Published Manual Number/ECN: MATDRYERBE/2022085A

- **Publishing System: TPAS2**
- **Access date: 02/17/2022**
- **Document ECNs: Latest**

Technical Reference-Dryers

Mark III, IV & V

Dryer 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

WARNING: For your safety, the information in this and the other manuals supplied with this appliance, must be followed to minimize the risk of fire or explosion or to prevent property damage, personal injury or death.

— Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

— WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Clear the room, building or area of all occupants.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

— Installation and service must be performed by a qualified installer, service agency or gas supplier.

Notice for Owner/Operator: Please post in a prominent location, instructions to be followed in the event the user smells gas. Consult with the local gas supplier for appropriate wording. Also post in a prominent location a sign bearing the following wording:

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

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MATDRYERBE/22085A

PELLERIN MILNOR CORPORATION
LIMITED STANDARD WARRANTY

We warrant to the original purchaser that MILNOR machines including electronic hardware/software (hereafter referred to as "equipment"), will be free from defects in material and workmanship for a period of one year from the date of shipment (unless the time period is specifically extended for certain parts pursuant to a specific MILNOR published extended warranty) from our factory with no operating hour limitation. This warranty is contingent upon the equipment being installed, operated and serviced as specified in the operating manual supplied with the equipment, and operated under normal conditions by competent operators.

Providing we receive written notification of a warranted defect within 30 days of its discovery, we will—at our option—repair or replace the defective part or parts, EX Factory (labor and freight specifically NOT included). We retain the right to require inspection of the parts claimed defective in our factory prior to repairing or replacing same. We will not be responsible, or in any way liable, for unauthorized repairs or service to our equipment, and this warranty shall be void if the equipment is tampered with, modified, or abused, used for purposes not intended in the design and construction of the machine, or is repaired or altered in any way without MILNOR's written consent.

Parts damaged by exposure to weather, to aggressive water, or to chemical attack are not covered by this warranty. For parts which require routine replacement due to normal wear—such as gaskets, contact points, brake and clutch linings, belts, hoses, and similar parts—the warranty time period is 90 days.

We reserve the right to make changes in the design and/or construction of our equipment (including purchased components) without obligation to change any equipment previously supplied.

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BMP720097/19036

BIUUUD19 (Published) Book specs- Dates: 20081231 / 20081231 / 20081231 Lang: ENG01 Applic: UUU

How to Get the Necessary Repair Components

This document uses Simplified Technical English.
Learn more at http://www.asd-ste100.org.

You can get components to repair your machine from the approved supplier where you got this machine. Your supplier will usually have the necessary components in stock. You can also get components from the Milnor® factory.

Tell the supplier the machine model and serial number and this data for each necessary component:

- The component number from this manual
- The component name if known
- The necessary quantity
- The necessary transportation requirements
- If the component is an electrical component, give the schematic number if known.
- If the component is a motor or an electrical control, give the nameplate data from the used component.

To write to the Milnor factory:

Pellerin Milnor Corporation
Post Office Box 400
Kenner, LA 70063-0400
UNITED STATES

Telephone: 504-467-2787
Fax: 504-469-9777
Email: parts@milnor.com

— End of BIUUUD19 —

Trademarks

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Table 1. Trademarks

AutoSpot™	GreenFlex™	MilMetrix®	PulseFlow®
CBW®	GearTrace™	MilTouch™	RAM Command™
Drynet™	GreenTurn™	MilTouch-EX™	RecircONE®
E-P Express®	Hydro-cushion™	MILRAIL™	RinSave®
E-P OneTouch®	Mentor®	Miltrac™	SmoothCoil™
E-P Plus®	Mildata®	PBW™	Staph Guard®
Gear Guardian®	Milnor®		

End of document: BNUUUU02

Commissioning 1

BICPUK01 (Draft) Book specs- Dates: 20030620 / 20030620 / 20030620 Lang: ENG01 Applic: CDU

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 1: 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.

