINNING`	As the machine is filling.
`1 AT LEVEL SAT.`	When level is satisfied.
`2 AT LEV & TEMP`	When level and temperature are both satisfied (only available when steaming to a specified temperature with *timer **stops** while steaming* commanded).
`3 AT LEV&TEMP+10`	10 seconds after both level and temperature are satisfied.

Chemical Injection Amounts: Methods of Control—Chemical injection amounts can be controlled by timed or metered chemical injection. *Metered chemical injection* requires optional chemical flow meter interface boards and user-supplied flow meters. With metered injection, the machine controller activates the desired chemical output, then reads pulses from the chemical flow meter. When the desired number of pulses is reached, the machine controller de-activates the chemical output.*Timed chemical injection*, in which the machine controller activates the desired chemical output for the amount of time programmed, is standard on all textile machines.

Metered Chemical Injection—not available for chemicals 01 through 05; for other chemicals, machine must be configured for metered chemical injection (*configure decision F*=1).

```
F05 CCNNW YYY QQQQ
F05 YYY INJ. DELAY
S01 001 SECONDS
```

The injection delay time entered here begins after the conditions of decision W are met. Hence, if W=3 and YYY=30, the chemical injections will begin 40 seconds after level and temperature are satisfied.

`000`	000 seconds (minimum)
`064`	64 seconds (example)
`999`	999 seconds (maximum)

Note: To accurately meter multiple chemicals through a single flow meter, adjust this value so that only one chemical is injected at any time. The procedure is to time the injection of the *first* chemical, then program the measured injection time plus a margin of safety as the *injection delay* for the *second* chemical. If multiple chemicals must be injected simultaneously, use a separate flow meter for each chemical.

```
F05 CCNNW YYY QQQQ
F05 QQQQ QUANTITY
S01 0001 UNITS
```

The injection quantity is based on the units for which the chemical flow meter is calibrated (see "Chemical Flow Meter Calibration" in this section).

	1 unit (minimum)
`0153 UNITS`	153 units (example)
`4095 UNITS`	4095 units (maximum)

Timed Chemical Injection—Requirements: none for chemicals 01 through 05; for other chemicals, machine must be configured for timed (not metered) chemical injection (*configure decision F*=0).

```
F05 CCNNWXIIOTIOSSS*
F05 X TYPE OF INJECT
S01 0 SSS [1 = MMQ]
```

Inject time is measured in seconds.

`1 MMQ [0 = SSS]`	Inject time is measured in minutes, minutes, and quarter minutes.

Intermittent Chemical Injection

```
F05 CCNNWXIIOTIOMMQ*
F05 I INTER. INJECT
S01 0 NO [1 = YES]
```

Intermittent chemical injection causes the injection of the desired chemical to cycle on and off for programmed times. This decision is not available for chemicals 01 through 05, and is available only if injection is timed (*configure decision F=0*) and the time units are minutes and quarter minutes (*programming decision X=1*, above).

```
F05 CCNNWXIIOTIOMMQ*
F05 IOT INJ. ON TIME
S01 001 SECONDS
    030 SECONDS
    127 SECONDS
```

This is the number of seconds the chemical injection output is turned on during each cycle of intermittent injection.
1 second (minimum and default)
30 seconds (example)
127 seconds (maximum)

```
F05 CCNNWXIIOTIOMMQ*
F05 IO INJ. OFF TIME
S01 01 MINUTES
    05 MINUTES
    14 MINUTES
```

This is the number of minutes the chemical injection is turned off during each cycle of intermittent chemical injection.
1 minute (minimum and default)
5 minutes (example)
14 minutes (maximum)

Duration of Chemical Injection

```
F05 CCNNWXIIOTIOMMQ*
F05 MMQ INJECT TIME
S01 052 = 05:30
```

This is the total amount of time that the chemical will be injected. The units are either seconds or minutes and quarter minutes.
If decision X = 1 (*Type of Inject = MMQ*), the minimum acceptable value is 000; the maximum acceptable value is 633 (63 minutes and 45 seconds). However, if the time for the step expires before the chemical injection time expires, the chemical injection will stop, **and the chemical manifold will not flush**.

```
F05 CCNNWXIIOTIOSSS*
F05 SSS INJECT TIME
S01 120 SECONDS
```

If decision X = 0 (*Type of Inject = SSS*), the minimum acceptable value is 001, and the maximum acceptable value is 255 seconds (4 minutes and 15 seconds).

⚠ CAUTION ⚠

RISK OF POOR OR INCONSISTENT WASH QUALITY—Short injections (less than 10 seconds) *do not* work for the following reasons: 1) Fine adjustments are not possible (e.g., a 1 second change to a 3 second injection is +/- one third). 2) Erratic response time (due to pump mechanical lag, draining of the delivery tubes, etc.) is more detrimental (e.g., a 1/2 second delay in a 3 second injection yields 17% less than expected, versus only 5% less for a 10 second injection).

- ☞ **Size pumps or valves small enough for adequate control (i.e., for longer injection times).**
- ☞ **Use two pumps or valves to inject a small or large quantity of the same chemical, if required.**

Signal with Chemical Injection

```
F05 CCNNWXIIOTIOSSS*
F05 * SIGNAL W/ CHEM
S01 0 NO [1 = YES]
S01 1 YES [0 = NO]
```

The signal occurs at the time specified by the *when to start injection* decision. **The commanded injection will not start until the signal is cancelled by the operator.**

The microprocessor control also assumes that any chemical commanded but outside the range of configured chemicals will be a signal without an injection.

Basket Rotation—These two decisions (XXX and YYY) determine the time that the basket is driven and the time that the basket coasts for each reversal. These decisions have no effect unless the bath is programmed as a two-way wash.

```
F05 XXX YYY RPM DRFE
F05 XXX ON TIME
S01 090 SECONDS
```

This is the number of seconds that the basket will rotate before pausing (dwelling) and resuming rotation. The acceptable values for this decision are from 5 seconds to 999 seconds. If this is a one-way bath (decision T=1), the basket will resume rotation in the same direction. If this is a two-way bath (decision T=2) the basket will resume rotation in the opposite direction.

```
F05 XXX YYY RPM DRFE
F05 YYY DWELL TIME
S01 030 SECONDS
```

This is the number of seconds that the basket will pause (dwell) before resuming rotation. The acceptable values for this decision are from 000 seconds to 254 seconds.

Basket Speed—If wash and/or extract speeds are programmable in this machine, the control displays *RPM*, as explained below. If not, this field is blank.

```
F05 XXX YYY RPM DRFE
F05 SPD WASH SPEED
S01 010 [5 - 36 RPM]
```

Program desired RPM (between 5 and 36) for wash.

```
F05 XXX YYY RPM DRFE
F01 RPM WASH SPEED
S01 010 [200-810RPM]
```

Program desired RPM (between 200 and 810)for extract.

Basket Rotation During Draining and Previous Fill (Drain Type)—Requirements: Accessible if this is a bath step *and* ***not*** *a cooldown*.

```
F05 XXX YYY RPM DRFE
F05 D HOW TO DRAIN
S02 0 STD DRAIN SPD
    1 2 WAY WASH SPD
    2 DO NOT DRAIN
    3 STOP AT DRAIN
    4 STOP WITH FILL
    5 STOP FILL & DR
    6 STP FILL+NO DR
    7 STP F+D+PROMPT
```

Because the machine must enter extract from drain (distribution) speed, if the next step is an *extract*, the control changes a selected 1, 2, or 3 to 0; or a 5, 6, or 7 to 4.

Basket turns clockwise at drain (distribution) speed.

Wash speed, reversing; more mechanical action while draining.

Use for functions later in this bath such as to inject chemicals, raise temperature or level or change basket speed without draining. Also see "Using Bath Soak To Create an Overnight Soak Wash Formula" in this section.

Basket stationary; no mechanical action while draining.

Basket stationary during *previous* fill; drain speed while draining.

Basket stationary during draining and *previous* fill.

Basket stationary during *previous* fill; no drain.

Basket stationary during draining and *previous* fill; signal sounds and chemical 64 name (e.g., **ADD SALT**) is displayed on bottom line of display during drain. To resume the formula at the next step, the operator must open and close the door, then press ①.

Drain Destination (Sewer or Reuse)

```
F01 XXX YYY RPM DRFE
F05 WHERE TO DRAIN
S02 SEWER       0
S02 REUSE       1
```

Requirements: Appears if this is a bath step and ***not*** *a Do Not Drain* or if this is an extract step.

Drain to sewer (default)

Drain to reuse

Flush Recirculation System (not used)

```
F05 XXX YYY RPM DRFE
F05 XXX YYY RPM DRFE
S05                 -
```

This decision is not used on current models, which are equipped with a separate pump for chemical tanks. On earlier models without a chemical tank pump, all chemicals were drawn into the recirculation system through a venturi in the recirculation system. To access this decision, the machine must be configured for recirculation and variable speed, but must not be equipped with a heat exchanger. This decision determines whether the recirculation system is flushed after chemicals are injected.

Cylinder Rotation at End of Formula

```
F05 XXX YYY RPM DRFE
F05 E HOW TO END ?
S05 0 FINISHED
    1 REVERSING
    2 FINAL DRAIN
    3 BREAK CAKE
```

The cylinder coasts to a stop, and the operator signal sounds. The operator presses ⓪ or CANCEL ESCAPE to silence the signal.

The cylinder is reversing at wash speed. The operator presses ⓪ or CANCEL ESCAPE to end the formula. For MIldata reversing, on time=20 and off time=2.

The cylinder is rotating at drain speed. The operator presses ⓪ or CANCEL ESCAPE to end the formula.

The cylinder begins a sequence designed to loosen goods that are plastered to the cylinder walls. The operator presses ⓪ or CANCEL ESCAPE to end the formula.

B

2 = COPY OLD TO NEW

PROGRAM 02 MENU COPY OLD TO NEW	When the *Program Menu* and *mode 2, Copy Old to New* is displayed, ENTER/NEXT **Accesses *mode 2*.**
COPY SOURCE NEW xx	When this display appears, <xx> **Selects the *source* formula** (must select by number, cannot scroll).
COPY SOURCE xx SHEETS	When the desired *source* formula number is selected, ENTER/NEXT **Confirms this is the *source* formula,** displays the formula name (e.g., SHEETS), and prompts for a *destination*.
COPY DESTINATION xx SHEETS	When this display appears, <xx> Enters a ***destination formula number***, where <xx> is a number from 01 to 50. If the destination formula number selected contains a formula, the control will automatically select the next available empty formula number as the destination.
COPY DESTINATION yy FORMULA yy	This display appears when an empty formula number is selected, where *yy* is the *unused formula number*. ENTER/NEXT **Copies the source formula to the destination formula number** except that the source formula name is not copied. The new formula is named the same as the formula number (e.g., *Formula 12*).
PROGRAM 00 MENU OK TURN KEY TO RUN	*Program Menu* reappears.

3 = EDIT NAME OF OPERATIONS

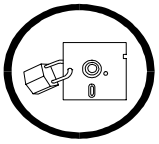
The following are the *default step names* supplied with the controller.

00 This names the step the same as the step number.

01 = Desize
02 = Abrasion
03 = Wash
04 = Bleach
05 = Rinse
06 = Extract
07 = Pre-soak
08 = Wet-out
09 = Softener
10 = Stone
11 = Finish
12 = Antichlo
13 = Clean-up
14 = Name me
15 = Name me

The names associated with step name numbers may be field-changed. Because step names are selected *by number* when programming formulas, any change to a step name will change the name in all formulas its step name number is used in.

⚠ CAUTION ⚠



DATA LOSS HAZARD—All field-changed step names are erased and lost whenever memory is cleared. The default step names will reappear.

☞ **ALWAYS re-enter any field-changed step names whenever memory is cleared.**

```
PROGRAM 03 MENU
EDIT NAME OF OPER
```

When the *Program Menu* and *mode 3, Edit Name of Oper* is displayed,

ENTER/NEXT **Accesses *the step name menu,*** and displays step name 00.

For a Quick Return to the Program Menu

CANCEL/ESCAPE **Aborts *mode 3* and returns to the *Program Menu* whenever the cursor is in the *name* field. It will have no effect if the cursor is in the *number* field. Any changes are retained.**

```
EDIT NAME OF OPER
01 FLUSH
```

Step name

Step name number
When cursor is here, you are at the *step name menu.*

When this display appears, where *01* is the *step name number* and *Flush* is the *step name*,

0 / 3 GHI **Selects step name 03 (example) and displays the name associated with this number** (can enter any number from 01 to 15).

ENTER/NEXT **Accesses the selected step name.**

```
EDIT NAME OF OPER
03 WASH
```

Step name 03 accessed

Example: Step name 03 can now be changed. Enter up to eight characters.

SKIP TO **Moves the cursor to the next position within the eight character field.**

S, SKIP TO, U, SKIP TO, D, SKIP TO, S **Enters *Suds* (example).** Press each key one or more times until the desired character appears.

```
CHANGE STEP NAMES
03 SUDS
```

When the new step name is entered,

ENTER/NEXT **Returns to the *step name menu*** (select another step name to change),

or CANCEL/ESCAPE **Saves all changes and returns to the *Program Menu.***

4 = EDIT CHEMS

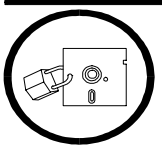
The following are the *default chemical names* supplied with the controller.

00 This names the chemical the same as the chem number.

01 = Alkali
02 = Soap
03 = Detergent
04 = Soap+alkali
05 = Deterg+alkali
06 = Chlorine Bleach
07 = Oxygen Bleach
08 = Antichlor
09 = Sour
10 = Softener
11 = Sour+softener
12 = Starch
13 = Anti-mildew
14 = Anti-bacteria
15 = Finishing Chems
16-64 = Chem Name xx

The names associated with chem name numbers 01 through 64 may be field-changed. Because chemical names are selected *by number* when programming formulas, any change to a chemical name will change the name in all formulas its chemical name number is used in.

⚠ CAUTION ⚠



DATA LOSS HAZARD—All field-changed chemical names are erased and lost whenever memory is cleared. The default chemical names will reappear.

☞ **ALWAYS re-enter any field-changed chemical names whenever memory is cleared.**

```
PROGRAM 04 MENU
EDIT CHEMS
```

When the *Program Menu* and *mode 4, Edit Chems* is displayed,

ENTER NEXT — **Accesses *the chemical name menu*** and displays the first editable name.

For a Quick Return to the Program Menu

CANCEL ESCAPE — **Aborts *mode 4* and returns to the *Program Menu* whenever the cursor is in the *name* field. It will have no effect if the cursor is in the *number* field. Any changes are retained.**

```
EDIT CHEMS
01 ALKALI
```

Chemical name

Chemical name number
When cursor is here, you are at the *chemical name menu.*

When this display appears, where *01* is the *chemical name number* and *Alkali* is the *chemical name,*

1 ABC, 3 GHI — **Selects chemical name 13 (example) and displays the name associated with this number** (can enter any number from 01 to 64).

ENTER NEXT — **Accesses the selected chemical name.**

```
EDIT CHEMS
ANTI-MILDEW
```

Chemical name 13 accessed

Example: Chemical name 13 can now be changed. Enter up to 15 characters.

SKIP TO — **Moves the cursor to the next position within the 15 character field.**

M, SKIP TO, I, SKIP TO, L, SKIP TO, D, SKIP TO, I, ↑, **etc. Enters *Mildistat* (example).** Press each key one or more times until desired character appears.

```
EDIT CHEMS
13 MILDISTAT
```

When the new chemical name is entered,

ENTER NEXT — **Returns to the *chemical name menu*** (select another name to change),

or CANCEL ESCAPE — **Saves all changes and returns to the *Program Menu.***

5 = CONFIGURE

Because the controller software is written to accommodate different machine models and options as well as certain user preferences (e.g., temperature in Fahrenheit or Celsius), it is necessary to *configure* the controller to match each specific machine. Hardware-based configure decisions must match the machine hardware, and they must be changed to match subsequent hardware changes. User preferences may be changed as desired.

Where To Find Configure Requirements—See "IMPORTANT OWNER/USER INFORMATION . . ." (see Table of Contents) for the circumstances that require reconfiguring and reprogramming. The metal *configure nameplate* on the machine shows factory configuration. Make all hardware-based configure decisions conform to this nameplate unless hardware has been added to or removed from the machine since it was manufactured. All configure decisions are explained in this section. Decisions are marked to indicate which are discretionary and which are hardware-based.

How To Access, Move Through, and Exit Program Mode 5, CONFIGURE and Use the Help Screens—The *configure mode* has two *pages* consisting of several *decisions*, each with a *help screen*. It also has several *additional screens*. **Once you have accessed *configure*, you must move through all decisions to exit** and return to the *Program Menu*. However, you need not view the help screens.

PROGRAM 05 MENU CONFIGURE

When the *Program Menu* and *mode 5, Configure* is displayed,

ENTER/NEXT **Accesses *mode 5, Configure* and displays *page AT*.** See FIGURE 2.

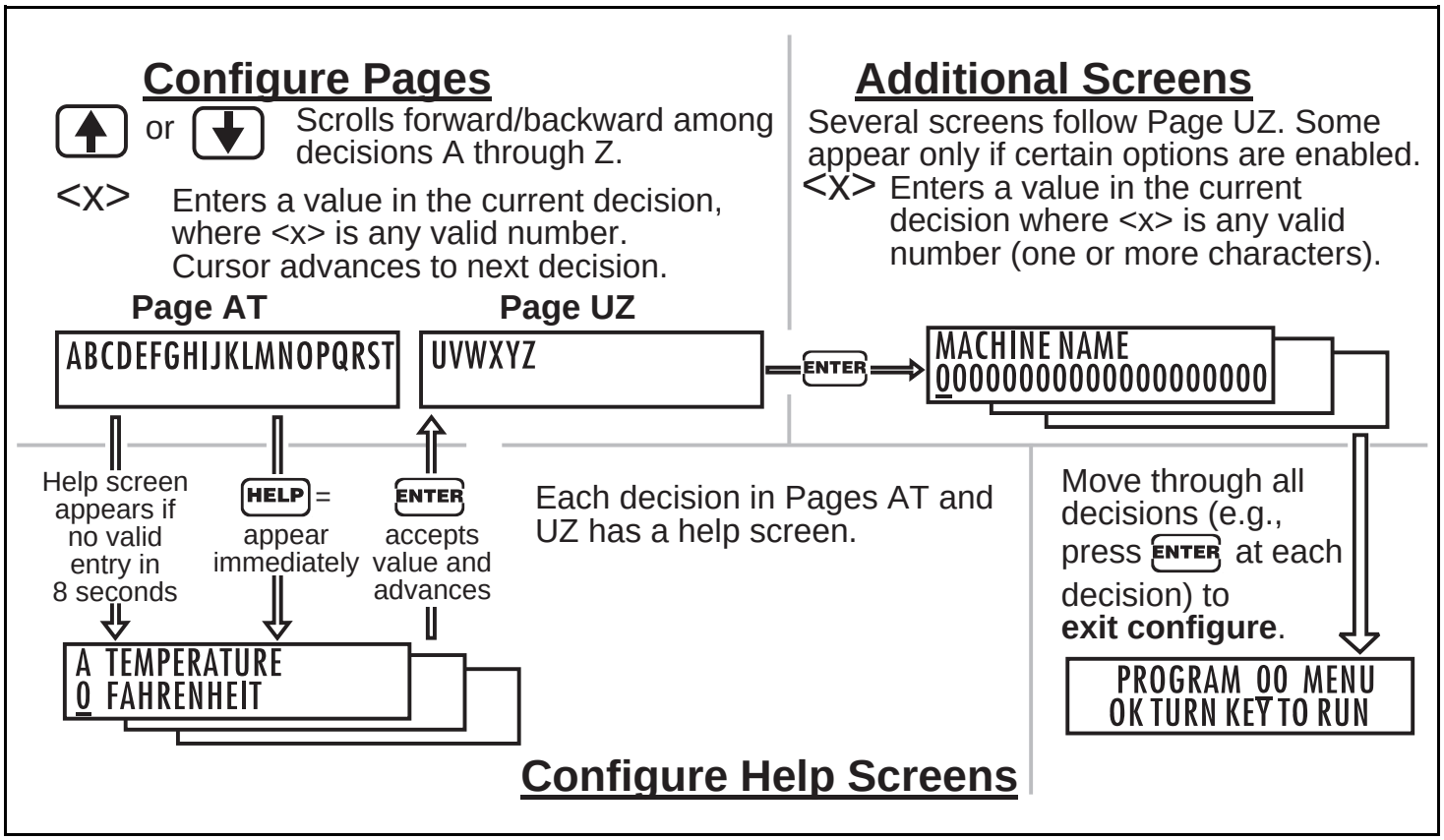


FIGURE 2 (MSOP0D10CE)
How To Move Around in *Configure* and Using the Help Screens

The Configure Decisions

A few configure decisions on *page AT* influence subsequent configure decisions on *page AT* and *page UZ.* For example, *decision H (steam error)*=1 mandates *decision T (temp control opt.)*=1 or 2. Although the control does not prevent the user from incorrectly entering T=0 in this instance, it will subsequently insert the value *one*. If the user commands T=2, the control will retain this value. Other similar lockouts are built into the configure decisions.

Several of the *additional screens* that follow *page UZ,* will only appear if certain values are entered for certain previous decisions. All possible screens are shown and explained here.

Configure Decisions for Pages AT and UZ

Configure Decision (Page and Help Screen)	D=Discretionary H=Must Accommodate Hardware	Selections	Explanation
Page AT			
ABCDEFGHIJKLMNOPQRST A TEMPERATURE 1 CENTIGRADE	D	0=Fahrenheit, inches, and month/day/year 1=Celsius, centimeters, and day/month/year	Determines temperature units, depth units, and date format for display and hard copy.
ABCDEFGHIJKLMNOPQRST B LANGUAGE 0 ENGLISH	D	0=English 1=Foreign At this time, only English is available. This selection is reserved for future use.	Specifies whether to display prompts, messages, step names and chemical names in English or the customer-specified non-English language. **⚠ CAUTION ⚠** **DATA LOSS HAZARD—If step or chemical names were field programmed, these can be lost if the language choice is changed now. See modes 3 and 4.**
B ABCDEFGHIJKLMNOPQRST C MACHINE TYPE 0 MK3 JxN D	H	0=Mark III JxN 1=Mark III JxN - WTB+ 2=Mk III Hydrocushion 3=Mark II JxN 4=Mark II JxN - WTB+ 5=Mk II Hydrocushion 6=42032JxP 7=30022JxP	
ABCDEFGHIJKLMNOPQRST D EXTRACT SPEED 1 2 EXT SPEEDS	H	0=one extract speed 1=two extract speeds	As of this writing, *two-speed extract* is optional on some machines, standard on some machines, and not available on others.
ABCDEFGHIJKLMNOPQRST *	—	not used	
ABCDEFGHIJKLMNOPQRST F CHEMFLOW MTR OPT 1 YES [0 = NO]	H	0=no 1=yes	Optional flowmeters on chemical supplies allow quantity-based, rather than time-based, chemical injection.

Configure Decisions for Pages AT and UZ, continued

Configure Decision (Page and Help Screen)	D=Discretionary H=Must Accommodate Hardware	Selections	Explanation
ABCDEFGHIJKLMNOPQRST G DRAIN BTH EXT E1-2 0 (SEC) 30 30 45	H	**BATH EXTR E1-E2** 0= 30 30 45 1= 45 45 60 2= 60 60 90 3= 75 75 105 4= 90 90 90 5= 90 120 120 6= 30 60 90	This is *drain time* in seconds after each bath or before each extract, and also the *delay time* from E1 to E2 (low to high speed extract) if machine has *two speed extract* (see *configure decision D, page AT*). **⚠ CAUTION ⚠** **MACHINE MALFUNCTION AND DAMAGE HAZARDS—Shorter drain times than the factory selection may not permit a full drain before extract, resulting in possible damage to the extract motors. Longer drain times are acceptable.**
ABCDEFGHIJKLMNOPQRST H STEAM ERROR 1 YES [ERROR=30 MIN]	H D	0=no steam 1=30 minutes 2=60 minutes 3=75 minutes	*Steam injection* is standard on certain machines and optional on others. It permits steaming for time indicated before the *too long to steam* error appears.
ABCDEFGHIJKLMNOPQRST I FILL ERROR 0 ALARM AFTER 3 MIN	D	0=3 minutes 1=5 minutes 2=10 minutes 3=15 minutes	Permits filling for the time indicated before the *too long to fill* error appears.
ABCDEFGHIJKLMNOPQRST J COOLDOWN ERROR 1 YES [ERROR=30 MIN]	H D	0=no cooldown 1=30 minutes 2=60 minutes 3=75 minutes	*Cooldown* is standard on certain machines and optional on others. It permits cooling down for time indicated before the *too long to cool* error appears.
ABCDEFGHIJKLMNOPQRST K WATER VALVE 0 HOT+COLD	H	0=*hot + cold* water valves (standard in America) 1=*hot + 2nd* water valves (standard in Europe and other areas) 2=*hot + cold + 3rd* water valves (optional) 3=*cold + 2nd + 3rd* water valves (optional)	
ABCDEFGHIJKLMNOPQRST L REUSE OPT 0 NO [1=YES]	H	0=no 1=yes	Optional *reuse drain* permits draining to sewer or reuse (as commanded in formula programming).
ABCDEFGHIJKLMNOPQRST M FLUSH TIME 0 5 SECONDS	H	0=5 sec 3=14 sec 1=8 sec 4=17 sec 2=11 sec 5=30 sec	The time the *flush tank* relay remains enabled after the *drain tank* signal has ended. Both drain and flush relays are de-energized after this time.
ABCDEFGHIJKLMNOPQRST *	—	not used	
ABCDEFGHIJKLMNOPQRST O # OF CHEM TANKS 0	H	0=no chemical tanks 1-8=number of tanks	Varying numbers of chemical tanks are optionally available. Machines may be equipped with either chemical tanks or chemical valves, but not both.

Configure Decisions for Pages AT and UZ, continued

Configure Decision (Page and Help Screen)	D=Discretionary H=Must Accommodate Hardware	Selections	Explanation
ABCDEFGHIJKLMNO**P**QRST P BALANCING 0 NO [1=YES]	H	0=no 1=yes	*Hydraulic (water) balancing* feature is standard on certain machines. It is not an option.
ABCDEFGHIJKLMNOP**Q**RST Q RECIRCULATION OPT. 0 NO [1=YES]	H	0=no 1=yes	A bath liquor recirculation system is optional on some models. This option is required for models equipped with a heat exchanger.
ABCDEFGHIJKLMNOPQ**R**ST R N/O SEWER? 0 NO [1=YES]	H	0=no 1=yes	To prevent loss of liquor if power is interrupted, some textile machines are equipped with a drain valve that does not open when power to the machine is lost.
ABCDEFGHIJKLMNOPQR**S**T S RAMP CONTROL OPT. 0 NO RAMP CONTROL	H	0=no ramp control 1=heat up ramp only 2=cooldown ramp only 3=heat up and cooldown ramps 4=on-off ramp	Ramp control allows for programming a maximum rate of change for temperature during heating, cooling, or both. While selections 1through 3 require a modulating valve, selection 4 (on-off ramp) controls ramp rate by turning a standard steam valve on and off.
ABCDEFGHIJKLMNOPQRS**T** T TEMP CONTROL OPT. 1 YES [1 PROBE]	H	0=no temperature probes 1=one probe 2=two probes	Number of temperature probes depends on model and method of filling with water. Two probes are required for models with optional heat exchanger.
Page UZ			
UVWXYZ *	—	not used	
UVWXYZ V VARIABLE SPEED 1 YES=WITH DRAIN MOT	H	0=no variable speed 1=variable speed with drain motor 2=variable speed without drain motor	Select 0 if machine is not equipped with variable speed. Select 1 if machine is equipped with variable speed. Selection 2 is not used at this time, and may cause improper operation or machine damage. **⚠ CAUTION ⚠** **MACHINE MALFUNCTION AND DAMAGE HAZARDS—The variable speed inverter was programmed at the factory. The constants are written inside the electrical box housing the inverter. Changing these constants may result in damage to goods or the machine.**

Configure Decisions for Pages AT and UZ, continued

Configure Decision (Page and Help Screen)	D=Discretionary H=Must Accommodate Hardware	Selections	Explanation
UVWXYZ W LIQUOR RATIO OPT. 1 YES [0 = NO]	H	0=no 1=yes	Liquor ratio is an equipment option which allows the machine to admit an amount of water proportional to the size of the load entered when a program is run.
UVWXYZ X DIRECT HEAT/COOL 1 YES [0=NO]	H	0=no 1=yes	Direct heat and direct cool are conventional methods of injecting either steam or cold water directly into the cylinder. Enter 1=YES if machine has either direct heat or direct cool.
UVWXYZ *	—	not used	
UVWXYZ Z HEAT EXCHANGER 1 YES [0=NO]	H	0=no 1=yes	A heat exchanger is available as an option on some models. If a heat exchanger is present, the machine must be configured for recirculation (Q=1), two temperature probes (T=2), and metered water (W=1).

Additional Configure Screens

Configure Decision (Screen)	D=Discretionary H=Must Accommodate Hardware	Selections/Range	Explanation
MACHINE NAME 0000000000000000000	D	up to 20 characters entered from the keypad	This is the machine name used on printed reports.
WTB+ Screens—*Miltrac Address* appears for *WTB+* machines *(decision C=1 or 4).* The remaining eight screens (Milnor Dryell? through Program Post Dry?) only appear for WTB+ machines *(decision C=1 or 4).*			
NOTE: Discharge time, discharge dwell time, and number of discharge sequences, below, control basket rotation and duration of discharge (machine tilted forward with door open). Use these configure decisions to ensure all goods are discharged.			
MILTRAC ADDRESS 048	H	000-255	
MILNOR DRYELL? 1 YES [0 = NO]	H	0=No 1=Yes	

B

Additional Configure Screens, continued

Configure Decision (Screen)	D=Discretionary H=Must Accommodate Hardware	Selections/Range	Explanation
Dryell Screens (only appear if *Milnor Dryell?=1)*			
DRYELL DELAY TIME: 000	D	000-255	Specify the delay time after loading is completed, before moving the dryell up. Provide enough time to ensure that the goods and water enter the machine.
DRYELL FLUSH TIME: 000	D	000-255	Specify how long to flush water into the dryell during loading.
DISCHARGE CW CCW TIME(10ths) 30 30	D	01-99 tenths of seconds (each field)	This is the duration of clockwise (CW) and counterclockwise (CCW) rotation during discharge.
<xx>	**For each direction, enters the time**, where <xx> is a two digit number. Cannot scroll decisions or values. **Do not use** ⬆ / ⬇ .		
ENTER NEXT	**Accepts the displayed value** and advances to the next decision.		
DISCHARGE DWELL TIME(10ths): 20	D	00-50 tenths of seconds	The duration of the pause between each reversal of rotation of the basket during discharge.
NUMBER OF DISCH SEQUENCES: 20	D	02-20 sequences	The number of times the direction of rotation changes during discharge. Each movement in either the CW or CCW direction counts as one sequence.
END TIME IN MIN. 2	D	0-8 minutes	The minimum time the machine will run in the how to end method (commanded in formula programming) before desiring to discharge. Specify sufficient time to assure that any plastered goods work loose.
PROGRAM POST DRY? 0 NO [1=YES]	D	0=no 1=yes	In some installations, dry code and destination code are not passes to the machine from the downstream device. 1 (yes) causes the controller to prompt for these codes during formula programming.
ELEC LEVEL 0 NO [1 = YES]	H	0=no 1=yes	Electronic level sensing is an option on some machines.

Additional Configure Screens, continued

Configure Decision (Screen)	D=Discretionary H=Must Accommodate Hardware	Selections/Range	Explanation
Electronic Level Sensing Screens (only appear if *Elec Level* =1) **NOTE:** *Low*, *med*, and *high* levels shown below do not set the levels for the machine; thus, they do not necessarily coincide with the traditional levels *one* (starch), *two* (wash), and *three* (rinse). However, they set the ranges within which levels are specified in the formula. They also provide safety lockouts. *Tilt level* does set the level the machine will achieve while tilted.			
ELEC. LOW LEVEL **04**	D	Inches (Centimeters) 04-10 (10-25)	Minimum level that can be commanded for any bath and thus, the minimum level required for steaming.
ELEC. MED LEVEL **10**	D	10-16 (25-40)	Minimum level required in a bath preceeding an extract. If a lower level is commanded, the control will insert the value configured here when the wash formula is saved.
ELEC. HIGH LEVEL **38**	D	16-38 (40-99)	Maximum level that can be commanded for any bath.
TILT LEVEL **06**	D	06-38 (15-99)	In a tilting machine, the actual level that will be achieved when machine is tilted up to load, if a formula is pre-selected.
TAP OFFSET COUNTS **0001**	H	0000-9999 counts	This value adjusts the transducer output to compensate for offsetting conditions (such as location of level sensor) specific to each machine. It is determined for each machine at the factory (and the value shown on a nameplate), but may be re-calibrated in the field. See “ADJUSTING LEVEL SENSING APPARATUSES . . .” for calibration procedure.
LOW DRAIN TIME SEC. **35**	D	30-99	Select the number of seconds the machine will drain bath liquor into the sewer or reuse tank if the liquor level is below low level.
MED DRAIN TIME SEC. **45**	D	40-99	Select the number of seconds the machine will drain bath liquor into the sewer or reuse tank if the liquor level is between low and medium level.
HI DRAIN TIME SEC. **55**	D	50-99	Select the number of seconds the machine will drain bath liquor into the sewer or reuse tank if the liquor level is above medium level.
AMPSAVER OPTION **1 YES [0 = NO]**	H	0=no 1=yes	Optional AmpSaver feature reduces maximum amperes required by a group of machines by postponing the beginning of extract in any machines that would cause total current draw to exceed a preset maximum.

B

Additional Configure Screens, continued

Configure Decision (Screen)	D=Discretionary H=Must Accommodate Hardware	Selections/Range	Explanation
DATA PASS OPTION 0 NO [1 = YES]	D	0=no 1=yes	Answer yes if machine should pass a destination code at the end of the formula.
KEYPAD INJECT MMQ 001	D	000-633 minutes, minutes, and quarter-minutes (e.g., 102=10 minutes, 30 seconds)	Enter the amount of time the chemical tank drain valve should remain open when chemicals are injected by keystroke.
Password (numeric pass code) Screens			
MANUAL PASSWORD 0 NO [1 = YES]	D	0=no— Password (numerical pass code) not required for manual modifications to a running formula 1=yes— Password required.	
PASSWORD: 1234	D	0000-9999	The four digit pass code configured here must be entered by the operator before making manual formula modifications.
Metered Water Screens (appear only if *decision W, page UZ* = 1)			
COUNTS PER 100 1483	H	0000-9999	Establishes the units measured by the electronic flowmeter. Enter the number of flowmeter counts resulting from flowing 100 gallons, 100 liters, etc., whichever is the unit of choice. The same unit must be used when programming formulas.
OFFSET VALVE TIME 048	H	000-255 tenths of seconds	This value reduces the amount of time the water valve will open to admit the metered quantity commanded. This compensates for the tendency of the valve/flowmeter to overshoot the commanded quantity. See flowmeter calibration procedures.
NUM CHEM VALVES ? 05	H	00-28 valves This decision appears only if *configure decision O #* of Chemical Tanks = 0	This is the number of valves or pumps used to inject chemicals, whether flush valves on an optional *flushing supply injector*, peristaltic pumps (supplied by others) or optional *liquid supply valve*s. This decision is not used if the machine is equipped with chemical tanks.
LINK TO MILDATA? 1 YES [0=NO]	H	0 = no—Machine does not communicate with a Mildata® computer 1 = yes —Machine communicates with a Mildata® computer	

Additional Configure Screens, continued

Configure Decision (Screen)	D=Discretionary H=Must Accommodate Hardware	Selections/Range	Explanation
DATA FWGCEWPL ENTRY 10000000	D	For each of the following, 0=*no* and 1=*yes*	Permits Mildata® accounting by the code categories enabled here.

Formula F — 0 or 1, but 1 inserts 0 in next two decisions and skips them.
Work Order W — 0 or 1 if *formula* above = 0, otherwise must be 0 and cursor skips over.
Goods Code G — 0 or 1 if *formula* ***and*** *work order* above are both = 0. Otherwise must be 0.
Customer Code C — 0 or 1 if *work order* above = 0. Otherwise must be 0.
Employee Code E — 0 or 1
Weight W — 0 or 1
Pieces P — 0 or 1
Lot Number L — 0 or 1

For each of the above,

<x> **Enters *no* or *yes***, where <x> is 0 or 1. Cannot scroll decisions or values. **Do not use** ⬆ / ⬇ .

ENTER NEXT **Accepts the selected choice** and advances to next decision. Cursor moves forward only.

Gains Screens (only appear if *decision S, page AT* = 1, 2, or 3)

GAINS KP 1/KP 120 100	H	These values calibrate the microprocessor for determining the temperature rate of change. This helps prevent overshooting the desired temperature or changing temperature more rapidly than desired. Consult the Milnor factory before changing these values.	
GAINS KI 1/KI 004 999			
GAINS KD 1/KD 300 010			

6 = DOWN LOAD

What Downloading Does—Downloading transfers *all* formulas, step names, chemical names, and configure codes (if specified) from one machine to another via a *serial communication cable* (chemical flow data is never received from a download.). This eliminates the need to enter the same data repeatedly. It can also transfer this data between a machine and a Milnor® *serial downloader (Milnor® part number KXMIC00508)* for convenient data retrieval in the event of computer memory loss.

B

Downloading completely replaces all of the above mentioned data (configure codes are downloaded only if specifically commanded). Selective downloading (e.g., transferring only certain wash formulas) is not possible.

When and When Not To Download—The reliability and usefulness of downloaded data depends on the similarity between the sending machine and any receiving machines. Abide by the following table.

Similarity between sending and receiving machines			Should you download?	Actions required after downloading
Software	**Basic model**	**Options**		
Identical	Identical	Identical	**Yes –include configure.**	none
Identical	Identical	Different	**Ok–probably exclude configure.**	Check configure (see caution).
Identical	Different	Different	**Probably not.**	Reconfigure then revise formulas.
Different	doesn't matter	doesn't matter	**No**—will result in scrambled, unusable data.	

⚠ CAUTION ⚠

MACHINE MALFUNCTION HAZARD—Machine may malfunction, possibly causing unsafe operation, damage to machine and/or damage to goods if not properly configured.

☞ **After downloading, reconfigure in accordance with each receiving machine's configure nameplate. This may be omitted only where all machines have *identical* configurations.**

The General Procedure—Downloading is done in the following stages:

1. *Connect* all participating devices via a temporary serial cable (if a permanent cable is not already installed).
2. *Set up* each machine (not the *serial downloader*), using *mode 6, Download.*
3. *Initiate and monitor* the downloading.

Making Connections

Machine To Machine—If a serial cable is not permanently installed (in conduit) between participating machines, install a temporary cable. See "THE EXTERNAL SERIAL LINK CABLES. . ." (see Table of Contents).

⚠ CAUTION ⚠

MACHINE MALFUNCTION HAZARD—Temporary cables (not enclosed in conduit) are susceptable to electromagnetic interference (EMI) which can disrupt machine operation.

☞ **Remove temporary cable as soon as downloading is completed.**

Machine To/From Serial Downloader—Two sets of instructions appear on the downloader: ***To Download*—copying data *from a machine to the downloader* and *To Upload*—copying data *from the downloader to one or more machines*.** Connect the lead from the downloader box to the *Printer/Download socket* on the machine (*step 1* on the downloader instructions for *both downloading and uploading*). Ready light should be *on*.

Setting Up Participating Machines (not the *serial downloader*)

Depending on the type of downloading, there will be none, one, or several slave (receiving machines), and none or one master (sending) machine. **Designate *all* slave machines first.**

For each participating machine, access *mode 6, Download*. You will be prompted for the following information: *type of download* to be performed, whether this machine is a *slave (sending)* or *master (receiving)* machine, and for slave (receiving) machines, whether to *receive configure data*.

```
PROGRAM 06 MENU
    DOWN LOAD
```

When the *Program Menu* and *mode 6, Down Load* is displayed,

ENTER NEXT **Accesses the *Down Load Devices menu* and displays the first selection.**

For a Quick Return to the Program Menu

CANCEL ESCAPE **Aborts *mode 6* prior to designating slave/master and returns to the *Program Menu.* After designating slave/master, see "Aborting Downloading In Progress" in this section.**

For each of the decisions explained below,

<x> Specifies a menu selection, where <x> is the menu item number.

ENTER NEXT **Accepts the displayed selection** and advances to the next decision.

Specify the Type of Download

```
DOWN LOAD DEVICES
0 MACHINE<==>MACHINE
```

Make the *same* selection for *all* participating devices.
This is the correct choice for all types of downloading covered by this instruction.

`1 MACHINE<==>TAPE` No longer used. See manual MATM2MICXE for instructions on retrieving data previously stored on cassette tape.

`2 MILDATA=>MACHINE` Data will transfer from a Mildata® PC to machine(s). See Mildata® manual for procedure.

Specify Slave (Receiving) or Master (Sending)

```
DOWN LOAD STATUS
0 SLAVE
```

Make the appropriate selection for each participating machine.
This machine will *receive* data (default). **All receiving machines must be designated *first.***

`1 MASTER` This machine will *send* data. **Must be designated last** (see next page before accepting).

Specify Whether To Download Configure Data (if this is a receiving machine)

```
RECEIVE CONFIG ?
0 NO [1=YES]
```

Make the selection likely to most closely match this machine's *configure nameplate*.
Configure data will *not* be downloaded. This machine will retain its current configuration.

`1 YES [0=NO]` Configure data *will* be downloaded. Configuration will match the sending machine.

```
(S)  xxxx BAUD  0000
WAITING FOR MASTER
```

When the display at left appears, this receiving machine is ready to accept download data. *xxxx*=9600 (fast data transfer rate) for all types of downloading covered by this instruction. If *xxxx*=0300 (slow data transfer rate), this indicates that *1=Machine<==>Tape* was incorrectly specified above.