1. Electro-Mechanical Controls

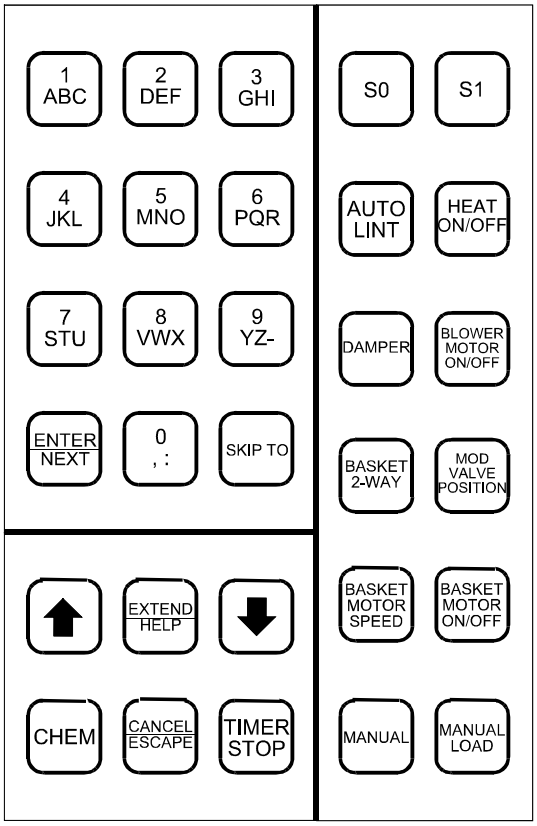
Electro-mechanical controls vary with machine model and are explained in the machine-specific operator manual furnished with the machine.

2. Microprocessor Interface Controls

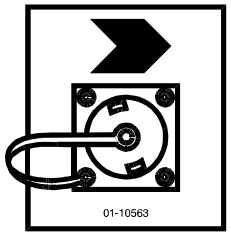
These controls, shown in Figure 1, include the keyswitch, display and keypad located on the main nameplate (position on nameplate varies), and the printer/download connection, located on its own nameplate. These controls permit the user to pass data to and from the microprocessor controller.

Figure 1: Microprocessor Interface Controls

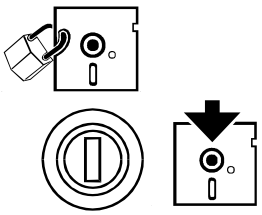
1. Keypad



2. Printer Download Connection



3. Keyswitch



4. Display

Legend

1. User input to microprocessor controller.
2. Connection for serial printer.
3. Allows the user to modify configuration and programming.
4. Output from control system to user.

Display or Action	Explanation
, NEXT	Turn the keyswitch clockwise to *program* ( ) then press and release the *Next* key.
, NEXT	Turn the keyswitch counterclockwise to *run* ( ) then press and release the *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).
6 , ↑ , 5 , ↑ , 4 , ↑ , 9	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 characters appears (e.g., press 6 until "P" appears). A comma between symbols means press and release each key sequentially.
1 , 5 , 5	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.
4 + 5 + 6	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 8 + 1	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).
⓪	Press and release the "Stop" button (⓪).
①	Press and release the "Start" button (①).

2.1. 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 1: 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.

2.2. Display—This two-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 satisified before operation can continue.

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.

2.3. Keypad—The 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 above.

Note 2: Some keys on the 30-key keypad are not used on some machines.

2.4. 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.

— End of BICPUK01 —

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	Contents after clearing
Type of Data		**Machines Data Applies To**					
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 —

BIUUUK05 (Published) Book specs- Dates: 20050112 / 20050112 / 20050112 Lang: ENG01 Applic: CDU

Definitions of Terms and Abbreviations

allied device—any device not manufactured by Milnor®, but associated with or connected to Milnor® equipment.

allied discharge—situation where an allied device is used to unload a Milnor® machine; see also **Allied device**

allied loading—situation where an allied device is used to load a Milnor® machine; see also **Allied device**

batch—a group of goods that is processed together

batch code—information for the CBW® controller about how to process the goods in a batch

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

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

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

code, single cake—code that specifies that the receiving device (shuttle, dryer, etc.) should handle only a single cake instead of its maximum capacity of cakes

conditioning—a dryer program in which only a portion of the moisture in the goods is removed, often used for goods which are to be further processed by ironing and folding

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, and in the case of dryers, to reduce the risk of spontaneous goods combustion after discharge. In a dryer, this gradual temperature reduction is accomplished by reducing the heat and increasing fresh air over time.

CAUTION 1: Fire hazard—Always program sufficient cooldown time to cool goods. Goods that are discharged from a dryer too hot can catch fire by spontaneous combustion—sometimes many hours after the laundry has stopped working.

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 load end, looking toward the discharge end

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

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

dry code—see **Code, dry**

dry cycle, full—the dry cycle used when a dryer is loaded to its full capacity (e.g., a two-cake dryer is loaded with two cakes); refers to the amount of goods loaded into the dryer, not to the degree of moisture removal. See also **Conditioning** and **Full Dry**.

dry cycle, partial—the dry cycle used when a multicake dryer is loaded to less than its full capacity (e.g., a two-cake dryer is loaded with one cake); refers to the amount of goods loaded into the dryer, not the degree of moisture removal. See also **Conditioning** and **Full 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

fire control unit—electronic device used in gas-fired dryers to ensure that a pilot flame is present before allowing the main gas valve(s) to open

formula—instructions used by the machine control to operate motors, valves, and other components during a standard cycle

formula code—see **Code, formula**

full dry—dryer formula that removes virtually all moisture from the goods

gains, PID—proportional–integral–differential gains; a set of constants used by the software in Milnor® dryers to determine the temperature and its rate of change at the inlet and outlet temperature probes

goods—articles processed or conveyed by a machine

hard start—process by which dryer basket motor momentarily provides additional torque to start into motion a loaded stationary basket

hardware—electronic boards that control the machine

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.

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

no-dry—station where clean, extracted, but undried goods are discharged

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**

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

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

thermocouple—temperature sensing device that provides a millivolt rang current which varies proportionally according to its temperature; used most frequently in dryers

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

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

— End of BIUUUK05 —

Programming 2

PROGRAMMING THE MARK III, IV, AND V DRYER CONTROL

The Program Menu and How To Access It

The Available Modes in the Program Menu

0=OK TURN KEY TO RUN (permits safe return to *run* menu)
1=MODIFY DRYCODES (also add/delete steps or delete drycode)
2=CONFIGURE DRYER (tells computer which options it is controlling)
3=CONFIGURE GAINS
4=DEFAULT DRYCODES
5=DOWNLOAD MEMORY (from machine to machine or machine to tape)
6=CLEAR ALL MEMORY (*voluntarily*)
7=PRINT DATA

To Access the Program Menu

When the display =

```
WAITING FOR LOAD
******************
```

This is the *run mode*, explained in "RUNNING. . ." (see Table of Contents).

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

Underline indicates cursor position. Select one of eight program modes by number or with ▲ or ▼, or select 0 before returning to *run mode*.

▲ or ▼ **Scrolls the available program modes.**

or <x> **Selects *program mode x*,** where <x> is the program mode number.

example:

```
PROGRAM 1 MENU
MODIFY DRYCODES
```

Program menu, mode 1 **selected.**

For Safe Return to Run Mode From Program Menu

0 **Selects *program mode 0* if menu is elsewhere.**

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

This display must appear before turning keyswitch to *run*, otherwise, memory may be scrambled or lost.

, ENTER/NEXT

```
WAITING FOR LOAD
******************
```

ENTER/NEXT **Accesses the selected program.**

example:

```
SELECT DRYCODE
00 REDRY
```

Program mode 1 **accessed.**

Once this mode is *accessed*, valid entries must be made for each decision before exiting this program is allowed.

How To Avoid Data Loss!

Returns to the *program menu* from any program mode (or displays instructions on how to escape).

Never , ***unless the display says***

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

Otherwise, the control may require clearing the entire memory.

If the control requires deleting its entire memory, it displays

```
ERROR IN MEMORY
TURN KEY TO PROGRAM
```

=

```
CLEAR MEMORY NOW
PRESS 4 + 5 + 6
```

Then 4 JKL + 5 MNO + 6 PQR =

```
CLEARING MEMORY
** PLEASE WAIT **
```

Display returns to

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

Never turn power OFF while in program mode.

Otherwise, the control may require clearing the entire memory.

If the control requires deleting its entire memory, it displays

```
ERROR IN MEMORY
TURN KEY TO PROGRAM
```

=

```
CLEAR MEMORY NOW
PRESS 4 + 5 + 6
```

Then 4 JKL + 5 MNO + 6 PQR =

```
CLEARING MEMORY
** PLEASE WAIT **
```

Display returns to

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

Reconfigure both Dryer and Gains whenever memory is cleared.