Initiating, Monitoring, and Aborting a Download

Once any receiving machines are set-up and awaiting data, downloading may be *initiated*. Displays are provided for *monitoring* the progress of downloading. You may *abort the download process* at any time. **However, if a download in progress is halted, all receiving devices will contain a mixture of old and new data, and will not operate properly until program memory is successfully downloaded or reprogrammed.**

Initiating Downloading

Between Machines	Machine to Serial Downloader (see *To Download* on downloader box)	Serial Downloader to Machine (see *To Upload* on downloader box)
1. **Designate master.** Downloading begins immediately.	1. **Clear memory in the serial downloader** as explained in the *To Download* instructions on the serial downloader. 2. **Designate master.** Downloading begins immediately.	1. **Command *Transmit,*** as explained in the *To Upload* instructions on the serial downloader.

Monitoring Downloading in Progress

Normal Displays During Downloading:

```
(M) 9600 BAUD  xxxx
RECEIVING DATA
```
Slave (receiving) machines

```
(S) 9600 BAUD  xxxx
TRANSFERRING DATA
```
Master (sending) machine

Display indicating successful completion (appears on all machines):

```
PROCESS COMPLETED
 NEXT TO PROCEED
```

The displays at left appear during downloading, where *xxxx* is a scrolling hexadecimal number, indicating byte location currently downloading. At 9600 baud, downloading takes about one minute. While downloading to/from the serial downloader, the *Transmit light* or *Receive light* (as appropriate) should be *on*. When downloading is successfully completed,

ENTER NEXT **On each machine, returns to *Program Menu*.**

NOTE: After downloading to the serial downloader, label the downloader with the *machine model and software version*.

Error Displays During Downloading:

```
(S) 9600 BAUD  000
WAITING FOR MASTER
```

```
ERROR IN CHECK SUM
NEXT TO PROCEED
```

If, during downloading, either display shown at left appears on a receiving machine, data transfer to that machine was unsuccessful. If the *Receive light* fails to illuminate when downloading from a machine to the serial downloader, data transfer was unsuccessful. Check the serial cable connections and repeat the download process.

Aborting Downloading In Progress

CANCEL ESCAPE **Aborts the download process** for any receiving machine on which it is commanded, or for all machines if commanded on the sending machine. The machine receiving the abort command displays the following:

```
DOWN LOAD ABORTED
  NEXT TO PROCEED
```

Repeat the download process for any receiving machine on which downloading was aborted; otherwise, the machine will contain a mixture of old and new data.

7 = CLEAR ALL MEMORY (VOLUNTARILY)

This mode clears all user-programmed formulas, step names and chemical names on command. The step names and chemical names originally supplied with the machine will reappear. Configure codes are unaffected when memory is cleared voluntarily, but the control must be reconfigured after first commissioning the machine or after the display says *Clear Memory Now.* See also "IMPORTANT OWNER/USER INFORMATION. . ." (see Table of Contents).

PROGRAM 07 MENU CLEAR ALL MEMORY

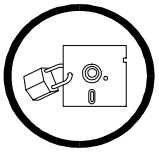
When the *Program Menu* and *mode 7, Clear All Memory* is displayed,

ENTER/NEXT **Accesses *mode 7*** and prompts the user to clear memory or cancel.

For a Quick Return to the Program Menu

CANCEL/ESCAPE **Aborts *mode 7* without clearing memory and returns to the *Program Menu.***

⚠ CAUTION ⚠



DATA LOSS HAZARD—The following key strokes will delete all user programmed data.

☞ **If this mode was entered accidently, press CANCEL/ESCAPE to cancel this procedure.**

4+5+6=CLEAR MEMORY CANCEL = ESCAPE

When this display appears (no cursor),

4 JKL + 5 MNO + 6 PQR **Clears all user-programmed formulas, step names, and chemical names.**

CLEARING MEMORY **PLEASE WAIT**

This display appears while the controller is clearing memory. When memory is cleared, the display returns to the *Program Menu*.

or CANCEL/ESCAPE **Aborts mode 7 without clearing memory.**
Display returns to the *Program Menu.*

8 = PRINT DATA

This mode permits printing the current *formulas, configure codes, chemical names, step names,* and *chemical flow meter configuration* (see FIGURE 3) on a printer meeting the requirements explained in "REQUIREMENTS AND SETTINGS FOR THE EPSON LX300 PRINTER" (see Table of Contents). The printer is connected to the machine through the *Printer/Download socket*. A mating plug is provided with the machine for wiring the printer interface cable. See "THE EXTERNAL SERIAL LINK CABLES. . .".

```
PROGRAM 08  MENU
PRINT DATA
```

When the *Program Menu* and *mode 8, Print Data* is displayed,

ENTER/NEXT **Accesses *mode 8*** and prompts for the type of data to print.

For a Quick Return to the Program Menu

CANCEL/ESCAPE **Aborts *mode 8* any time prior to the start of printing and returns to the *Program Menu*.**

```
PRINT DATA
0  FORMULAS
```

When this display appears, select the type of data to print from the choices shown.

0 FORMULAS — Prints the range of formulas specified below.

1 CONFIGURATION — Prints the configure codes.

2 CHEMICAL NAMES — Prints the 64 field-programmable chemical names.

3 STEP NAMES — Prints the 15 field-programmable step names.

4 CHEM FLOW DATA — Prints the flow meter configuration data for each chemical flow meter

ENTER/NEXT **Accepts the selected choice and prompts for today's date.**

```
DATE:  MM - DD - YYYY
       mm - dd - yyyy
```

When configure decision A=0

When configure decision A=1

```
DATE:  DD - MM - YYYY
       dd - mm - yyyy
```

This display permits entering today's date, which will appear on the printout. *mm*, *dd*, and *yyyy* are numbers representing month, day, and year, respectively. Note that month/day or day/month order depends on *configure decision A*. The date is retained (in unprotected memory) for about 48 hours with power *off*.

<mm> or <dd> or <yyyy> enters a value at the indicated cursor location, where <mm> is a number from 01 to 12, representing the month, <dd >is a number from 01 to 31 representing the day, and <yyyy> is a number representing the year (e.g., 1995).

ENTER/NEXT **Accepts the displayed value and advances to next field or decision.**

```
START          STOP
  xx             yy
```

This display only appears if *Formulas* was selected above. Formulas 00 and 99 are always printed. Enter the range of additional formulas to be printed, where *xx* is the starting formula and *yy* is the ending formula, inclusive.

<xx>, ENTER/NEXT **Enters the lowest formula number**, where <xx> is greater than 00 and less than or equal to <yy>.

<yy>, ENTER/NEXT **Enters the highest formula number**, where <yy> is greater than or equal to <xx> and less than 99. Printing begins.

```
 PRINTING . . . .
**  PLEASE WAIT  **
```

During printing, this display appears. When printing is concluded, the display returns to the *Program Menu.*

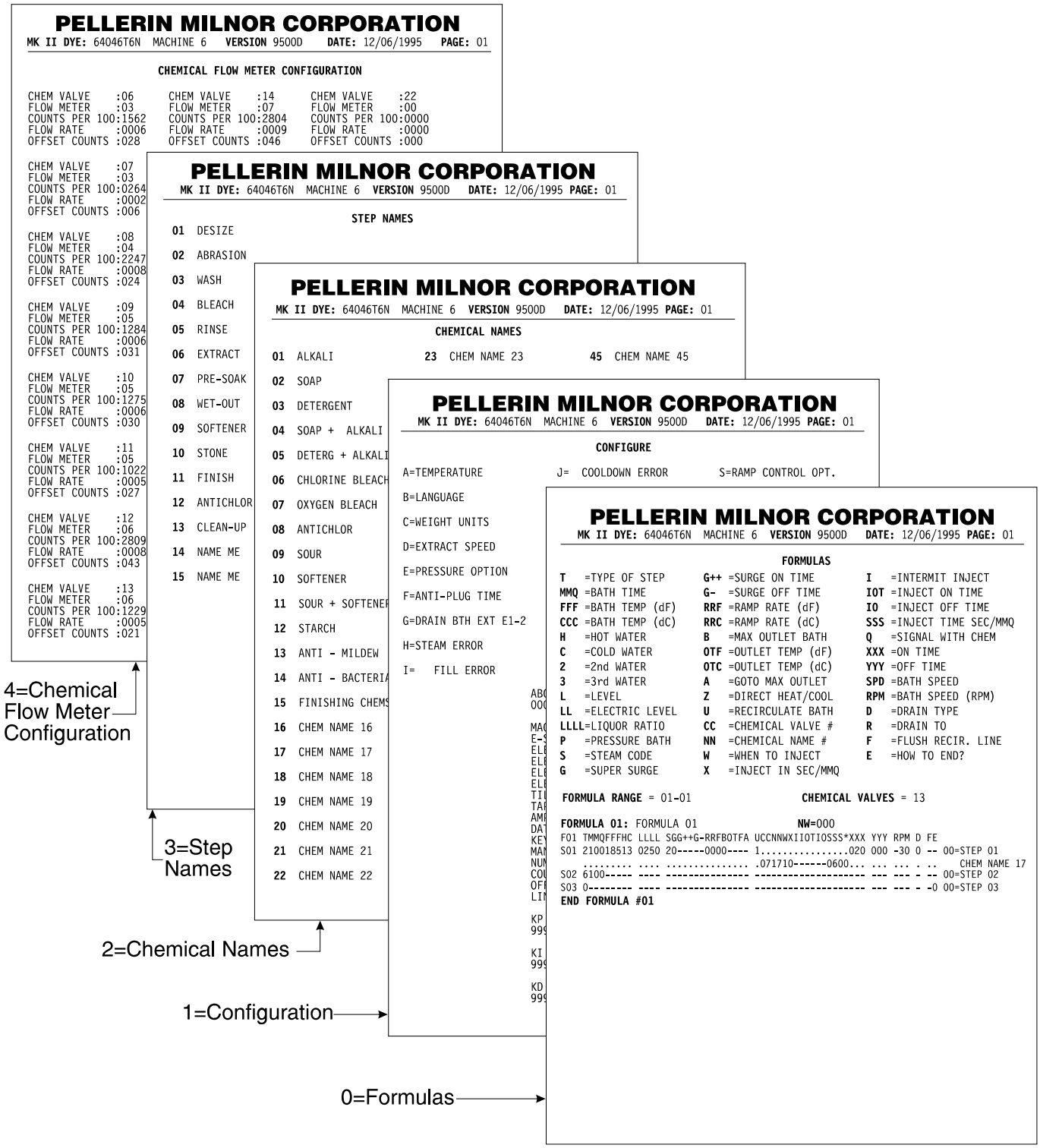


FIGURE 3 (MSOP0D10CE)
Example Printouts Using *Mode 8, Print Data*

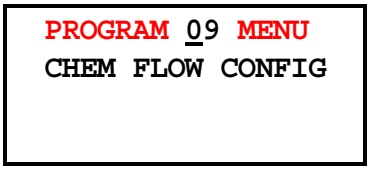
9=CHEMICAL FLOW METER CONFIGURATION

A chemical flow meter measures the amount of a chemical injected into the machine and signals the microprocessor when the programmed amount of chemical has been injected. By using flow meters to measure chemical injection quantities, wash formulas can be created which call for a specific amount of a chemical, rather than a chemical injection of a certain amount of time.

Why Flow Meters Must be Calibrated—Flow meters count electronic pulses produced by a paddlewheel in the chemical flow path. The paddlewheel rotates at a speed proportional to the speed of the passing chemical, so faster chemical flows cause the counter to increment faster. The number of pulses for any quantity of chemical will vary with the size of the tubing the chemical is flowing through; chemical flowing through a large tube and past a flow meter will produce fewer pulses than the same quantity of chemical flowing through a smaller tube. Similarly, a viscous liquid will flow through a given tubing diameter more slowly than a thin liquid. Calibration determines the ratio of pulses to chemical quantity for the specific tubing size and chemical viscosity, and also compensates for any minor variations in the sensitivity of the flow meter.

Calibration Procedure

The chemical flow meter calibration procedure consists of two steps: assigning chemical valves to flow meters, and calibrating each flow meter for each chemical which flows through it. If chemical flow meters have never been calibrated for this machine, or if the processor board has been replaced since the last flow meter calibration, these two steps should be preceded by clearing calibration data. However, note that clearing calibration data affects **all** chemicals. **If calibration data is cleared, all chemicals must be recalibrated.**



When the *Program Menu* and *mode 9, Chem Flow Config* is displayed,

ENTER NEXT **Accesses mode 9 and displays the first selection.**

For a Quick Return to the Program Menu

CANCEL ESCAPE **Aborts *mode 9* prior to entering data in the "units" field, and returns to the *Program Menu.***

For each of the decisions explained below,

<x> Specifies a menu selection, where **<x>** is the menu item number.

ENTER NEXT Accepts the displayed selection and advances to the next decision.

The Chemflow Setup Menu

```
CHEM FLOW CONFIG
0 VALVE ASSIGNMENT
```

Assign specific chemical valves to each flow meter.

`1 CALIBRATE` Calibrate each flow meter for all chemicals which will flow through it.

`2 CLEAR CALIBRATION` Clear all chemical-to-flow meter assignments and reset **all** chemical flow meter data to 0. This selection requires recalibration of all chemicals, so it should only be used when a machine is first commissioned or after the processor board is replaced.

0=Assign Chemical Valves to Flow Meters

```
CHEM FLOW CONFIG
0 VALVE ASSIGNMENT
```

When the display at left appears,

ENTER NEXT Accesses the valve assignment display.

```
SELECT VALVE #
06
SELECT METER #
03
```

Select the first chemical valve to be assigned to a flow meter, then select the physical number of the meter to which this chemical is attached.

Example:

0 , 6 PQR , ENTER NEXT Selects chemical valve 06 and prompts *Select Meter #*.

0 , 3 GHI , ENTER NEXT Assigns selected chemical valve to flow meter 03 (first mechanical flow meter), and prompts *Select Valve #* for next chemical valve.

Textile machines can be equipped with up to 28 chemical valves, but only valves 06 through 28 can be metered. A separate flow meter is not required for each chemical; multiple chemicals may be metered by a single flow meter if the chemicals will not interact unfavorably in the meter or tubing.

Connections are available for up to 24 individual chemical flow meters, but connections 1, 2, 9, 10, 17, and 18 are high-speed inputs reserved for use with electro-magnetic flow meters. Standard mechanical flow meters (paddle-wheel type) should be connected only to chemical flow meter connections 3 through 8, 11 through 16, and 19 through 24.

```
SELECT VALVE #
06
SELECT METER #
03
```

When all desired chemicals are assigned to flow meters, place the cursor at the *Select Valve #* prompt (shown at left), and press CANCEL ESCAPE . The control returns to the main *Program Menu*.

1=Calibrate Flow Meters for Each Chemical

After assigning chemical valves to flow meters, you must calibrate each flow meter for all chemical flowing through it. This procedure helps the controller to accurately inject several chemicals through a single flow meter, regardless of the viscosity of the chemical or the size of the conduit through which it is injected.

```
CHEM FLOW CONFIG
1 CALIBRATE
```

From the *Chemflow Setup menu*, 1 ADC, ENTER NEXT accesses the *Calibrate menu*.

```
VALVE 06 FLMTR 03
NEXT = OFF/ON
COUNTS 00000000
ENTER UNITS 000
```

The *calibrate menu* displays the number of the chemical valve selected, the flow meter to which this valve was assigned (see "Assign Chemical Valves to Flow Meters"), the counts recorded, and the number of units injected. Because the chemical valve has not been opened, the counts value is 0.

To calibrate a chemical, enter the valve number (e.g., 06). When a valid valve number is entered, the *FLMTR* field is updated. Verify that the indicated flow meter exists and that the selected chemical injects through this flow meter.

To calibrate the selected chemical, route the flow meter chemical outlet to a container graduated in the same units that will be used in programming chemical injections. Place the container on the floor and insert the tubing from the outlet of the flow meter securely in the container.

ENTER NEXT Toggles the chemical valve on/off.

```
VALVE 09 FLMTR 03
NEXT = OFF/ON
COUNTS 00000000
ENTER UNITS 000
```

Press ENTER NEXT once to start the flow of chemical into the graduated container and to signal the controller to begin monitoring the flow meter. Note that the chemical will begin flowing and the *COUNTS* field will begin counting as soon as ENTER NEXT is pressed. When the desired quantity of chemical has been pumped into the container, press ENTER NEXT again to stop the flow.

```
VALVE 09 FLMTR 03
NEXT = OFF/ON
COUNTS = 00045902
ENTER UNITS 000
```

Enter the number of units pumped in the *UNITS* field. Press ENTER NEXT to save the units data and return to the valve field for the next valve, or press CANCEL ESCAPE to discard the data. Repeat this procedure for each chemical valve.

Note: The units recorded may be any meaningful units; however, the maximum number of units allowed when programming a chemical injection is 4095. Therefore, the unit used for calibration should be large enough that no more then 4095 units of the chemical will ever be desired in a wash formula.

2=Clear Calibration Data

```
CLEAR CALIBRATION
4 + 5 + 6 = DELETE

 CANCEL = ESCAPE
```

When the display appears as shown at left,

4 JKL + 5 MNO + 6 PQR Clears all chemical flow meter calibration data,

or CANCEL ESCAPE cancels the operation and returns to the Program Menu.

Section 2

Operating

Determining Load Size

Document BIWUUO01
Specified Date 20000817
As-of Date 20000817
Access Date 20000817

Applicability ..... WUU

Putting **too much** linen into a properly designed laundry washer-extractor will not **overload** the machine to its mechanical or electrical detriment if these guidelines are followed:

1. The goods consist of typical cotton and/or synthetic fabrics normally encountered in commercial laundering operations.
2. The load is not so bulky as to prevent a reasonably balanced distribution prior to the onset of extraction.
3. The extract speed has not been increased above the designed maximum.
4. The total number of intermediate and final extractions do not exceed the designed maximum for the extract motor.

Thus, the *maximum soiled linen capacity* for any properly designed washer-extractor is essentially limited by the amount of soiled goods that can actually be placed in the cylinder.

The maximum weight of soiled goods that a washer-extractor cylinder will accept depends on the following factors:

- the internal volume of the cylinder (the space into which the goods can be placed), and
- the density (weight and bulkiness) of the specific goods

For example, many polyester-cotton fabrics have relatively low weights for their bulk so one should rarely expect to be able to put in a published maximum capacity load of such fabrics. In fact, published maximum capacities of machines based on the now generally accepted industry standards will usually be achieved only with the highest density, closely woven fabrics and a reasonable soil content.

The best load size depends on the size of the machine—plus the type of goods, soil content, and wash quality desired. Since the latter factors vary considerably, prior experience and/or experimentation generally yield the best results. Use these guidelines:

1. Overloading a washer-extractor will not increase production because longer wash formulas and more rewash will be required.
2. Avoid underloads because the inevitable greater extraction imbalance will cause more extract re-cycles and may stress the machine unnecessarily.
3. Load divided cylinder machines so that the **weight in each compartment is approximately equal at the onset of extraction.** Do not put goods with grossly dissimilar water absorption characteristics in the different compartments. Do not attempt to balance loads of wet goods in one compartment against dry goods in the other.

— End of BIWUUO01 —

OPERATING THE MARK III, IV, AND V TEXTILE MICROPROCESSOR CONTROLLER

The Mark III, IV, and V textile machine controller is used on several types of machines for textile processing. Each type has its own electromechanical controls and operating procedures. This section provides information to assist management personnel in establishing procedures and training operators in the use of these machines.

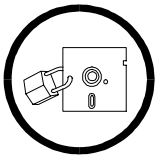
Procedures Used in Normal Operation

⇦ Fold out FIGURE 1 in "ABOUT THE USER CONTROLS . . ." (see Table of Contents) for the meaning of display and key symbols used in this section.

See the "Description of Controls . . ." in the operator manual for depictions of the nameplates containing the controls explained here.

OPR 1: Verify Switch Positions—The machine must be in the *Run mode* for operation. Verify that the *Run/Program keyswitch* is set to *run* ( ) with the key removed.

⚠ CAUTION ⚠



DATA LOSS HAZARD—Improper use of the *Program/Run keyswitch* may corrupt program data.

- ☞ **Return to the run mode only when the display says *OK Turn Key To Run.***
- ☞ **Only power off or on with the Program/Run keyswitch at *run*.**
- ☞ **Do not leave key accessable to unauthorized personnel.**

Machines configured for WTB+ operation (automatic loading and unloading) have operator controls for selecting and de-selecting automatic operation.

Optionally, the machine may be furnished with *Overnight Bath Soak*; it may also be linked to a *Mildata*® and/or *Ampsaver*® system. Operator controls are furnished for selecting and de-selecting these modes of operation.

Mildata—Mark III, IV, and V machines may link to a *Mildata computer* which permits a bank of machines to download formulas from and provide accounting and other data to the Mildata computer. Set the *Remote/Local switch* to *remote* ( ) to place a washer-extractor on-line. When on-line, each time the operator selects a formula, the Mark III controller requests the selected formula from Mildata. For example, if the operator selects *formula 0005*, the machine receives and runs whatever formula is currently associated with that formula number in the Mildata computer. When operating on line, the machine displays the message "PLEASE WAIT," while it is requesting and downloading the formula from the Mildata computer. To take the machine off-line, set the *Remote/Local switch* to *local* ( ). The machine will then run the selected formula stored in the machine's formula memory.

Ampsaver—Mark III machines may also link to an *Ampmaster controller* which temporarily delays an extract step to prevent the total amperes drawn by a bank of machines from exceeding a preset maximum. Set the *Ampsaver/Machine switch* to *Ampsaver* ( ) to place the machine on-line. The machine will then respond to any request from the Ampmaster controller to delay entering extract. When properly set, this system will save energy and not significantly delay the production output of any machine. To take the machine off-line, set the *Ampsaver/Machine switch* to *machine* ( ).

OPR 2: Energize the Microprocessor Controller—The external disconnect switch (furnished by the owner/user) provides/removes *all* power to/from the machine (but not necessarily to/from non-Milnor electrical devices mounted to the machine). The *Master switch* (⏻/⏻) provides/removes power to/from the Mark III, V, and V controller. C

⚠ DANGER ⚠

ELECTROCUTION AND ELECTRICAL BURN HAZARDS—Contact with high voltage will electrocute or burn you. Power switches on the machine and the control box do not eliminate these hazards. High voltage is present at the machine unless the main machine power disconnect is *off*.

- ☞ **Do not unlock or open electric box doors.**
- ☞ **Do not remove guards, covers or panels.**
- ☞ **Do not reach into the machine housing or frame.**
- ☞ **Keep yourself and others off of machine.**
- ☞ **Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.**

To power-up the machine, verify that all utilities are on (electricity, water, air, steam, and chemicals), set the *Master switch* to *on* (⏻) and view the start-up displays, as follows:

`COPYRIGHT PELLERIN MILNOR 1995`	Copyright statement (may repeat).
`ALL RIGHTS RESERVED MKIII TEXTILE 9500E`	Software date code (example). C
`FORMULA CHECK SUM 02C8`	The check-sum changes with any programming changes. Record the check-sum after each programming session to protect against unauthorized programming.

OPR 3: Compose the Load—The operator is responsible for maintaining proper *load size*, as explained in "DETERMINING LOAD SIZE" (see Table of Contents).

Effective centrifugal extraction (drawing water from the goods by spinning the cylinder) depends on proper distribution in the cylinder. If the machine cannot adequately distribute the goods, it will be out of balance and its vibration safety devices will prevent it from achieving normal extract speed. The knowledgable operator can minimize severe imbalances and intervene to correct those that occur, as explained below. Methods used to achieve distribution are specific to the type of machine—*open pocket* or *balancing*.

Open Pocket Models—These models distribute the load by turning the cylinder at drain (distribution) speed, just prior to extract. Drain speed is just fast enough to hold the goods against the cylinder, but slow enough to permit the goods to spread out as they pass through the draining bath.

If goods do not spread out sufficiently and a severe imbalance occurs, the machine will return to wash speed and attempt to redistribute the goods (extract recycle). Persistent recycles waste time and energy, and usually indicate a need for operator intervention. If goods are netted or tangled, distribution may not be possible. Observe the machine during extract and if necessary, stop the machine and untangle the goods.

Balancing (Some Open Pocket Models)—These machines can counteract an unbalanced load by sensing an imbalance and filling the rib(s) opposite the imbalance with water. Lights are provided on the machine for monitoring the balancing system. Refer to the "Description of Controls . . ." in the operator manual for an explanation of these lights. If persistent recycles occur, observe these lights to determine if the balancing system is operating properly.

OPR 4: Open/Close Hand-Operated Door

—Machine power must be on to open the door. Safeguards prevent the door from being opened during and immediately after manually terminating a cycle. **These safeguards are for the operator's protection. Never attempt to bypass them, nor operate the machine if there is any evidence of malfunctioning safeguards.**

⚠ DANGER ⚠

CRUSH, ENTANGLE AND SEVER HAZARDS—Contact with the turning cylinder can crush your limbs. Contact with the goods being processed can cause the goods to wrap around your body or limbs and dismember you. The turning cylinder and goods are normally isolated by the locked cylinder door.

- ☞ **Do not attempt to open the door or reach into the cylinder until the cylinder is stopped.**
- ☞ **Do not operate the machine with a malfunctioning door interlock.**
- ☞ **Do not touch goods inside or hanging partially outside the turning cylinder.**

Opening the door silences the operator alarm. Closing the door sounds the operator alarm if a formula was previously selected. The shell door must be mechanically pressed against the shell to seal it before processing begins. Door operation is specific to the type of machine—*rigid* or *suspended.*

Rigid Models—The door on these models has a hand-operated latch with an electric interlock. To open the door, simultaneously hold the *Stop button* (⓪) and press the door latch. Close the door firmly to latch and seal it.

Suspended Models—Although the door configuration varies within this range of models, all doors have an air-retracted, spring-extended plunger which holds the door closed. All models have an air operated door seal that automatically de-pressurizes when the door is opened and pressurizes when the cycle is started. The controller will delay retracting the door plunger long enough to de-pressurize the seal.

To open the door, hold the *Door Open button* ( ). When the door plunger retracts, pull the door until it clears the latch, then release the *Door Open button*. On tilting machines, make sure the door is latched open before tilting. To close the door, swing it closed with sufficient force to latch it.

OPR 5: Open/Close Power-Operated Door (some models)—Power operated doors are controlled by the operator and governed by the same safeguards as hand-operated doors.

⚠ WARNING ⚠

STRIKE AND CRUSH HAZARDS—The moving door can strike you or crush or pinch your limbs if caught between the door and machine.

- ☞ **Keep yourself clear of movement areas and paths.**
- ☞ **Keep both hands on the controls while operating.**
- ☞ **Do not operate the machine with malfunctioning manual two-hand controls.**

To open the door, simultaneously hold the *Door Open button* ( ) and hold the *Door switch* to *open* ( ). Continue to hold until the door reaches its open limit. To close the door, simultaneously hold the *Door Open button* ( ) and hold the *Door switch* to *close* ( ). Continue to hold until the door latches.

OPR 6: Tilt Rearward/Forward (tilting models)—Tilting is controlled by the operator. Machines that tilt rearward to load are able to *fill while tilted*, which reduces cycle time. Tilt operation is specific to the type of machine—*Hydro-cushion* or *spring-mounted*.

⚠ DANGER ⚠

CRUSH HAZARD—The machine can crush your body or limbs if you are caught between the tilting housing and a stationary object.

- ☞ **Keep yourself and others clear of movement areas and paths.**
- ☞ **Keep both hands on the controls while operating.**
- ☞ **Do not operate the machine with malfunctioning manual two-hand controls.**

OPR 6A—Tilt rearward to load (if machine has two way tilting) as follows:

Hydro-Cushion models—Set the *Rear/Front Tilt switch* to *front* ( ). Simultaneously hold the *Start button* ( ) and hold the *Up/Down Tilt switch* to *up* ( ) until the desired angle is reached, or the machine stops at its tilt limit.

Spring-mounted models—Simultaneously hold the *Start button* ( ) and the *Up/Down Tilt switch* to *up* ( ) until the desired tilt angle is reached or the machine stops at its tilt limit.

NOTE: If a formula was selected before tilting, the drain valve(s) close(s) and the machine partially fills. **Close the door before returning to non-tilted, otherwise the drain will open letting the water out.**

OPR 6B—Return to non-tilted from tilt rearward as follows:

Hydro-Cushion models—Simultaneously hold the *Start button* ( ) and the *Up/Down Tilt switch* to *down* ( ) until the machine reaches its non-tilted position.

Spring-mounted models—Simultaneously hold the *Start button* ( ) and the *Up/Down Tilt switch* to *down* ( ) until the machine reaches its non-tilted position.

OPR 6C—Tilt forward to unload as follows:

Hydro-Cushion models—Set the *Rear/Front Tilt switch* to *rear* ( ). Simultaneously hold the *Start button* ( ) and the *Up/Down Tilt switch* to *up* ( ) until the desired tilt angle is reached, or the machine stops at its tilt limit.

Spring-mounted models—Simultaneously hold the *Start button* ( )and the *Up/Down Tilt switch* to *down* ( ) until the desired tilt angle is reached or the machine stops at its tilt limit.

OPR 7: Jog the Cylinder—Jogging (briefly turning the cylinder with the door open) is controlled by the operator. Machines configured for *WTB+* operation will jog automatically as well as manually. On *non-tilting* models, jog the cylinder to loosen the goods before unloading. On *tilting* models, jog with the machine tilted forward to discharge the goods, and jog with the machine tilted rearward to help pull in the goods being loaded. B

⚠ DANGER ⚠

CRUSH HAZARDS—Contact with the rotating cylinder can crush your limbs.

- ☞ **Keep yourself and others clear of cylinder and goods during jogging operation.**
- ☞ **Keep both hands on the controls while operating.**
- ☞ **Do not operate the machine with malfunctioning manual two-hand controls.**

OPR 8: Add Chemicals—Mark III, IV, and V textile machines may be equipped with a five-compartment supply injector, a pumped chemical system by others, or a central liquid supply system (chemical inlet valve supplied by Milnor®, chemical storage and delivery system by others). If the machine has a supply injector, the operator adds measured quantities of chemicals to the compartments as required for each load. This is normally done before starting the cycle, but may be done during the cycle, if required by the formula. Management personnel who determine the formulas must instruct the operator as to chemical type, quantity, and location (supply injector pocket to load) for each formula. See "USING THE FIVE-COMPARTMENT FLUSHING SUPPLY INJECTOR" for more information. If a pumped chemical or central liquid supply system is used, observe this system periodically to ensure that chemicals are automatically delivered to the machine when called for. C

OPR 9: Select a Formula—The machine can contain up to 50 field-programmed (local) wash formulas. The machine may also be connected to a Mildata computer providing access to up to 1,000 (remote) formulas. With Mildata, the operator selects either a formula, a work order, or a goods code (as configured), then enters cake data. Cake data is the set of batch codes assigned to each load to identify it.

NOTE: Machines configured for WTB+ operation require cake data. However, the procedures differ because the cake data is normally passed to each system machine electronically (see "WTB+ SUPPLEMENTAL OPERATING INFORMATION"). B

Select the formula just before loading a *tilt-to-load* machine and load the machien before selecting the formula on other machines.

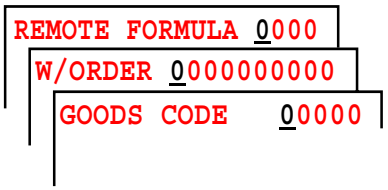
Select a *local* formula when the machine *is not* on-line to Mildata as follows:

```
FORMULA
001
```

When the *Formula menu* is displayed as shown at left,

<xxx> Selects a formula, where <xxx> is a three-digit number from 001 to 200. The formula name and number appear if a valid formula was selected. "DOES NOT EXIST" appears for a non-existent formula. A valid formula sounds the operator signal if the shell door is closed.

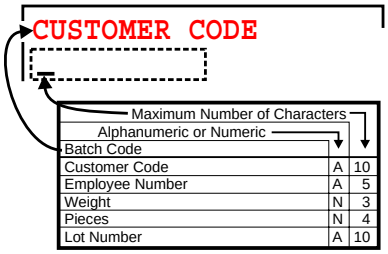
Select a *remote* formula, work order, or goods code and enter cake data when on-line to Mildata as follows:



When one of the prompts shown at left appears,

<response> **Selects formula, work order, or goods code**, where <response> is a four, ten, or five digit number, respectively. Cannot scroll.

ENTER NEXT **Accepts the value entered above.**



When each prompt shown at left appears,

<response> **Enters the requested batch code** where <response> is the number or alpha characters described at left. Codes are determined locally.

ENTER NEXT

- **After each code, accepts entered value and prompts for next code.**
- **After the last batch code, downloads the formula from Mildata®.** Formula name and number appear if valid data was entered. "INVALID FORM DATA" (or similar) appears for any invalid data.
- **After formula is downloaded, displays and permits changing each code previously entered.**

When the *Formula menu* and selection *01* is displayed as shown at left,

ENTER NEXT **Accesses *formula 01*.**

① **Silences the operator signal and starts the process** (see OPR 13).

or CANCEL ESCAPE **Cancels *formula 01* access.**

OPR 10: Start/Stop the Cycle—The Start button (①) starts processing, and the Stop button (⓪) stops processing, as further explained below.

Some machines move externally during processing. Movement varies with the type of machine—*rigid*, *Hydro-Cushion®*, *or spring-mounted*.

Rigid Models—A rigid machine is securely anchored to the foundation which absorbs most of the vibrating forces generated by the machine. The operator should periodically check to be sure all anchor bolts are secure and request servicing immediately if any anchor bolts are found loose.

⚠ CAUTION ⚠

INJURY AND MACHINE DAMAGE HAZARDS—Extraction forces can cause an inadequately anchored rigid machine to jerk out of position, damaging the machine and injuring personnel.

- ☞ **Check anchor bolts frequently.**
- ☞ **Never operate an improperly anchored machine.**

Hydro-Cushion Models—On these models, the shell is pushed down onto seats to hold it rigid in the frame during washing. At the start of extract, the shell is released so it can vibrate freely within the frame.

⚠WARNING⚠

CRUSH HAZARD—Machine can crush body parts caught in gaps around shell front that close due to push down/release motion and machine vibration.

☞ **Keep clear of moving parts.**

Spring-Mounted Models—On these models, the shell vibrates within the frame during the entire cycle. On tilting models, the shell automatically tilts rearward approximately 10 degrees at the start of distribution, then returns to the non-tilted position at the end of extract.

⚠WARNING⚠

CRUSH HAZARD—Machine can crush body parts caught in gaps around shell front and at rear of machine that close due to vibration and tilting.

☞ **Keep clear of moving parts.**

When the machine loaded, the door is closed, and the supply injector (if any) is charged with chemicals, start processing as follows:

```
FORMULA
08 DENIM04
```

With a valid wash formula displayed as in the example at left,

① **Starts the cycle and silences the operator signal.** Various displays appear so operator can monitor the formula in progress.

A wash cycle can be stopped then either resumed or cancelled (OPR 10A). The cycle can also be resumed after a power interruption (OPR 10B), because the controller remembers the step it was in. If a supply injector is used and the formula in progress requires additional chemicals, the operator signal sounds, the timer stops, and the display shows which chemical(s) to add (OPR 10C). When the cycle ends, a signal and display message alert the operator (OPR 10D). C

OPR 10A—If necessary, stop, then either resume or cancel the wash formula in progress as follows:

⓪ **Disables the three-wire circuit,** immediately stopping all machine functions and displaying an error message. If this is a bath, water, chemical, and steam valves close. If the machine is equipped with and configured for a normally closed drain, the drain remains closed; otherwise, the machine drains. (See "MODIFYING FORMULAS IN PROGRESS" for how to stop the formula timer without draining the machine.)

```
3 WIRE DISABLED
FAULT: SEE MANUAL
```

or

CANCEL/ESCAPE **Cancels the formula.** Display returns to the *Formula menu.*

① **Resumes the formula *where the count left off* in the interrupted step**, as stipulated in the note below.

NOTE: How the machine recovers depends on whether the interruption occurred during a *bath*, *drain*, or *extract*.

- Bath—machine achieves level and temperature again, even if these were already achieved before the interruption. (If the machine is configured for *metered water*, the control prompts the user to choose whether to refill the machine with water or not.)
- Drain—the drain duration will be repeated.
- Extract—the control will not allow operation to resume in an extract step.

OPR 10B—When power is restored after a power loss, resume or cancel the interrupted formula as follows:

```
NEXT TO RESTART AT
Fxxxx Syy
```

When the display at left appears, where *xxxx* and *yy* are the interrupted formula/step,

ENTER NEXT **Confirms that the formula will be resumed,**

or CANCEL ESCAPE **Cancels the formula** and returns to *Formula menu*. Enter the password if requested (otherwise, resume the formula as described).

```
STARTING STEP?
YY
```

After confirmation that the formula will be resumed, the control prompts for the step to resume with. The interrupted step is the default starting step.

ENTER NEXT **Resumes operation at this step** unless it is an extract step.

```
FORMULA
xx
PRESS START
formula name
```

When this display appears,

① **Resumes the formula *at the beginning* of the interrupted step**, as stipulated in the note in OPR 10A.

```
FILL/REFILL WATER?
1      0=NO, 1=YES
```

When this display appears,

1 ABC , ENTER NEXT Injects water to the programmed level or number of units.

0 , ENTER NEXT Resumes operation without injecting water.

```
EXTRACT STEP!
```

This display appears if the interrupted step is an extract; restarting in an extract step is not allowed. To resume operation, enter the step number of the **previous bath step** at the "*Starting Step?*" prompt. Then, select *no* when prompted "*Fill/Refill Water?*". Press ① to start the step, then press 0 + CANCEL ESCAPE to terminate the step. The control will advance to the interrupted (extract) step.

OPR 10C—Respond to the operator signal to add supplies as follows:

1. Read the display to determine chemical(s) to be added.
2. Load the supply compartment(s), add through soap chute, or flush manually as instructed locally. To flush supplies manually, load *compartment one* and hold the *Flush/Spray switch* to *manual flush*.
3. Press the *Signal Cancel button*. If a *signal only* was commanded, processing resumes immediately. If a *signal with chemical* was commanded, the supply compartment is flushed for the commanded time.

OPR 10D—Respond to the end-of-cycle signal as follows:

```
message
PLEASE UNLOAD ME
```

When the display at left appears, where *message* describes cylinder motion,

Silences the signal and completes the cycle, except as follows:
If *message* = "break cake," cylinder motions continue until completed.

OPR 11: Overnight Soak—An overnight soak can be performed on any Mark III, IV, and V machine; however, the procedure varies depending on whether or not the machine is equipped with the *overnight bath soak* option. C

To start an overnight soak *using the bath soak option,* start the field-programmed overnight soak formula, verify that the machine has stopped filling, select the *Alternate Drain* function (/) to hold the drain closed and disable all other machine functions), and turn power off.

To start an overnight soak *without* the bath soak option, start the field-programmed overnight soak formula. Make sure power and compressed air remain on.

To end overnight soak if the bath soak option *is* used, turn power on, return to normal functioning (machine will not operate otherwise), cancel the formula (OPR 10A), and unload.

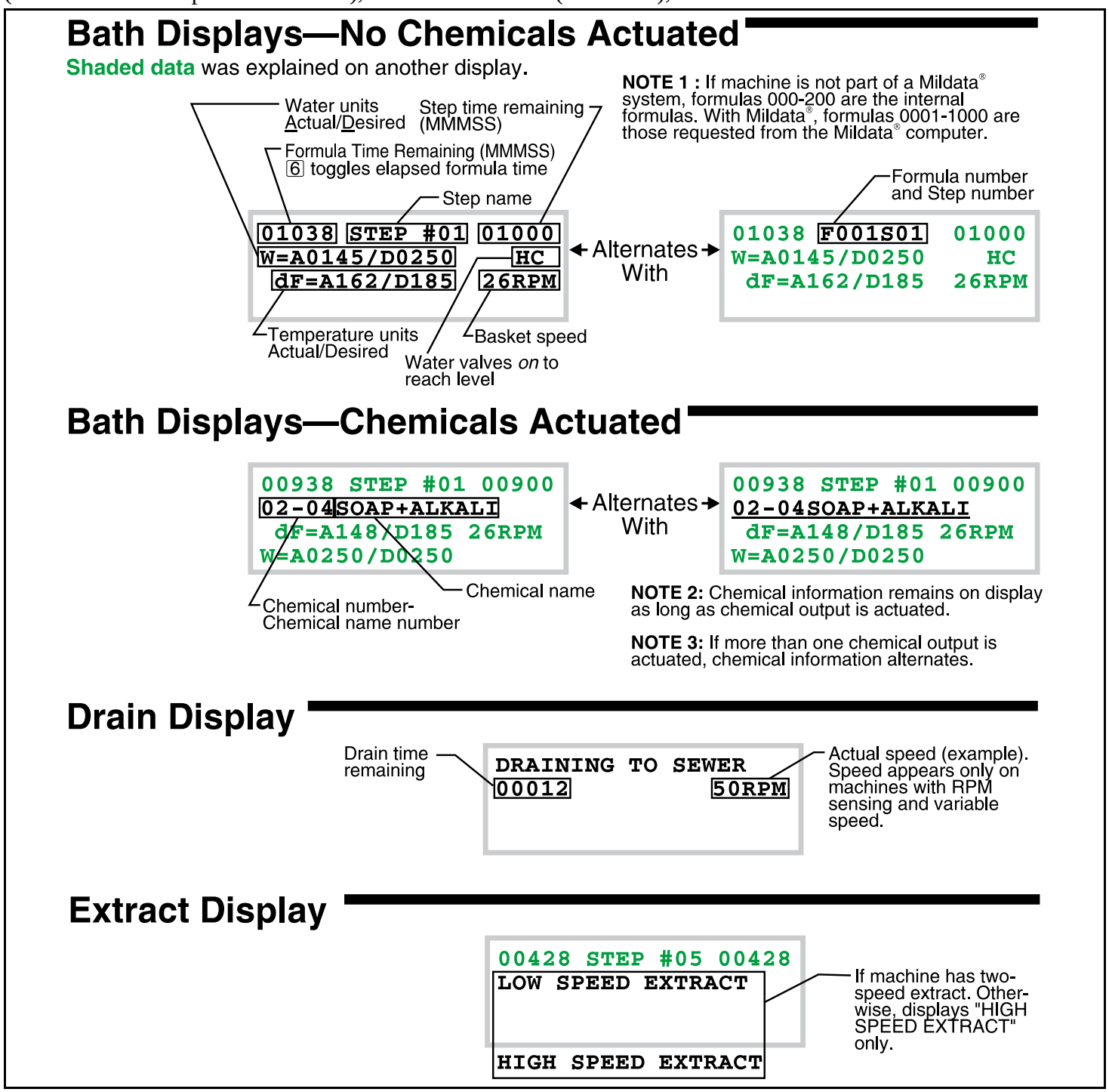


FIGURE 1 (MSOP0D10CE)
Normal Displays During a Cycle

To end the overnight soak if the bath soak option *is not* used, cancel the formula (OPR 10A) and unload.

Summary of Operation

The operator actions listed here correspond to the headings in "Operating the Mark III Textile Microprocessor Controller."

Start the Operating Day

Be safe. Comply with all safety instructions.

Verify switch positions (OPR 1).

Energize microprocessor controller (OPR 2).

Run the Wash Cycle—The following table lists three type of Mark III textile machines. For each type, it lists the part number of the operator manual (in parentheses) and the sequence of actions when running cycles.

Open Pocket Non-Tilt		Open Pocket Tilt Forward Only		Open Pocket Tilt Both Ways	
Action	**OPR**	**Action**	**OPR**	**Action**	**OPR**
compose load	3	compose load	3	select formula	9
load machine	3	load machine	3	tilt rearward	6A
close door	4, 5	close door	5	jog to pull in	7
add chemicals	8	add chemicals	8	close door	5
select formula	9	select formula	9	return to non-tilted position	6B
start cycle	10	start cycle	10	add chemicals	8
				start cycle	10
Wash cycle in progress. 1.If the operator desires to stop or terminate the formula, see OPR 10A. 2.If power is lost, see OPR 10B. 3.If the operator signal sounds to prompt the operator to add chemicals, see OPR 10C.					
respond to end of cycle	10D	respond to end of cycle	10D	respond to end of cycle	10D
open door	4, 5	open door	4, 5	open door	4, 5
jog to loosen	7	tilt forward	6C	tilt forward	6C
unload machine	—	jog/discharge	7	jog/discharge	7
		return to non-tilted position	6	return to non-tilted position	6

WTB+ TEXTILE SUPPLEMENTAL OPERATING INFORMATION

This section supplements "OPERATING THE MARK III, IV, AND V TEXTILE MICROPROCESSOR CONTROLLER" (see Table of Contents) for machines configured for *WTB+* operation. A machine equipped for *WTB+* operation can cyclically receive, process, and discharge loads automatically, under the direction of a Miltrac system controller.

NOTE: *WTB+* is not a model number or part of a model number. As of this writing, it is an informal label given to Mark III, IV, and V textile machines furnished with certain optional hardware and configured for operation within an automated laundry system. The + in *WTB+* distinguishes it from no-longer manufactured machines such as the 72044*WTB* used in Milnor® *hands-off* washing systems. B

WTB+ Procedures Used in Normal Operation

WTB+ Modes of Operation—In addition to the operating modes described in "OPERATING THE MARK III, IV, AND V TEXTILE . . . ," WTB+ machines can be set for *automatic* or *stand-alone* operation.

Automatic Mode—In this mode (normal operating mode), the machine is on-line to the washing system. When powered on and started, the machine will operate automatically (load, run a formula, discharge, wait for an available load or discharge device) in response to commands from the system controller unless stopped due to an error. Leave the *Manual/Automatic keyswitch* set to *automatic* for normal automatic operation.

NOTE: Automatic loading and unloading sequences vary with different textile machines, optional equipment, interfacing devices, and software versions. See "DEVICE COMMUNICATION FOR WTB+ . . ."

Stand-Alone Mode—Although Milnor® recommends against using the machine in a *stand-alone* mode for normal production, this may be done provided personnel understand the safety considerations and comply with applicable safety instructions. Stand-alone operation is the same as for a Mark III, IV, and V textile machine not equipped for *WTB+* (see "OPERATING THE MARK III, IV, AND V TEXTILE . . ."). Set the *Manual/Automatic keyswitch* to *manual* to take the machine off-line for stand-alone operation or error correction. B

Recovery Actions—Before the machine will begin operating on-line, it must move to the loading position (tilted rearward, door open fully, and dryell, if furnished, up and locked) and receive load status information from the operator. If automatic mode is selected, the operator alarm will sound as soon as the *Master switch* is set to *on*.

⚠ DANGER ⚠

STRIKE / CRUSH HAZARD—Machines in the washing system move automatically and will strike or crush anyone in their path.

+ **Do not enter the washing system's restricted area without authorization.**
+ **Do not attempt to operate a WTB+ textile machines in stand-alone mode while other machines in the washing system are operating automatically.**

If the machine is not in the loading position, it will move to this position when started.

```
WAIT FOR
condition
```

When the display at left appears, where ***condition*** is any condition displayed below,

① **Starts the machine and silences the operator alarm.** The machine moves to the loading position.

While the machine is in motion, the controller displays the following:

```
WAIT FOR
DRYELL LOCKED UP
```

```
WAIT FOR
FULL DOWN
```

```
WAIT FOR
DOOR FULL OPEN
```

NOTE: If the machine is already in the loading position at power-up, the controller will immediately prompt for load status and cake data, as explained below. The operator may start the machine (press the *Start button*) before or after entering cake data. Once the machine is started and all data is entered, the machine functions under the control of the washing system. The machine may summon a shuttle at any time.

⚠ DANGER ⚠

STRIKE / CRUSH HAZARD—A traveling machine such as a shuttle can strike, crush, or entrap you if you enter its path. Traveling machines or their components can move automatically in any direction. Placing a system machine on line by energizing the machine control my immediately summon a shuttle or other traveling machine.

+ **Keep yourself and others clear of movement areas and paths.**
+ **Understand the consequences of placing a system machine on line.**
+ **Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.**
+ **Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.**

When the machine is in the loading position, the controller prompts for the status of the load, as follows:

```
DO I HAVE A LOAD?
0 NO   [1=YES]
```

0 , NEXT **(No) starts automatic operation** (tells Miltrac *load desired*) unless loading has been disable.

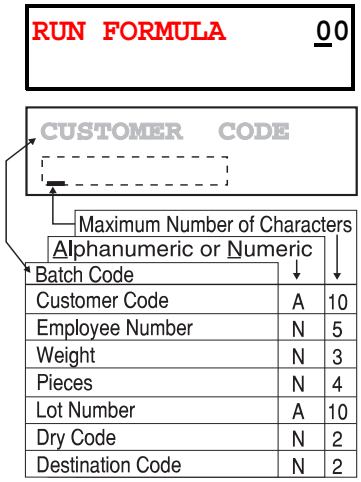
or 1 ABC , NEXT **(Yes) displays the following prompt.**

```
I AM
0 LOADING [1=DISC]
```

0 , NEXT **(Loading) closes the door then prompts for cake data.**

or 1 ABC , NEXT **(Discharging) prompts for cake data then tells Miltrac *discharge desired*** (unless discharging has been disabled) .

Cake Data—Cake data is the set of batch codes assigned to each load to identify it. Some cake data is used by the washing system to determine the processing and routing of loads. This data is passed electronically, from one device to the next, concurrent with the movement of loads. Some data is also needed by the Mildata® computer (if used) for accounting and other administrative purposes. At power-up and after correcting certain errors, if a load remains in the machine, the operator must supply cake data for it. The controller will prompt for the data needed.



Batch Code		
Customer Code	A	10
Employee Number	N	5
Weight	N	3
Pieces	N	4
Lot Number	A	10
Dry Code	N	2
Destination Code	N	2

When the display at left appears,

<xx> **Selects the formula**, where <xx> is a two-digit number from 01 to 50. The formula name and number appear if a valid formula was selected. "INVALID FORMULA" appears for a non-existent formula.

NEXT **Accepts the value entered above.**

When any prompt shown at left appears (depends on configuration),

<response> **Enters the requested batch code**, where <response> is the number or alpha characters described at left.

NEXT **After each code, accepts entered value and prompts for next code.**

Summary of Operation

Start the Operating Day

Be safe. Comply with all safety instructions.

Verify switch positions (see "WTB+ Modes of Operation" herein).

Energize microprocessor controller (see "Recovery Actions" herein).

Energize machine control (see "Recovery Actions" herein).

Enter cake data (see "Cake Data" herein).

Monitor Normal Operation—In addition to the processing displays described in "OPERATING THE MARK III, IV, AND V TEXTILE . . ." several displays indicate the machine's status during loading and unloading (see "Recovery Actions" herein).

Error Correction

Should an error requiring operator attention occur during loading, processing, or discharging, the operator alarm will sound and an error message will be displayed. See "ERROR MESSAGES . . ." for an explanation of the error condition. If the error occurred during loading or discharging or was the result of a power loss, the machine will execute the recovery sequence, with one of the following consequences:

- If the operator answers *no* to the *Do I have a load?* prompt, the controller returns to the *load desired* status, regardless whether the error occurred during loading, processing or discharging.
- If the operator answers *yes* to the *Do I have a load?* prompt and the error occurred during loading or processing, the controller prompts for load data then starts (or restarts) the formula.
- If the operator answers *yes* to the *Do I have a load?* prompt and the error occurred during discharge, the controller prompts for load data then restarts the discharge sequence.

USING THE FIVE-COMPARTMENT FLUSHING SUPPLY INJECTOR

Five-compartment supply injectors are optional on most rigid washer-extractor models and standard on most suspended models. FIGURE 1 depicts the supply injector used on 75-135 lb. capacity models. Injectors on other models vary in appearance but not in function.

General Guidelines

Compartments 1 and 2 are intended for dry chemicals (e.g., soap, alkali) which may be placed directly into the compartment.

Compartments 3, 4, and 5 may be used for liquid or dry chemicals (e.g., bleach, sour, softener) and are furnished with plastic cups. Liquid chemicals are recommended because they are more easily measured and diluted. When dry chemicals are to be injected from cups, drill a 1/8" (3mm) diameter hole just above the base of the cup to allow it to drain automatically.

Restrict starch to compartment 5, if possible.

NOTE: All machines are furnished with a soap chute which may be used to manually inject chemicals directly into the cylinder at any time.

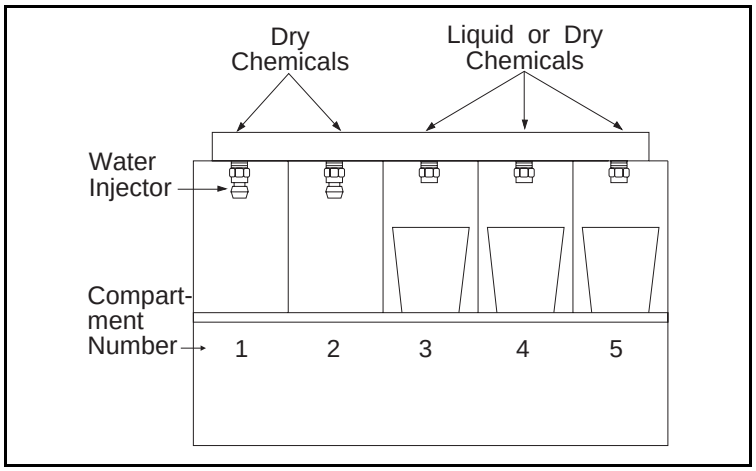
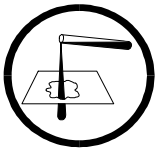


FIGURE 1 (MSOP0207AE)
Five-Compartment Flushing Supply Injector for 75-135 Pound Washer-Extractors (Injectors for Other Machines Similar)

⚠ CAUTION ⚠



MACHINE DAMAGE HAZARD—Stainless steel surfaces can corrode if chemicals (e.g., bleach) dry on them, leaving residue. Rubber and plastic components (other than plastic cups) can deteriorate from exposure to chemical concentrates.

☞ **Keep surfaces clean.**

Operator Guidelines

Load Chemicals According to Formula Instructions

For System 7 (non-programmable) controllers, refer to the wash formula descriptions for chemical loading instructions (which chemicals to preload into which pockets).

For E-P Plus or Mark II, III, IV, and V controllers, refer to the wash formula descriptions for any fixed (factory-supplied) formulas employed. For field-programmed formulas, refer to instructions prepared locally. B

Load the supply injector before starting a cycle. Each chemical is automatically *flushed* into the washer at the proper moment. If supply compartments need to be re-loaded during the cycle, the operator signal and a display message will alert you.

Protect Against Corrosion Damage

- When loading compartment 3, 4, or 5, place chemical into cup and direct flushing water into it. Do not place chemical directly into the compartment. This is especially true for dry bleach.
- Avoid spilling any chemically active concentrate directly onto machine surfaces.
- Spray all supply compartments with water at the end of each day's production.
- Carefully clean away any rust from the supply injector at least once a week.
- Notify management if injection water does not completely flush chemicals into the machine, or if machine components corrode.

Some washer-extractors are equipped with a *Manual Flush switch* and/or spray hose shown in FIGURE 2.

- Hold the switch at *Manual Flush*, to flush the contents of the first compartment into the basket.
- Hold the switch at *Spray* and use the hose to assist chemicals into the cylinder and to clean the supply injector at the end of the day.

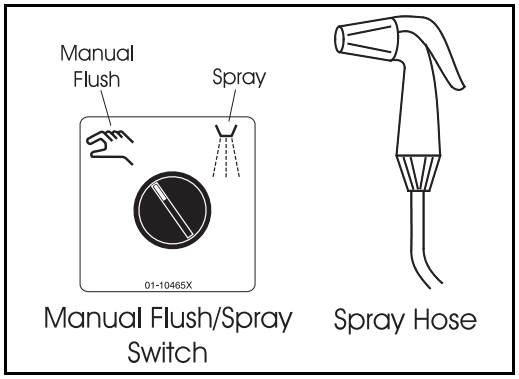


FIGURE 2 (MSOP0207AE)
Manual Flush/Spray Switch and Spray Hose

Formula Development Guidelines

Protect Against Corrosion Damage

- Verify that chemical injection durations ensure complete flushing. It is recommended to extend injections 30 seconds beyond the required time, for safety.
- If surface deterioration persists, check for intermittent low water pressure. If dry bleach is used, try changing the brand of bleach.

Determine Bleach Quantity and Concentration—The supply cups are large enough to contain all the chemicals required for a given bath. For bleaching, however, a concentration higher than 1% may be required. For the normal practice of 64 ounces (1893 ml) of 1% solution per 100 pounds (45 kg) of goods, use the quantities and concentrations shown in the table at right. These may be used with complete confidence since the diluting action of the supply injector will reduce the actual strength of the bleach to less than 1% prior to injection.

Washer Capacity pounds (kg)	Bleach Quantity and Concentration ounces (ml)
35 (15.9)	6 ounces (177) of 4%
50 (22.7)	8 ounces (237) of 4%
55 (24.9)	9 ounces (266) of 4%
60 (27.2)	10 ounces (296) of 4%
75 (34.0)	12 ounces (355) of 4%
90 (40.8)	14 ounces (414) of 4%
125 (56.7)	15 ounces (444) of 4%
135 (61.2)	16 ounces (473) of 4%
200 (90.7)	16 ounces (473) of 8%
250 (113.4)	20 ounces (591) of 8%
300 (136.1)	24 ounces (710) of 8%
450 (204.1)	36 ounces (1065) of 8%
700 (317.5)	56 ounces (1656) of 8%

Determine the Type of Starch—The supply injector is normally connected to a source of hot water. However, some types of dry starch may require cold water to prevent them from becoming too "gooey." If you have difficulty injecting dry starch automatically, the supply injector can be modified to flush one compartment with cold water. Consult the Milnor® factory for more information.

MODIFYING FORMULAS IN PROGRESS

The operator can manually override certain programmed values (e.g., bath temperature) and invoke certain functions (e.g., chemical injection) on the Mark III, IV, or V microprocessor textile controller while a formula is running, **but not during a drain or extract step**. This can be done either 1) one action at a time, with the formula running (*method A*), or 2) one *or more* actions simultaneously, with the formula temporarily suspended, using the *manual mode* (*method B*). *Method A* applies to baths, drains, and extract steps. *Method B* only applies to bath steps. Certain actions are exclusive to each method.

If a password is not enabled, both methods are available to anyone. If a password is enabled, both methods are password-protected.

Individual Modifications With the Formula Running

Method A: General Procedure

```
10:38 F0005S03 02:37
W=A00127/D00150  HC3
 dF =A130/D185 R=130
```

When a formula is running and a normal run display similar to the display at left appears,

<command> **Either 1) causes the commanded action to occur or 2) prompts for the password**, where <command> is the key or key combination explained in "Method A: Actions Available. . ." below.

```
ENTER PASSWORD :
```

If the display shown at left appears,

<password> **Enters the password**, where <password> is the four digit numerical pass code configured. The controller will permit several actions to be performed after entering <password>, provided the key strokes are no more than 10 seconds apart. If <command> prompts for the password, then <command> must be re-entered after entering <password>. The *Start* and *Stop buttons* are not password-protected.

```
INVALID PASSWORD :
```

If the display shown at left appears, an invalid or no password was entered. Repeat <command>, <password>, <command>.

Method A: Actions Available During Wash, Drain, and Extract—The following actions (other than manually stopping and starting the timer) can be invoked with the formula timer stopped or running.

TIMER STOP — **Stops the formula timer.** Any functions in progress continue.

CANCEL ESCAPE — **Resumes timing if the timer is stopped.**

0 — **Stops the formula in progress.** Any functions in progress, cease. 1 resumes the formula.

0 , CANCEL ESCAPE — **Cancels the formula in progress.** Formula cannot be resumed.

EXTEND HELP — **Extends a bath or extract in progress one minute** (repeat for each additional minute). **Extends a drain in progress 10 seconds** (repeat for each additional 10 seconds).

CANCEL ESCAPE — **Shortens a bath by one minute, or cancels a drain preceding a bath or an extract in progress, and proceeds to the next step.** This action will not cancel a drain proceeding an extract.

CANCEL ESCAPE + 0 — **Cancels a bath in progress.**

Method A: Actions Available During Wash Only

WASH MOTOR SPEED — Displays current basket speed.

WASH MOTOR SPEED + ▲ / ▼ — **Increases/decreases basket speed** (if so equipped). If machine has *two speed wash*, during a bath, this action moves the commanded speed between 0 (normal) and 1 (low). If the machine is equipped with *variable speed*, this action increases/decreases the RPMs (if speed is programmed in RPMs), or increases/decreases the percent of normal speed (if speed is programmed in percent). The display skews approximately two units per second.

LEVEL + ▲ / ▼ — **Raises/lowers the *commanded* level.** If the machine is configured for *preset levels*, this action moves *commanded* level between 1 (low level), 2 (medium level), and 3 (high level). If levels are programmed in inches/centimeters, this action increases/decreases the inches/centimeters *commanded,* within the allowable limits configured. This action is unavailable on machines with *metered water*.

If level was previously achieved, the display only shows *actual* level, not *commanded* level. When commanded level is raised, the controller injects water using the water valves/ thermo-modulation commanded for this bath in the formula. Lowering the commanded level has the following limitations: 1) the controller will not permit lowering the com*manded* level in a bath preceeding an extract and 2) the machine has no way of actually lowering a level, but merely achieving a lower commanded level *if not already achieved.*

ENTER NEXT + ▲ / ▼ — **Raises/lowers *commanded* bath temperature** (if so equipped). A higher *commanded* temperature can be achieved by thermo-modulation or steaming if conditions permit. The machine can only achieve a lower commanded temperature by thermo-modulation and only if commanded level is not yet achieved.

hold CHEM + **<x>** — **Injects a chemical** (from Chem 1 to Chem 5) any time during a bath (without consideration for level/temperature achieved), as long as keys are held depressed. <x> is the chemical number from 1 to 5. Injection continues for one second after keys are released.

hold 7 + **<y>** — **Injects a chemical** (from Chem 6 to Chem 13, if so equipped) any time during a bath (without consideration for level/temperature achieved). <y> is the number from 1 to 9, indicated by the table at right. The injection stays on for the time defined for Keypad Inject Time (MMQ) in Configure.

<y>	Chemical
1	6
2	7
3	8
4	9
5	10
6	11
8	12
9	13

hold CHEM + ↓ — **Flushes the supply injector manifold** (if so equipped) as long as keys are held depressed.

hold 2 — **Displays Metered Water amounts** (Actual and Desired) before level is satisfied.

hold 3 — **Displays Flow Rate** per configured offset time before level is satisfied.

hold 0 — **Displays Metered Water amounts** (Actual and Desired) after level is satisfied.

hold 0 + 2 — **Displays Metered Water counts** (Actual and Desired) after level is satisfied.

hold 0 + 3 — **Displays Flow Rate** per configure offset time after level is satisfied.

hold 5 — **Displays Ramp valve status.**

Multiple Modifications With the Formula Suspended (available during baths only)

Method B: General Procedure

```
10:38 F0005S03 02:37
W=A00127/D00150  HC3
 dF =A130/D185 R=130
```

When a formula is running and a normal run display similar to the display at left appears,

MANUAL — **Either 1) places the machine in *manual mode* or 2) prompts for the password.** In *manual mode*, the timer stops, all water/steam/chemical valves close, and the *manual mode* display appears.

```
ENTER PASSWORD :
```

If the display shown at left appears,

<password> **Enters the password**, where <password> is the four digit numerical pass code configured. Press MANUAL within 10 seconds after entering <password>.

```
INVALID PASSWORD :
```

If the display shown at left appears, an invalid or no password was entered. Repeat MANUAL, <password>, MANUAL.

Manual Intervention Displays

The outputs that can be acuated during manual intervention are grouped by function on eight display pages. Manual intervention is available only during bath steps. It is not available if the machine is in a drain or extract step.

ENTER/NEXT + ▲ / ▼ Scrolls among the eight available pages.

```
10:38  MANUAL  02:37
W=A00127/D00150  HC3
 dF =A130/D185 R=130
```

Page 1: General Status—When manual intervention is successfully accessed, "MANUAL" alternates with the step name, as shown at left. Press ENTER/NEXT + ▲ to proceed to the next display page.

```
HC3 L WATER  UNITS
--- * A00127 D00150
 dF=A130/D185
```

Page 2: Water Valves—This page allows the operator to inject water by opening the hot, cold, or third (if equipped) water valves, and view the level and actual and desired units of water in the machine.

The temperatures shown on the third line of the display change only when "MANUAL" alternates with the step name on the top line (Page 1).

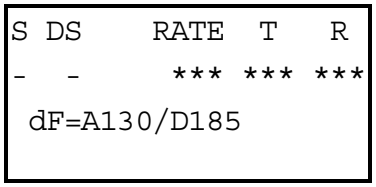
HOT H2O **Opens/closes** the hot water valve if Level 3 is not achieved.

COLD H2O **Opens/closes** the cold water valve if Level 3 is not achieved.

THIRD H2O **Opens/closes** the third water valve, if the machine is so equipped and Level 3 is not achieved.

hold HOT H2O After Level 3 is achieved, opens hot water valve. Similarly, hold COLD H2O or THIRD H2O to inject cold or third water after Level 3 is achieved.

These commands will not work if the Drain valve is open or the Cooldown relay is engaged.



Page 3: Steam—This page allows the operator to increase the bath temperature by opening steam valves into the heat exchanger (Steam) or directly into the machine cylinder (Direct Steam). It also allows the operator to change the temperature ramp rate, and view the actual temperature and desired ramp temperature.

Steam is disabled if the liquor temperature is higher than 240°F, low level is not achieved, the Cooldown relay is engaged, or the drain is open.

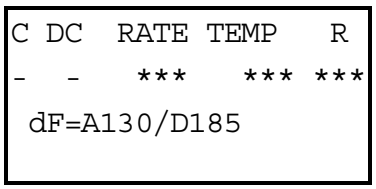
STEAM **S (Steam)**—increases the bath temperature by allowing steam into the heat exchanger. Press this button again to disable steaming.

0 + 2 **DS (Direct steam)**—increases the bath temperature by allowing steam directly into the machine cylinder. Press this button again to disable steaming.

8 + ↑ / ↓ **RATE (Steam ramp rate)**—increases/decreases the temperature rate of rise in tenths of a degree per minute.

T (Achieved Temperature)—This is the temperature achieved in the cylinder.

R (Ramp Temperature)—This is the temperature desired by the controller. In reality, the achieved temperature will usually be slightly higher or lower than this value.



Page 4: Cooldown—This page allows the operator to increase the bath temperature by opening steam valves into the heat exchanger (Steam) or directly into the machine cylinder (Direct Steam). It also allows the operator to change the temperature ramp rate, and view the actual temperature and desired ramp temperature.

COOL DOWN **C (Cooldown)**—decreases the bath temperature by circulating cold water through the heat exchanger. Press this button again to disable cooldown.

0 + 2 **DC (Direct cooldown)**—decreases the bath temperature by injecting cold water directly into the machine cylinder. Press this button again to close the cold water valve.

8 + ↑ / ↓ **RATE (Cool ramp rate)**—increases/decreases the temperature rate of fall in tenths of a degree per minute.

TEMP (Achieved Temperature)—This is the temperature achieved in the cylinder.

R (Ramp Temperature)—This is the temperature desired by the controller. In reality, the achieved temperature will usually be slightly higher or lower than this value.

```
DR RC FL 12345 M RPM
--  -  - ----- + 030
 dF=A130/D185
```

Page 5: Drains, Liquor Recirculation, and Motor—This page allows the operator to drain the cylinder to the sewer or to the reuse tank, to enable liquor recirculation and flush recirculation lines, and to change the speed of the wash motor.

SEWER

D (Drain to sewer)—drains the cylinder to the sewer as long as this button is held. Press this button again to close the drain.

REUSE

R (Drain to reuse tank)—drains the cylinder to the reuse tank as long as this button is held. Press this button again to close the drain.

0 + 3

RC (Recirculation pump)—enables the recirculation pump if the machine is equipped with the recirculation option. Press these buttons again to disable recirculation.

0 + 4

FL (Flush recirculation line)—flushes the recirculation line and heat exchanger (if the machine is so equipped) with fresh water to prevent the introduction of chemicals from this bath into later baths. Press these buttons again to disable recirculation.

CHEM + <x>

12345—opens chemical valve <x> as long as CHEM and the number of the chemical are held. This function is disabled if the drain is open, the cooldown relay is enabled, or the steam relay is enabled.

WASH MOTOR ON/OFF

M (Wash Motor ON/OFF)—provides or removes power to the wash motor. Press this button again to change the on/off status of the motor.

WASH MOTOR SPEED + ▲ / ▼

RPM (Revolutions per Minute)—allows the operator to increase/decrease the basket speed from 005 revolutions per minute to 036 revolutions per minute. The speed changes as long as ▲ or ▼ is held.

```
D 6789 10 11 12 13 R
+ ----  -  -  -  - -
 dF=A130/D185
```

Page 6: Drain Chemical Tanks—This page allows the operator to drain the chemical tanks into the cylinder, and monitor the status of the inject pressure input and the recirculation circuit.

D (Inject Pressure Input)—displays the status of the inject pressure input. This input must be present for chemical tank draining to be allowed.

7 + <x>

6789 10 11 12 13 (Drain Chemical Tanks)—(from Chem 6 to Chem 13, if so equipped) any time during a bath (without consideration for level/temperature achieved). <x> is the number from 1 to 9 indicated by the table at right. Release the buttons to stop draining the tanks.

Tanks can not be drained if the Cooldown or Steam relay is on, if the Drain is open, or if the Inject Pressure input is not present.

<x>	Chemical
1	6
2	7
3	8
4	9
5	10
6	11
8	12
9	13

R (Recirculation status)—displays the On/Off status of the recirculation circuit.

```
F 6789 10 11 12 13 R
+ ----  -  -  -  - -
 dF=A130/D185
```

Page 7: Flush Chemical Tanks—This page allows the operator to flush the chemical tanks with fresh water, and monitor the status of the inject pressure input and the recirculation circuit.

F (Inject Pressure Input)—displays the status of the inject pressure input. This input must be present for chemical tank flushing to be allowed.

7 + <x>

6789 10 11 12 13 (Flush Chemical Tanks)—(from Chem 6 to Chem 13, if so equipped) any time during a bath (without consideration for level/temperature achieved). <x> is the number from 1 to 9 indicated by the table at right. Release the buttons to stop draining the tanks.

Tanks can not be flushed if the Cooldown or Steam relay is on, if the Drain is open. The tanks can not be drained to the sewer if the Inject Pressure input is not present.

<x>	Chemical
1	6
2	7
3	8
4	9
5	10
6	11
8	12
9	13

R (Recirculation status)—displays the On/Off status of the recirculation circuit.

```
D 6789 10 11 12 13FR
+ ----  -  -  -  --+
 dF=A130/D185
```

Page 8: Drain Chemical Tanks to Sewer—This page allows the operator to drain the chemical tanks to the sewer, and monitor the status of the Inject Pressure input, the Recirculation Circuit, and the Flush Recirculation Line relay.

This page is accessed by pressing **1 + 2 + 3** while in Manual Intervention. **This page is not available if the machine is equipped with a heat exchanger.**

D (Inject Pressure Input)—displays the status of the inject pressure input. This input must be present for chemical tank flushing to be allowed.

7 + <x>

6789 10 11 12 13 (Drain Chemical Tanks to Sewer)— (from Chem 6 to Chem 13, if so equipped) any time during a bath. <x> is the number from 1 to 9 indicated by the table at right. Press the same buttons again to stop draining the tanks.

The tanks can not be drained to the sewer if the Inject Pressure input is not present.

<x>	Chemical
1	6
2	7
3	8
4	9
5	10
6	11
8	12
9	13

F (Flush Recirculation Line relay status)—displays the On/Off status of the Flush Recirculation Line relay.

R (Recirculation status)—displays the On/Off status of the recirculation circuit.

Section 3

Troubleshooting

C

ERROR MESSAGES ON THE MARK III, IV, AND V TEXTILE CONTROLLER

Errors At Power-Up (or Power Restoration)

Memory Errors—These errors occur when field data stored in the microprocessor's memory becomes unreliable as a result of: 1) a power loss while the controller is in a *program mode*, 2) improper use of the *Run/Program keyswitch*, 3) a loss of back-up power to microprocessor components, or 4) a power surge at power-up. The risk of these errors occurring is minimized if the precautions in "IMPORTANT OWNER/USER INFORMATION. . ." and "PROGRAMMING . . ." (see Table of Contents) are observed. See also *display freezes* in "Errors While Programming" in this section.

```
FORMULA ERROR
CLEAR MEMORY NOW
```

Both configure data and formula data have become unreliable.

4 JKL + 5 MNO + 6 PQR **Clears field-programmed formulas, and step/chemical names.**

After clearing field data, re-enter the data in the following order:

1. Reconfigure (*program mode 5, Configure*)
2. Rename steps and/or chemicals, if desired (*program modes 3, Change Step Names* and *4, Change Chem Names*)
3. Program the formulas (*program mode 1, Add/Change Formulas*)

```
CONFIG ERROR
```

Both configure data and formula data have become unreliable.

Accesses *mode 5, Configure*, and displays *Page A* for reconfiguration.

Reconfigure (*program mode 5, Configure*), then re-enter other field data in the following order:

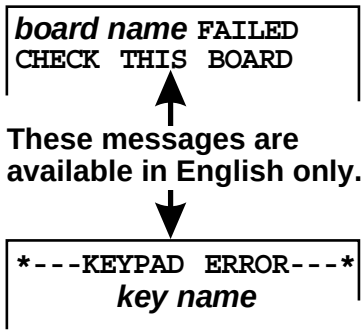
1. Clear field-programmed formulas, step names and chemical names (*program mode 7, Clear All Memory*)
2. Rename default step/chem names, if desired (*program modes 3, Change Step Names* and *4, Change Chem Names*).
3. Program the formulas (*program mode 1, Add/Change Formulas*)

```
LOST WATER DATA
  NEXT TO PROCEED
```

(Machines with *liquor ratio* only) Water data for a formula which was resumed after a power loss has become unreliable. Controller cannot tell if machine has water.

NEXT **Clears the error message. The user is prompted whether or not to refill.**

Hardware Errors—These errors usually result from hardware failure. See precaution on next page.



The controller detects a failed *or missing* control circuit board. *Board name* can include *16 OUT #1, 16 OUT #2, A/D BOARD*, etc. This error can also result from configuring the machine for an option not furnished, installing a new board, or installing software that was configured for an option not on this machine.

CANCEL ESCAPE **Clears the error message,** permitting access to the *Program Menu*. It also permits running a formula if the cause of the error has been corrected.

The keypad key named on the second line shorted or failed to release, requiring keypad replacement. See also *display freezes* in "Errors While Programming" in this section.

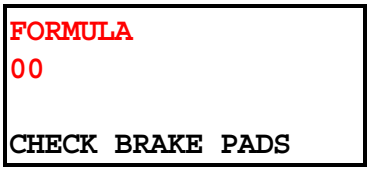
Errors While Operating

PRECAUTION: Before troubleshooting operating errors, review safety instructions in all applicable manuals.

Chemical Injection Error—This error occurs only on machines equipped and configured for metered chemical injection.

This message indicates that chemical flowmeter *xx* is not communicating with the machine controller. The operator signal sounds, and the chemical continues to inject. The most common cause of this error is a defective chemical flow meter—if the paddlewheel does not operate in the flow of chemical, the machine has no way of determining how much chemical has been injected. Pressing CANCEL ESCAPE will clear the singal only if the flow meter starts working again. Pressing MANUAL will clear the signal and allow manual intervantion.

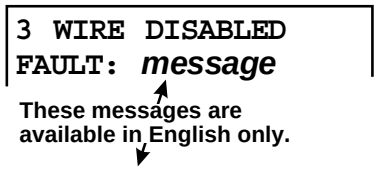
Brake Pad Wear Indicator—This error occurs only on machines equipped with disk braking for the cylinder.



This error normally indicates that the disk brake pads have worn and should be replaced to prevent damage to the disk or other components. The microprocessor input that creates this message is provided by two contacts embedded in the disk material. These contacts touch the brake disk and complete a circuit when the pad wears to the level of the contacts.

Errors That Disable the Three-Wire Circuit (Immediately Stops All Machine Functions)

—The *three-wire relay* provides control circuit power to the machine. Once energized by momentarily depressing the *Start button*, the *three-wire relay* is held energized by its own normally open contact and numerous other safety devices (e.g., motor overloads, front and rear down switches, door interlock). Should any of these contacts open, even momentarily, all machine functions stop immediately, inlet valves close, the drain opens, the operator alarm sounds, and the appropriate *error* message appears.



The *three-wire relay* became de-energized for the reason indicated by *message*.

① **Resumes the cycle (or enables the *three-wire circuit*), clears the error message, and silences the operator alarm, providing the cause of the error has been corrected.**

Message	Explanation
DOOR	*Door interlock relay* indicates door is or was open.
WASH OVERLOAD	*Wash motor overload* opened.
VARIABLE SPEED	*Variable speed drive unit* malfunctioned. Check the *variable speed drive unit display* for an error code and refer to the manual for this unit.
DRAIN OVERLOAD	*Drain motor overload* opened.
E1 OVERLOAD	*E1* (low-speed extract) *motor overload* opened.
E2 OVERLOAD	*E2* (high-speed extract) *motor overload* opened.
FRONT UP	Front of machine not full down, or *front down switch*, relay, or circuitry malfunctioned.
REAR UP	Rear of machine not full down, or *rear down switch*, relay, or circuitry malfunctioned.
SEE MANUAL	The controller cannot determine why the *three-wire relay* opened. Most often, this is the result of pressing a *Stop button*. Otherwise, see *three-wire circuit* in schematic manual.

NOTE: The two errors explained below function as follows:

- **All except machines configured for WTB+ operation**—The error disables the *three-wire circuit*, immediately stopping all machine functions. Once the cause of the error has been rectified, a *three-wire error message* appears. Clear the message and start the machine as previously explained.
- **Machines configured for WTB+**—The error immediately stops all machine functions, but does not disable the three-wire circuit. Once the cause of the error has been rectified, automatic operation occurs.

B

BRAKE FAULT MUST BE
CLEARED TO RESTART

Brake pressure switch detects insufficient air pressure in the *brake release air cylinder* to guarantee brake has released. Possible causes include low air pressure (often caused by an inadequately sized air line to the machine, especially on Hydro-Cushion® models, as the *pushdown* and the brake operate simultaneously), a leaking *air cylinder piston cup*, pinched or leaking brake or push down *air lines*, a leaking *quick release air valve*, or a faulty *pressure switch* or *pilot air valve*.

board name FAILED
CHECK THIS BOARD

The controller detects a failed *or missing* control circuit board. See "Hardware Errors" under "Errors At Power-Up . . ." in this section.

Errors That Interrupt the Cycle, Usually Requiring Corrective Action—These errors stop the formula timer and sound the operator alarm, but they do not open the *three-wire circuit*. Except where noted otherwise, the operator alarm is silenced and operation resumes as soon as the error is rectified, without additional operator action.

normal run data
CHECK **type** PROBE

Controller detects a steam or heat exchanger temperature probe malfunction (where *type* is *STEAM* or *HEAT-X*). Check probe position and connections at resistor board. If OK, disconnect probe and verify that lead-to-lead resistance is 2K to 35K ohms and that lead-to-ground resistance is infinite. **Once the cause of the error is remedied, press the *Signal Cancel button* to clear the error message, silence the operator alarm, and resume operation.**

SPEED SWITCH OPEN

Controller detects *speed switch* is open–a normal condition when machine is slowing from extract. It indicates a *speed switch* circuit malfunction if cylinder is stationary.

normal run data
TOO LONG TO COOL

The allotted time to cool down to the commanded temperature was exceeded (*configure decision J*). Check *cooldown* procedures in "PROGRAMMING . . ." in this manual.

normal run data
TOO LONG TO FILL

The allotted time to fill to the commanded liquor level (*configure decision I*) has been exceeded. Check for low water pressure.

normal run data
TOO LONG TO STEAM

The allotted time to achieve the commanded temperature by steam injection (*configure decision H*) has been exceeded. Check for low steam pressure.

DRIVE MOTORS
DISABLED

All safeties required for operation of the drive motors were not satisfied.

Conditions That Interrupt the Cycle, Usually Not Requiring Corrective Action—These conditions are normally self-correcting.

normal extract data AMPSAVER HALT	(Machines with Ampsaver® option) The machine desires to extract but the Ampmaster controller is delaying this action until the current drawn by other machines in the system falls below the specified level (an energy saving feature).
REDISTRIBUTING RECYCLE FAILURE	Machine recycled five times in a single extract step. The controller will now attempt to balance the load by repeating the previous step. If problem persists, check load balance and *excursion switch* adjustment.
normal drain data LEVELS STILL MADE	The configured drain time expired before the level in the cylinder dropped below low level.
EXTRACT STEP!	The machine was commanded to begin the selected formula in an extract step. Because accelerating a fully loaded machine from a dead stop using only the extract motor could overload the motor, this command is not allowed.

Additional Errors That Interrupt User Actions (Mildata® Option)

INVALID WORK ORDER	User entered a *work order number* that is not used in Mildata®. Enter a valid number.
INVALID GOODS CODE	User entered a *goods code* that is not used in Mildata®. Enter a valid number.
INVALID CUST CODE	User entered a *customer code* that is not used in Mildata®. Enter a valid number.
INVALID EMPLOYEE #	User entered an *employee number* that is not used in Mildata®. Enter a valid number.
INVALID FORM DATA	User entered an *formula number* that is not used in Mildata®. Enter a valid number.
DATA UNLOCATABLE	User entered a valid code which has invalid data associated with it (e.g., user entered a *goods code* that is used in Mildata®, but the *formula code* assigned to that *goods code* is not used).
** NETWORK DOWN ** SWITCH TO LOCAL	The Mildata formula requested was not provided by the Mildata computer within the 30 seconds allowed. Switch the machine to local mode and run an internal formula.

B

Errors That Interrupt Loading and Discharging (Machines Configured for WTB+ Operation)

—These errors halt automatic operation and sound the oeprator alarm. Pressing the Signal Cancel button clears the error message, silences the operator alarm, and permits the machine to return to the recovery position, once the cause of the error is rectified. The controller then prompts the user for any required batch data (see "WTB+ supplemental operating information"). When this data is entered, operation begins.

DISCHARGE ABORTED	The discharge sequence, initiated by the Miltrac controller, was terminated (not completed). This occurs if, during discharge, Miltrac is set to a program mode or loses power, or the manual desired input is made.
INVALID FORMULA	(Machines without Mildata® option) Miltrac requested a formula which is not programmed in this machine's formula memory.
INVALID FORM DATA	(Machines with Mildata® option) Miltrac requested a formula which is not programmed in Mildata®.
LOADING ABORTED	The loading sequence initiated by Miltrac was terminated (not completed). This occurs if, during loading, MIltrac is set to a program mode or loses power, or if either the *manual desired* or *load terminate* input is made.

Errors While Programming

If a Keypad Error Occurs While Programming

display freezes	If the display stops responding to *valid* keypad commands, a keypad malfunction probably occurred. (The controller cannot detect and display a *Keypad Error* in any *program mode*.) If a replacement keypad is available, it is permissible for authorized service personnel, observing the hazard statement below, to replace the keypad with power *on*. This procedure will usually regain keypad function, thus avoiding powering off when the *keyswitch* is set to *Program*, with resulting data loss.