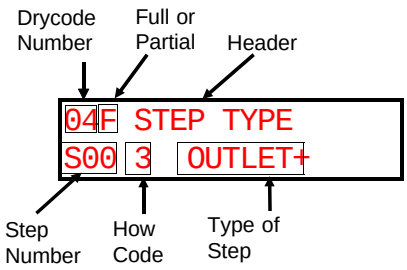
Default drycodes must be reloaded after clearing memory (refer to *Mode 4=Default Drycodes*).

See *Mode 2=Configure Dryer* for the consequences of clearing memory.

To Move Cursor Backward/Forward in Drycode Programming

Every step in a drycode has a minimum of three *displays—pages A, B,* and *C*—and may have one or more *additional displays* (*B1, D1,* and *D2*) depending on configuration and the values commanded for this drycode.

PAGE A



PAGE B

```
04F HIdFCdF2IFMMQRAC
S00 3425185---101100
```

PAGE B1

```
04F SPD
S00 100
```

PAGE C

```
04F MHTMCTMVPDSHU
GEN 2000501750000
```

PAGE D1

```
04F ONOFRV
GEN 202504
```

PAGE D2

OR

```
04F DDBLOABTIM
GEN 1003010040
```

Page B1 **appears only if dryer is configured for *variable speed drive*.**

Page C **is available for programming only after a cooldown step has been programmed for a drycode (*page B, decision H=0*).**

Page D1 **is available for programming only if *custom unload has not been* programmed (*page C, decision U=0*).**

Page D2 **is available for programming only if *custom unload has been* programmed (*page C, decision U=1*).**

When the cursor is at the last decision on a page, ENTER/NEXT brings up the next page or accepts the entire drycode.

If *page B, C, or D* is displayed (but not the help screen) ***and the cursor is blinking:***

↓	**Moves the cursor backward among the valid decisions on *pages B, B1, C, D1, and D2.***
↑	**Moves the cursor forward among the valid decisions on *pages B, B1, C, D1, and D2.***
ENTER/NEXT	**Enables cursor on *page B*.**
ENTER/NEXT	**Moves the cursor forward among all the pages through each valid decision. This accepts the *standard* or *default* decision unless another choice is made.**
ENTER/NEXT	**Continues to the following page.**
SKIP TO + ↓	**Skips backward to the beginning of the previous page.**
SKIP TO + ↑	**Skips forward to the beginning of the next page.**

1=MODIFY DRYCODES

When the display =

```
PROGRAM 1 MENU
MODIFY DRYCODES
```

ENTER/NEXT =

```
SELECT DRYCODE
00 REDRY
```

To Access a Drycode

0, 4 JKL **Selects drycode 04** (example)

```
SELECT DRYCODE
04 BLANKETS
```

Drycodes 00-15 are available for programming.

↑ or ↓ **Scrolls the drycode numbers**.

ENTER/NEXT

```
ENTER LOAD SIZE
0 FULL LOAD
```

0=Full load
1=Partial load

Control provides a discrete *small load* modification to each basic drycode, so random single batches can be processed more efficiently in multi-batch dryers. **Decision required only if dryers configured for *Max # Cakes* (*configure decision G*) = 2 or greater.**

ENTER/NEXT **Accesses the drycode name.**

```
04F DRYCODE NAME
BLANKETS
```

Keep the default name (BLANKETS) or enter any other name, up to 10 characters.

To Name the Drycode

ENTER/NEXT **Names the drycode the same as the drycode number, or**

B*, ↑, A, ↑, T, ↑, H, ↑, M, ↑, A, ↑, T, ↑, S enters "BATHMATS" (example)

*Example: For "B," press 1 ABC **twice or hold it to scroll.** 0 **displays a blank.**

```
04F DRYCODE NAME
BATHMATS_
```

↑ or ↓ **Moves cursor right/left.**

ENTER/NEXT **Accepts drycode name.** Display =

```
04F STEP TYPE
S00 3 OUTLET+
```

This is *page A*, as described earlier in this section.

To Delete, Duplicate, or Access a Step in a Drycode

ENTER/NEXT **Permits deleting or duplicating a previously programmed step.**

Display =
```
04F HIdFCdF2IFMMQRAC
S00 3425115---101101
```

No cursor. One of the following three actions may be performed.

When cursor disappears,

CANCEL/ESCAPE + ENTER/NEXT **Deletes this step**. The next higher step becomes the current step. The control prevents deleting a *Cooldown* or an *Outlet+* step if it is followed by an *Inlet–* step. See "H=Type of Step" in this section.

or EXTEND/HELP + ENTER/NEXT **Duplicates this step**. If this is step 00, the duplicated step becomes new step 00 and this step all the following steps move one number higher. The control prevents duplicating a *Cooldown*.

or ENTER/NEXT **Accesses the selected step for programming (without deleting or duplicating this step).** Cursor advances to first decision (*H=Type of Step*).

Display=
```
08F HIdFCdF2IFMMQRAC
S00 3425185---101101
```

To Completely Delete an Entire Drycode

In step 00 of the unwanted drycode, enter H=0 (*Type of Step=Cooldown*), then ENTER/NEXT .

Display =
```
DELETE DRYCODE #04 ?
0 NO                T
```
1/ABC =
```
DELETE DRYCODE #04 ?
1 YES
```
ENTER/NEXT **If yes, deletes this drycode.** All programmed data except drycode name are replaced with default values.

How the Cursor Moves Through the Decisions, and How the Formula Programming Help Screens Work

Most decisions on each page have a help screen.

```
04F HIdFCdF2IFMMQRAC
S00 3425185---101101
```

***Page B*. Any valid entry or ↑ or ENTER/NEXT advances the cursor to the next decision.**

appears in 8 seconds (if no valid entry)

TIMER/STOP =delay 1 minute

EXTEND/HELP =appear immediately

```
F04 H TYPE OF STEP
S01 3 OUTLET+
```

Help screen for *Type of Step*. When any help screen is present, ↑ or ↓ scrolls the choices (unless a time or temperature value must be entered) **. When help screen is displayed, ENTER/NEXT is required to accept the displayed choice and advance cursor to the next decision.**

Pages B and B1—The Decisions When Programming a Drycode Step

Read "HOW THE MILNOR® DRYER WORKS" before programming drycodes.

```
04F HIdFCdF2IFMMQRAC
S00
```

A total of 32 drycodes—16 full and 16 partial—where each of the 16 partial drycodes can be completely separate and discrete, but is usually a small load modification of one of the full load drycodes. This permits random small batches to be processed more efficiently in multi-batch dryers. The 32 drycodes can contain a maximum total of 320 steps.

NOTE: All temperature parameters of a drycode will appear as either *Fahrenheit* or *Celsius* units, depending upon the setting of *configure decision H* (*Temperature Unit*).

H = Type Of Step (Page B)

0=Cooldown **All dryers.** Each drycode must end with a cooldown step. The step timer starts when the actual outlet temperature falls below the commanded outlet temperature for 15 seconds. Separate and discrete cooldown temperatures may be commanded for each of the 16 x 2 drying codes.

1=Time Only **Gas, Modulating Steam, and Thermal Oil dryers only**. Step timer starts immediately, and modulating valve adjusts to maintain commanded outlet temperature without exceeding commanded inlet temperature. A separate and discrete time may be commanded for each step in each of 16 x 2 drycodes.

Non-Modulating Steam dryers only. Step timer starts immediately. There is no heating control for the inlet or outlet temperatures. A separate and discrete time may be commanded for each step in each of the 16 x 2 drying codes.

2=Inlet– **Gas, Modulating Steam, and Thermal Oil dryers only** *(Inlet temperature falls to commanded).* This type can never be a first step and must always follow an *H=3 (Outlet +)*. During the heating cycle, the valve modulates up or down to maintain the commanded outlet temperature, while not exceeding the commanded inlet temperature. The step timer starts once the actual inlet temperature falls below the commanded second inlet temperature for fifteen seconds, providing the actual outlet temperature is within two degrees of the commanded outlet temperature.

3=Outlet+ **Gas, Modulating Steam, and Thermal Oil dryers only** *(Outlet temperature rises to commanded).* During the heating cycle, the valve modulates up or down to maintain the commanded outlet temperature while not exceeding the commanded inlet temperature. The step timer starts once the commanded outlet temperature is achieved, providing the outlet temperature does not fall below commanded for 15 seconds. Separate and discrete outlet temperatures may be commanded for each step in each of the 16 x 2 drying codes.