⚠ DANGER ⚠

ELECTRIC SHOCK HAZARD—Although the keypad conductors on the Mark II washer-extractor controller are potential-free, accessing the keypad connections will expose other live conductors within the electric box/enclosure.

- ☞ **Keypad replacement must be done *only* by qualified service personnel.**
- ☞ **Ensure that body parts and metal tools do not come in contact with conductors.**

Errors While Programming Formulas—See "1=ADD/CHANGE FORMULA" under "PROGRAMMING . . ." for a complete explanation of the following errors and the *formula programming* procedure.

FORM ***xx*** INCOMPLETE TURN KEY TO PROG

An attempt was made to exit formula programming by turning the *keyswitch* to *Run* without first returning to the *Program Menu*. This is an improper procedure which causes the formula data to become unreliable.

Deletes the incomplete formula. If no other memory errors are detected, the controller permits returning to the *Run mode*.In some cases, the controller will prompt CLEAR MEMORY NOW.

Fxx TMMQFFFHC3LL S Syy ILLEGAL INSERT!

An attempt was made to duplicate this step when this would result in an *illegal* condition (e.g., adjacent extract steps or two *end formula* steps). *xx* and *yy* are the formula and step numbers, respectively.

Fxx TMMQFFFHC3LL S Syy ILLEGAL DELETE!

An attempt was made to delete this step when this would result in an *illegal* condition (e.g., adjacent extract steps).

Errors While Downloading—See "6=DOWNLOAD" under "PROGRAMMING . . ." for a complete explanation of the following errors and the *download* procedure.

DOWN LOAD ABORTED NEXT TO PROCEED

The user manually aborted the download on this machine, or on the sending machine, if this is a receiving machine.

ERROR IN CHECK SUM NEXT TO PROCEED

This receiving machine received unreliable data, possibly due to a bad connection in the serial link. Repeat the download once the problem is corrected.

[S] 9600 BAUD 000 WAITING FOR MASTER

If this display appears after downloading has begun, this receiving machine is not receiving data, possibly due to a bad connection in the serial link. Repeat the download once the problem is corrected.

INPUT AND OUTPUT DESCRIPTIONS; VIEWING INPUTS AND OUTPUTS WHILE A FORMULA IS RUNNING

This section identifies all inputs and outputs used in the Mark III Textile microprocessor controller. The current state of all inputs (made or not made) and the current state of most outputs (energized or not energized) can be displayed *while a formula is running or stopped due to an error condition.* This is real-time information. Any change in the state of the input or output is displayed *as it occurs.*

NOTE 1: See "ACTUATING OUTPUTS, VIEWING INPUTS . . ." (see Table of Contents) for instructions on testing outputs and viewing inputs *while the machine is idle.*

Inputs

```
10:38 F0005S03 02:37
dF=A093/D140 LEV2
```

```
3 WIRE DISABLED
FAULT : SEE MANUAL
```

When a formula is running and a normal run display or error display similar to the displays at left appears,

hold 9 + 1 **Displays the *first* 16 inputs: (1) A through P.**

hold 9 + 2 **Displays the *second* 16 inputs: (2) A through P.**

hold 9 + 3 **Displays the *third* 16 inputs: (3) A through P.**

1 = First 16 inputs (8/16 Board #1)
2 = Second 16 inputs (8/16 Board #2)
3 = Third 16 inputs (direct inputs-processor board)

```
(1) ABCDEFGHIJKLMNOP
    --++---+---+----
```

Top line shows input letter (see "Table of Inputs"). Bottom line shows status: **–** = not made, **+** = made.

When the *input status display* appears as in the example at left, see the "Table of Inputs" below, for input descriptions.

Table of Inputs

Display Code	(1) A through P 8/16 Board #1—Standard		(2) A through P 8/16 Board #2—Optional		(3) A through P 8/16 Board #3—WTB+ Only	
	Input Name	Connector/Pin	Input Name	Connector/Pin	Input Name	Connector/Pin
A	Manual Chemical Desired #1	1MTA3-10	Inject Pressure OK	2MTA3-10	Dryell Locked Up	3MTA3-10
B	Pressure Desired	1MTA3-9	Manual Chemical Desired #2	2MTA3-9	Dryell Down	3MTA3-9
C	Extract Position	1MTA3-8	Fill Dye Tanks	2MTA3-8	Eye blocked	3MTA3-8
D	Wash Position	1MTA3-7	Pressure Fault	2MTA3-7	Door Full Open	3MTA3-7
E	Low Level	1MTA3-4	Temperature OK	2MTA3-4	Allied Load Terminate	3MTA3-4
F	Stop Basket	1MTA3-3	Amps OK	2MTA3-3	Allied Start Discharge	3MTA3-3
G	Don't Allow Chems	1MTA3-2	not used	2MTA3-2	Manual Desired (WTB+)	3MTA3-2
H	Speed Switch	1MTA3-1	not used	2MTA3-1	Not Used	3MTA3-1
I	Pressure Ports Open	1MTA4-10	E2 Overload	2MTA4-10	Full Down	3MTA4-10
J	Front Not Down	1MTA4-9	E1 Overload	2MTA4-9	Full Up	3MTA4-9
K	Tilt Level	1MTA4-8	Drain Overload	2MTA4-8	Timer Stop Input	3MTA4-8
L	Brake is Off	1MTA4-7	Wash Overload	2MTA4-7	Unload Allowed	3MTA4-7
M	Motor Allowed	1MTA4-4	Variable Speed Over-load	2MTA4-4	Load Allowed	3MTA4-4
N	Sample Desired	1MTA4-3	Rear Up	2MTA4-3	Allied Start Loading	3MTA4-3
O	Manual Direct Cool-down	1MTA4-2	Door Open	2MTA4-2	Not Used	3MTA4-2
P	Manual Cooldown	1MTA4-1	Not Used	2MTA4-1	Load Terminate	3MTA4-1

Display Code	(4)A through P 8/16 Board #4—WTB+ Only		**(5) A through P Direct Inputs—80186 Processor Board**	
	Input Name	Connector/Pin	Input Name	Connector/Pin
A	Formula Bit 0	4MTA3-10	Mildata (Remote/Local)	MTA38-3
B	Formula Bit 1	4MTA3-9	Program Key	MTA38-2
C	Formula Bit 2	4MTA3-8	Signal Cancel	MTA38-1
D	Formula Bit 3	4MTA3-7	Coarse Balance	MTA38-4
E	Formula Bit 4	4MTA3-4	Machine Excursion	MTA38-5
F	Formula Bit 5	4MTA3-3	Three-wire	MTA38-6
G	Weight Bit 0	4MTA3-2	Not Used	MTA39-5
H	Weight Bit 1	4MTA3-1	Not Used	MTA39-4
I	Weight Bit 2	4MTA4-10	Not Used	MTA39-3
J	Weight Bit 3	4MTA4-9	Not Used	MTA39-8
K	Weight Bit 4	4MTA4-8	Not Used	MTA39-6
L	Weight Bit 5	4MTA4-7	Not Used	MTA39-7
M	Weight Bit 6	4MTA4-4		
N	Weight Bit 7	4MTA4-3		
O	Not Used	4MTA4-2		
P	Not Used	4MTA4-1		

Outputs

```
10:38 F0005S03 02:37
dF=A093/D140 LEV2
```

```
3 WIRE DISABLED
FAULT : SEE MANUAL
```

When a formula is running and a normal run display or error display similar to the displays at left appears,

hold 8 + 1 **Displays the *first* 16 outputs: (1) a through p.**
hold 8 + 2 **Displays the *second* 16 outputs: (2) a through p.**
hold 8 + 3 **Displays the *third* 16 outputs: (3) a through p.**
hold 8 + 4 **Displays the *fourth* 16 outputs: (4) a through p.**
hold 8 + 5 **Displays the *fifth* 16 outputs: (5) a through p.**
hold 8 + 6 **Displays the *sixth* 16 outputs: (6) a through p.**

1 = First 16 outputs (8/16 Board #1 and 16 Out Board #1)
2 = Second 16 outputs (16 Out Board #1 and 8/16 Board #2)
3 = Third 16 inputs (16 Out Board #2)
4 = Fourth 16 outputs (8/16 Board #3)

```
(1) abcdefghijklmnop
    --+---+---+----
```

Top line shows output letter (see "Table of Outputs"). Bottom line shows status: **–** = not made, **+** = made.

When the *output status display* appears as in the example at left, see the following tables of outputs for output descriptions.

Table of *First* 16 Outputs: (1) a through p

Display Code	Output Name	Relay Number	Connector/Pin		
			Common	**Normally Open**	**Normally Closed**
8/16 Board #1—Standard					
a	Drain Motor	1	1MTA5-9	1MTA5-8	1MTA5-10
b	Cooldown	2	1MTA5-6	1MTA5-5	1MTA5-7
c	Extract Position	3	1MTA5-4	1MTA5-3	1MTA5-1
d	Chem 4	4	1MTA5-2	1MTA6-10	1MTA6-3
e	Chem 1	5	1MTA6-1	1MTA6-2	N/A
f	Chem 3	6	1MTA6-4	1MTA6-5	N/A
g	Chem 2	7	1MTA6-6	1MTA6-7	N/A
h	Chem 5	8	1MTA6-8	1MTA6-9	N/A
16 Out Board #1—Standard					
i	High Extract (E2)	0	1MTA13-9	1MTA13-8	1MTA13-10
j	Balance	1	1MTA13-6	1MTA13-5	1MTA13-7
k	Low Extract (E1)	2	1MTA13-3	1MTA13-4	1MTA14-10
l	Clockwise Wash	3	1MTA13-1	1MTA13-2	1MTA15-10
m	Counter-clockwise Wash	4	1MTA14-8	1MTA14-7	1MTA14-9
n	Steam Valve	5	1MTA14-5	1MTA14-6	N/A
o	Operator Signal	6	1MTA14-3	1MTA14-4	N/A
p	Three Wire Relay	7	1MTA14-1	1MTA14-2	N/A

Table of *Second* 16 Outputs: (2) a through p

Display Code	Output Name	Relay Number	Connector/Pin		
			Common	Normally Open	Normally Closed
16 Out Board#1—Standard					
a	Brake Release	8	1MTA15-7	1MTA15-8	N/A
b	Water Valve #1	9	1MTA15-5	1MTA15-6	N/A
c	Water Valve #2	10	1MTA15-3	1MTA15-4	N/A
d	Water Valve #3	11	1MTA15-1	1MTA15-2	N/A
e	Sewer Drain	12	1MTA16-7	1MTA16-8	N/A
f	Reuse Drain	13	1MTA16-5	1MTA16-6	N/A
g	Wash Clutch	14	1MTA16-3	1MTA16-4	N/A
h	Wash Position	15	1MTA16-1	1MTA16-2	N/A
8/16 Board #2—Optional					
i	Flush 11	1	2MTA5-9	2MTA5-8	2MTA5-10
j	Recirculation	2	2MTA5-6	2MTA5-5	2MTA5-7
k	not used	3	2MTA5-4	2MTA5-3	2MTA5-1
l	Flush 9	4	2MTA5-2	2MTA6-10	2MTA6-3
m	Chemical 9	5	2MTA6-1	2MTA6-2	N/A
n	Chemical 11	6	2MTA6-4	2MTA6-5	N/A
o	Chemical 10	7	2MTA6-6	2MTA6-7	N/A
p	Flush 10	8	2MTA6-8	2MTA6-9	N/A

Table of *Third* 16 Outputs: (3) a through p

Display Code	Output Name	Output Number	Connector/Pin		
			Common	Normally Open	Normally Closed
16 Output Board #2—Optional					
a	Water Safety	0	2MTA13-9	2MTA13-8	2MTA13-10
b	Chemical Manifold Flush	1	2MTA13-6	2MTA13-5	2MTA13-7
c	Manual Chemical Inject	2	2MTA13-3	2MTA13-4	2MTA14-10
d	Pressure Allowed	3	2MTA13-1	2MTA13-2	2MTA15-10
e	Dry Supply Manifold Flush	4	2MTA14-8	2MTA14-7	2MTA14-9
f	Fill Dye Tanks	5	2MTA14-5	2MTA14-6	N/A
g	Direct Cooldown	6	2MTA14-3	2MTA14-4	N/A
h	Machine Moving	7	2MTA14-1	2MTA14-2	N/A
i	Direct Steam	8	2MTA15-7	2MTA15-8	N/A
j	Chemical Inject	9	2MTA15-5	2MTA15-6	N/A
k	Chemical 6	10	2MTA15-3	2MTA15-4	N/A
l	Chemical 7	11	2MTA15-1	2MTA15-2	N/A
m	Chemical 8	12	2MTA16-7	2MTA16-8	N/A
n	Flush 6	13	2MTA16-5	2MTA16-6	N/A
o	Flush 7	14	2MTA16-3	2MTA16-4	N/A
p	Flush 8	15	2MTA16-1	2MTA16-2	N/A

Table of *Fourth* 16 Outputs: (4) a through p

Display Code	Output Name	Output Number	Connector/Pin		
			Common	Normally Open	Normally Closed
8/16 Board #3—WTB+ Only					
a	Discharge Command	1	3MTA5-9	3MTA5-8	3MTA5-10
b	Dryell Up Lock Release	2	3MTA5-6	3MTA5-5	3MTA5-7
c	Load/Unload Allowed	3	3MTA5-4	3MTA5-3	3MTA5-1
d	Load Command	4	3MTA5-2	3MTA6-10	3MTA6-3
e	Flush Dryell	5	3MTA6-1	3MTA6-2	N/A
f	Load Desired	6	3MTA6-4	3MTA6-5	N/A
g	Dryell Move Up	7	3MTA6-6	3MTA6-7	N/A
h	Dryell Move Down	8	3MTA6-8	3MTA6-9	N/A
16 Output Board #3 —Optional					
i	Chemical 12	9	3MTA13-9	3MTA13-8	3MTA13-10
j	Chemical 13	10	3MTA13-6	3MTA13-5	3MTA13-7
k	Flush 12	11	3MTA13-3	3MTA13-4	3MTA14-10
l	Flush 13	12	3MTA13-1	3MTA13-2	3MTA15-10
m	AmpSaver	13	3MTA14-8	3MTA14-7	3MTA14-9
n	I Am Injecting	14	3MTA14-5	3MTA14-6	N/A
o	Chemical 14	15	3MTA14-3	3MTA14-4	N/A
p	Chemical 15	16	3MTA14-1	3MTA14-2	N/A

Table of *Fifth* 16 Outputs: (5) a through p

Display Code	Output Name	Output Number	Connector/Pin		
			Common	Normally Open	Normally Closed
16 Output Board #3—Optional					
a	Chemical 16	8	3MTA15-7	3MTA15-8	N/A
b	Chemical 17	9	3MTA15-5	3MTA15-6	N/A
c	Chemical 18	10	3MTA15-3	3MTA15-4	N/A
d	Chemical 19	11	3MTA15-1	3MTA15-2	N/A
e	Chemical 20	12	3MTA16-7	3MTA16-8	N/A
f	Not Used	13	3MTA16-5	3MTA16-6	N/A
g	Not Used	14	3MTA16-3	3MTA16-4	N/A
h	Not Used	15	3MTA16-1	3MTA16-2	N/A
8/16 Board #4—WTB+ Allied Discharge					
i	Drycode Bit 0	1	4MTA5-9	4MTA5-8	4MTA5-10
j	Drycode Bit 1	2	4MTA5-6	4MTA5-5	4MTA5-7
k	Drycode Bit 2	3	4MTA5-4	4MTA5-3	4MTA5-1
l	Drycode Bit 3	4	4MTA5-2	4MTA6-10	4MTA6-3
m	Destination Bit 0	5	4MTA6-1	4MTA6-2	N/A
n	Destination Bit 1	6	4MTA6-4	4MTA6-5	N/A
o	Destination Bit 2	7	4MTA6-6	4MTA6-7	N/A
p	Destination Bit 3	8	4MTA6-8	4MTA6-9	N/A

Table of *Sixth* 16 Outputs: (6) a through p

Display Code	Output Name	Output Number	Connector/Pin		
			Common	Normally Open	Normally Closed
16 Output Board #4—WTB+Only					
a	Discharge Desired	0	4MTA13-9	4MTA13-8	4MTA13-10
b	Load/Unload Terminate	1	4MTA13-6	4MTA13-5	4MTA13-7
c	Deflate Dryell Up Seal	2	4MTA13-3	4MTA13-4	4MTA14-10
d	Flag Down	3	4MTA13-1	4MTA13-2	4MTA15-10
e	Dryell Blow	4	4MTA14-8	4MTA14-7	4MTA14-9
f	Discharge Terminated	5	4MTA14-5	4MTA14-6	N/A
g	Seq. Load Desired	6	4MTA14-3	4MTA14-4	N/A
h	Seq. Load Allowed	7	4MTA14-1	4MTA14-2	N/A
i	Seq. Flag Down Discharge	8	4MTA15-7	4MTA15-8	N/A
j	Seq. Load /Unload Terminate	9	4MTA15-5	4MTA15-6	N/A
k	Seq. Discharge Desired	10	4MTA15-3	4MTA15-4	N/A
l	Seq. Discharge Allowed	11	4MTA15-1	4MTA15-2	N/A
m	Start Discharging	12	4MTA16-7	4MTA16-8	N/A
n	Start Loading	13	4MTA16-5	4MTA16-6	N/A
o	Not Used	14	4MTA16-3	4MTA16-4	N/A
p	Not Used	15	4MTA16-1	4MTA16-2	N/A

MONITORING MICROPROCESSOR INPUTS AND OUTPUTS FOR MARK IV AND V WASHER-EXTRACTORS

This section identifies all inputs and outputs used in the Mark IV and V Textile microprocessor controller. The current state of all inputs (made or not made) and the current state of most outputs (energized or not energized) can be displayed *while a formula is running or stopped due to an error condition.* This is real-time information. Any change in the state of the input or output is displayed *as it occurs.*

NOTE 1: See "MANUAL MODE MENU . . ." (see Table of Contents) for instructions on testing outputs and viewing inputs *while the machine is idle.*

Inputs

```
10:38 F0005S03 02:37
dF=A093/D140 LEV2
```

```
3 WIRE DISABLED
FAULT : SEE MANUAL
```

When a formula is running and a normal run display or error display similar to the displays at left appears,

hold [9] + [1] **Displays the *first* 16 inputs: (1) A through P.**
hold [9] + [2] **Displays the *second* 16 inputs: (2) A through P.**
hold [9] + [3] **Displays the *third* 16 inputs: (3) A through P.**
hold [9] + [4] **Displays the *fourth* 16 inputs (4) A through P.**
hold [9] + [5] **Displays the *fifth* 16 inputs (5) A through P.**

1 = First 16 inputs (8/16 Board #1)
2 = Second 16 inputs (8/16 Board #2)
3 = Third 16 inputs (8/16 Board #3)
4 = Fourth 16 Inputs (8/16 Board #4)
5 = Fifth 16 Inputs (Processor board)

```
(1) ABCDEFGHIJKLMNOP
    --+---+---+----
```

Top line shows input letter (see "Table of Inputs"). Bottom line shows status: – = not made, + = made.

When the *input status display* appears as in the example at left, see the "Table of Inputs" below, for input descriptions.

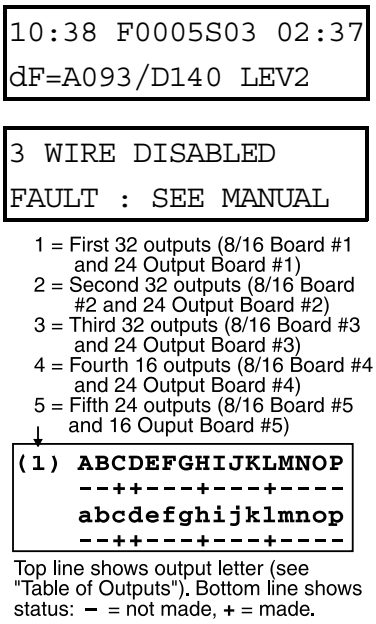
Inputs—Display Pages 1, 2, and 3

Display Code	Input Name	Connector/Pin	Input Name	Connector/Pin	Input Name	Connector/Pin
	8/16 Board #1—Standard		**8/16 Board #2—Optional**		**8/16 Board #3—WTB+ Only**	
A	Manual Chemical Desired #1	1MTA4-1	Inject Pressure OK	2MTA4-1	Dryell Locked Up	3MTA4-1
B	Pressure Desired	1MTA4-2	Manual Chem Desired #2	2MTA4-2	Dryell Down	3MTA4-2
C	Extract Position	1MTA4-3	Fill Tanks	2MTA4-3	Eye Blocked	3MTA4-3
D	Wash Position	1MTA4-4	Pressure Fault	2MTA4-4	Door Full Open	3MTA4-4
E	Low Level	1MTA4-5	Temperature OK	2MTA4-5	Allied Load Terminate	3MTA4-5
F	Stop Washing	1MTA4-6	Amps OK	2MTA4-6	Allied Start Discharge	3MTA4-6
G	Don't Allow Chems	1MTA4-7	Brake Pads Worn	2MTA4-7	Manual Desired (WTB+)	3MTA4-7
H	Speed Switch	1MTA4-8	Not used	2MTA4-8	Not Used	3MTA4-8
I	Pressure Ports Open	1MTA4-11	E2 Overload	2MTA4-11	Full Down	3MTA4-11
J	Front Not Down	1MTA4-12	E1 Overload	2MTA412	Full Up	3MTA4-12
K	Tilt Level	1MTA4-13	Drain Overload	2MTA4-13	Timer Stop Input	3MTA4-13
L	Brake is Off	1MTA4-14	Wash Overload	2MTA4-14	Unload Allowed	3MTA4-14
M	Motors Allowed	1MTA4-15	Variable Speed OL	2MTA4-15	Load Allowed	3MTA4-15
N	Sample Desired	1MTA4-16	Rear Up	2MTA4-16	Allied Start Loading	3MTA4-16
O	Manual Direct Cool	1MTA4-17	Door Open	2MTA4-17	Not Used	3MTA4-17
P	Manual Cooldown	1MTA4-18	Not Used	2MTA4-18	Load Terminate	3MTA4-18

Inputs—Display Pages 4 and 5

Display Code	Input Name	Connector/Pin	Input Name	Connector/Pin
	8/16 Board #4—WTB+ Only		**Direct Inputs—80186 Processor Board**	
A	Formula Bit 0	4MTA4-1	Mildata	MTA38-8
B	Formula Bit 1	4MTA4-2	Program Key	MTA38-3
C	Formula Bit 2	4MTA4-3	Signal Cancel	MTA38-2
D	Formula Bit 3	4MTA4-4	Course Balance	MTA38-5
E	Formula Bit 4	4MTA4-5	Excursion	MTA38-6
F	Formula Bit 5	4MTA4-6	Three wire	MTA38-7
G	Weight Bit 0	4MTA4-7	Bearing Seal Deflated	MTA39-3
H	Weight Bit 1	4MTA4-8	Not Used	MTA39-2
I	Weight Bit 2	4MTA4-11	Not Used	MTA39-1
J	Weight Bit 3	4MTA4-12	Not Used	MTA39-6
K	Weight Bit 4	4MTA4-13	Not Used	MTA39-5
L	Weight Bit 5	4MTA4-14	Not Used	MTA39-4
M	Weight Bit 6	4MTA4-15		
N	Weight Bit 7	4MTA4-16		
O	Not Used	4MTA4-17		
P	Not Used	4MTA4-18		

Outputs



When a formula is running and a normal run display or error display similar to the displays at left appears,

hold 8 + 1 **Displays the *first* 16 outputs: (1) a through p.**

hold 8 + 2 **Displays the *second* 16 outputs: (2) a through p.**

hold 8 + 3 **Displays the *third* 16 outputs: (3) a through p.**

hold 8 + 4 **Displays the *fourth* 16 outputs: (4) a through p.**

hold 8 + 5 **Displays the *fifth* 16 outputs: (5) a through p.**

When the *output status display* appears as in the example at left, see the following tables of outputs for output descriptions.

First 32 Outputs—Display Page 1

Display Code	Output Name	Connector/Pin		Display Code	Output Name	Connector/Pin	
		Common	Normally Open			Common	Normally Open
8/16 Board#1—Standard				**24 Out put Board#1—Standard**			
A	Drain Motor	1MTA5-10	1MTA5-19	**a**	Brake Release	1MTA13-9	1MTA13-19
B	Cooldown	1MTA5-9	1MTA5-18	**b**	Water Valve #1	1MTA13-10	1MTA14-1
C	Extract Position	1MTA5-8	1MTA5-17	**c**	Water Valve #2	1MTA14-11	1MTA14-2
D	Chem 4	1MTA5-7	1MTA5-16	**d**	Water Valve #3	1MTA14-12	1MTA14-3
E	Chem 1	1MTA5-4	1MTA5-14	**e**	Sewer Drain	1MTA14-4	1MTA14-13
F	Chem 3	1MTA5-3	1MTA5-13	**f**	Reuse Drain	1MTA14-4	1MTA14-14
G	Chem 2	1MTA5-2	1MTA5-12	**g**	Low Extract	1MTA14-10	1MTA14-5
H	Chem 5	1MTA5-1	1MTA5-11	**h**	Wash Position	1MTA14-10	1MTA14-15
24 Output Board #1—Standard							
I	High Extract	1MTA13-1	1MTA13-11	**i**	Not used	1MTA14-10	1MTA14-6
J	Balance	1MTA13-2	1MTA13-12	**j**	Not used	1MTA14-10	1MTA14-16
K	Wash Clutch	1MTA13-3	1MTA13-13	**k**	Not used	1MTA14-10	1MTA14-7
L	Clockwise Wash	1MTA13-4	1MTA13-14	**l**	Not used	1MTA14-10	1MTA14-17
M	C-Clockwise Wash	1MTA13-5	1MTA13-15	**m**	Not used	1MTA14-10	1MTA14-8
N	Steam Valve	1MTA13-6	1MTA13-16	**n**	Not used	1MTA14-10	1MTA14-18
O	Signal	1MTA13-7	1MTA13-17	**o**	Not used	1MTA14-10	1MTA14-9
P	Three Wire Relay	1MTA13-8	1MTA13-18	**p**	Not used	1MTA14-10	1MTA14-19

Second 32 Outputs—Display Page 2

Display Code	Output Name	Connector/Pin		Display Code	Output Name	Connector/Pin	
		Common	Normally Open			Common	Normally Open
8/16 Board #2—Optional				**24 Output Board #2—Optional**			
A	Flush 11	2MTA5-10	2MTA5-19	**a**	Direct Steam	2MTA13-9	2MTA13-19
B	Recirculate	2MTA5-9	2MTA5-18	**b**	Chemical Inject	2MTA13-10	2MTA14-1
C	Not used	2MTA5-8	2MTA5-17	**c**	Chemical 6	2MTA14-11	2MTA14-2
D	Flush 9	2MTA5-7	2MTA5-16	**d**	Chemical 7	2MTA14-12	2MTA14-3
E	Chem 9	2MTA5-4	2MTA5-14	**e**	Chemical 8	2MTA14-4	2MTA14-13
F	Chem 11	2MTA5-3	2MTA5-13	**f**	Flush 6	2MTA14-4	2MTA14-14
G	Chem 10	2MTA5-2	2MTA5-12	**g**	Flush 7	2MTA14-10	2MTA14-5
H	Flush 10	2MTA5-1	2MTA5-11	**h**	Flush 8	2MTA14-10	2MTA14-15
24 Output Board #2—Optional							
I	Water Safety	2MTA13-1	2MTA13-11	**i**	Not Used	2MTA14-10	2MTA14-6
J	Chemical Manifold Flush	2MTA13-2	2MTA13-12	**j**	Not Used	2MTA14-10	2MTA14-16
K	Manual Chemical Inject	2MTA13-3	2MTA13-13	**k**	Not Used	2MTA14-10	2MTA14-7
L	Pressure Allowed	2MTA13-4	2MTA13-14	**l**	Not Used	2MTA14-10	2MTA14-17
M	Dry Supply Manifold Flush	2MTA13-5	2MTA13-15	m	Not Used	2MTA14-10	2MTA14-8
N	Fill Dye Tanks	2MTA13-6	2MTA13-16	**n**	Not Used	2MTA14-10	2MTA14-18
O	Direct Cooldown	2MTA13-7	2MTA13-17	**o**	Not Used	2MTA14-10	2MTA14-9
P	Machine Moving	2MTA13-8	2MTA13-18	**p**	Not Used	2MTA14-10	2MTA14-19

Third 32 Outputs—Display Page 3

Display Code	Output Name	Connector/Pin		Display Code	Output Name	Connector/Pin	
		Common	Normally Open			Common	Normally Open
8/16 Board #3—WTB+ Only				**24 Output Board #3—Optional**			
A	Discharge Command	3MTA5-10	3MTA5-19	**a**	Chem 16	3MTA13-9	3MTA13-19
B	Dryell Up Lock Release	3MTA5-9	3MTA5-18	**b**	Chem 17	3MTA13-10	3MTA14-1
C	Load/Unload Allowed	3MTA5-8	3MTA5-17	**c**	Chem 18	3MTA14-11	3MTA14-2
D	Load Command	3MTA5-7	3MTA5-16	**d**	Chem 19	3MTA14-12	3MTA14-3
E	Flush Dryell	3MTA5-4	3MTA5-14	**e**	Chem 20	3MTA14-4	3MTA14-13
F	Load Desired	3MTA5-3	3MTA5-13	**f**	Not Used	3MTA14-4	3MTA14-14
G	Dryell Move Up	3MTA5-2	3MTA5-12	**g**	Not Used	3MTA14-10	3MTA14-5
H	Dryell Move Down	3MTA5-1	3MTA5-11	**h**	Not Used	3MTA14-10	3MTA14-15
24 Output Board #3 —Optional							
I	Chem 12	3MTA13-1	3MTA13-11	**i**	Not Used	3MTA14-10	3MTA14-6
J	Chem 13	3MTA13-2	3MTA13-12	**j**	Not Used	3MTA14-10	3MTA14-16
K	Flush 12	3MTA13-3	3MTA13-13	**k**	Not Used	3MTA14-10	3MTA14-7
L	Flush 13	3MTA13-4	3MTA13-14	**l**	Not Used	3MTA14-10	3MTA14-17
M	AmpSaver	3MTA13-5	3MTA13-15	**m**	Not Used	3MTA14-10	3MTA14-8
N	I Am Injecting	3MTA13-6	3MTA13-16	**n**	Not Used	3MTA14-10	3MTA14-18
O	Chem 14	3MTA13-7	3MTA13-17	**o**	Not Used	3MTA14-10	3MTA14-9
P	Chem 15	3MTA13-8	3MTA13-18	**p**	Not Used	3MTA14-10	3MTA14-19

Fourth 32 Outputs—Display Page 4

Display Code	Output Name	Connector/Pin		Display Code	Output Name	Connector/Pin	
		Common	Normally Open			Common	Normally Open
8/16 Board #4—Allied Discharge				**16 Output Board #4—WTB+Only**			
A	Drycode Bit 0	4MTA5-10	4MTA5-19	**a**	Seq. Flag Down Discharge	4MTA13-9	4MTA13-19
B	Drycode Bit 1	4MTA5-9	4MTA5-18	**b**	Seq. Load /Unload Terminate	4MTA13-10	4MTA14-1
C	Drycode Bit 2	4MTA5-8	4MTA5-17	**c**	Seq. Discharge Desired	4MTA14-11	4MTA14-2
D	Drycode Bit 3	4MTA5-7	4MTA5-16	**d**	Seq. Discharge Allowed	4MTA14-12	4MTA14-3
E	Destination Bit 0	4MTA5-4	4MTA5-14	**e**	Start Discharging	4MTA14-4	4MTA14-13
F	Destination Bit 1	4MTA5-3	4MTA5-13	**f**	Start Loading	4MTA14-4	4MTA14-14
G	Destination Bit 2	4MTA5-2	4MTA5-12	**g**	Not Used	4MTA14-10	4MTA14-5
H	Destination Bit 3	4MTA5-1	4MTA5-11	**h**	Not Used	4MTA14-10	4MTA14-15
24 Output Board #4—WTB+Only							
I	Discharge Desired	4MTA13-1	4MTA13-11	**i**	Not Used	4MTA14-10	4MTA14-6
J	Load/Unload Terminate	4MTA13-2	4MTA13-12	**j**	Not Used	4MTA14-10	4MTA14-16
K	Deflate Dryell Up Seal	4MTA13-3	4MTA13-13	**k**	Not Used	4MTA14-10	4MTA14-7
L	Flag Down	4MTA13-4	4MTA13-14	**l**	Not Used	4MTA14-10	4MTA14-17
M	Dryell Blow	4MTA13-5	4MTA13-15	**m**	Not Used	4MTA14-10	4MTA14-8
N	Discharge Terminated	4MTA13-6	4MTA13-16	**n**	Not Used	4MTA14-10	4MTA14-18
O	Seq. Load Desired	4MTA13-7	4MTA13-17	**o**	Not Used	4MTA14-10	4MTA14-9
P	Seq. Load Allowed	4MTA13-8	4MTA13-18	**p**	Not Used	4MTA14-10	4MTA14-19

Last 24 Inputs—Display Page 5

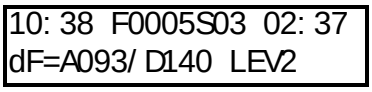
Display Code	Output Name	Connector/Pin		Display Code	Ouput Name	Connector/Pin	
		Common	Normally Open			Normally Closed	Normally Open
8/16 Board #5				**8/16 Board #7**			
A	Chem Flow Flush	5MTA5-10	5MTA5-19	**a**	Chem Flow 21	7MTA5-10	7MTA5-19
B	Chem Flow 6	5MTA5-9	5MTA5-18	**b**	Chem Flow 22	7MTA5-9	7MTA5-18
C	Chem Flow 7	5MTA5-8	5MTA5-17	**c**	Chem Flow 23	7MTA5-8	7MTA5-17
D	Chem Flow 8	5MTA5-7	5MTA5-16	**d**	Chem Flow 24	7MTA5-7	7MTA5-16
E	Chem Flow 9	5MTA5-4	5MTA5-14	**e**	Chem Flow 25	7MTA5-4	7MTA5-14
F	Chem Flow 10	5MTA5-3	5MTA5-13	**f**	Chem Flow 26	7MTA5-3	7MTA5-13
G	Chem Flow 11	5MTA5-2	5MTA5-12	**g**	Chem Flow 27	7MTA5-2	7MTA5-12
H	Chem Flow 12	5MTA5-1	5MTA5-11	**h**	Chem Flow 28	7MTA5-1	7MTA5-11
8/16 Board #6							
I	Chem Flow 13	6MTA5-10	6MTA5-19				
J	Chem Flow 14	6MTA5-9	6MTA5-18				
K	Chem Flow 15	6MTA5-8	6MTA5-17				
L	Chem Flow 16	6MTA5-7	6MTA5-16				
M	Chem Flow 17	6MTA5-4	6MTA5-14				
N	Chem Flow 18	6MTA5-3	6MTA5-13				
O	Chem Flow 19	6MTA5-2	6MTA5-12				
P	Chem Flow 20	6MTA5-1	6MTA5-11				

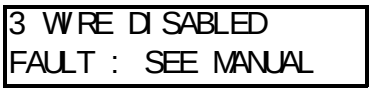
MONITORING MICROPROCESSOR INPUTS AND OUTPUTS FOR SINGLE MOTOR TEXTILE MACHINES

This section identifies all inputs and outputs used in the single-motor style textile microprocessor controller. The current state of all inputs (made or not made) and the current state of most outputs (energized or not energized) can be displayed *while a formula is running or stopped due to an error condition.* This is real-time information. Any change in the state of the input or output is displayed *as it occurs.*

NOTE 1: See "MANUAL MODE MENU . . ." (see Table of Contents) for instructions on testing outputs and viewing inputs *while the machine is idle*.

Inputs





When a formula is running and a normal run display or error display similar to the displays at left appears,

hold 9 + 1 Displays the *first* 16 inputs: (1) A through P.
hold 9 + 2 Displays the *second* 16 inputs: (2) A through P.
hold 9 + 3 Displays the *third* 16 inputs: (3) A through P.
hold 9 + 4 Displays the *fourth* 16 inputs (4) A through P.
hold 9 + 5 Displays the *fifth* 16 inputs (5) A through P.

1 = First 16 inputs (8/16 Board #1)
2 = Second 16 inputs (8/16 Board #2)
3 = Third 16 inputs (8/16 Board #3)
4 = Fourth 16 Inputs (8/16 Board #4)
5 = Fifth 16 Inputs (Processor board)

Top line shows input letter (see "Table of Inputs"). Bottom line shows status: – = not made, + = made.

When the *input status display* appears as in the example at left, see the "Table of Inputs" below, for input descriptions.

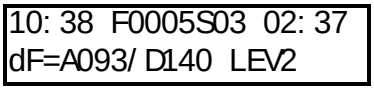
Inputs—Display Pages 1, 2, and 3

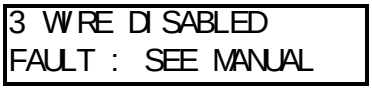
Display Code	Input Name	Connector/Pin	Input Name	Connector/Pin	Input Name	Connector/Pin
	8/16 Board #1—Standard		**8/16 Board #2—Optional**		**Processor Board**	
A	Manual Chemical Desired #1	1MTA3-10	Inject Pressure OK	2MTA3-10	Mildata	MTA38-3
B	Door Closed	1MTA3-9	Manual Chem Desired #2	2MTA3-9	Program key	MTA38-2
C	Extract Position	1MTA3-8	Fill Tanks	2MTA3-8	Signal cancel	MTA38-1
D	Wash Position	1MTA3-7	Pressure Fault	2MTA3-7	Course Balance	MTA38-4
E	Not Used	1MTA3-4	Temperature OK	2MTA3-4	Excursion	MTA38-5
F	Stop Washing	1MTA3-3	Amps OK	2MTA3-3	Three Wire	MTA38-6
G	Don't Allow Chems	1MTA3-2	Brake Pads Worn	2MTA3-2	Inverter Tripped	MTA39-5
H	Speed Switch	1MTA3-1	Not used	2MTA3-1	Not Used	MTA39-4
I	Pressure Port Open	1MTA4-10	E2 Overload	2MTA4-10	Not Used	MTA39-3
J	Front Not Down	1MTA4-9	E1 Overload	2MTA4-9	Not Used	MTA39-8
K	Not Used	1MTA4-8	Drain Overload	2MTA4-8	Not Used	MTA39-6
L	Brake is Off	1MTA4-7	Wash Overload	2MTA4-7	Not Used	MTA39-7
M	Motors Allowed	1MTA4-4	Variable Speed OL	2MTA4-4		
N	Sample Desired	1MTA4-3	Rear Up	2MTA4-3		
O	Manual Direct Cool	1MTA4-2	Door Open	2MTA4-2		
P	Manual Cool	1MTA4-1	Not Used	2MTA4-1		

Inputs on Uart3 Serial Port

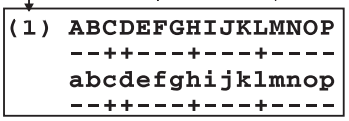
8/16 Board #5		8/16 Board #6		8/16 Board #7	
Flow Meter	MTA Number	Flow Meter	MTA Number	Flow Meter	MTA Number
1	5MTA2-6	1	6MTA2-6	1	7MTA2-6
2	5MTA1-1	2	6MTA1-1	2	7MTA1-1
3	5MTA3-10	3	6MTA3-10	3	7MTA3-10
4	5MTA3-9	4	6MTA3-9	4	7MTA3-9
5	5MTA3-8	5	6MTA3-8	5	7MTA3-8
6	5MTA3-7	6	6MTA3-7	6	7MTA3-7
7	5MTA3-4	7	6MTA3-4	7	7MTA3-4
8	5MTA3-3	8	6MTA3-3	8	7MTA3-3

Outputs





1 = First 32 outputs (8/16 Board #1 and 24 Output Board #1)
2 = Second 32 outputs (8/16 Board #2 and 24 Output Board #2)
3 = Third 32 outputs (8/16 Board #3 and 24 Output Board #3)
4 = Fourth 16 outputs (8/16 Board #4 and 24 Output Board #4)
5 = Fifth 24 outputs (8/16 Board #5 and 16 Ouput Board #5)



Top line shows output letter (see "Table of Outputs"). Bottom line shows status: **–** = not made, **+** = made.

When a formula is running and a normal run display or error display similar to the displays at left appears,

hold 8 + 1 **Displays the *first* 16 outputs: (1) a through p.**

hold 8 + 2 **Displays the *second* 16 outputs: (2) a through p.**

hold 8 + 3 **Displays the *third* 16 outputs: (3) a through p.**

hold 8 + 4 **Displays the *fourth* 16 outputs: (4) a through p.**

hold 8 + 5 **Displays the *fifth* 16 outputs: (5) a through p.**

When the *output status display* appears as in the example at left, see the following tables of outputs for output descriptions.

First 32 Outputs—Display Page 1

Display Code	Output Name	Connector/Pin		Display Code	Output Name	Connector/Pin	
		Common	Normally Open			Common	Normally Open
8/16 Board#1—Standard				**16 Output Board #1—Standard (cont'd)**			+
A	Drain Motor	1MTA5-9	1MTA5-8	**a**	Brake Release	1MTA15-7	1MTA15-8
B	Cooldown	1MTA5-6	1MTA5-5	**b**	Water Valve #1	1MTA15-5	1MTA15-6
C	Dry Fold Manifold	1MTA5-4	1MTA5-3	**c**	Water Valve #2	1MTA15-3	1MTA15-4
D	Chem 4	1MTA5-2	1MTA6-10	**d**	Water Valve #3	1MTA15-1	1MTA15-2
E	Chem 1	1MTA6-1	1MTA6-2	**e**	Sewer Drain	1MTA16-7	1MTA16-8
F	Chem 3	1MTA6-4	1MTA6-5	**f**	Reuse Drain	1MTA16-5	1MTA16-6
G	Chem 2	1MTA6-6	1MTA6-7	**g**	Door Unlock	1MTA16-3	1MTA16-4
H	Chem 5	1MTA6-8	1MTA6-9	**h**	Wash Position	1MTA16-1	1MTA16-2
16 Output Board #1—Standard				8/16 Board #2—Optional			
I	High Extract	1MTA13-9	1MTA13-8	**i**	Flush 11	2MTA5-9	1MTA5-8
J	Balance	1MTA13-6	1MTA13-5	**j**	Recirculate	2MTA5-6	1MTA5-5
K	Low Extract	1MTA13-3	1MTA13-4	**k**	Alt. Accel/Decel	2MTA5-4	1MTA5-3
L	Clockwise Wash	1MTA14-8	1MTA13-2	**l**	Flush 9	2MTA5-2	1MTA6-10
M	C-Clockwise Wash	1MTA14-5	1MTA14-7	**m**	Chem 9	2MTA6-1	1MTA6-2
N	Steam Valve	1MTA14-3	1MTA14-6	**n**	Chem 11	2MTA6-4	1MTA6-5
O	Signal	1MTA14-3	1MTA14-4	**o**	Chem 10	2MTA6-6	1MTA6-7
P	Three Wire Relay	1MTA14-1	1MTA14-2	**p**	Flush 10	2MTA6-8	1MTA6-9

Second 32 Outputs—Display Page 2

Display Code	Output Name	Connector/Pin		Display Code	Output Name	Connector/Pin	
		Common	Normally Open			Common	Normally Open
16 Output Board #2—Optional				**16 Output Board #3—Optional**			
A	Water Safety	2MTA13-9	2MTA13-8	**a**	Chem 12	3MTA13-9	3MTA13-8
B	Chemical Manifold Flush	2MTA13-6	2MTA13-5	**b**	Chem 13	3MTA13-6	3MTA13-5
C	Manual Chemical Inject	2MTA13-3	2MTA13-4	**c**	Flush 12	3MTA13-3	3MTA13-4
D	Pressure Allowed	2MTA13-1	2MTA13-2	**d**	Flush 13	3MTA13-1	3MTA13-2
E	Dry Supply Manifold Flush	2MTA14-8	2MTA14-7	**e**	Amp Saver	3MTA14-8	3MTA14-7
F	Fill Dye Tanks	2MTA14-5	2MTA14-6	**f**	I am Injecting	3MTA14-5	3MTA14-6
G	Direct Cooldown	2MTA14-3	2MTA14-4	**g**	Chem 14	3MTA14-3	3MTA14-4
H	Machine Moving	2MTA14-1	2MTA14-2	**h**	Chem 15	3MTA14-1	3MTA14-2
I	Direct Steam	2MTA15-7	2MTA15-8	**i**	Chem 16	3MTA15-7	3MTA15-8
J	Chem Inject	2MTA15-5	2MTA15-6	**j**	Chem 17	3MTA15-5	3MTA15-6
K	Chem 6	2MTA15-3	2MTA15-4	**k**	Chem 18	3MTA15-3	3MTA15-4
L	Chem 7	2MTA15-1	2MTA15-2	**l**	Chem 19	3MTA15-1	3MTA15-2
M	Chem 8	2MTA16-7	2MTA16-8	m	Chem 20	3MTA16-7	3MTA16-8
N	Flush 6	2MTA16-5	2MTA16-6	**n**	Not Used	3MTA16-5	3MTA16-6
O	Flush 7	2MTA16-3	2MTA16-4	**o**	Not Used	3MTA16-3	3MTA16-4
P	Flush 8	2MTA16-1	2MTA16-2	**p**	Not Used	3MTA16-1	3MTA16-2

Last 24 Outputs—Display Page 3

Display Code	Output Name	Connector/Pin		Display Code	Ouput Name	Connector/Pin	
		Common	Normally Open			Normally Closed	Normally Open
8/16 Board #5				**8/16 Board #7**			
A	Chem Flow Flush	5MTA5-9	5MTA5-8	**a**	Chem Flow 21	7MTA5-9	7MTA5-8
B	Chem Flow 6	5MTA5-6	5MTA5-5	**b**	Chem Flow 22	7MTA5-6	7MTA5-5
C	Chem Flow 7	5MTA5-4	5MTA5-3	**c**	Chem Flow 23	7MTA5-4	7MTA5-3
D	Chem Flow 8	5MTA5-2	5MTA6-10	**d**	Chem Flow 24	7MTA5-2	7MTA6-10
E	Chem Flow 9	5MTA6-1	5MTA6-2	**e**	Chem Flow 25	7MTA6-1	7MTA6-2
F	Chem Flow 10	5MTA6-4	5MTA6-5	**f**	Chem Flow 26	7MTA6-4	7MTA6-5
G	Chem Flow 11	5MTA6-6	5MTA6-7	**g**	Chem Flow 27	7MTA6-6	7MTA6-7
H	Chem Flow 12	5MTA6-8	5MTA6-9	**h**	Chem Flow 28	7MTA6-8	7MTA6-9
8/16 Board #6							
I	Chem Flow 13	6MTA5-9	6MTA5-8				
J	Chem Flow 14	6MTA5-6	6MTA5-5				
K	Chem Flow 15	6MTA5-4	6MTA5-3				
L	Chem Flow 16	6MTA5-2	6MTA6-10				
M	Chem Flow 17	6MTA5-1	6MTA6-2				
N	Chem Flow 18	6MTA6-4	6MTA6-5				
O	Chem Flow 19	6MTA6-6	6MTA6-7				
P	Chem Flow 20	6MTA6-8	6MTA6-9				

Section 4

Supplemental Information

MANUAL MODE MENU FUNCTIONS ON THE MARK III, IV, AND V TEXTILE CONTROLLER

This section describes functions on the microprocessor textile controller which are available when the machine is *idle* (formula not running) and in the *run mode*.

NOTE: See "MODIFYING FORMULAS IN PROGRESS" (see Table of Contents) for instructions on manually modifying a *running formula*. See "MONITORING MICROPROCESSOR INPUTS . . ." (see Table of Contents) for instructions on viewing inputs and outputs *while the machine is running*.

Selections (Modes) on the Manual Menu

0=Turn Output On—Actuate individual outputs for testing. This is called *bare manual*.
1=Look at Inputs—View the on/off status of each input *during idle conditions.*

To Access the Manual Menu

```
RUN FORMULA
00 OR OK POWER OFF
```

When the *Run Formula menu* and *selection 00* is displayed as shown at left,

MANUAL **Accesses the manual menu.**

```
TURN OUTPUT ON
0
```

When *selection 0, Turn Output On,* on the *manual menu* is displayed as shown,

<x> **Selects a *manual* mode,** where <x> is 0 or 1. See the following information for how to access and utilize each manual mode.

or CANCEL ESCAPE **Returns to the *Run Formula menu* (run mode).**

0=Turn Output On (Bare Manual)

How Bare Manual Works—Bare manual permits turning certain outputs *on* and *off*, one at a time, for testing, when the machine is idle. Note that outputs appear in a different order on the *bare manual menu* herein, than on the *output status displays* (see "INPUT AND OUTPUT DESCRIPTIONS. . .").

To Actuate Outputs in Bare Manual

```
TURN OUTPUT ON
0
```

When *selection 0, Turn Output On* on the *manual menu* is displayed as shown,

ENTER NEXT ① **Accesses mode 0 and displays *Press Start.***

Closes the *three-wire circuit* permitting output actuation and displays the *bare manual menu.*

```
ABORT MANUAL OPER
00
```

When *selection 00* on the *bare manual menu* is displayed, as shown at left,

<xx> Selects an output by number, where <xx> is a menu item number on the "Table of Bare Manual Outputs."

or CANCEL ESCAPE **Returns to the *Run Formula menu.***

```
COUNTER CLOCKWISE
02
```

When an output is selected as in the example *02, Counter Clockwise*, at left,

ENTER NEXT **Turns the output *on*.** See table for consequences.

CANCEL ESCAPE **Turns the output *off*** and permits selecting any other output for testing.

Table of Bare Manual Outputs for Mark II Microprocessor Textile Controller

Menu Item	Output Name on Display	Applicable Machines	Standard or Option	Consequences of Actuating the Output
01	Abort Manual Oper	all	S	Return to *Run Formula menu.*
02	Clockwise	all	S	Turn basket clockwise at wash speed.
03	Counter Clockwise	all	S	Turn basket counterclockwise at wash speed.
04	Drain Speed	all	S	Turn basket at drain speed (clockwise).
05	Clutch 1 (Wash Clutch)	all	S	Clutch is normally engaged when *Master switch* is *on*. Clutch disengages when this output is turned on then off.
06	Clutch 2 (duplicates Clockwise)	all	S	Turn basket clockwise at wash speed.
07	Water Valve #1	all	S	Opens valve.
08	Water Valve #2	all	S	Opens valve.
09	Water Valve #3	all	O	Opens valve.
10	Sewer Drain	all	S	Output *on* closes drain.
11	Reuse Drain	all	O	Output *on* opens drain.
12	Brake	all	S	Output *on* releases brake.
13–17	Chemical (1 thru 5)	all	S	Operates selected chemical inject device.
18–25	Chemical (6 thru 13)	all	O	Operates selected chemical inject device.
26	Steam	all	O	Opens steam valve to heat exchanger if machine so equipped, else opens steam valve to cylinder.

Menu Item	Output Name on Display	Applicable Machines	Standard or Option	Consequences of Actuating the Output
27	Cool Down	all	O	Opens cooldown valve to heat exchanger if machine so equipped, else opens cooldown valve to cylinder.
28	Push Dn (Pushdown)	Hydro-cushion®	S	Actuates push-down devices, lowering shell onto pads. Output *off* de-actuates push-down *and releases clutch.*
	Wash Pos. (Wash Tilt Position)	spring-mount,tilt	S	Moves housing to the wash tilt position.
29	Signal	all	S	Sounds operator alarm.
30	Aux Bal	self-balance	S	Enables balancing circuit.
31	Direct Cooldown	heat exchanger	O	Opens cooldown valve to cylinder if machine is equipped with a heat exchanger.
32	Direct Steam	heat exchanger	O	Opens steam valve to cylinder if machine is equipped with a heat exchanger.
33	Extract Position	spring-mount, tilt	S	Moves housing to the extract tilt position.
34-41	Flush Tank 6-13	chemical tanks	O	Flushes chemical tank into manifold.
42	5 Supply Manifold	all	O	Flushes 5-supply injector.
43	Manual Chem Inject	all	S	Injects selected chemical.
44	Dye Manifold Flush	chemical tanks	S	Flushes dye tank manifold with water.
45	Pressure Allowed	pressure models	S	Prepares cylinder for pressurization.
46	Recirculating	all	O	Enables recirculation pump.
47	not used	all	—	
48	Fill Dye Tanks	chemical tanks	O	Fills dye tanks with water.
49-52	Dry Code 0-3	all	S	Passes dry code to receiving device.
53-56	Dry Destination 0-3	all	S	Passes dry destination to receiving device.
57	Wash Speed 2	4-speed wash	O	Enables wash speed 2 (of 4, if machine so equipped).
58	Wash Speed 3	4-speed wash	O	Enables wash speed 3 (of 4, if machine so equipped).
59	Wash Speed 4	4-speed wash	O	Enables wash speed 4 (of 4, if machine so equipped).
60	Water Safety	heat exchanger	S	Water safety valve prevents backflow of bath liquor in the heat exchanger to the incoming water supply; not used if machine does not have a heat exchanger.

1=Look at Inputs (While Idle)

The current state of all microprocessor inputs (made or not made) can be displayed while the machine is *idle*. This is real-time information. Any change in the state of the input is displayed *as it occurs.*

NOTE: This procedure accesses the same *input status displays* explained in "MONITORING MICRO-PROCESSOR INPUTS . . . . . ." (see Table of Contents), but permits viewing these displays *while the machine is idle*. See the referenced section for discriptions of the displays, input descriptions, and for instructions on viewing these displays *while a formula is running.*

When *selection 1, Look At Inputs,* on the *manual menu* is displayed as shown at left,

ENTER NEXT — **Displays the first 16 inputs.**

9 YZ- + 1 ABC — **Displays the second 16 inputs.**

9 YZ- + 2 DEF — **Displays the third 16 inputs.**

CANCEL ESCAPE — **Returns to the *Run Formula* menu.**

NOTICE

As this manual was being printed, Pellerin Milnor Corporation began a manufacturing change which may affect how this manual applies to your machine. The six-position DIP switch on each printed circuit board is being replaced with two sixteen-position rotary switches. The switches (DIP and rotary) are used to set the logical address for each board that communicates with the microprocessor in the machine, or with a higher-level control system (e.g., a Mildata network).

Because the change to rotary switches corresponds so closely to the release of this manual, we are supplying you with documentation on how to set both types of switches.

If your machine uses printed circuit boards containing one DIP switch, refer to MSFDA401**D**E to set the address on replacement boards. If your machine uses printed circuit boards containing rotary switches, refer to MSFDA401**E**E.

BMP970004/97071

Hardware Components of Serial Microprocessor Controllers

1. General

Milnor® serial microprocessor controls are designed specifically for Milnor® machines and systems. Along with certain external electromechanical relay logic and sensing devices, they control all machine and system functions. **Not every microprocessor controller includes all the components described in this section.**

2. Microprocessor Components

Note 1: This is a list of all components for Milnor® microprocessor controllers. Not every Milnor® microprocessor controller includes all of the following components.

2.1. Keypad or Keyboard—Depending upon the model and type of machine, the keypad may have 12, 30, or 58 buttons. The different keypads are not interchangeable.

2.2. Keyswitch—Selects run/program modes. The key may be removed only when the switch is set to the *Run* position.

CAUTION 1: Prevent Unauthorized Programming—To prevent unauthorized programming, store the programming key so that it is not available to unauthorized personnel. Improper programming can damage equipment and goods.

2.3. Display—Depending upon the type and model of machine, the display may be either liquid crystal, vacuum fluorescent, or cathode ray tube (CRT), which is a typical computer monitor. Different types of displays are not interchangeable.

Liquid crystal graphic display—This display is identified by colored characters and graphics, usually on a black or white background. It's currently used only on certain washer-extractor models with the Milnor Mark VI control system.

Liquid crystal text display—This type of display is identified by dark gray characters on a lighter gray background, or by green characters on a dark gray background.

Vacuum fluorescent display—The bright green characters on a black background make this display highly visible. This is the most common display for Milnor® washer-extractors, textile machines, and dryers.

Cathode ray tube (CRT)—The CRT display resembles a television screen in appearance and function. This type of display is most commonly used in Miltrac™ and Mildata® systems, which require the display of graphics such as boxes and lines. It is also used on Milnor CBW® tunnel washers.

2.4. Power Supply—The power supply converts the alternating current at the control circuit voltage to direct current voltages of 12 volts positive and negative, and 5 volts positive. One or more of these values are adjustable, depending on the specific power supply used in each application.

The Milnor™ CBW® system employs two different power supplies to convert alternating current from the control circuit to direct current for the microprocessor and peripheral boards.

2.4.1. Control Console Power Supply—The power supply referenced as ESPS in the schematic

diagrams is a 40-watt power supply located in the Miltron™ or Mentor™ cabinet. It powers the peripheral boards located within this cabinet, including the optional load cell interface board and the analog to digital board for a weighing conveyor, as well as the microprocessor board and the memory expansion board.

Tip: For maximum reliability and to minimize the chances of the processor board resetting due to low voltage, adjust the power supply voltage for 80186 processors to 5.10 VDC at the processor board.

In systems operated via the Miltron™ controller, this power supply also provides electricity to the monitor interface board. In Mentor™-controlled tunnel systems, the monitor interface board is contained within the Mentor™ computer enclosure and powered by the computer power supply.

2.4.2. Tunnel Power Supply—The power supply referenced as PSO in the schematic diagrams is a 120-watt unit which powers the peripheral boards located on the tunnel washer. All three voltages output by this device are adjustable.

If adjustment is necessary, set the 5 volts output to provide at least positive 4.8VDC at the electric box on the module farthest from the power supply. This measurement must be made with an accurate digital voltmeter. Verify that the positive and negative 12 volts outputs are set at positive and negative 12.00VDC, respectively.

If the 5 volts reading at the peripheral board nearest the PSO power supply is at least positive 5.25VDC, and the voltage at the peripheral board farthest from PSO is positive 4.8VDC or less, suspect one or more loose connections or inadequate wiring somewhere between the two peripheral boards.

2.5. Power Supply —The power supply converts the alternating current at the control circuit voltage to direct current voltages of 12 volts positive and negative, and 5 volts positive. One or more of these values are adjustable, depending on the specific power supply used in each application.

- The 12 volts positive is used to power all boards other than the microprocessor board. This value is not adjustable.
- The 12 volts negative is used by the analog to digital (A/D) board. This value is not adjustable.
- The 5 volts output powers the microprocessor. This value is adjustable and very sensitive. For devices using microprocessors other than the 80186, the power supply must be adjusted to provide actual voltage of 4.95VDC to 5.10VDC at the microprocessor board. Use an accurate digital voltmeter to measure this value. For devices with 80186 microprocessors, the power supply voltage should be 5.10VDC at the processor board.

A wire of at least 14AWG (2.5 sq mm) must be connected between the ground points on the microprocessor and the peripheral boards. This ground wire is installed at the factory if both enclosures are mounted on the same machine (e.g., washer-extractors). The ground wire must be provided during installation if the microprocessor enclosure and its associated peripheral board enclosures are remote from one another (e.g., dryers).

Some machines, including Milnor® dryers, employ a second identical power supply to provide power for the peripheral boards, which are mounted in an enclosure separate from the microprocessor enclosure.

2.6. Central Processing Unit (CPU) Board—Also referred to as the microprocessor, the central processing unit processes data received from the various inputs, stores information, and responds to each keypad entry with the appropriate action. It may be mounted in an enclosure separate from its peripheral boards. The CPU board contains EPROMs programmed by the Milnor® factory with fixed instructions (software) that determine how the machine functions. Depending upon machine model/type, the processor chip may one of three Intel models: the 8085, the 8088, or the 80186.

Although the EPROMs do not require battery backup, the CPU board utilizes a battery which normally provides power to retain the user-programmable memory for two to three months without external power.

2.7. Memory Expansion Board—Increases memory space available to the processor. This board is used with 8088 CPU boards in some applications.

2.8. Battery—Provides memory retention backup when power is off. The battery is mounted directly on 8085 CPU boards, and mounted separately for 8088 and 80186 CPU boards. A capacitor on the 8088 and 80186 CPU boards provides enough power to retain memory for several hours after the battery has been disconnected. Once fully charged, the battery backup is reliable for two to three months with no power applied.

2.9. Opto-Isolator Board—Optically isolates inputs to the microprocessor for electronic noise immunity. Opto-isolators are incorporated into the 8088 and 80186 CPU board; thus this separate board is only required for machines employing Intel 8085 CPUs.

2.10. Input/Output Board—The 16/8 input-output board contains 16 solid-state signal input devices and eight output relays. The input devices are capable of faithfully conducting a low VA 12VDC ground signal to the microprocessor. The output relays are socket-mounted SPDT, 12VDC electromechanical relays with contacts capable of faithfully conducting a maximum of 25VA at 110/120VAC (0.2 ampere or 200 milliamperes at 110/120VAC) or 12.5 VA at 24VAC (0.5 ampere or 500 milliamperes at 24VAC). The output will be either 24VAC or 110/120VAC, depending on the machine model/type.

These outputs and their power source are intended only to drive another relay with higher contact ratings, that in turn may drive a pump, valve, solenoid, etc., from a separate power source. Never use these outputs to directly drive a pump, valve, or solenoid unless the maximum current required never exceeds the above values. Higher ampere or VA loads will burn out traces on the printed circuit board or possibly overload and damage the control circuit transformer.

This board has 25 status lights. The amber light flashes when the board is communicating. Each of the 24 remaining lights represent an input (green lights) or output (red lights) on that board, and illuminates when the corresponding input or output is made. This board has two rotary dials which must be adjusted to set the board's address (see Section 4 “Assigning Board Addresses” in this document). This board also has convenient test points that can be used to test voltage to the board.

Standard input/output board—used in all devices requiring input/output boards, except those listed below.

High-speed input/output board—used only in the following devices and configurations: E6N, J6N, and T6N washer-extractors equipped with and configured for both variable basket speed and electronic balancing; Milrail configured for high-speed boards, and all configurations of the M7E centrifugal extractor.

2.11. Output Board—A 24-output board contains 24 output relays identical to those described in Section 2.10 "Input/Output Board".

2.12. Analog to Digital Convertor Board—Converts analog voltage signals, such as temperature, to a digital signal that can be utilized by the CPU. Up to a maximum of eight channels may be provided on a single board. Although seemingly identical, the analog to digital boards used to sense air temperature in the dryer, water temperature in washer-extractors and textile machines, water temperature in the tunnel, and weight for a weighing conveyor are all different. The different types are clearly marked with different part numbers, which are mentioned in the wiring diagram set and are not interchangeable.

All analog to digital boards have one status light which flashes when the board is communicating. The board has two rotary dials which must be adjusted to set the board's address (see Section 4 "Assigning Board Addresses"). This board also has convenient test points that can be used to test voltage to the board.

2.13. Digital to Analog Convertor Board—Converts digital signals from the processor to analog signals with voltages between 0 and 5VDC (e.g., provides the analog signal to the dryer gas valve position actuator and dye machine steam position actuator).

This board has one status light which flashes when the board is communicating. The two rotary dials must be adjusted to set the board's address (see Section 4). This board also has convenient test points that can be used to test voltage to the board.

2.14. CRT (Video Display) Board—Receives display instructions from the processor and generates the signals to the video monitor to create the desired displays; used in controllers such as the Miltron™ and Miltrac™ controllers and Device Master™ systems.

CAUTION 2: Avoid Component Damage—The CRT board can be installed backwards, even though the cabinet and bracketry makes this difficult, and labelling on the parent board states the proper orientation. Use care to orient the board correctly, otherwise microprocessor components may be damaged.

CBW® systems with the Mentor™ controller use a standard computer video display adapter, housed within the Mentor™ computer, to transmit signals from the Mentor™ computer to the video monitor. Thus, Mentor™ systems do not have a separate video display board as described here.

2.15. Resistor Boards—Although visually similar, resistor boards vary according to the application. The different types are clearly marked with part numbers, which are mentioned in the electrical schematic diagrams and are not interchangeable.

For temperature-sensing systems—used with analog to digital boards in washer-extractors and dye-extractors as part of temperature-sensing system; not required on tunnel systems because the necessary circuitry is included on other standard CBW® circuit boards.

For modulating gas valves—used with digital to analog boards in the temperature control circuit of gas dryers; converts 0-5VDC to 4-20 milliamperes for controlling the modulating gas valve.

For modulating steam valves—used with digital to analog boards in temperature control circuit of older steam dryers; converts 0-5VDC to 4-20 milliamperes for modulating steam valve. See Section 2.20 "4-20mA Output Board" in this document.

2.16. Signal Conditioner for Thermocouple—Amplifies and filters the output from a thermocouple so an analog to digital board can convert the signal to digital values for the microprocessor.

2.17. Rotation Safety Board—Used in dryers. Reads rotational safety proximity switch to confirm that the basket is turning.

2.18. Temperature Probe—Two types of temperature probes are used, depending on equipment type:

Thermistor temperature probe—a temperature-sensitive resistor whose resistance value changes with respect to temperature; uses include washer-extractors, textile machines, and tunnel systems.

Thermocouple temperature probe—a closed loop of two dissimilar metals which produces a voltage with respect to the change in temperature between the two junctions. Thermocouples are used in dryers.

2.19. Weigh Scale Interface Board—In the electrical circuit, this device is between the weighing conveyor (CONWA) load cell and the weighing conveyor analog to digital board. It filters and interprets the signals from the conveyor load cell to the analog to digital board.

2.20. 4-20mA Output Board—Used on newer textile machines and steam dryers with temperature control. See Section 2.15 "Resistor Boards" in this document.

2.21. 8 Output/16 Input Chemical Flow Meter Board—This board is used with the metered chemical injection option on textile machines. Eight outputs and eight counters respectively are assigned to chemical valves and chemical flow meters. Two of the counters are non-isolated direct inputs to the microprocessor on this board and are capable of counting pulses of 0 to 5VDC at a frequency of up to 10kHz. The remaining six counters are optically isolated from the peripheral board microprocessor and are capable of counting pulses from 0 to 12VDC at a frequency up to 150 Hz.

3. Serial Communications Port

All Milnor® serial microprocessors have a serial port with a nine-pin receptacle and plug to communicate with other devices via one of several special serial cables. If supported by the software, downloading and printing of data is accomplished through this port. These actions are described in the programming section of this manual.

For more information on the various separate serial cables required for these functions, see the related section in document BICWUC01, if applicable.

Table 1: Board Application by Device (Part A)

Device		Board Name													
		CPU	Input/Output	Output	Analog to Digital	Digital to Analog	CRT	Opto-isolator	Temperature Sensing Resistor	Gas Valve Resistor	Steam Valve (4-20mA)	Thermocouple Signal Conditioner	Chemical Flow Meter	Rotation Safety	Weight Scale Interface
CBW System*	Number	1	2		1		1								1
	Note(s)		+	1	9										5
Device Master*	Number	1	2				1								
	Note(s)		1	1											
Miltrac*	Number	1					1								
	Note(s)														
VERTSTO	Number	1	2				1								
	Note(s)														
Linear COSTA	Number	1	1												
	Note(s)		1												
Link Master	Number	1													
	Note(s)														
Textile*	Number	1	1	2	1	1			1		1				
	Note(s)				4								1		

Notes:

*	Intel 80186 central processing unit
1	Boards can be added for options
2	Used on steam dryers with temperature control, and all gas dryers
3	Used on washer-extractors with temperature option
4	Analog to digital boards vary according to application. See the descriptions of these boards elsewhere in this section.
5	Required for weighing conveyors on tunnel washing systems
6	Required for reuse/cooldown and/or overhead fill tanks on tunnel washing systems
7	Mark I washer-extractor control used Intel 8085 central processing unit
8	Notes 3 and 4 apply
9	One board required per each 8 modules (see also Notes 1, 4, 5, and 6)
10	Two boards required, plus one additional board per module

Table 2: Board Application by Device (Part B)

Device		Board Name													
		CPU •	Input/Output •	Output •	Analog to Digital •	Digital to Analog •	CRT •	Opto-isolator •	Temperature Sensing Resistor •	Gas Valve Resistor •	Steam Valve (4-20mA) •	Thermocouple Signal Conditioner •	Chemical Flow Meter •	Rotation Safety •	Weight Scale Interface •
COBUC	Number	1	2												
	Note(s)		1	1											
COSHA	Number	1	2												
	Note(s)		1												
Dryer	Number	1	2	1	1	1				1		1		1	
	Note(s)				4	2				2	2				
Extractor	Number	1	2	1											
	Note(s)		1	1											
Press	Number	1	2	1	1										
	Note(s)		1	1											
W/E (Mark I)	Number	1	1	1	1			1	1						
	Note(s)	7	1	1	8	1									
W/E (Mark II-VI)	Number	1	1	1	1	1								1	
	Note(s)		1	1	8	1			1						

Notes:

*	Intel 80186 central processing unit
1	Boards can be added for options
2	Used on steam dryers with temperature control, and all gas dryers
3	Used on washer-extractors with temperature option
4	Analog to digital boards vary according to application. See the descriptions of these boards elsewhere in this section.
5	Required for weighing conveyors on tunnel washing systems
6	Required for reuse/cooldown and/or overhead fill tanks on tunnel washing systems
7	Mark I washer-extractor control used Intel 8085 central processing unit
8	Notes 3 and 4 apply
9	One board required per each 8 modules (see also Notes 1, 4, 5, and 6)
10	Two boards required, plus one additional board per module

4. Assigning Board Addresses

The input/output board, output board, analog to digital board, and digital to analog board each have two rotary switches which establish the address for each board. This allows each board to communicate serially with the microprocessor in its device while sending and receiving its own messages. In a battery of machines, the rotary switches are identical for each identical peripheral board in each identical machine (e.g., the first input/output board (I/O-1) in each washer-extractor has identical rotary switch settings). When a microprocessor must communicate with a higher level control (e.g., when all dryers communicate with the MilData® system), the higher level control must know the address of each microprocessor. For 8088 microprocessors, the high level control knows the address of each device because that information was established during configuration (e.g., see *Miltrac Address* configure decision in the programming manual for any device that communicates with Miltrac).

Table 3: Rotary Switch Settings

Board		Washer-Extractor	VERTSTO	Extractor	Two-Stage Press	One-Stage Press	Linear COSTO	Textile	Dryer	Device Master	COBUC	COSHA
Analog to Digital	SW2	2*			2	2		2	2			
	SW1	1*			1	1		1	1			
Digital to Analog	SW2	3*				3		3	3			
	SW1	1*				1		1	1			
Input/Output #1	SW2	0	0	0	0	0	0	0	0	0		
	SW1	1	1	1	1	1	1	1	1	1		
Input/Output #2	SW2	0*	0	0*	0	0	0*	0*	0	0	0	0
	SW1	2*	2	2*	2	2	2*	2*	2	2	2	2
Input/Output #3	SW2			0*	0*	0*				0*	0*	0*
	SW1			3*	3*	3*				3*	3*	3*
Input/Output #4	SW2			0	0*					0*	0*	0*
	SW1			4	4*					4*	4*	4*
Output #1	SW2	1		1	1	1		1	1	1*		
	SW1	1		1	1	1		1	1	1*		
Output #2	SW2	1*		1*	1*			1		1*		
	SW1	2*		2*	2*			2		2*		
Output #3	SW2	1						1*		1*		
	SW1	3						3*		3*		

Notes:

* Optional boards

1 See schematics for rotary switch positions on tunnel washer system devices.

— End of BICMDF01 —

BICMUM01 (Published) Book specs- Dates: 20040817 / 20040817 / 20040817 Lang: ENG01 Applic: CWT

How to Upgrade Microprocessor EPROM Chips

Milnor® microprocessor software is continually upgraded to improve performance and maximize efficiency. Depending on the software change, the new software EPROM (Erasable, Programmable Read-Only Memory) chips may be offered for sale or for no charge to the customer. When a set of these chips is changed in the field, ensure that the software version being installed matches the machine hardware, and that the chips are installed in the proper socket positions and orientation.

1. How to Change EPROMs

WARNING 1: Electrocution and Electrical Burn Hazards—Contact with high voltage will electrocute or burn you. Power switches on the machine and the control box do not eliminate these hazards. High voltage is present at the machine unless the main machine power disconnect is off.

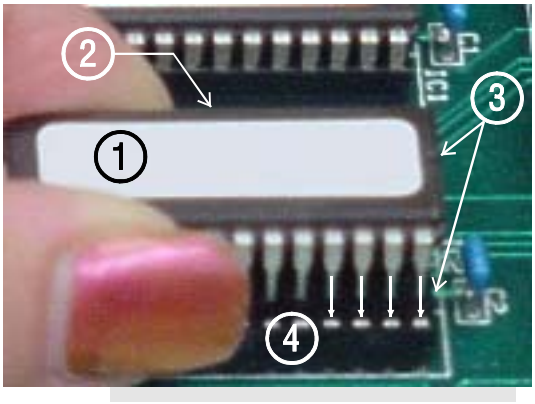
- Do not attempt unauthorized servicing, repairs, or modification.
- Lock out and tag out power at the main machine disconnect before servicing, or in accordance with factory service procedures.

1.1. Remove and Replace EPROM Chips

1. Make sure all power to the machine is off.
2. Locate the chips as described in Section 2 “Location of EPROM Chips”. Note the orientation of the chips as shown in the figure(s) below.
3. Use a chip removal tool or another small flat tool to carefully remove each EPROM chip from its base. Be sure to note the numerical order of each chip and the orientation to the key notch on the socket.
4. Install new chips, making sure the key notch on each chip is properly oriented and that all pins enter the proper holes in the socket, as shown in Figure 1. If necessary, slightly bend the pins on the EPROM chip to align the pins with the holes in the socket. After inserting each chip, verify that all pins are seated in the socket.

Figure 1: EPROM Chip Identification and Installation

EPROM Chip and Socket



Legend

1. Label
2. EPROM chip
3. Key notch
4. EPROM socket

CAUTION 2: Machine Damage Hazards—Incorrectly installing any EPROM chip may destroy or damage the chip or cause the machine or the display to operate erratically.

- Match each chip with its corresponding socket. Each EPROM chip will operate in only one socket, although it may physically fit into others.
- Align each chip so every pin mates with the correct hole in the socket.

1.2. **Verify Proper EPROM Chip Installation**—After installing new EPROM chips, apply power to the machine and turn the machine on. If the chips are properly installed, the display will continue with the normal display sequence when powering up. If the display is blank or appears unusual, turn the machine off at once and verify that the chips are correctly oriented in the sockets.

2. Location of EPROM Chips

Depending on machine model and type, the microprocessor may be an Intel 8085, Intel 8088, or Intel 80186. Each microprocessor board requires at least one EPROM chip for proper operation, but these chips may be located differently on each type of processor board. The following information describes the location and arrangement of the EPROM chips on each type of board, as well as the favored location for checking the voltages required by each type of board.

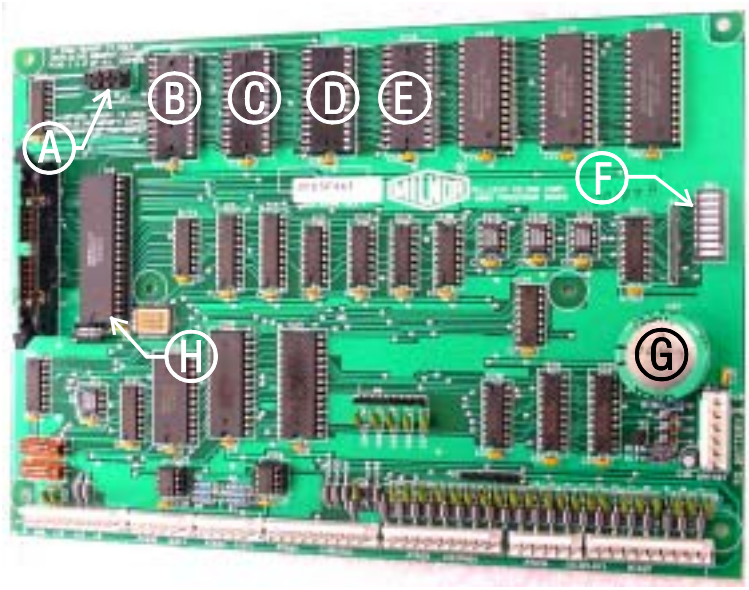
Table 1: Processor Boards and Applications

Processor Part Number	Typical Machine Applications	Comments
08BNCMPAD_	System 7 (e.g., 30015M5G)	
08BN785A_	30-inch E-P Plus	
08BN788A_	---see above---	
08BH18EP_	36- and 42-inch E-P Plus	20 MHz; brown output and chemical connectors
08BH18EPA_	---see above---	15 MHz; brown output and chemical connectors
08BH18EPB_	---see above---	15 MHz; white output and chemical connectors
08BH18EPC_	---see above---	11 MHz
08BH18EPD_		20 MHz; white output and chemical connectors
		8085 non-serial
08BSP___	Mark 2 washer-extractors, etc.	8085 serial with 4 EPROMs
08BSPA___	Mark 2 textile machines	8085 serial with 2 EPROMs
08BSPAA_	replacement for 08BSP_ and 08BSPA_	uses jumpers on processor board to match EPROM type
08BSPC_		Revisions A through D use same software; revision E software is different
08BSPD_	tunnel washers (with expanded memory board)	8088 serial with 2 EPROMs; same as Rev. E of 08BSPC_
08BSPDA_		8088 serial with 4 EPROMs; expanded memory added to processor board
08BSPE_		80186 serial with 1 EPROM and 4 UART chips
08BSPE1_		80186 serial with 1 EPROM and 1 quad-UART chip
08BSPE2_	Mark 6 devices (with graphic display)	
08BT168A_	E-P OneTouch (e.g., 30015T5E)	

2.1. **8085 Processor Boards (except Coin Machines)**—See Figure 4. Install EPROM #1 at the end of the row nearest the corner of the board, then #2, #3, and #4. Chip #4 goes next to the two chips soldered to the board. See Figure 3 for where to check for proper voltages.

Figure 2: Replacement Processor Board

08BSPAA_

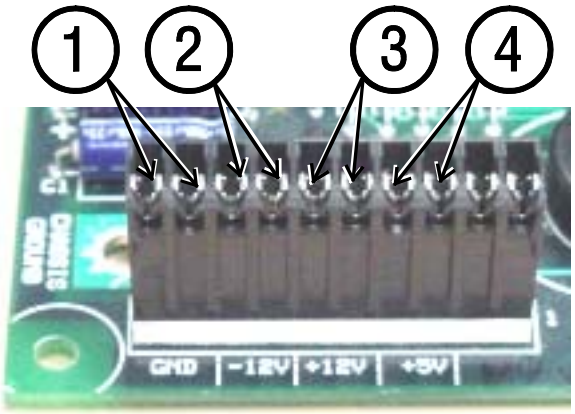


Legend

A. Jumpers for setting EPROM capacity
B. EPROM socket 1
C. EPROM socket 2
D. EPROM socket 3
E. EPROM socket 4
F. DIP switch
G. Capacitor
H. Microprocessor

Figure 3: Where to Check Processor Board Voltages

Typical MTA-31

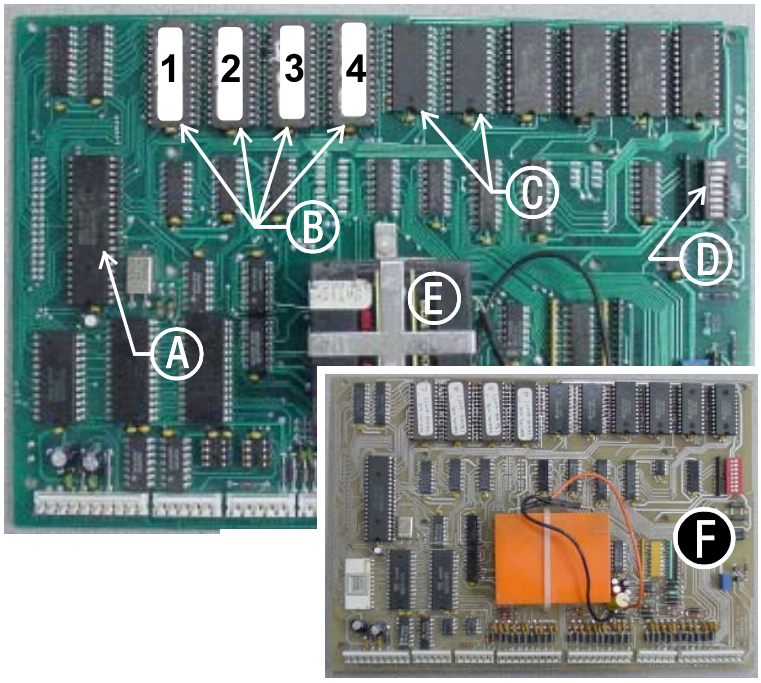


Legend

1. Ground (Earth)
2. Negative 12VDC
3. Positive 12VDC
4. Positive 5VDC

Figure 4: 8085 Processor Boards (Except Coin Machine)

Typical 08BSP_ and 08BSPx_ Processor Boards



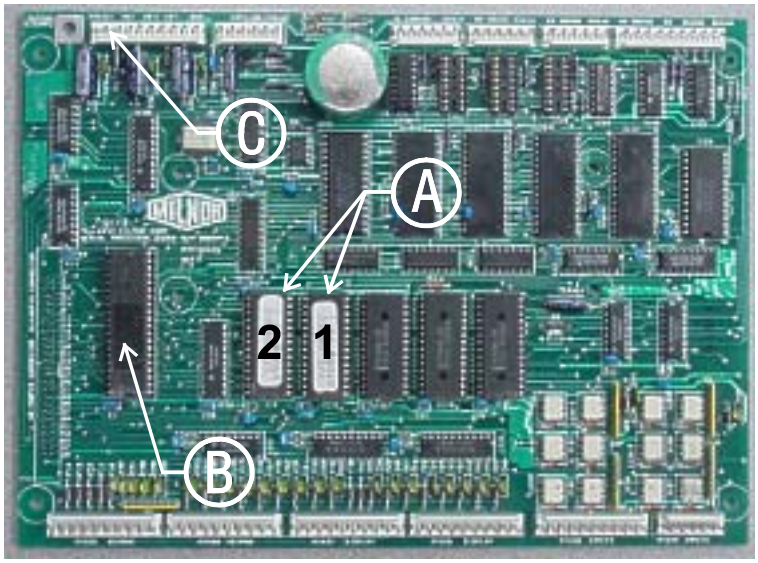
Legend

- **A.** 8085 microprocessor chip
- **B.** EPROMs
- **C.** Soldered chips
- **D.** DIP switch
- **E.** Battery
- **F.** 08BSPB_ processor board

2.2. 8088 Processor Boards without Memory Expansion Board—See Table 2 "EPROM Locations for 8088 Processor Applications" and Figure 6. If the set consists of only one EPROM, install it in socket A of Figure 6 . If two EPROMs comprise the set, install EPROM #2 in socket A and EPROM #1 in socket B. Always install the highest numbered EPROM in socket A. If the set consists of more than two EPROMs, a memory expansion board must be present in the machine along with the processor board.

Figure 5: Typical 8088 Processor Board without Memory Expansion Board

08BSPC_ Processor Board



Legend

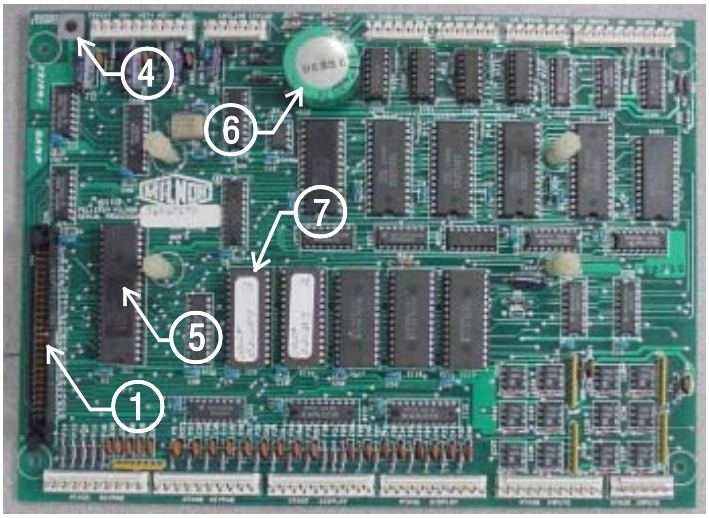
- **A.** EPROMs
- **B.** 8088 processor chip
- **C.** MTA31 for voltage verification

Table 2: EPROM Locations for 8088 Processor Applications

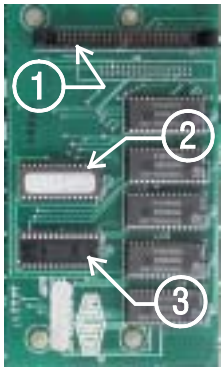
	EPROM Location by Socket			
EPROMS in Set	**A**	**B**	**IC-1**	**IC-2**
4 chips	4	3	2	1
3 chips	3	2	1	—
2 chips	2	1	—	—
1 chip	1	—	—	—

Figure 6: 8088 Processor Board and Optional Memory Expansion Board

8088 Processor Board



Memory Expansion Board



Legend

1. Connector, memory board to processor board
2. Socket IC1
3. Socket IC2
4. Chassis ground
5. 8088 microprocessor chip
6. Capacitor
7. Highest numbered EPROM

2.3. 8088 Processor Boards with Memory Expansion Board—See Table 2 and Figure 6. If the EPROM set consists of three or more EPROMs, install the two highest numbered EPROMs (e.g., #3 and #4 of a four-chip set) on the processor board, with the highest numbered EPROM (EPROM #4 of a four-chip set) in socket A, and the EPROM with the second highest number (EPROM #3 of a four-chip set) in socket B. Install the remaining EPROM(s) on the memory expansion board with the highest numbered of the remaining EPROMs (e.g., EPROM #2 of a four-chip set) in socket IC-1 on the memory expansion board and EPROM #1 in socket IC-2.

2.4. 80186 Processor Boards—This processor board (see Figure 7) is used on all Milnor® system controllers (Miltron™, Mildata®, etc.) equipped with a color monitor. It is also used on fully-programmable washer-extractors, textile processing machines with software version 95000 and later, and other models. The single EPROM on this board is located in socket IC-2.

Tip: For maximum reliability and to minimize the chances of the processor board resetting due to low voltage, adjust the power supply voltage for 80186 processors to 5.10 VDC at the processor

board.

There are three major revisions of this board, both of which have Milnor part numbers starting with “08BSPE”. If the seventh character is a number “1,” the board is a later version with a single four-channel communications chip. If the seventh character of the part number is a letter, the board is an earlier version with four one-channel communications chips.

The third version of 80186 processor board—with part number “08BSPE2_”—can be configured via a jumper on the board to operate either a vacuum fluorescent **text** display, or a flat panel **color graphic** LCD display. The jumper controls the serial communications port on MTA30.

Supplement 1

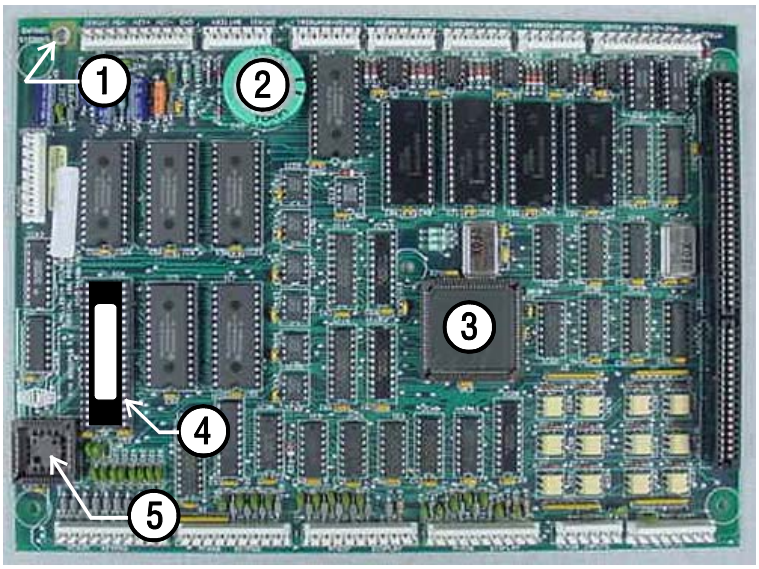
Rules for Replacing 80186 Processor Boards

Processor board “08BSPET” is obsolete. Depending on machine model and build date, this board can be replaced by either “08BSPE1T” or “08BSPE2T”, but new software is required. Contact Milnor's service engineering department to determine the appropriate replacement board and software.

Processor board “08BSPE1T” has been superseded by board “08BSPE2T”(see Figure 9). If your machine uses a two-line or four-line vacuum fluorescent text display, either “...E1T” or “...E2T” will work with your existing software. The most important difference between these two boards is jumper *J1* on the “...E2T” board for selecting the flat panel **color graphic** LCD display. This jumper must be set to the *TXT* or *NO* position for machines with a vacuum fluorescent display, or in the *GPX* (graphics) position for machines with a color LCD display.

Figure 7: Obsolete 80186 Processor Board

08BSPE_ Processor Board

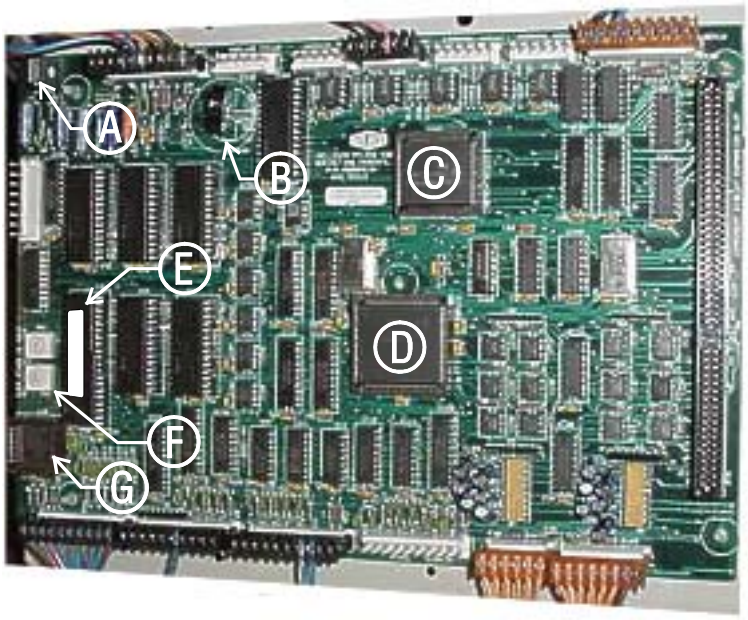


Legend

1. Chassis ground
2. Capacitor
3. 80186 microprocessor chip
4. EPROM in socket IC-2
5. ROM socket (empty except in Japan)

Figure 8: 80186 Processor Board

08BSPE1_ Processor Board

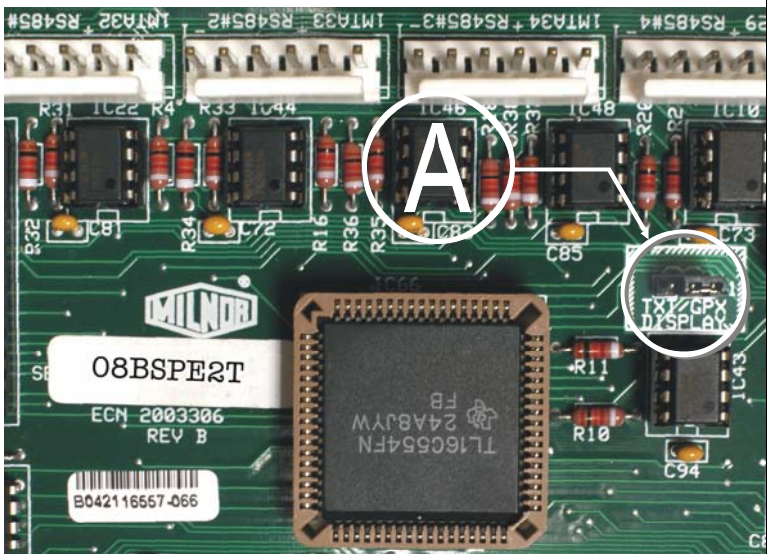


Legend

A. Chassis ground
B. Capacitor
C. Quad-UART chip
D. 80186 microprocessor
E. EPROM
F. Rotary DIP switches for keypad
G. ROM socket (empty except in Japan)

Figure 9: 08BSPE2_ 80186 Processor Board

Detail



Legend

A. Jumper for selecting display type

— End of BICMUM01 —

Memory Download Box Applications

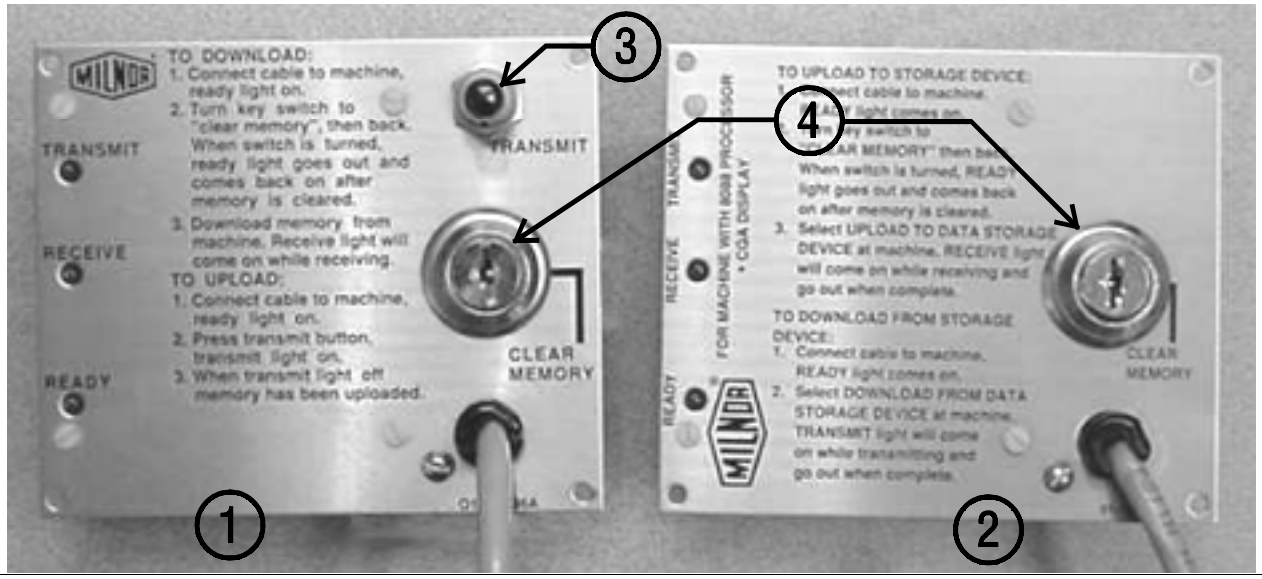
Document..... BICUDC01
Specified Date..... 20010807
As-of Date..... 20010807
Access Date..... 20010807

Applicability..... YUD CUD
Language Code..... ENG01

The memory download box is used to store configuration and formula data for most current models of Milnor® machines. Two types of download boxes (Figure 1) are available: one with a *Transmit* button on the front panel, and one without the button. The *Transmit* button is not required for machines—usually CBW® controllers and similar devices—which are capable of initiating the data transfer.

Figure 1: Download Box Identification

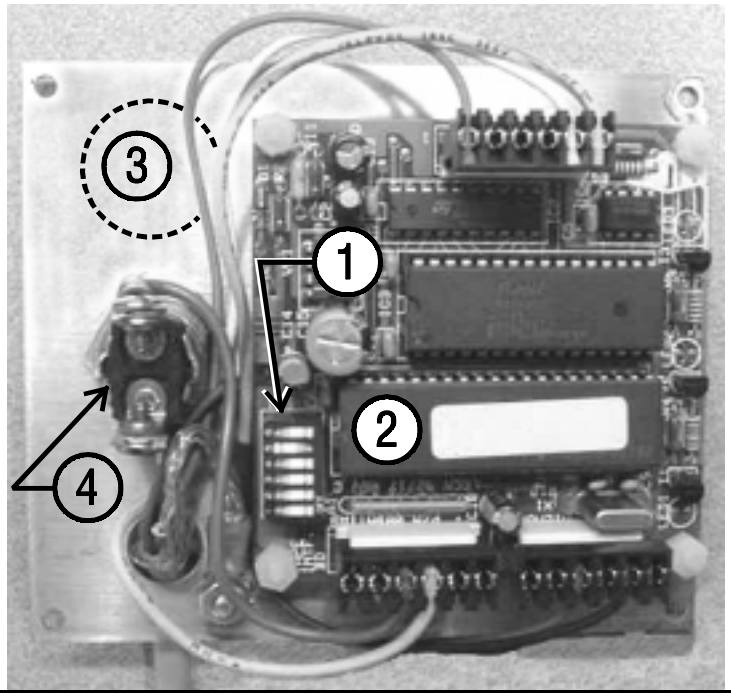
Faceplate Comparison



Legend

1. Download box **with** *Transmit button*
2. Download box **without** *Transmit button*
3. *Transmit button*
4. Key switch

Figure 2: Rear View of Circuit Board

View	Legend
	**1.** DIP switch **2.** Software chip **3.** Location of *Transmit button*, if equipped **4.** Key switch

Supplement 1

Interpreting the DIP Switch Settings

Use the following codes and their definitions to set the DIP switch positions for the equipment, as shown in Table 1.

A. All switch positions are OFF.

B. Switch position 4 is ON; all other switch positions are OFF.

C. Switch position 5 is ON; all other switch positions are OFF.

D. Switch positions 1 and 5 are ON; all other switch positions are OFF.

Note 1: If necessary, a memory download box with the *Transmit* button may be used to store configuration and formula data from any machine that's capable of downloading. When using a button-equipped download box to store data from one of the devices listed in Table 1 as requiring the *Transmit* button, ignore the button. The download will begin when commanded from the device control panel.

Table 1: DIP Switch Positions

Processor Board	Software Version	DIP Switch Setting
Uses Memory Download Box WITH Transmit Button		
Washer-extractor Models		
8088	All	C
80186	98000-98003	C
	98004-99004	not supported
	99005-9900B	D
	20000-20003	D
FxW, FxP, and FxS Washer-extractor models		
8088	All	C
80186	98000-98003	C
	98004-98009	not supported
	9800A-9800H	D
	20000-2000B	D
Textile and Dye Machine Models		
8088	All	C
80186	95000-95305M	C
	95305N-95306	D
	20000-20004	D
Dryer Models		
8088	All	C
80186	All	C
Centrifugal Extractor Models		
8088	All	C
80186	All	C
Single-station Press Models		
8088	All	C

Processor Board	Software Version	DIP Switch Setting
Uses Memory Download Box WITHOUT Transmit Button		
Miltron Controller for CBW System		
8088	All	A
80186	All	B
Miltrac		
8088	All	A
80186	All	B
Milrail Rail Controller		
8088	All	A
80186	All	B
Device Master		
8085	All	not supported
8088	All	not supported
80186	94000-94017	not supported
	94018	B
	20000-present	B
Linear Costo Master		
8085	All	not supported
8088	All	not supported
80186	94000-94011	not supported
	20000-present	B

Key:

A	All switch positions OFF
B	Position 4 ON; all others OFF
C	Position 5 ON; all others OFF
D	Positions 1 and 5 ON; all others OFF

— End of BICUDC01 —

BICWUC01 (Published) Book specs- Dates: 20050112 / 20050112 / 20050118 Lang: ENG01 Applic: CWU CDU

Construction of External Serial Link Cables

This document provides information for on-site fabrication of certain types of serial communication cables. An individual machine can be connected to certain makes and models of serial printer (see Note 1) using the printer cable described in Section 2.2. Programmable data can be transferred between compatible machines or between a machine and a Milnor serial memory storage device (see Note 2), using the download cables described in Section 2.3 and Section 2.4 respectively. These cable(s) connect to the cabinet-mounted 9-pin DIN type receptacle shown in Figure 1 and may be installed temporarily or permanently, as appropriate.

If the machine is connected to a Mildata® or Drynet (dryer/shuttle controller) network (see Note 3), downloading is more likely to be handled by these products. Another Milnor document—the related section in document BICCUC01—describes the permanent cables needed to communicate across a Mildata, Drynet, or Miltrac™, network. In the unlikely event that personnel will want to download data via the download cables described herein, rather than via Mildata, all energized machines on the Mildata network will receive the downloaded data. **Turn off power to any machines to which you do not wish to download.**

Note 1: The currently approved printers and printer configuration settings are provided in the related section in document BICWUI01. A pre-assembled machine-to-printer cable similar to the cable described here, is available from Milnor (P/N 10YMK2PNTR).

Note 2: The Milnor serial memory storage device (also known as a download box) contains nonvolatile memory to hold a back-up copy of the programming and configuration data for **one machine**. This data is transferred between the machine and the memory storage device via the DIN receptacle on the machine. Two models are currently available: KXMIC00507 and KXMIC00508. The already wired cable and DIN connector are included as part of the memory storage device. Consult the Milnor Service department to determine the correct device for a particular application.

Note 3: Mildata is Milnor's PC-based product for centralized data collection, productivity analysis, report generation, formula development and data downloading. Drynet permits supervisory and manual functions for a group of dryers and the shuttle that serves them to be performed from a central PC.

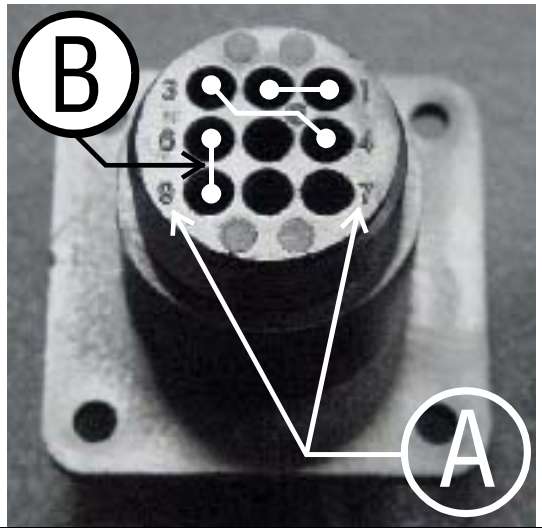
Applicable machines are provided with a single DIN receptacle for both downloading and printing. Only one function at a time (downloading or printing) can be performed using this connection.

1. Pin Identification

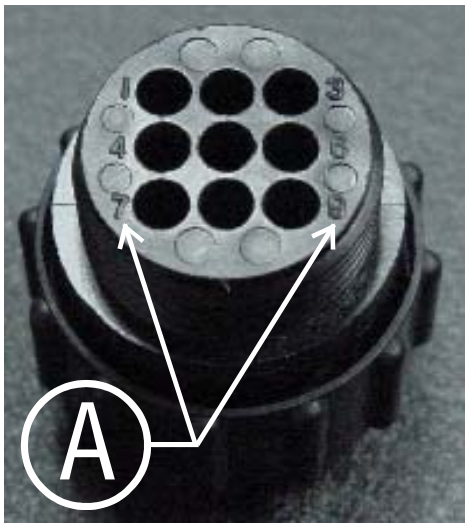
The download and printing functions use different data communication lines, but the DIN receptacle on the machine contains all of the pins used for either function. Figure 1 illustrates the DIN receptacle (which uses male pins) and the mating plug (which uses female pin sockets), each viewed from the **wire entry** side. The receptacle is normally installed and wired at the Milnor factory. The plug and female pin sockets for customer use are provided in a bag inside the electric box. Table 1 shows the function of each pin.

Figure 1: 9-Pin DIN Connector Pin Identification (from wire entry side of connectors)

Receptacle (uses male pins)



Plug (uses female pin sockets)



Legend

A. Pin numbers molded into parts

B. Heavy white lines terminated with dots indicate pins normally connected together at the Milnor factory

Table 1: External Serial Link Pin Assignments

Pin Number	Function	Receptacle Wiring (inside electrical enclosure)	
		Wire Number	Color Code
1	Serial low	DLL	Blue and black
2			
3	Serial high	DLH	Blue and red
4			
5	Clear to send (used for printing only)	CTS	Blue and orange
6	Electronic ground	2G	Blue and white
9			
7	Transmit data (used for printing only)	TXD	Blue and orange
8	+5 volts DC (used for serial memory storage device only)	V1	Blue

CAUTION 1: Risk of damage to electronic components—Pin 8 is only used to supply +5VDC power to the download box and, if improperly connected, will damage components in both devices.

- Never connect pin 8 to any other pin in the connector, a printer, or another machine.

2. How to Wire the Cables

Because the DIN receptacle is wired to support different functions and because the data transferred across these cables can be corrupted by electrical noise, follow these instructions carefully.

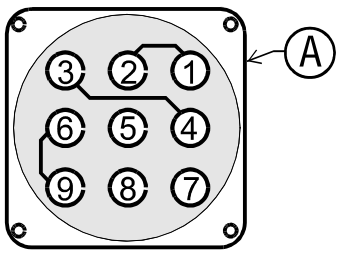
2.1. Cable Specifications—Multi-conductor shielded cable that meets the following minimum requirements must be used in the applications covered herein. Conforming cable may be purchased from Milnor (P/N 09V300A04S) or purchased from another source:

- Jacket: 600VAC insulation
- Shielding: braided, tinned copper, minimum 85% coverage
- Four conductors with these specifications:
  - » Conductive material: Tinned copper, 20 AWG
  - » Insulation: 300VAC, color coded
  - » Preferred colors: red, black, green and white

2.2. Connecting a Machine to a Printer for "Print Data"—Many Milnor microprocessor-controlled machines allow permanent or temporary connection of a serial printer for generating printed copies of formulas or status reports during operation. Figure 2 shows how to wire the machine-to-printer cable. Milnor has tested and approved certain printers for this application (see Note 1).

Figure 2: Wiring Diagram for Cable to Connect a Machine to a Printer

Receptacle

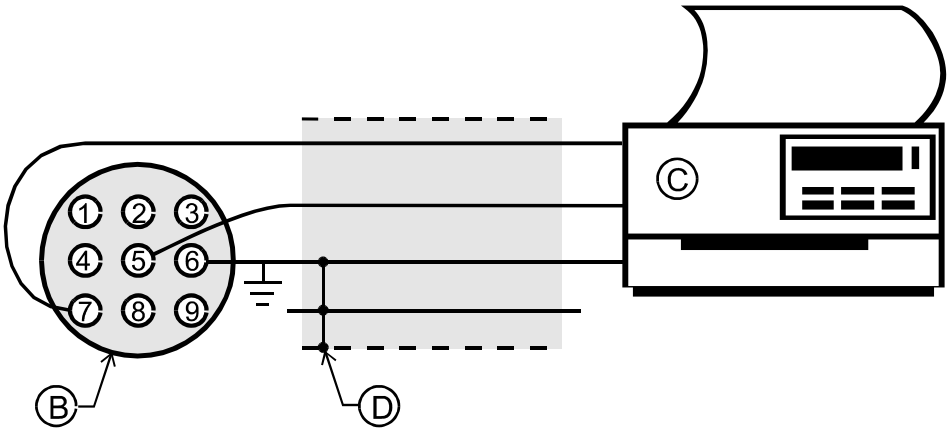


Legend

A. Receptacle (with male pins). Pin functions are as follows:
- **5.** Clear to send (CTS).
- **7.** Transmit data (TXD)
- **6&9.** Ground. This application only uses Pin 6.
- **1&2.** Not used in this application
- **3&4.** Not used in this application
- **8.** Not used in this application. See caution statement **1** .

B. Plug (with female pin sockets)
C. Approved serial printer (see Note 1)
D. Tie shield and spare conductor(s) on this end of cable to ground. Leave unconnected on other end.

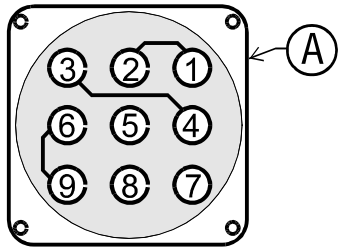
Cable Wiring



2.3. Connecting Two or More Machines for Machine-to-machine Transfer—Figure 3 shows how to wire a cable to connect a bank of identical machines (the Figure 3 example shows connections for four machines) so that data programmed on one machine in the group can be downloaded to all other machines simultaneously. This cable is referred to as a daisy chain because it runs in segments from machine to machine, connecting all machines in the group.

Figure 3: Wiring Diagram for Cable to Connect Two or More Machines

Receptacle On Each Machine



Legend

A. Receptacle on machine (with male pins). Pin functions are as follows:
- **1&2.** Serial low
- **3&4.** Serial high
- **6&9.** Ground
- **5&7.** Not used in this application
- **8.** Not used in this application. See caution statement **1** .

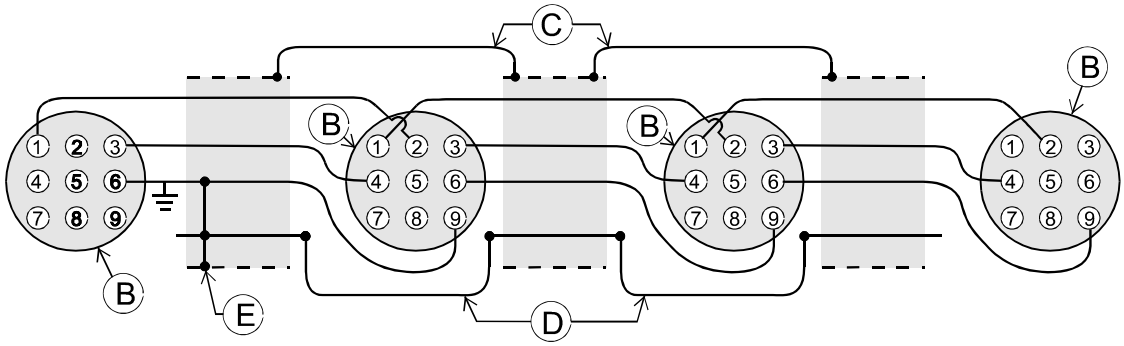
B. Plug on cable (with female pin sockets)

C. Connect together each segment of shield so that it has continuity across entire daisy chain.

D. Connect together each segment of an unused conductor so that it has continuity across entire daisy chain.

E. Tie shield and spare conductor(s) on one end of daisy chain to ground. Leave unconnected on other end of daisy chain.

Cable Wiring



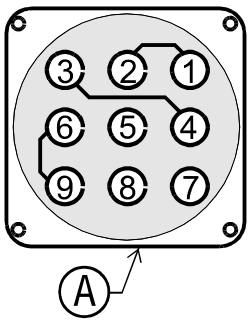
The internal connections on each receptacle (machine) between pins 1 and 2, 3 and 4, and 6 and 9 make it easier to wire the cable because it is not necessary to jumper these pins together on the cable. However, this also means that every plug on the daisy chain must be plugged into a receptacle. Otherwise, the serial low, serial high, and ground conductors will not have continuity across the entire daisy chain and some machines will not receive data.

Rules and details about downloading among machines are fully described in the programming section of the reference manual.

2.4. Connecting a Machine to a Serial Memory Storage Device—The cable used with the serial memory storage device (download box) available from Milnor, see Note 2, is permanently attached to the storage device. Cable fabrication, as shown in Figure 4, is not required except for replacing a damaged cable. The memory storage device is the only application in which the power conductor (Pin 8) is used.

Figure 4: Wiring Diagram for Cable to Connect a Machine to a Serial Memory Storage Device

Receptacle



Legend

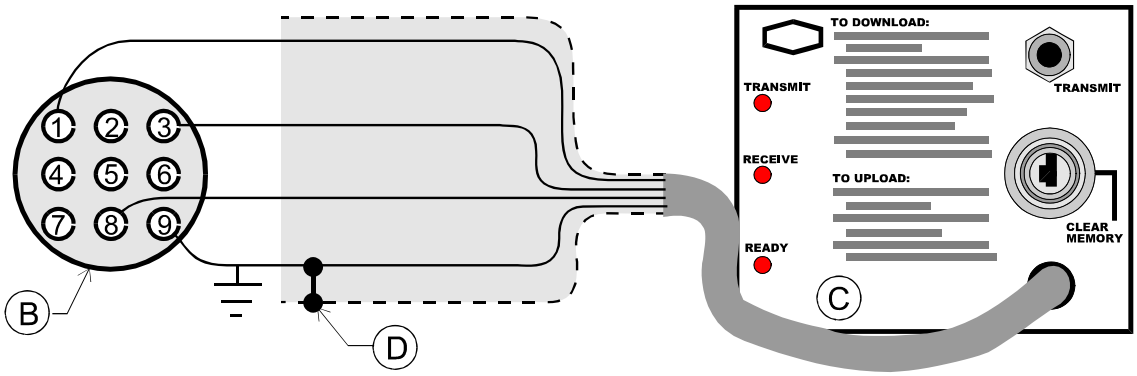
A. Receptacle on machine (with male pins). Pin functions are as follows:
- **1&2.** Serial low. This application only uses Pin 1.
- **3&4.** Serial high. This application only uses Pin 3.
- **6&9.** Ground. This application only uses Pin 9.
- **5&7.** Not used in this application.
- **8.** +5VDC. Provides power to memory storage device.

B. Plug on cable (with female pin sockets)

C. Memory storage device (front panel may be different)

D. Tie shield on this end of cable to ground. Leave unconnected on other end.

Plug and Storage Device



— End of BICWUC01 —

BICWUI01 (Published) Book specs- Dates: 20071113 / 20071113 / 20071113 Lang: ENG01 Applic: CDU

Printer Requirements and Settings

Notice 1: Because of the many differences among printer makes and models, Milnor® cannot ensure suitability or troubleshoot printers other than those described in this document (or certain older approved models), with the required interface cable.

1. Cable Requirements

The printer must be connected to the printer port on the machine using the appropriate one of the following Milnor® interface cables:

Table 1: Milnor® Printer Cables

Printer Cable Part Number	Description
10YMK2PNTR	100-formula washer-extractor, dryer, extractor, and Miltron (CBW) controllers
10YCBWPNTR	Non-serial Miltron (CBW) controller
08MPSERCBL	Mentor (CBW) and Mildata controllers

2. Configuring the Citizen GSX-190 Printer

Table 2 lists the required settings for this printer model to work properly with Milnor® equipment. To print the current settings stored in your printer, move the *Menu* slide switch on the printer to the *VuePrint* position, then hold the *Print* button for three seconds. Hold the *Menu* button for three seconds to enter the *VuePrint* menu system to make changes.

Table 2: Required Settings for Citizen GSX-190 Printer

Menu	Data Field	Value	Menu	Data Field	Value
Install 1	Ribbon	Normal	Character	Slash zero	Off
	A.S.F.	Off		Character set	Graphics
	Emulation	Epson		Intl character set	U.S.A.
Print Style	Font	Draft		Code page	U.S.A.
	Emphasized	Off	Install 2	Tear off	Off
	Pitch	10 characters per inch		Paper out	Enable
	Font lock	Off		Auto linefeed	Off
Page Layout	Line spacing	6 lines per inch		Copy mode	Off
	Form length	Letter		Envelope	Off
	Page skip	Off	Serial I/F	Baud rate	9600
Print Mode	NLQ Dir	Uni-directional		Parity	Even
	Graphic Dir	Uni-directional		Data bits	8 bits
				Stop bits	1 bit
				Protocol	DTR

3. Configuring the Epson LX300 Printer

The Epson model LX300 printer was supplied by Milnor® prior to March 2001 to print data from microprocessor controllers with printing functions. When shipped from Milnor®, this printer was configured to operate correctly with Milnor® equipment. If the printer is replaced or must be reconfigured for any reason, refer to the user's guide and the following table.

Table 3: Required Settings for Epson LX300 Printer

Data Field	Value	Data Field	Value
Character spacing	10 characters per inch	Tractor	Single
Shape of zero	0	Interface	Serial
Skip over perforation	Off	Bit rate	9600 bps
Character table	PC 437	Parity	Even
Auto line feed	Off	Data length	8 bits
Page length	11 inches	ETX/ACT	On
Auto tear off	Off		

4. Previous Printer Models

The Epson LX300 printer replaced the Epson LX-810, which replaced the Epson LX-800. For information on these older printer models, request document MSSM0251AE from the Milnor factory.

— End of BICWUI01 —

DEVICE COMMUNICATION FOR WTB+/DRYELL OPERATION—WASHER-EXTRACTOR SOFTWARE 9100x NOW AND LATER

B

This section describes the concept of automatic operation of the washer-extractor configured for *WTB+* operation, equipped with a *dryell* and using software in the 9100x range. It will assist the technician in interfacing the machine with other components of the automated washing system.

WTB+/Dryell Loading and Unloading—A typical *WTB+* system such as shown in FIGURE 1 contains a bank of dryell-equipped, tilting washer-extractors, a rail loading system, and a shuttle conveyor (to move clean goods from the washer-extractors to the dryers). Loading and unloading is automatic. During washer-extractor loading, the washer-extractor tilts *rearward* to the *rear full down* position and the dryell moves to the down position. Bag(s) are then moved into position and the goods are dropped into the dryell which directs them into the washer. During washer-extractor discharge, the shuttle moves to the washer then the washer tilts *forward* to the *rear full up* position with the cylinder turning, causing the goods to discharge onto the shuttle.

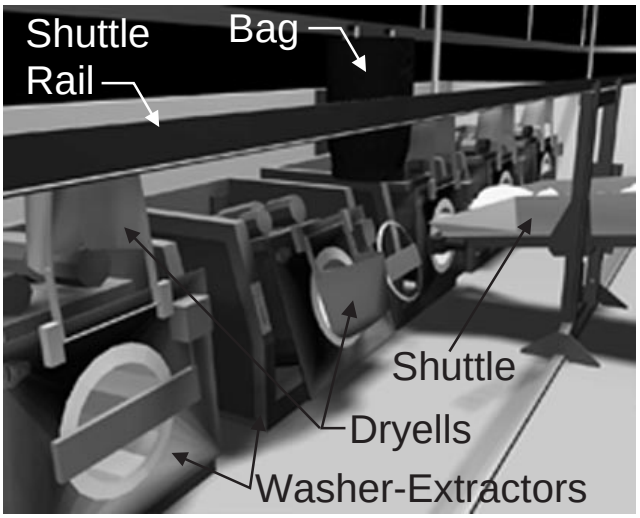


FIGURE 1 (MSFD0213AE)
A Typical WTB+ System

Controllers That Communicate With _WTB+_ Machines—The device movements described above are coordinated primarily by the *Miltrac central controller* located in the *system control box* (see Miltrac manual). However, the dryells, bags on the rail, and shuttle, which continually cross paths, require special coordination. This is handled by a *discharge sequencer*, also located in the *system control box*, and by direct links between each washer-extractor controller and both the shuttle controller and the rail controller. The washer controller may also communicate with a Mildata® computer, but Mildata has no control over the device movements described above.

Device Interconnections—Interconnections among controllers housed within the system control box (Miltrac controller, Milnor sequencer, Milnor shuttle controller, and sometimes Milrail) are factory wired. Interconnections between the system control box and other devices (washer-extractors, non-Milnor shuttle, non-Milnor rail system, and sometimes Milrail) are field wired. A standard serial communication cable as described in "THE EXTERNAL SERIAL LINK CABLES . . ." (see Table of Contents) links all Milnor device controllers with the Miltrac controller. All non-Miltrac communication is accomplished via inputs and outputs on the sequencer, washer, rail system, and shuttle controllers. On Milnor controllers, each input and output is assigned a connector and one or more pin numbers (MTA number), which appear in the device electrical schematics. For WTB+ machines, see "MONITORING MICROPROCESSOR INPUTS AND OUTPUTS . . ." (see Table of Contents). MTA numbers for other devices are identified in the lists of inputs and outputs in the reference manual for the device. B

Allied Interface Requirements—If an allied (non-Milnor) rail system and/or shuttle are utilized, these devices must be capable of communicating with the Milnor washer-extractors and system controllers via the inputs and outputs described herein. For signals to Milnor, the allied equipment must provide potential-free contacts capable of faithfully conducting low energy signals of 5 to 150 milliamps at 5VDC to 12VDC. These signals ground a Milnor computer input and go directly into the computer. Therefore, never run them adjacent to or in the same conduit with any other wires. For signals from Milnor, Milnor provides potential free contacts capable of faithfully conducting signals from 5 to 150 milliamps at 5VDC to 12VDC or up to 120 VAC. Do not use these contacts to directly energize any device requiring amps or volts outside of the ranges listed above.

B **WTB+ Loading and Discharge Sequences**—The following table applies to the microprocessor washer-extractor controller with software version 91002 and latter, configured for *WTB+* with *dryell* (see "5=CONFIGURE . . ." in "PROGRAMMING . . ."). The table describes a sequence of general conditions (states) of the controller and specific actions performed by it in the process of loading and discharging. All interfacing devices must respond to these actions as implied by this table, for proper system functioning.

NOTES:

1. Controller actions may consist of communicating (data *in* or *out*) or processing (*internal*). Communication (data in/out) may be with 1) Miltrac via the serial link, 2) the sequencer, rail system or shuttle via inputs/outputs, or 3) mechanisms on the washer itself (the machine the controller is on) via inputs/outputs.
2. Miltrac communication consists of *status* queries and *commands*. Miltrac continually asks the washer its *load-end* and *discharge-end* status (Miltrac always distinguishes between load and discharge end, even though they are the same on the washer). All Miltrac status lines are shown as data *out* to indicate this is the washer controller's response to a Miltrac query. Miltrac issues commands based on these responses.
3. "Allied load-end" and "allied discharge-end" refer to *allied* devices that feed goods to and receive goods from the washer, respectively. These outputs are only used if the interfacing device is allied. Outputs to "Milrail," "Milnor shuttle," and "Milnor shuttle flag" are only used if these Milnor devices are used.
4. Actions are listed in order of occurrance. Any indented line in the "Action" column is an action that cannot begin until the data described by the previous, less-indented line is received.

Washer-Extractor Controller State	Action (See note 4) See note 1→	Controller Data In, Data Out, or Internal Processing	Source (Data In) or Destination (Data Out)	Comments
00	Load end status=*cannot receive*	out	Miltrac	See note 1
Ask permission to lower dryell	Turn on *sequencer load desired* output	out	sequencer	
	Wait for *load allowed* input	in	sequencer	
	Turn on *load desired* output	out	allied load-end	See note 3

Washer-Extractor Con-troller State	**Action** (See note 4) See note 1→	**Controller Data In, Data Out, or Internal Processing**	**Source (Data In) or Destination (Data Out)**	**Comments**
01	Turn on *deflate dryell up seal* and *release dryell up lock* outputs	out	this machine	
Prepare to lower dryell	Wait to lose *dryell locked up* input	in	this machine	
	Start a two second timer	internal	—	Allows time for lock to retract.
02	Wait for timer = zero	internal	—	
Lower dryell	Turn on *dryell move down* output	out	this machine	
	Wait for *dryell down* input	in	this machine	
	Turn on *sequencer load allowed* output	out	Milrail	See note 3
	Start a five second timer	internal	—	Extra safety to assure dryell down
03	Wait for timer = zero	internal	—	
Request a load	Turn off *deflate dryell up seal, release dryell up lock,* and *dryell move down* outputs	out	this machine	Turned on in states 01, 02
	Load end status = *want to receive*	out	Miltrac	See note 2
04	Wait for load end command = *get ready*	in	Miltrac	See note 2
Prepare to flag	Turn off *sequencer load desired* and *sequencer load allowed* outputs	out	sequencer	Turned on in states 00, 02
05	Turn on *load/unload allowed* and *load commanded* outputs	out	this machine	Opens door and assures machine is tilted down
Flag for bags.	Turn on *flag down* output		allied load-end	See note 3
Verify machine in load-ing posi-tion	Wait for *full down* and *door full open* inputs	in	this machine	Full down = tilted rearward
	If Mildata, then request and wait for remote formula	out/in	Mildata	
	Load end status = *ready to receive*	out	Miltrac	See note 2
06	Wait for load end command = *start receiving*	in	Miltrac	See note 2
Prepare to load	Turn on *dryell move down* output	out	this machine	Holds dryell tight against door

Washer-Extractor Controller State	Action (See note 4) See note 1→	Controller Data In, Data Out, or Internal Processing	Source (Data In) or Destination (Data Out)	Comments
07 **Receive goods**	Turn on *flush dryell* output	out	this machine	
	Turn on *start loading* output	out	allied load-end	See note 3
	Wait for load end command = *receive complete* or *you're finished receiving–do not hold*	in	Miltrac	See note 2 and explanation below
	• If *receive complete*	—	—	This indicates one or more additional bags are to be loaded. Repeat states 04 through 07.
	load end status = *finished receiving* Go to state 04.	out	Miltrac	^
	• If *you're finished receiving–do not hold*	—	—	This indicates this was the last or only bag to be loaded.
	Load end status = *finished receiving*	out	Miltrac	^
	Turn off *dryell move down* output Go to state 08.	out	this machine	Turned on in state 06
08 **End loading**	Wait for load end command = *do nothing*	in	Miltrac	See note 2
	Load end status = *cannot receive*	out	Miltrac	See note 2
	Turn off *load desired, load/unload allowed, load commanded, flag down,* and *start loading* outputs	out	this machine/ allied	Turned on in states 00, 05, 07.
	Start *dryell flush timer* (configurable)	internal	—	See following explanation.
09 **End flushing**	Wait for dryell flush timer = zero	internal	—	Continue flushing for the *dryell flush time* configured to assure all goods flushed into machine.
	Turn off *flush dryell* output (turned on in state 07)	out	this machine	
	Start *dryell delay timer* (configurable)	internal	—	See following explanation.
10 **Prepare to raise dryell**	Wait two seconds	internal	—	Delay raising dryell and purge flush inlet with air for the *dryell delay time* configured to assure all flushing water drains into the machine.
	Turn on *dryell blow* output	out	this machine	
	Wait for dryell delay timer = zero	internal	—	
	Turn off *dryell blow* output	out	this machine	
	Turn on*deflate dryell up seal* output			
11 **Raise dryell**	Turn on *dryell move up* output	out	this machine	
	Wait for *dryell locked up* input	in	this machine	
	Turn off *deflate dryell up seal* and *dryell move up* outputs	out	this machine	Turned on in states 10, 11

Washer-Extractor Con-troller State	Action (See note 4) See note 1→	Controller Data In, Data Out, or Internal Processing	Source (Data In) or Destination (Data Out)	Comments
12	Load end status = *cannot receive*	out	Miltrac	See note 2
Go to washing position.	Turn on *load/unload terminate* output	out	this machine	Closes door
	Wait for *full down* and *door full closed* inputs	in	this machine	
	Turn off *load/unload terminate* output	out	this machine	Turned on in this state
Signal loading complete	Turn on *sequencer load/unload terminate* output	out	sequencer	
	Start a two second timer	internal	—	Make sure sequencer sees signal
13 End signal	Wait for timer=zero	internal	—	
	Turn off *sequencer load/unload terminate* output	out	sequencer	Turned on in state 12
14	Run the wash formula	internal	—	
15	Turn on *sequencer discharge desired* output	out	sequencer	
Ask permission to discharge	Wait for *discharge allowed* input	in	sequencer	
	Discharge end status=*want to transfer*	out	Miltrac	See note 2
	Turn on *sequencer discharge allowed* output	out	Milnor shuttle	See note 3
	Turn on *discharge desired* output	out	allied discharge-end	See note 3
16	Wait for discharge end command = *get ready*	in	Miltrac	
Flag for shuttle	Turn off *sequencer discharge desired* and *sequencer discharge allowed* outputs	out	sequencer	Turned on in state 15
	Turn on *sequencer flag down discharge* output	out	Milnor shuttle flag	See note 3
17	Turn on *load/unload allowed* and *discharge commanded* outputs	out	this machine	Opens door (would also tilt machine if left on—see below)
Go to discharge position	Wait for *door full open* input		this machine	
	Turn off *load/unload allowed* and *dicharge commanded* outputs	out	this machine	Turn off outputs before machine starts tilting in case shuttle is not yet in position.
	Discharge end status = *ready to receive*	out	Miltrac	
	Wait for discharge end command = *start transfer*	in	Miltrac	
	Turn on *load/unload allowed* and *discharge commanded* outputs	out	this machine	Tilts machine forward
	Turn on *start discharging* output	out	allied discharge end	See note 3
	Wait for *full up* input	in	this machine	Full up = tilted forward

Washer-Extractor Controller State	Action (See note 4) See note 1→	Controller Data In, Data Out, or Internal Processing	Source (Data In) or Destination (Data Out)	Comments
18 **Discharge goods.** **Go to loading position** **Signal discharge complete**	Load end status=*want to receive*	out	Miltrac	
	Run discharge sequence	internal	—	
	Turn off *discharge desired, sequencer flag down discharge, discharge commanded,* and *start discharging* outputs	out	this machine	Turned on in states 15, 16, 17
	Turn on *load commanded* output	out	this machine	Tilts machine rearward
	Turn on *discharge terminated* output	out	allied discharge end	See note 3
	Wait for *full down* input	in	this machine	Full down = tilted rearward
	Turn off *load/unload allowed, load commanded,* and *discharge terminated,* outputs	out	this machine	Turned on in states 17, 18
	Wait for discharge end command = *do nothing*	in	Miltrac	See note 2
	Turn on *sequencer load/unload terminate* output	out	sequencer	
	Start a two second timer	internal	—	Make sure sequencer sees signal
19 **End signal**	Wait for timer=zero	internal	—	
	Turn off *sequencer load/unload terminate* output	out	sequencer	Turned on in state 18
	Go to state 00	—	—	

USING THE EXTRACT TEST ON THE WASHER-EXTRACTOR MICROPROCESSOR CONTROLLER

B

The *extract test*, available on all machines that use the Mark II, III, IV, and V washer-extractor controller, is a convenient means for maintenance personnel to run the machine in extract for testing purposes. It is not for processing.

When and When Not To Use the Extract Test

Use the Extract Test To Test *Certain* Repairs and Adjustments—The extract test is helpful after replacing drive train components. Use this test to check the phasing of the drain or extract motors. **The extract test cannot be used to test the *Excursion switch* on suspended (Hydro-cushion® and spring mounted) machines or the *Accelerometer* on self-balancing machines because the test bypasses these devices.** Run a formula to test these switches. Machine maintenance must be performed only by qualified and authorized maintenance personnel, in strict compliance with published procedures and safety precautions.

Do Not Use the Extract Test for Processing—The extract test accelerates the machine to drain speed from a dead stop rather than from wash speed, as occurs when running a formula. If goods are in the machine, the drain motor may stall because it does not have sufficient torque. If extract speed is achieved, an imbalance may cause the machine to vibrate excessively because the extract test bypasses the out-of-balance sensing devices that would normally initiate an extract recycle. Either of these conditions can damage the machine.

How To Run the Extract Test

⚠ CAUTION ⚠

MACHINE DAMAGE HAZARDS—This test causes the cylinder to accelerate to drain speed from a dead stop. A normal size load can stall the drain motor. This test bypasses out-of-balance sensors. Severe imbalances may result.

- ☞ **Never run this test with goods in the cylinder.**
- ☞ **Stop the test immediately if the shell bangs around inside the housing (suspended models).**
- ☞ **Never run this test on an improperly anchored rigid machine.**

```
RUN FORMULA
00 OR OK POWER OFF
```

When the *Run Formula menu* and *selection 00* is displayed, as shown at left,

EXTRACT **Displays the message *Extract Test* and sounds the operator alarm.**

① **Initiates extraction and silences the operator alarm.** The cylinder accelerates to drain speed, then to extract with the balancing system enabled (if any). Verify that the cylinder rotates clockwise (observed from front of the machine), as the machine accelerates through drain to extract speed.The test continues until commanded to stop.

⓪ **Ends the extract test.** Braking continues for at least 30 seconds or until the *speed switch* contacts close. The message *Braking* appears during this time.

ADJUSTING LEVEL SENSING APPARATUSES AND SETTING LEVELS ON 100-FORMULA WASHER-EXTRACTORS AND TEXTILE MACHINES

How Level Control Works

Types of Level Sensing Apparatuses—Three types of apparatuses are used on these machines: *float chamber assemblies, pressure switches,* and *pressure transducers*.

A *float chamber assembly* (FIGURE 1) is an open-top, metal tube connected to the shell below the water line. The height of water in the tube is the same as in the cylinder. Changes in the level cause a float, rod, and actuating arm to move, which in turn, actuate either of two switches. Each switch actuates at one pre-set level.

A *pressure switch* (FIGURE 2) actuates when the air inside an airtight chamber connected to the washer shell below the water line reaches a certain pressure. As the liquor level changes, the air pressure in the chamber changes. Each pressure switch actuates at one pre-set level.

A *pressure transducer* (electronic level control) works similar to a pressure switch, except that it produces a voltage which varies with changes in pressure. The varying voltage is converted into digital data which the microprocessor controller can interpret and display as inches or centimeters of water.

Which Apparatuses and Methods of Level Control Are Used—Table A, below, shows which apparatuses are used on various machine types. These apparatuses permit controlling the liquor level using the methods listed in the table, unless the machine is equipped and configured for *metered water* (specifying a quantity of water). In the latter case, the level sensing apparatuses are not used to control levels, but they are used by the microprocessor controller for certain internal lockouts (e.g., permit steaming only after low level is achieved).

Table A: Apparatuses and Methods for Each Machine Type

Machine Type	Level	Level Sensing Apparatus	How level is specified in wash formula (no *metered water*)
Divided cylinder models	Level 3=high (rinse)	pressure switch SPLL3	Select one of the four pre-set levels
	Level 2=low (wash)	pressure switch SPLL1	
	Level 1=below low (starch)	pressure switch SPLLL	
	Level 0=no water (shake out)	N. A.	
36021xxx and 36026xxx open pocket models	Level 3=high (rinse)	float chamber/switch SLLL3	Select one of the four pre-set levels
	Level 2=low (wash)	float chamber/switch SLLLL	
	Level 1=below low (starch)	pressure switch SPLL1	
	Level 0=no water (shake out)	N. A.	
	OK to open door	pressure switch SPLLS	N. A.
42026xxx and larger open pocket models	Processing levels	pressure transducer	Specify inches or centimeters within a pre-set range
	OK to open door		N. A.
	Fill while tilted		N. A.

NOTE: There is no separate *cooldown* level. Cooldown occurs at the commanded level in the bath in which cooldown is commenced.

Determining Levels

Washer-Extractors—Ultimately, the local situation dictates the best processing levels to use. However, the factory levels shown in Table B, below, reflect "typical" processing conditions, and the user should carefully consider the consequences before changing these settings. For example, given normal load size and common fabric type, the factory settings for *level 2* and *medium* shown in the table below are the minimum required for a first bath. At lower levels the goods may not be fully wetted, resulting in poor washing and unbalanced extractions.

Textile Machines—Because textile processes vary greatly, the configure lockouts for textile machines are set initially to provide the widest range for commanding levels in the formula.

Table B: Factory Levels (in inches and ( ) centimeters)

B

Actual levels set on apparatus (machines with a float chamber assembly and/or pressure switches)			
Cylinder Designation	Level 1 (starch)	**Level 2 (wash)**	**Level 3 (rinse)**
Divided Cylinder Washer-Extractors			
42044	4 (10)	7 (19)	12 (31)
60036	4 (10)	9 (23)	14 (36)
60044	4 (10)	9 (23)	14 (36)
72044	4 (10)	9 (23)	14 (36)
36021xxx and 36026xxx Washer-Extractors			
36021	3 (8)	8 (20)	13 (33)
36026	3 (8)	8 (20)	13 (33)
NOTE: *Ok to open door* level = 7 (18) This setting must not be changed.			

Configure values entered in microprocessor (machines with a pressure transducer)				
Cylinder Designation	Low (minium)	**Medium (min. prior to extract)**	**High (maximum)**	Tilt
F8W Outerwear Washer-Extractor				
30022	4 (10)	7 (19)	10 (25)	—
Open Pocket Washer Extractors—42026 and Larger				
42026	8 (20)	10 (25)	16 (41)	—
42032	8 (20)	10 (25)	16 (41)	—
48032	9 (23)	11 (28)	16 (41)	*
48036	9 (23)	11 (28)	16 (41)	*
52038	8 (20)	10 (25)	16 (41)	*
64046	10 (25)	12 (31)	16 (41)	16 (41)*
72046	10 (25)	14 (36)	18 (46)	18 (46)*
72058	10 (25)	14 (36)	18 (46)	18 (46)*
* On non-tilting models, the *tilt level* must be set to 00. On tilting models, the factory settingis the same as high level.				
Textile Machines				
64046	4 (10)	15 (38)	38 (97)	6 (15)
72058	4 (10)	15 (38)	38 (97)	6 (15)

Precautions When Changing Factory Levels

1. *Pressure switch SPLLS*, used on 36021xxx and 36026xxx models to unlock the door at a safe level, must remain at the factory setting. (In other models, this level is specified in the software and cannot be changed.)
2. Never set the level for a first bath lower than needed to thoroughly wet the goods. Normally this will be the factory setting shown in the table for *level 2* or *medium* .
3. Never change float or pressure switch hierarchy. All lower level switches must make (i.e., L1 and L2 must both make for *level 2*; L1, L2, and L3 must all make for *level 3*.)
4. *Pressure switch* settings that vary more than one inch (2.5 cm) from the factory settings are not recommended.

About Level Adjustments

⚠ CAUTION ⚠

INJURY AND MACHINE DAMAGE HAZARDS—A knowledge of machine programming, operating, and mechanical/electrical servicing is needed when making level adjustments. These adjustments must be performed only by qualified personnel, in strict compliance with published safety precautions.

When Adjustments Are Needed—If the mounted position of a *float chamber assembly* or part of it changes (which can occur when components are replaced), the switches will no longer actuate at the same levels. Similarly, a *pressure switch* may not actuate at the original level setting as a result of prolonged wear or replacement. In these situations, the pre-set levels must be re-established.

On machines with *pressure transducers,* the microprocessor may not properly interpret the transducer output as a result of prolonged wear or replacement of the transducer. In this situation, the transducer must be re-calibrated.

Apparatuses Used To Make Level Adjustments—*Level float*-controlled levels are adjusted by moving the clips on the float rod. *Pressure switch*-controlled levels are adjusted with the *trip point adjusting screw* on the switch. On machines with *pressure transducers,* actual processing levels are not pre-set (levels are specified in the formula), but ranges and tilt level are pre-set with the *low, medium, high,* and *tilt level* configure decisions. The transducer is calibrated with the *tap offset counts* configure decision.

Measuring Levels Accurately—The adjustment procedures require filling the machine to a level mark of known height. The amount of water needed to achieve a level will vary unpredictably if goods (which both absorb water and occupy space) are present or if the cylinder is rotating. **Always set levels/calibrate with the cylinder at rest and without goods.**

On divided cylinder machines (which hang level, front to back), use the graduated sight glass on the shell front to measure levels. The graduations are in inches or centimeters, depending on the machine's destination country.

The levels in open pocket cylinders (which slope down to the rear) are measured at the rear (deepest part) of the cylinder. Temporary marks must be placed on the cylinder rear wall, as explained below.

Marking Levels on an Open Pocket Machine

⚠ DANGER ⚠

CONFINED SPACE HAZARDS—Confinement in the cylinder can kill or injure you. Hazards include, but are not limited to panic, burns, poisioning, suffocation, heat prostration, biological contamination, and crushing.

☞ **Do not enter the cylinder until it has been thoroughly purged, flushed, drained, cooled, and immobilized.**

1. Prepare the machine for safe entry and in accordance with all applicable codes (e.g., OSHA permit-required confined space entry requirements). Lock power off at the external disconnect switch.
2. On the inside of the cylinder, measure from the bottom rear and place clearly visible marks on the rear wall. If the machine has a *level float* and/or *pressure switches,* mark a line at each level to be set. If the machine has a *pressure transducer,* mark a line at *high* level. The cylinder will be stationary while filling, so the marks will not move.
3. When all personnel are clear, restore machine power.

Level Setting Procedures

(Machines With a *Float Chamber Assembly* and/or *Pressure Switches*)

General Procedure—Perform the following for each level to be set:

1. Close the door and run Formula 99. (The cylinder will be stationary and without water.)
2. Use the procedures described in "MODIFYING FORMULAS IN PROGRESS," "Method B . . ." (see Table of Contents) to fill with cold water just to the mark for the level to be set.
3. Adjust the appropriate apparatus (*float chamber assembly* or *pressure switch*) as explained below, just enough to actuate (as indicated by the proper level number appearing on the display).

Accessing and Adjusting the Float Chamber Assembly

⚠ DANGER ⚠

ENTANGLE AND SEVER HAZARDS—Contact with moving components normally isolated by guards, covers, and panels can entangle you and crush your limbs. These components move automatically.

☞ **Do not service machine unless qualified and authorized.**

The machine must remain powered on while adjusting the float rod clips. **Use extreme caution not to reach into the path of any apparatuses which could move, such as pulleys or belts.** On rigid models, the float chamber assembly (FIGURE 1) is located behind the shell. The float rod clips are accessible from the top of the machine. On suspended models, the level float is located within the frame. Remove the appropriate panel(s) for access.

Move clips as shown in FIGURE 1. Note that top and bottom clips must not be placed closer together than one inch (25 mm), otherwise the float rod can bind in the actuator arm.

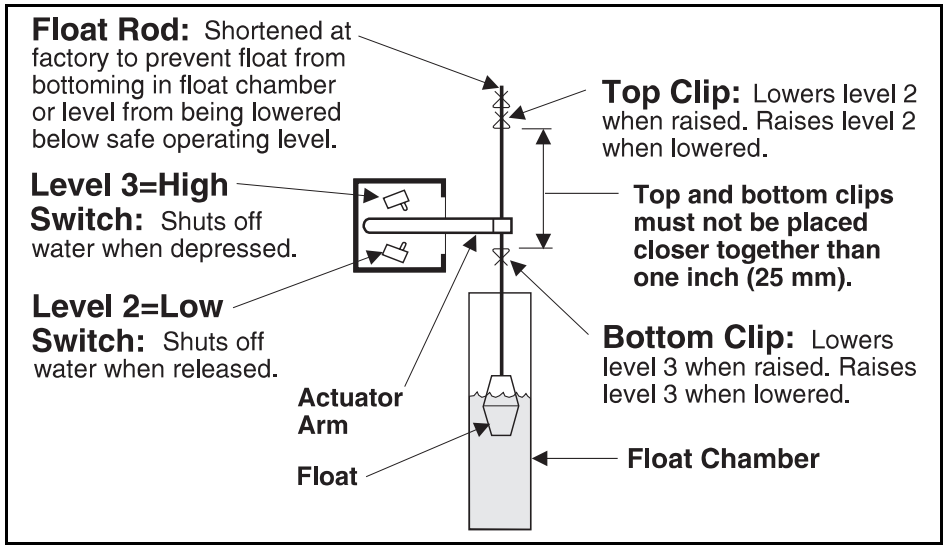


FIGURE 1 (MSSM0238BE)
Float Chamber Assembly—Clip Adjustment

Accessing, Identifying, and Adjusting Pressure Switches

⚠ DANGER ⚠

ELECTROCUTION AND ELECTRICAL BURN HAZARDS—Contact with high voltage will electrocute or burn you. Power switches on the machine and the control box do not eliminate these hazards. High voltage is present at the machine unless the main machine power disconnect is off.

☞ **Do not service machine unless qualified and authorized.**

The machine must remain powered on when adjusting pressure switches. **Use extreme caution not to touch any electrical conductors on the switch or in the electric box. The trip point adjusting screw may become electrically energized when power is on. Use only an insulated screwdriver to make adjustments.**

Pressure switches (FIGURE 2) are located in the *low voltage control box*. A sticker on the switch and/or a tag in the control box identify the switches by the functional names given in Table A (e.g., SPLL3).

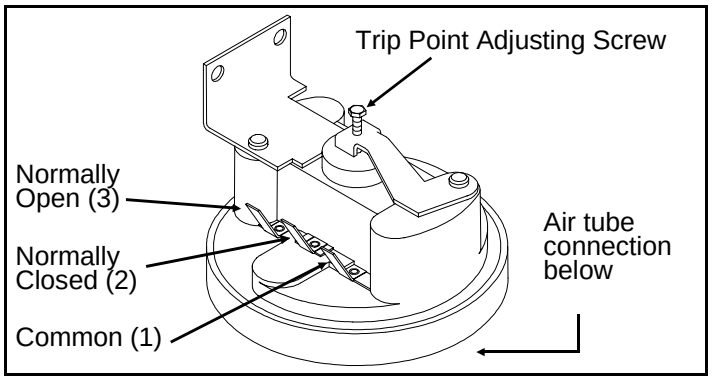


FIGURE 2 (MSSM0240AE)
Pressure Switch

The switch manufacturer calibrates these switches to actuate at a set pressure. When proper levels are verified at the Milnor factory, the *trip point adjusting screw* is painted with wax to hold its adjustment. **With an insulated screwdriver**, turn the *trip point adjusting screw* slowly. Turning clockwise causes the switch to actuate at a higher level; turning counter-clockwise actuates it at a lower level.

NOTE: A crimp, cut, or loose connection in the plastic air tube will prevent the pressure switch from functioning, causing the machine to overflow. Inspect air tubes periodically.

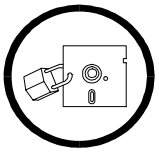
Range Setting, Calibrating, and Testing Procedures

(Machines With a *Pressure Transducer*)

Disabling *Metered Water* if the Machine Also Has a Flow Meter—If the machine has a flow meter and is configured for *metered water* (configure decision N), then the pressure transducer is only used for internal lockouts. Never-the-less, the transducer must be properly calibrated. The procedures described herein for range setting and calibrating may be used in this instance provided *metered water* is disabled, as follows:

1. Write down (or print out) all configure decisions. This is necessary because the next step will cause certain configure values to be lost. These must be re-entered later.
2. Set configure decision N (*metered water*)=0. Now a calibration formula can be programmed, specifying levels in inches (or centimeters) of water, as explained elsewhere herein.

⚠ CAUTION ⚠



DATA LOSS AND MALFUNCTION HAZARDS—Existing formulas contain water quantity data which only applies to *metered water*. While metered water is disabled:

- ☞ **Do not access existing formulas. The microprocessor will delete the water data.**
- ☞ **Do not run existing formulas. The water data will cause the machine to malfunction.**

Setting the Level Ranges and Tilt Level—The *low*, *medium*, and *high level* configure decisions determine the ranges within which levels may be specified in the wash formula. See "PROGRAMMING . . . ," "5=CONFIGURE . . ." for how these values affect the ranges. Set these values as desired. The *tilt level* configure decision specifies the level a tilting machine will fill to while tilted. On non-tilting machines this level must be set to *00*.

Creating a Calibration Formula—A one-step calibration formula is needed for calibrating and testing. Command a soak wash (cylinder does not turn), no temperature, cold water only, a level height (inches or centimeters) equal to high level (the height of the level mark), no steam, and no chemicals.

Calibrating Tap Offset Counts—Set the *tap offset counts* configure decision to 0000. Run the calibration formula and observe the water level. If the machine does not fill precisely to *high* level, adjust the *tap offset counts* configure value and run the formula again, repeating as required. Initially, change this value in fifty unit increments.

If the level is too low—enter 0050. *Increasing* the value in the range 0000 to 4095 *increases* the level achieved.

If the level is too high—enter 5050. *Increasing* the value in the range 5000 to 9095 *decreases* the level achieved.

Enabling *Metered Water* if the Machine Also Has a Flow Meter—If *metered water* was previously disabled, re-enable it as follows (if the transducer must be tested, do this after testing):

1. Set configure decision N (*metered water*)=1
2. Step through all configure decisions, comparing them with the recorded values. **Do not change the *low level, medium level, high level, tilt level,* and *tap offset counts* values, which were just established.** Verify that all other values are as previously recorded. The *counts per 100* and *offset valve time* values for *metered water* will probably need to be re-entered.

Testing the Transducer—If problems with the transducer are encountered (e.g., eratic levels), a qualified service technician can troubleshoot this condition as follows:

1. **Test for a faulty transducer:**
   a. Disconnect the pressure transducer output wire (2MTA3-4).
   b. Measure the voltages on the transducer. There should be +12VDC on the input pin and approx. 1 VDC on the output pin with no water in the cylinder.
2. **Test for an air leak:**

⚠ CAUTION ⚠

The following step requires injecting water with the transducer output disconnected. The water supply must be shut off manually otherwise the machine will overflow.

   a. With the output wire still disconnected, have an assistant run the calibration formula and manually shut off the cold water supply externally when high level is achieved.
   b. While the machine is filling, measure the voltage on the output pin of the transducer. It should rise from 1.0VDC to some voltage less then 6.0VDC. It rises approximately 1VDC per 11inches (28 cm) of water.
   c. With the machine at high level, monitor the transducer output voltage. It should remain stable.
3. **Test for effective shielding of the transducer box-to-low voltage control box cable.** The shield on this four conductor cable must be grounded to the copper bus bar in the low voltage control box and disconnected in the transducer box. Verify proper shielding as follows:
   a. Re-connect the wire to the output pin on the transducer.
   b. Change the calibration formula *type of step* to a *two-way bath* and run this formula.
   c. While the machine is filling with the cylinder rotating, hold 9 YZ- on the keypad.

```
05:38 STEP 01   05:00
2461/056/056
```

The display will appear similar to the example at left. Monitor the middle numeric value on the bottom line of the display which is the actual level in centimeters. If this value goes to zero while the basket is turning and returns to the correct level during dwell, then the shield is not properly grounded.

SETTING THE UNIT OF MEASURE AND CALIBRATING ELECTRONIC WATER FLOWMETERS USED ON WASHER-EXTRACTORS AND TEXTILE MACHINES

Metered water (formerly called *liquor ratio*) is a feature which permits the formula developer to specify a quantity of water (as opposed to a liquor level) for each wash step. On washer-extractors, the quantity injected when the formula is run is the quantity specified in the formula. On textile machines, the quantity of water injected is proportional to the ratio of actual load weight entered by the operator and nominal weight specified in the formula.

Washer-extractors and textile machines furnished with *metered water* are equipped with a flowmeter to measure the quantity of incoming water. The flowmeter is calibrated at the Milnor factory.

NOTE: Ensure that reuse water is free of lint and other solid contaminants which can become entangled in the flowmeter, causing it to malfunction.

About These Procedures

Why the Flowmeter Must be Calibrated—Flowmeters have a paddle wheel that rotates at a speed proportional to the *speed* of the passing water, sending pulses to an electronic counter. The number of pulses for a given *speed* of water will vary slightly from one flowmeter to another. The number of pulses for a given *quantity* of water depends on the size of the pipe the flowmeter is in. A 2" (51 mm) diameter pipe will have a much lower pulse count than a 1" (25 mm) diameter pipe, for the same quantity. Calibration determines the ratio of pulses to quantity of water for the specific flowmeter and pipe. Initially, some unit of measure (e.g., pounds, gallons, kilograms, liters) must be chosen for calibrating. The Milnor factory uses *pounds.*

What Calibration Values are Required—The calibration values required by the microprocessor controller are *counts per 100* and *offset valve time*. These values are entered in *mode 5, Configure* (see "PROGRAMMING . . ." see Table of Contents).

Counts per 100 is the number of flowmeter counts resulting from injecting 100 units of water (pounds, gallons, kilograms, liters). Once the *counts per 100* is established for a given unit of measure it may be converted to any other unit. The unit of measure that *counts per 100* is based on must also be used when programming formulas.

Offset Valve Time is the *reduction* in time that the water valve will remain open to admit the metered quantity commanded in the formula. This adjustment compensates for the tendancy to *overshoot* the commanded quantity because of the time taken for the valve to close. The value is in tenths of seconds.

NOTE: The *counts per 100* must be finalized before determining the *offset valve time.*

Setting the Unit of Measure

When Setting the Unit of Measure is Required—Every machine equipped with electronic flowmeters is calibrated at the Milnor factory and the *flowmeter calibration label* is marked with the *counts per 100* and *offset valve time* values. This label is located on the inside of the processor control board. A laundry desiring to program formulas in any unit other than pounds (the unit used by Milnor) must first convert the *counts per 100* shown on the calibration label to their preferred unit of measure and enter this value in the *counts per 100* configure decision. B

Conversion Procedure—Use the following formula to convert from pounds to another unit of measure:

Factory *counts per 100* pounds x Multiplier listed below = New *counts per 100*

Desired Unit	Multiplier
Gallons	8.33
Kilograms	2.2
Liters	2.2

Example: Factory *counts per 100* pounds = 0532
Desired units = Liters

New *counts per 100* liters = 0532 x 2.2 = 1170

NOTE: Contact the Milnor factory for any unit not listed if the conversion factor cannot be determined.

Calibrating

When Calibration is Required—If configuration label is lost, merely re-enter the values listed on the configuration plate (or convert to the desired units). Recalibration is only required for replacement flowmeters or if it is suspected that a flowmeter has lost its calibration as may eventually occur with use.

Preparations for Calibrating

⚠ CAUTION ⚠

INJURY AND MACHINE DAMAGE HAZARDS—Calibrating requires temporarily removing the cylinder water inlet hose. This procedure must be performed only by qualified maintenance personnel, in strict compliance with published safety precautions.

Obtain a container large enough to hold 460 pounds (208 kilograms, 55 gallons, 208 liters). Establish a means of accurately measuring the contents of the container (by weighing or determining volume).

Lock off machine power at the external disconnect switch, then remove the appropriate panels to gain access to the machine's water inlet piping. An internal hose connects the water inlet piping to the wash cylinder. Obtain eight feet (2.5 meters) of hose of the same diameter as the internal hose. Disconnect the internal hose and install the temporary hose such that incoming water will be injected into the measuring container. Make sure the hose is secured so it cannot jump out of the container.

Taking care to keep bystanders away from the machine, restore machine power. In *mode 5, Configure*, enter the initial *counts per 100* value from Table A and enter *000* for the *offset valve time*.

Create a calibration formula consisting of one bath step. For this step, command no steam, cold water only, no chemicals, and whichever of the following water quantities is in the same units as the *counts per 100* configure decision: 416 pounds, 189 kilograms, 50 gallons, or 189 liters.

Table A: Initial *Counts per 100*

Cylinder Size	Initial Value of *Counts per 100*			
	Pounds	Kilograms	Gallons	Liters
36021/36026	Consult Milnor factory			
42026				
42031/42044				
48032/48036	0540	1189	4498	1189
52038	0540	1189	4498	1189
60044	0225	0496	1874	0496
64046	0225	0496	1874	0496
72044/72058	0225	0496	1874	0496

Summary of Calibration Procedure—The calibration procedure is in two parts:

Part A. **Determine the actual *counts per 100* value.** This is done by running the calibration formula, measuring the actual quantity injected (disregarding commanded quantity), reading the total counts, calculating the actual *counts per 100* units, entering this value in configure, and repeating the procedure until consistent results are achieved.

Part B. **Determine the *offset valve time*.** This is done by running the calibration formula, measuring the actual quantity injected, determining any difference between actual and commanded quantity (because the water valves do not close instantaneously when commanded quantity is achieved) then adjusting the *offset valve time* to eliminate discrepancies. This procedure is repeated until actual and commanded quantities are equal.

Part A: Determining *Counts per 100*

⚠ CAUTION ⚠

When first running the calibration formula, the measuring container may overflow.

☞ **Increase the number of *counts per 100* to reduce the quantity of water injected.**

1. Run the calibration formula. When the water valve closes, hold 2 DEF on the keypad and read the display.

```
04:38 F0001S01 04:00
01784 01350
```

The number on the lower left of the display (01784 in this example) is the total counts for this injection. Record this number.

2. Accurately measure the quantity of water injected. Record this value then drain the container.

3. Calculate the *counts per 100* using the following formula:

$$\frac{\text{Total counts}}{\text{Actual quantity}} \times 100 = \textit{Counts per 100}$$

Example: Let's say the actual quantity is 395 pounds. Then,

$$\frac{1784}{395} \times 100 = 452 \textit{ counts per 100} \text{ pounds}$$

4. Enter the result in the *counts per 100* configure decision.

5. Repeat steps 1 through 4. The quantity injected should be slightly more than the commanded quantity and the new *counts per 100* should be close to the previously calculated value. Repeat, if necessary, until the *counts per 100* value is consistent.

Part B: Determining *Offset Valve Time*

1. Run the calibration formula.

2. Accurately measure the quantity of water injected, and compare this to the commanded quantity. Assuming actual is more than commanded, enter 010 (one second) into the *offset valve time* configure decision. (If actual is less than commanded, repeat Part A). Drain the container.

3. Repeat steps 1 and 2 as required, adjusting the offset valve time until actual and commanded quantities are equal. This is a trial and error process.

4. Once testing is completed, lock power off at the machine's external disconnect switch and restore the machine to its correct operational condition.

Pellerin Milnor has begun a manufacturing change which may affect how this manual applies to your machine. European-style wiring is replacing conventional wiring methods in electrical boxes. Because this change is being implemented one machine model at a time, not all models currently use European-style wiring.

Because this wirirng change affects the chemical connections made in the field, it is important to refer to the correct manual section when making these connections. If your machine uses conventional wiring methods, refer to MSSM0262BE. If your machine uses European-style wiring, refer to MSSM0262CE.

The following list includes all washer-extractor models currently being shipped with European-style wiring and the date code of the day the change was implemented on that machine.

36021BWP	--97146
36030F8P	--97173
36030F8S	--97362
36030F8W	--97113
36026Q6P	--97073
36021Q6P	--97073
42026Q6P	--97146
42032F7W	--98107
42032F7P	--98107
36030F8J	--98107
42032F8J	--98107
36030Q6J	--97146

BMP980025/98141

CONNECTING CHEMICAL SYSTEMS TO 100-FORMULA WASHER-EXTRACTORS AND TEXTILE MACHINES

Various methods, some standard and some optional, are available on all 100-formula washer-extractors and textile machines, to accommodate any of the commonly used allied (non-Milnor) chemical systems. Use this section to help determine the best method of chemical injection and how to connect the chemical system. Always consult the schematic manual before connecting chemical systems to the machine.

⚠ DANGER ⚠

ELECTRIC SHOCK HAZARD—Contact with high voltage electricity will kill or seriously injure you. Even with the Master Switch off and/or any emergency stop switches off, three-phase power and control circuit power are still present at several locations within electric boxes and electrical components.

INJURY AND DAMAGE HAZARDS—Improper wiring can cause machine to malfunction, risking injury to personnel, damage to machine components, and damage to goods.

- ☞ **Electrical and piping connections described in this section must be made only by qualified, authorized maintenance personnel.**
- ☞ **Lock off and tag out power at the external disconnect switches for the washer-extractor and for any chemical devices that provide power to the interpreter relay box (if furnished) before proceeding.**
- ☞ **DO NOT rely merely on the information in this section when wiring. Consult all applicable electrical schematics.**
- ☞ **DO NOT reroute or rearrange any wires not specifically permitted by this instruction.**
- ☞ **DO NOT connect a *common* wire to *ground*. Use the *common* terminal furnished.**

Chemical Injection Methods Available

(Item numbers correspond to those in FIGURE 1)

1. Inject Signals—An inject signal is an electric potential that occurs in response to a programmed chemical injection. Five discrete signals (chemicals 1 through 5) are always furnished. If *only these signals* are furnished, they are available at terminal strip *TBS* on BWP, QxP, and FxP models, and at Molex connector *WCS* on larger models.

Ten additional signals (chemicals 6 through 15) are optionally available. If these signals are furnished, then on BWP and QxP models, all 15 signals are available at terminal strips *TBS* and *TBT*. On BWP and QxP models furnished with interpret relays and on all other models (whether or not interpret relays are furnished) all 15 signals are available at terminal strip *TBA*.

Items 2 through 5 below operate off of inject signals. Disconnect the factory wired apparatus to use the inject signal for any other *low current* apparatus that meets the electrical specifications provided elsewhere herein.

2. Supply Injector—If a supply injector is furnished, the five electrically operated flush valves are wired to terminal strip *TBS, WCS,* or *TBA* (depending on model and options).

3. Optional Interpret Relays—Interpret relay contacts have a higher current carrying capacity than inject signals. The interpret relay coils are wired to *TBA* (see FIGURE 3). One set of contacts on each relay is wired to terminal strip *TBB* and connected to an internal power source. This power source may be replaced by an external, *separately fused* source, or merely disconnected, to provide potential-free ("dry") contacts. Use interpret relays to actuate electrically operated apparatuses (e.g., pumps, valves) or provide potential-free signals for other controllers.

4. Optional Pilot Air Valves—If these electrically operated valves are furnished, they are wired to terminal strip *TBS, WCS,* or *TBA,* (depending on model and options) at the factory. Use pilot air valves to actuate air-operated apparatuses (e.g., chemical valves).

5. Optional Liquid Supply Valves—If these air-operated valves are furnished, they are tubed to the pilot air valves. Use these valves with pressurized liquid chemical delivery systems (e.g., ring main).

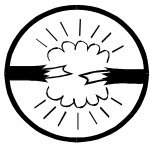
6. Pumped Chemical Inlets—A five-port inlet is standard on rigid models and a 15 port inlet is optional on all models. Use these valveless inlets only with systems that are not continuously pressurized and that deliver chemicals only when an injection is commanded (e.g., peristaltic pumps).

Sequenced Chemical Injection (Chemwait)—When coupled with an allied chemical controller of appropriate capability, the Chemwait feature permits a single chemical source to supply a bank of washer-extractors by delaying chemical injection into one machine whenever that chemical source is currently supplying another machine. See "HOW CHEMWAIT WORKS . . ." (see Table of Contents).

Connecting Apparatuses to Inject Signals

Electrical Specifications—Inject signals provide a 110VAC, 50Hz or 120VAC, 60Hz potential. Each signal can accommodate one apparatus not exceeding 37 milliamperes. Inject signals cannot be made potential-free.

⚠ CAUTION ⚠



COMPONENT DAMAGE HAZARD—Board components will burn out, requiring board replacement if devices driven by inject signals do not meet the electrical specifications. (Pumps generally draw a higher current and will burn out board components.)

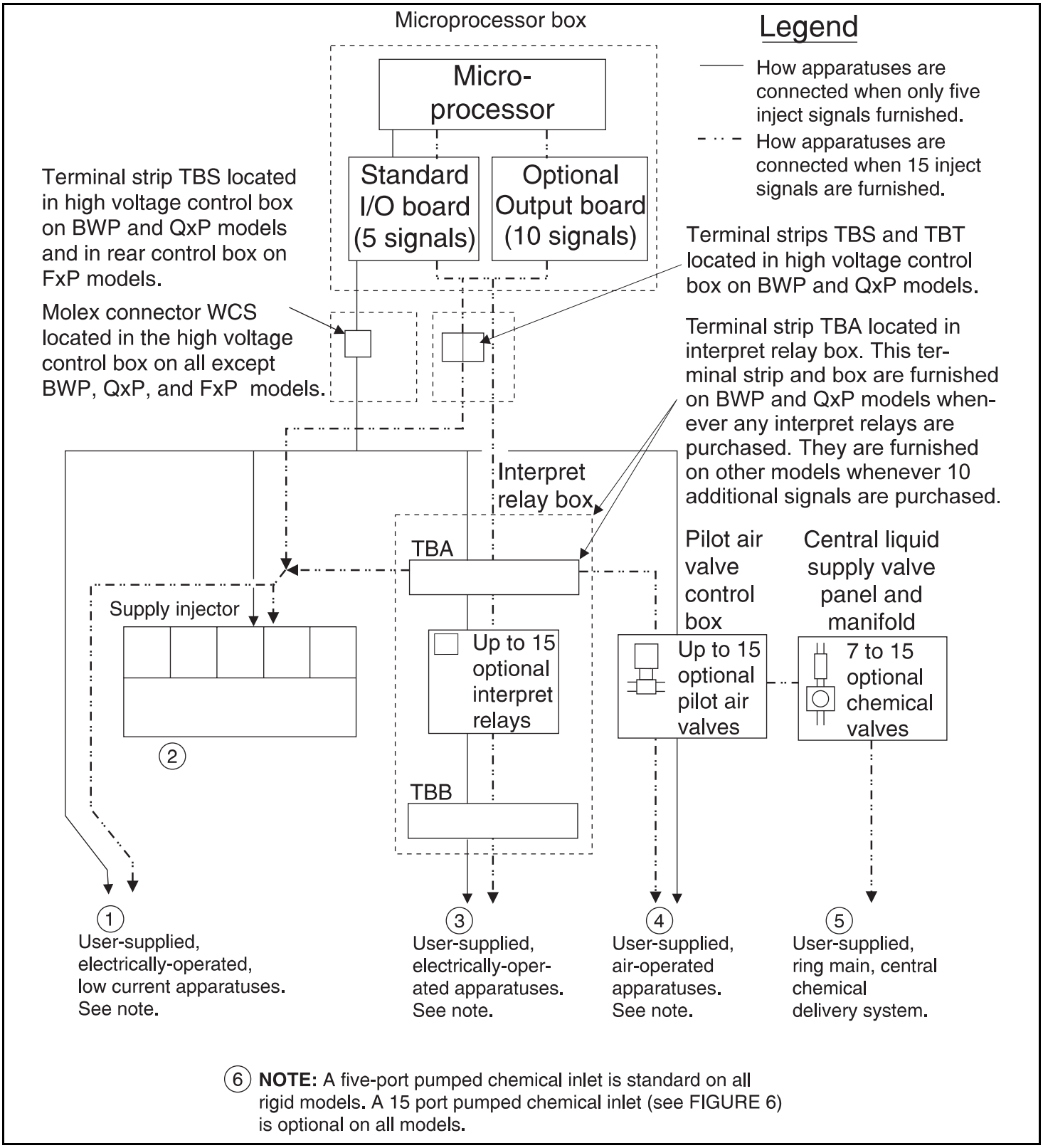


FIGURE 1 (MSSM0262BE)
Schematic Illustration of Available Chemical Injection Methods

BWP, QxP and FxP Models With Five Signals Only—Acquire signals at terminal strip *TBS*, located in the *high voltage control box* on BWP and QxP models and in the *rear control box* on FxP models. *Terminals 1* through *5* are *chemicals 1* through *5*, respectively and *terminal 8* is *common.* The specified voltage is enabled between the appropriate terminal and *common* whenever an injection is called for.

Other Models With Five Signals Only—Acquire signals at Molex connector *WCS* in the *high voltage control box* (see FIGURE 2). *Pins 1* through *5* are *chemicals 1* through *5* respectively and *pin 7* is *common*. The specified voltage is enabled between the appropriate pin and *common* whenever an injection is called for.

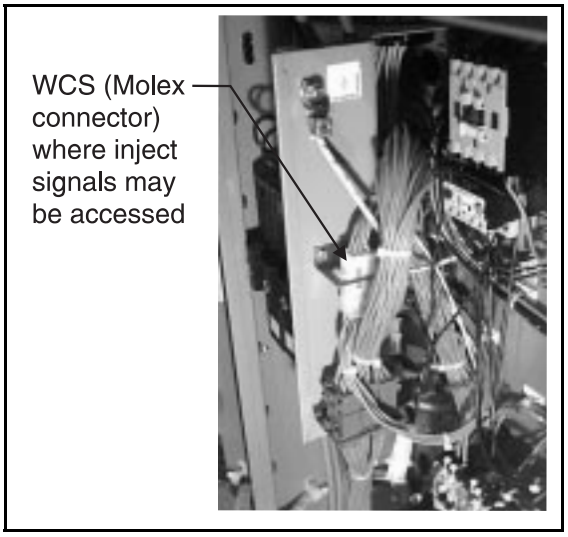


FIGURE 2 (MSSM0262BE)
Locating WCS in High Voltage

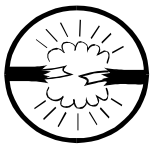
BWP and QxP Models With 15 Signals and No Interpret Relays—Acquire all 15 signals at *TBS* and *TBT* in the *high voltage control box*. *Terminals 1* through *7* on *TBS* and *1* through *8* on *TBT* are *chemicals 1* through *15* respectively. *Terminal 8* on *TBS* is *common*. The specified voltage is enabled between the appropriate terminal of *TBS* or *TBT* and *common*, whenever a chemical injection is called for.

Other Models With 15 Signals and No Interpret Relays—Acquire all 15 chemical signals and a *manifold flush* signal at *TBA* (see FIGURE 3). *Terminals A* through *Q* on this terminal strip are *chemicals 1* through *15* respectively and *Terminal R* is the *flush*. Terminal *TB1* provides a multi-pin *common*. The specified voltage is enabled between the appropriate terminal of *TBA* and *common* whenever a chemical injection or flush is called for.

Connecting Apparatuses to Interpret Relays

Electrical Specifications—The internal power source provides a 110VAC, 50Hz or 120VAC, 60Hz potential. Each interpret relay can accommodate one apparatus, not exceeding 0.6 amperes. The total current drawn by all apparatuses must not exceed 10 amperes. When apparatuses are driven by external power, do not exceed 1 ampere at 250VAC per relay contact.

⚠ CAUTION ⚠



COMPONENT DAMAGE HAZARD—Interpret relay contacts will fail, requiring relay replacement if devices exceed the specified current load.

Using Internal Power—When interpret relays (up to 15) are furnished, chemical signals are available at *TBB* in the *interpret relay box*. *Terminals A* through *Q* are *chemicals 1* through *15* respectively. Terminal *TB1* provides a multi-pin *common*. The specified voltage is enabled between the appropriate terminal of *TBB* and *common* whenever a chemical injection is called for. As shown in FIGURE 3, *terminal R* of *TBB* is used to supply power internally to one contact on each interpret relay.

Using External Power or Potential-Free Contacts—As shown in FIGURE 3, *TBB, terminal R*, which receives power via *WCL*, not only supplies power to the interpret relay contacts but also to the pumped chemical inlet manifold flush valve and/or supply injector flush valves, if furnished. To disconnect the internal power source, remove all of the wires from the left side of *terminal R, but maintain the connections between the removed wires.* **Make certain that any external power source connected to terminal R is separately fused.**

⚠ WARNING ⚠

Consider carefully the potential hazards of having more than one power source in a single enclosure.

If an external power source is wired to *TBB, terminal R*, then the voltage provided by this source is enabled between the appropriate terminal of *TBB* and the user-supplied *common* (not *TB1*) whenever a chemical injection is called for. If no power source is connected to *TBB, terminal R*, then a potential-free signal (contact closure) is enabled between the appropriate terminal (*A* through *Q*) of *TBB* and *TBB, Terminal R*, whenever an injection is called for.

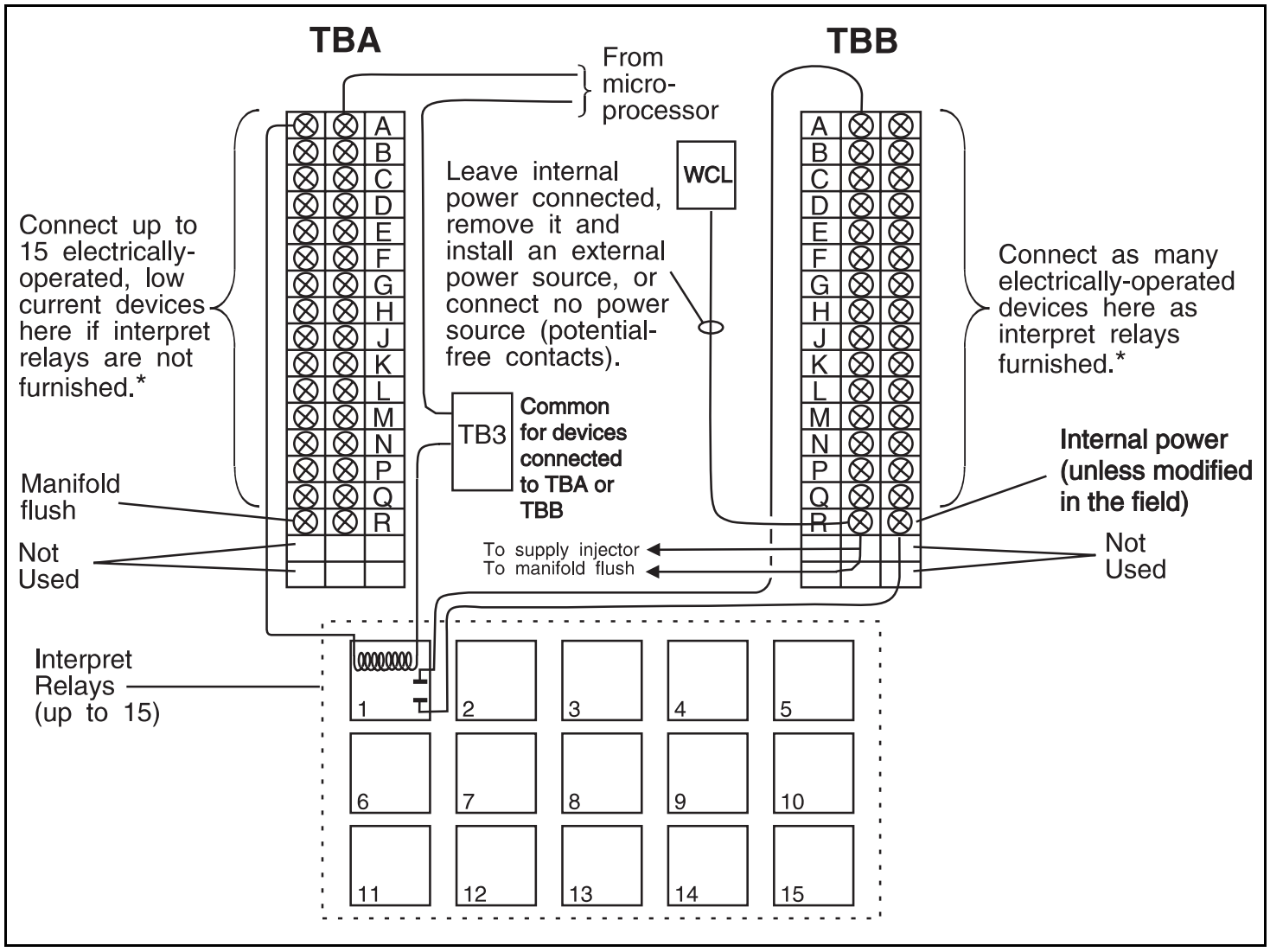


FIGURE 3 (MSSM0262BE)
Connections Inside the Interpret Relay Box

Pressurized Chemical Systems

These systems use chemical valves on the machine to admit chemicals from pressurized lines (e.g., ring main systems). The machine may be furnished with pilot air valves only, to which the customer may attach air-operated chemical valves, or with pilot valves and chemical valves.

Connecting Air-Operated Chemical Valves to Pilot Air Valves—When chemical injection pilot valves are furnished, they are located in an *air valve box* dedicated to this function. Connect incoming compressed air where indicated in FIGURE 4. See the installation manual for compressed air specifications. Pilot valves are arranged from left to right, beginning with *chemical 1*, when facing the connections, as shown in FIGURE 4 (however spacing varies with the number of valves furnished). Pilot valve connections accept 1/4" (6.3 mm) OD, 0.17" (4.3 mm) ID tubing. Tubing used by Milnor is rated for 310 psi (2.137 MPa) working pressure at 72°F (22°C) and 1250 psi (8.618 MPa) minimum burst pressure at 73°F (23°C). If air-operated, liquid chemical valves are also furnished, these will be pre-connected to the pilot valves; however, these may be disconnected and the pilot valves used to drive other devices, if desired.

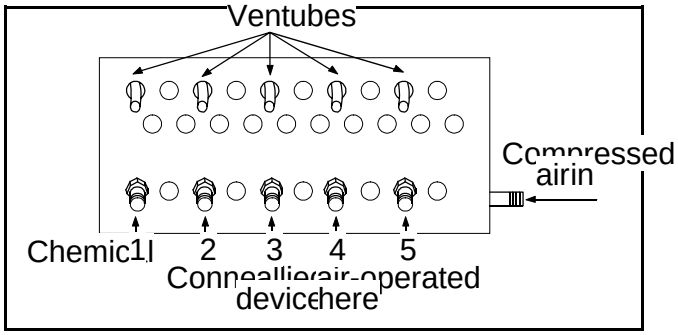


FIGURE 4 (MSSM0262BE)
Arrangement of Pilot Air Valves

Connecting Pressurized Liquid Chemical Lines to Air-Operated Valves

If air-operated chemical valves are furnished, between seven valves (two standard flow plus five high flow) and 15 valves will be supplied. Although each valve can be devoted to a separate chemical, the high flow valves are usually used to speed up injection when an extra large quantity of a chemical also injected via a standard flow valve is required (e.g., large doses of alkali in early heavy soil baths followed by smaller doses in later baths). Thus, the basic seven-valve set normally accommodates five chemicals as shown in FIGURE 5. When air-operated chemical valves are furnished by Milnor, corresponding pilot air valves and associated air connections between pilot and chemical valves are also furnished. All chemicals are injected into a manifold which is automatically flushed with water after every injection.

Standard flow valve connections (1, 2, 3, 4, 5, etc.) are 3/8" NPT. High flow valve connections (1L, 2L, etc.) are 1/2" NPT. Chemical piping should adhere to chemical system manufacturer specifications. The water inlet for flushing is internally connected to the main cold water inlet on some machines. An external, 1/2" NPT connection is required on other machines. Because the output relay-to-pilot valve wiring and the pilot valve to chemical valve air connections vary with the number and combination of valves furnished, its best to test each chemical output to determine which output (chemical 1, 2, 3, etc.) operates which valve (1, 1L, 2, 2L, etc.). See “MANUAL MODE MENU FUNCTIONS . . .”

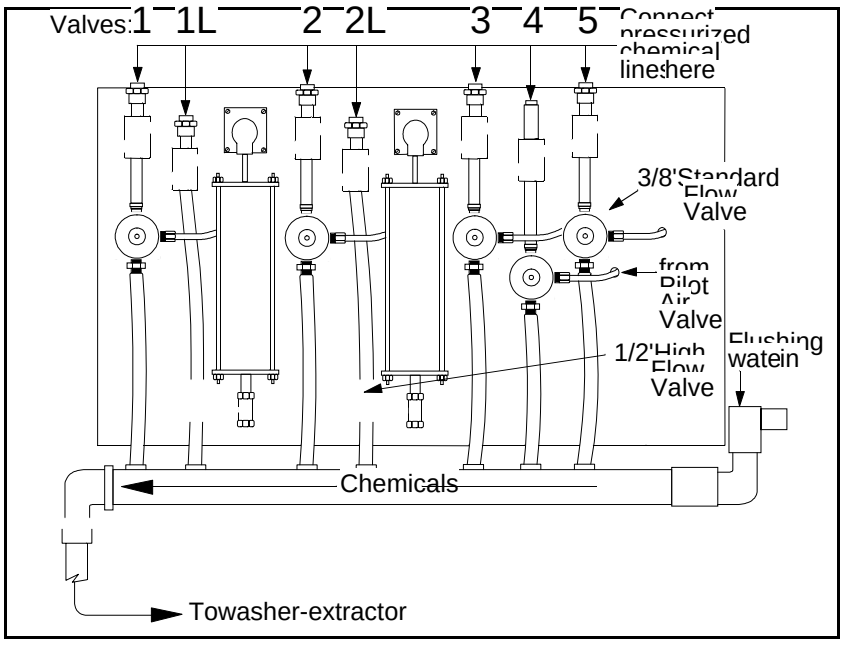


FIGURE 5 (MSSM0262BE)
Arrangement of Liquid Chemical Valves

Pumped Chemical Systems

These systems deliver chemicals to the machine intermittantly usually via peristaltic pumps. Inlets on the machine must be unrestricted at all times (valveless). The 5 and 15 port pumped chemical inlets meet this requirement.

Risk Associated With Pumped Chemical Systems—An inherent risk of this method of chemical injection is that concentrated chemicals can dribble into the machine after hours, when the machine is not in operation, causing machine and/or linen damage. Because Milnor has no control over the design or installation of pumped chemical systems, **Pellerin Milnor Corporation accepts absolutely no responsibility for damage to its equipment or textiles therein, caused in this way**. Much more information on this subject is provided in document B2TAG86033, "Pumped Chemical Installation and Precautions." Consult this document before connecting a pumped chemical system.

Connecting Flushing Water to 15-Port Inlets—Flushing water is required for 15-port inlets. It is internally piped to the incoming cold water inlet on some machines. When not internally piped, a 1/2" NPT external water line must be connected where indicated in FIGURE 6.

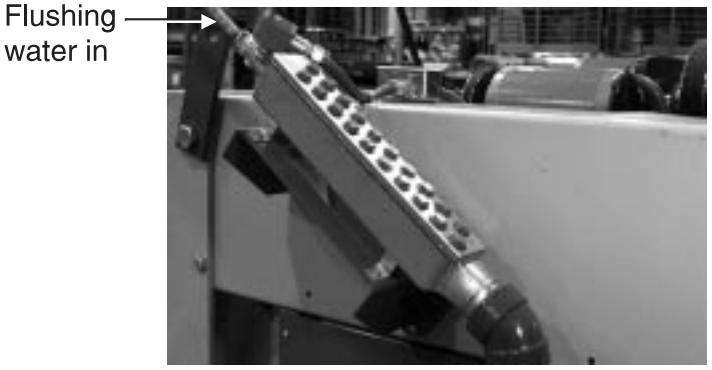


FIGURE 6 (MSSM0262BE)
15-Port Pumped Chemical Inlet

CONNECTING CHEMICAL SYSTEMS TO 100-FORMULA WASHER-EXTRACTORS AND TEXTILE MACHINES WITH EUROPEAN WIRING

Various standard and optional methods are available on all 100-formula washer-extractors and textile machines, to accommodate any of the commonly used allied (non-Milnor) chemical systems. Use this section to help determine the best method of chemical injection for your laundry and how to connect the chemical system. Always consult the machine schematic manuals before connecting chemical systems.

⚠ DANGER ⚠

ELECTRIC SHOCK HAZARD—Contact with high voltage electricity will kill or seriously injure you. Even with the Master Switch off and/or any emergency stop switches off, three-phase power and control circuit power are still present at several locations within electric boxes and electrical components.

INJURY AND DAMAGE HAZARDS—Improper wiring can cause the machine to malfunction, risking injury to personnel, damage to machine components, and damage to goods.

- ☞ **Electrical and piping connections described in this section must be made only by qualified, authorized maintenance personnel.**
- ☞ **Lock off and tag out power at the external disconnect switches for the washer-extractor and for any chemical devices that provide power to the interpret relay box (if furnished) before proceeding.**
- ☞ **DO NOT rely merely on the information in this section when wiring. Consult all applicable electrical schematics.**
- ☞ **DO NOT reroute or rearrange any wires not specifically described by this instruction.**
- ☞ **DO NOT connect a *common* wire to *ground*. Use the *common* terminal furnished.**

Chemical Injection Connection Methods Available

Chemical Injection Output Signals

Five discrete signals, released in response to programmed chemical injections for chemicals 1 through 5, are furnished standard on all washer-extractors. Ten additional signals (chemicals 6 through 15) are optionally available on most machines. Often these start signals are used to operate other electrically-operated, low-voltage chemical injection devices like interpreter relays and pilot valves. These devices, in turn, are used to operate a higher voltage chemical injection device.

These signals, each capable of a maximum electrical load of 9VA at 120VAC, can be accessed at terminal strip *TBA*. Disconnect the factory wired apparatus to use these start signals for any other low current apparatuses.

Liquid Chemical Tube Barbed Connectors

Barbed fittings, furnished standard on F-style machines, provide for the connection of tubes from remote chemical supply injection systems. The F8P and F7P are furnished with six barbed connectors, while outerwear machines are furnished with ten connectors.

One chemical injection output signal is required for each connector, and at least five are provided standard.

Five Compartment Flushing Chemical Injector

A five-compartment dry supply injector mounted externally on the washer-extractor is furnished standard on most washer-extractors in lieu of a pumped chemical style system. The flushing chemical injector is offered optionally on the Q style microprocessor machines and outerwear machines.

Each electrically operated flush valve located in a supply compartment is wired to terminal strip *TBA* and uses a chemical injection output signal.

Optional Interpret Relays

One or more interpreter relays (up to 15) mounted in a control box are optionally available and connected to the standard chemical injection outputs on washer-extractors. These relays can be used to operate other electrically-operated, high voltage chemical injection devices like pumps and valves.

These relays, each capable of a maximum electrical load of 1 ampere at 250VAC, have one set of contacts on each relay wired to terminal strip TBA and connected to an internal power source. The internal power source may be replaced by an external, separately fused source, or merely disconnected, to provide potential-free (“dry”) contacts.

Optional Pilot Air Valves

Pilot air valves are optionally available to actuate air-operated chemical injection valves or other similar air-operated devices supplied by others. A maximum of 15 of these normally-closed air valves are available and are connected to corresponding chemical injection output signals.

Each air-operated valve is wired to terminal strip *TBA* and uses a chemical injection output signal.

Optional Central Liquid Chemical Supply System/Valves

Seven air-operated chemical injection valves are optionally available for use with up to seven different chemicals on most models. The system includes two 1/2" high flow and five 3/8" standard flow air-operated valves. Individual standard flow central liquid chemical valves are also optionally available up to a maximum of 8 additional standard flow valves in the system for a maximum of 15 valves. Each individual valve includes the necessary interpreter relay and pilot valve.

Chemical injection valves are wired to terminal strip *TBA* and use a output signal, interpreter relay, and pilot valve for each optional chemical valve. These valves are used with pressurized liquid chemical delivery systems like a ring main.

Optional Peristaltic Pump Connections

Up to fifteen 1/2" barbed fittings for separate peristaltic hose connections are optionally available. Automatic flush can be added optionally with peristaltic pump connections.

The connections are provided standard with five chemical output signals, and additional signals must be added to operate more than five peristaltic hose connections. These valveless inlets are used only with systems that are not continuously pressurized and that deliver chemicals only when an injection is commanded.

Sequenced Chemical Injection (Chemwait)

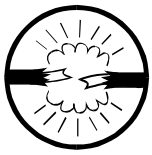
A chemical injection sequencer supplied by others interfaces with the machines to supply each machine with chemicals one at a time.

See “HOW CHEMWAIT WORKS . . .” (see Table of Contents).

Connecting Apparatuses to Chemical Injection Signals

Electrical Specifications—Inject signals provide a 110VAC, 50Hz or 120VAC, 60Hz potential. Each signal can accommodate one apparatus not exceeding 37 milliamperes. Inject signals cannot be made potential-free.

⚠ CAUTION ⚠



COMPONENT DAMAGE HAZARD—Devices driven by injection output signals which exceed electrical specifications will burn out board components, requiring board replacement. (Pumps generally draw a higher current and will burn out board components.)

BWP and QxP Models With Five Signals Only—Acquire signals at terminal strip *TBA*, located in the *high voltage control box . Points 86* through *90* are *chemicals 1* through *5*, respectively, *point 109* is flush, and *point 6* is *common.* The specified voltage is enabled between the appropriate terminal and *common* whenever an injection is called for.

FxP, FxS, and FxW Models With Five Signals Only—Acquire signals at terminal strip *TBA* in the *rear control box. Points 47* through *51* are *chemicals 1* through *5, point 62* is *flush, point 6* is *common*. In FxS models, *point 63* is the soap chute. The specified voltage is enabled between the appropriate terminal and *common* whenever an injection is called for.

BWP and QxP Models With 15 Signals and No Interpret Relays—Acquire all 15 signals at *TBA* in the *high voltage control box. Points 86* through *90* are *1* through *5* respectively and *points 94* through *102* are *6* through *14* respectively. *Point 108* is chemical 15. *Point 109 is flush*. The specified voltage is enabled between the appropriate terminal of *TBA* and *common*, whenever a chemical injection is called for.

FxP and FxW Models With 15 Signals and No Interpret Relays—Acquire all 15 signals at *TBA* in the *high voltage control box. Points 52* through *61* are chemicals *6* through *15* respectively. The specified voltage is enabled between the appropriate terminal of *TBA*, whenever a chemical injection is called for.

FxW Models With 15 Signals and Interpret Relays—Acquire all 15 signals at *TBA* in the high voltage control box. *Points 68* through *82* are *1* through *15* respectively. The specified voltage is enabled between the appropriate terminal of *TBA* and common, whenever a chemical injection is called for.

Connecting Apparatuses to Interpret Relays

Electrical Specifications—The internal power source provides a 110VAC, 50Hz or 120VAC, 60Hz potential. Each interpret relay can accomodate one apparatus, not exceeding 0.6 amperes. The total current drawn by all apparatuses must not exceed 10 amperes. When apparatuses are driven by external power, do not exceed 1 ampere at 250VAC per relay contact.

⚠ CAUTION ⚠

COMPONENT DAMAGE HAZARD—Connecting devices which exceed the electrical specifications can cause interpret relay contacts to fail, requiring relay replacement.

Using Internal Power

When interpret relays (up to 15) are furnished, chemical signals are available at *TBB* in the interpret relay box. Terminals *A* through *Q* are chemicals 1 through 15 respectively. Terminal *TB1* provides a multi-pin common. The specified voltage is enabled between the appropriate terminal of *TBB* and common whenever a chemical injection is called for. As shown in Figure 1, terminal *R* of *TBB* is used to supply power internally to one contact on each interpret relay.

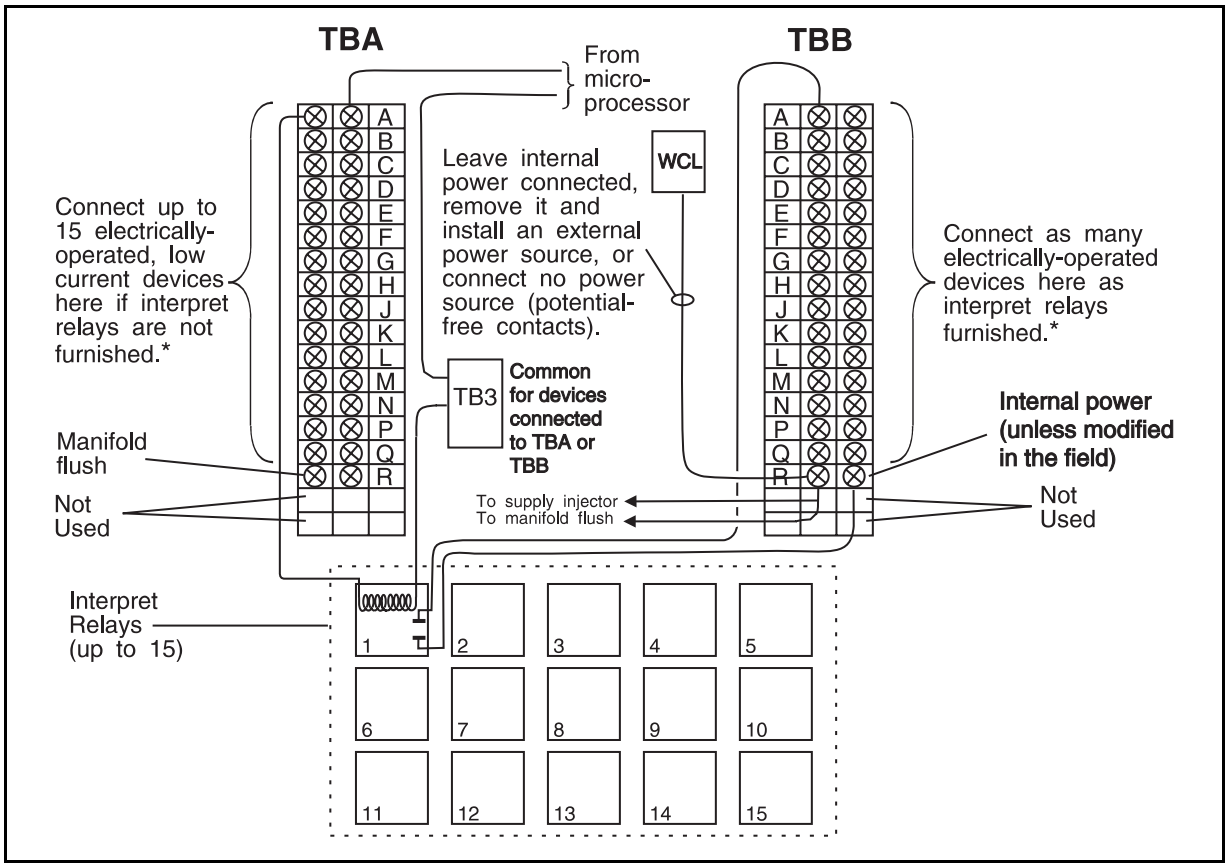


FIGURE 1 (MSSM0262CE)
Connections Inside the Interpret Relay Box

Using External Power or Potential-Free Contacts

As shown in Figure 1, *TBB*, terminal *R*, which receives power via *WCL*, not only supplies power to the interpret relay contacts but also to the pumped chemical inlet manifold flush valve and/or supply injector flush valves, if furnished. To disconnect the internal power source, remove all wires from the left side of terminal *R*, but maintain the connections between the removed wires. Make certain that any external power source connected to terminal *R* is separately fused.

⚠ WARNING ⚠

Consider carefully the potential hazards of having more than one power source in a single enclosure.

If an external power source is wired to *TBB*, terminal *R*, then the voltage provided by this source is enabled between the appropriate terminal of *TBB* and the user-supplied common (not *TB1*) whenever a chemical injection is called for. If no power source is connected to *TBB*, terminal *R*, then a potential-free signal (contact closure) is enabled between the appropriate terminal (*A* through *Q*) of *TBB* and *TBB*, Terminal *R*, whenever an injection is called for.

Pressurized Chemical Systems

These systems use chemical valves on the machine to admit chemicals from pressurized lines (e.g., ring main systems). The machine may be furnished with pilot air valves only, to which the customer may attach air-operated chemical valves, or with pilot valves and chemical valves.

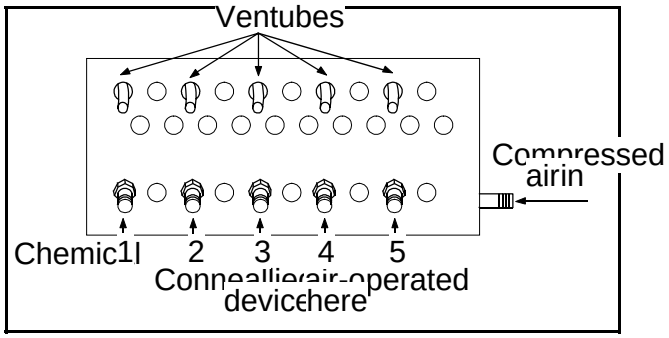


FIGURE 2 (MSSM0262CE)
Arrangement of Pilot Air Valves

Connecting Air-Operated Chemical Valves to Pilot Air Valves

—When chemical injection pilot valves are furnished, they are located in an *air valve box* dedicated to this function. Connect incoming compressed air where indicated in Figure 2. See the installation manual for compressed air specifications. Pilot valves are arranged from left to right, beginning with *chemical 1*, when facing the connections, as shown in Figure 4 (however spacing varies with the number of valves furnished). Pilot valve connections accept 1/4" (6.3 mm) OD, 0.17" (4.3 mm) ID tubing. Tubing used by Milnor is rated for 310 psi (2.137 MPa) working pressure at 72°F (22°C) and 1250 psi (8.618 MPa) minimum burst pressure at 73°F (23°C). If air-operated, liquid chemical valves are also furnished, these will be pre-connected to the pilot valves; however, these may be disconnected and the pilot valves used to drive other devices, if desired.

Connecting Pressurized Liquid Chemical Lines to Air-Operated Valves—If air-operated chemical valves are furnished, between seven valves (two standard flow plus five high flow) and 15 valves will be supplied. Although each valve can be devoted to a separate chemical, the high flow valves are usually used to speed up injection when an extra large quantity of a chemical also injected via a standard flow valve is required (e.g., large doses of alkali in early heavy soil baths followed by smaller doses in later baths). Thus, the basic seven-valve set normally accommodates five chemicals as shown in Figure 3. When air-operated chemical valves are furnished by Milnor, corresponding pilot air valves and associated air connections between pilot and chemical valves are also furnished. All chemicals are injected into a manifold which is automatically flushed with water after every injection.

Standard flow valve connections (1, 2, 3, 4, 5, etc.) are 3/8" NPT. High flow valve connections (1L, 2L, etc.) are 1/2" NPT. Chemical piping should adhere to chemical system manufacturer specifications. The water inlet for flushing is internally connected to the main cold water inlet on some machines. An external, 1/2" NPT connection is required on other machines. Because the output relay-to-pilot valve wiring and the pilot valve to chemical valve air connections vary with the number and combination of valves furnished, it is best to test each chemical output to determine which output (chemical 1, 2, 3, etc.) operates which valve (1, 1L, 2, 2L, etc.). See "MANUAL MODE MENU FUNCTIONS . . ."

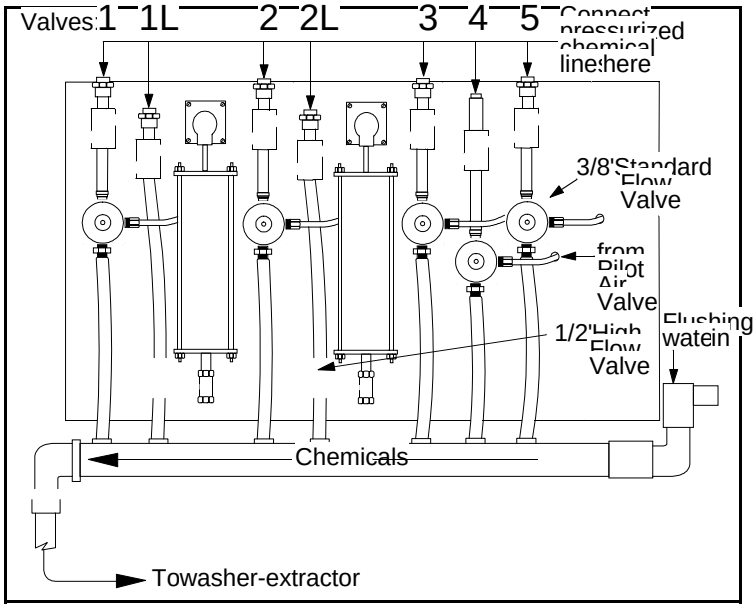


FIGURE 3 (MSSM0262CE)
Arrangement of Liquid Chemical Valves

Pumped Chemical Systems

These systems deliver chemicals to the machine intermittently usually via peristaltic pumps. Inlets on the machine must be unrestricted at all times (valveless). The 5 and 15 port pumped chemical inlets meet this requirement.

Connecting Flushing Water to 15-Port Inlets—Flushing water is required for 15-port inlets. It is internally piped to the incoming cold water inlet on some machines. When not internally piped, a 1/2" NPT external water line must be connected where indicated in FIGURE 6.

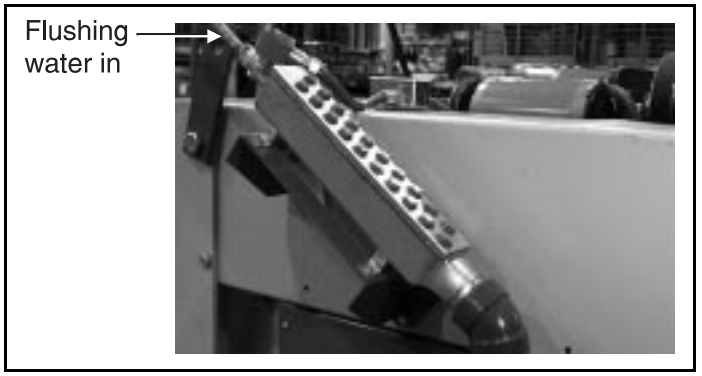


FIGURE 4 (MSSM0262CE)
15-Port Pumped Chemical Inlet

Risk Associated With Pumped Chemical Systems—An inherent risk of this method of chemical injection is that concentrated chemicals can dribble into the machine after hours, when the machine is not in operation, causing machine and/or linen damage. Because Milnor has no control over the design or installation of pumped chemical systems, **Pellerin Milnor Corporation accepts absolutely no responsibility for damage to its equipment or textiles therein, caused in this way**. Much more information on this subject is provided in document B2TAG86033, "Pumped Chemical Installation and Precautions." Consult this document before connecting a pumped chemical system.

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Definitions of Terms and Abbreviations

AutoSpot—a control mechanism with which the operator can automatically align one cylinder pocket of a divided cylinder machine with the loading doors

bath—a general term for any step of a wash formula during which the goods are exposed to water with or without chemicals.

CPU (central processing unit)—integrated circuit component, usually an Intel 8088 and its ancillary devices, that interprets programming instructions and inputs to the microprocessor and provides outputs to other devices

CCW—counterclockwise cylinder rotation, as viewed from the load end; see also CW

central liquid supply system—chemicals are constantly supplied to the machine under pressure; valves on the machine open and close to regulate the flow of chemicals into the machine

checksum—one of several numbers generated by the control that represents the amount of data in a specific memory area; any change in a checksum indicates that data has changed

clean side—the side of a pass-through machine from which clean goods are unloaded after processing

code, customer—the code that identifies the one of 1,000 possible owners of a batch

code, destination—the code that identifies the one of 64 (with the Miltrac™ controller) or one of eight (if allied data pass) desired post-dry or no-dry destination of a batch

code, dry—code that identifies the one of 16 full-dry and 16 partial-dry cycles for a batch

code, formula—code that identifies the one of 16 basic wash formulas used to process a batch

code, goods—code that identifies the one of 256 goods classifications that describe a batch and invoke any variations to the basic formula used

configure—microprocessor programming for various software and hardware options on the machine

control—an electrical enclosure, usually housing a keypad, at which the user commands actions and programs the machine; also includes all electromechanical devices on the machine involved with its operation; also referred to as “controller”

cooldown—used to gradually cool goods to prevent the setting of wrinkles. In a washer equipped with the cooldown option (an additional level switch, a manual throttling valve, and an on/off cooldown water valve), this is a method of reducing the temperature of the goods through repeated partial draining and refilling with cold water. The cooldown rate is controlled by the manual throttling valve.

CPU—central processing unit; the main computer chip in a microprocessor control system that processes data, as well as the board on which the CPU chip is mounted

customer code—see **Code, customer**

CW—clockwise cylinder rotation direction as viewed from the front of the machine

cycle—operations undertaken in a specific order to process goods; a cycle normally ends with the device ready to accept another load

cylinder—the perforated basket inside the machine shell which contains the goods and is rotated by the motors

cylinder pocket—one of the two or three divisions of a divided cylinder washer-extractor into which goods are loaded for processing

daisy chain—method of linking two or more serial type microprocessor controls with one four-conductor shielded cable. All data passes via this cable, regardless of which machines are communicating.

default password—see **Password, default**

default value—value used by the microprocessor control if no other value has been set by the programmer

destination—area or zone of a laundry facility to which goods will be routed after drying, or before pressing if the destination is a "no-dry" station

destination code—see **Code, destination**

DIP switches—dual in-line package switches; a row of (usually six or eight) miniature switches in a single housing used to permanently select or configure certain options on microprocessor boards; on Milnor® microprocessor controls these switches are used most often to specify the communications address for each machine in a system

discretionary data field—any field in the microprocessor control system that can be updated through the keyboard or keypad; also, a machine configuration field, such as temperature units, that is not limited by hardware or equipment in the machine

display—the component by which the machine provides data to the operator; the component may be one of several types, including vacuum fluorescent or liquid crystal (two lines of 20 alpha-numeric characters), color graphic liquid crystal (320 pixels by 240 pixels), or CRT monitor of various resolutions.

door, manual—machine door which is opened and closed by hand, without power assistance

door, power operated—machine door which is normally operated through electro-mechanical controls rather than manually; usually, the machine must be energized for the door to operate

download—process of transferring data, usually configuration and programming instructions, from a machine to another machine or to a memory storage device

drain speed—one of several ways to end a wash formula; goods are kept in motion at a speed approximating the force of gravity (1g) until the operator is ready to discharge them

dry code—see **Code, dry**

EPROM—erasable programmable read-only memory; the portion of some Milnor® microprocessor control systems used to store the fixed instructions (software) that determine how the machine functions

extraction—the removal of excess water from goods discharged from the tunnel washer

formula—instructions used by the machine control to operate motors, valves, and other components during a standard cycle

formula code—see **Code, formula**

gains, PID—proportional–integral–differential gains; a set of constants used by the software in Milnor® textile machines to achieve a commanded temperature based on the temperature probes in the heat exchanger and the machine sump

goods—articles processed or conveyed by a machine

hardware—electronic boards that control the machine

hold code—function of a programmable output which answers the question, "If a hold condition is encountered while this function is actuated, should the function continue to operate even if its commanded parameters have not been achieved?"

inching—a control mechanism with which an operator can manually align one pocket of a divided cylinder machine with the loading doors

input, direct—signals that enter the processor board directly; direct inputs are provided by switches on the machine, including limit switches, the *Signal Cancel* button, and the *Run/Program* keyswitch

input, standard—signals to the microprocessor controller that certain standard conditions exist; these inputs enter the processor board through the standard input/output board(s); include *Bag Ready*, *Load Conveyor Ready*, and remote customer and goods codes, etc.

jogging—intermittent rotation of the cylinder on certain Milnor® machines can be used to dislodge goods from the cylinder wall after extraction, or to assist in discharging goods from the tilted cylinder, etc.

level switch—device that signals the controller when the bath liquor has reached a preset level

liquor—bath solution, usually consisting of water and chemicals at a specified temperature, for processing goods

load—the amount of goods, measured by weight or pieces, that a machine normally handles during a cycle

loading device—in a system, this is the device which loads another device; example: a shuttle may be the loading device for a dryer

loading direction—the direction the goods are loaded into or onto a device

MMQ—minutes, minutes, and quarter minutes (e.g., 043 = 4 minutes and 45 seconds); see also **SS** and **SSS**

model—designation of machine without regard to options; for most devices, the model includes some dimensional representation of the effective machine size

motor contactor box—enclosure containing the high voltage motor contactors

password—three-character code entered to access or change values in certain display pages, used to prevent unauthorized programming. The instructions for changing the password are contained in a separate document sent only to the owner of the machine. See also **Minipass**

password, default—password when shipped from the Milnor® factory that automatically replaces any field-programmed password after a failed Program Memory check, or if a new password has not been entered since the processor board memory was cleared or a new processor board was installed

permanent press—a fabric or finish which is heat-set after the article is manufactured to minimize wrinkling and to retain creases

program mode—mode which allows programming of wash formulas, dry cycles, and other discretionary data; see also **Run mode**

pumped chemical supply system—chemicals flow into the machine when the machine control or operator commands the pump to operate

reversing—one of several ways to end a wash formula; goods are kept in motion at wash speed by the rotating cylinder until the operator is ready to discharge them

run mode—mode of operation that allows devices to run automatically; see also **Program mode**

software—fixed information contained in EPROMs (programming by Milnor®) or on disk files that determines how a machine or computer operates

soil side—the side of a pass-through machine into which soiled goods are loaded for processing

spray-down—a feature which allows the operator to facilitate loading the machine by spraying the goods with water as they are loaded

SS (SSS)—seconds, i.e., “SS” means two digits (usually 00-99 seconds), “SSS” means three digits (usually 000-255 seconds); see also **MMQ**

step timer—counts time for each individual step in a formula or dry code

supply injector—compartmented hopper into which chemicals are loaded before beginning a wash cycle; the chemicals are flushed from the hopper compartments into the machine automatically when commanded by the control

thermistor—temperature sensing device that varies its resistance to an electrical current with regard to temperature; used frequently in CBW® washers, washer-extractors, and textile machines

three-wire circuit—circuit that provides control power for all machine functions; any of several safety devices in the three-wire circuit will open the circuit and stop machine operation if a malfunction is detected; once open, the three wire circuit can only be closed by manual intervention and then only if the condition that opened the circuit is rectified

Thermo-water—method of controlling incoming water temperature by modulating (alternately and oppositely opening and closing) the hot and cold water valves

toggle switch—one of several types of hand-operated switches with a single operating lever that can be moved to two or more positions (e.g., the *Master* switch)

trickle charge—process of slowly and continuously charging a microprocessor backup battery during machine operation to maintain a full charge

tumbling—goods are kept moving after the cycle is complete until the operator is ready to discharge them

washer-extractor—machine that both washes and extracts (spins the goods) to remove a large percentage of the absorbed water

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