3=On-Off **Temperature Control for Non-Modulating Steam dryers only.** During the heating cycle, the main steam valve closes (opens) when the actual outlet temperature reaches (falls below) the commanded outlet temperature plus (minus) the commanded *delta*. The step timer starts once the commanded outlet temperature is achieved, providing the outlet temperature does not fall below the commanded temperature minus delta for 15 seconds. Separate and discrete outlet and delta temperatures may be commanded for each step in each of the 16 x 2 drying codes. This is a standard feature of all Milnor® non-modulating steam dryers with Mark II controls and software date code 90017 or later.

4=Tumble **All dryers.** This is a non-heating step. Step timer starts immediately with the heating system and main blower off. The cooldown damper is commanded open on steam dryers.

5=Tumble+Air **All dryers.** This is a non-heating step. Same as *H=4 (Tumble)*, except the main blower is enabled.

6=Steam Ratio **Steam dryers only**. Steam valve is commanded open, and the control monitors the actual inlet and outlet temperatures. By means of a proprietary algorithm, a ratio of inlet to outlet temperatures is determined. As the actual inlet and outlet temperatures converge (the goods become drier) the actual ratio becomes larger. When the actual ratio is greater than or equal to the commanded *steam ratio* for 15 seconds, the step timer starts.

7=Humidity **All dryers.** During the heating cycle, this optional control measures the humidity of the air as it enters the dryer and subtracts it from the humidity of the outlet air as it exits the dryer. This value is called the *delta*. The step timer starts once the delta is equal to or less than the the commanded delta for 15 seconds. Separate and discrete delta humidities may be commanded for each step in each of the 16 x 2 drying codes.

Controlling Inlet Temperature (Page B) See "HOW THE MILNOR® DRYER WORKS" for descriptions of this setting.

```
04F HIdFOdF2IFMMQRAC
S00 3xxx
```

Maximum allowed inlet temperature for this step. Only if dryer is equipped with and configured for a modulating valve *(configure decision B=yes)*.

IdF=**Max Inlet Temperature** in this step if configured for °F
IdC=**Max Inlet Temperature** in this step if configured for °C
- - - =**Inlet Temperature not programmable** (example: *H=2* for this step)
200=**Min °F (093°C)** for full or partial load
450=**Max °F (232°C)** for full or partial load

Controlling Outlet Temperature (Page B) See "HOW THE MILNOR® DRYER WORKS" for descriptions of this setting.

```
04F HIdFOdF2IFMMQRAC
S00 3425xxx
```

Commanded outlet temperature for this step. Control will try to achieve this temperature without exceeding the programmed IdF (IdC); cannot be greater than the IdF (IdC) of previous step.

OdF=**Commanded Outlet Temperature** in this step if configured for °F
OdC=**Commanded Outlet Temperature** in this step if configured for °C
090=**Min °F (032°C)**
214=**Max °F (101°C)** for steam dryers and non-CSA gas dryers (CSA=Canadian Standards Association)
185=**Max °F (085°C)** for CSA gas dryers

```
04F HDdFOdF2IFMMQRAC
S00 3xxx
```

Commanded Delta Temperature. Replaces display above if dryer is configured as non-modulating steam dryer *(configure decisions A=1* and *B=0)* and *H=3 (Type of step=(on/off)*.

DdF=**Commanded Delta Temperature** if configured for °F
DdC=**Commanded Delta Temperature** if configured for °C
000=**Min °F or °C**
100=**Max °F or °C**

Controlling Second Inlet Temperature (Page B) See "HOW THE MILNOR® DRYER WORKS" for descriptions of this setting.

```
04F HIdFOdF2IFMMQRAC
S01 2---185xxx
```

Commanded Second Inlet Temperature for this step. Only if *H=2 (Type of step=Inlet–)*

2IF=**Commanded Second Inlet Temperature** if configured for °F
2IC=**Commanded Second Inlet Temperature** if configured for °C
200=**Min °F (093°C)** for full or partial

Must be higher temperature than OdF (OdC) for the current step; can not be higher than IdF (IdC) for the previous step.

Controlling Cooldown Temperature (Page B) See "HOW THE MILNOR® DRYER WORKS" for descriptions of this setting.

```
04F HIdFCdF2IFMMQRAC
S00 0---xxx---
```

Cooldown Temperature. Only if *H=0 (Type of Step=Cooldown)*; maximum temperature at which goods can be discharged unless *MCT (Maximum Cooldown Time)* exceeded.

CdF=Commanded Cooldown Temperature in °F
CdC=Commanded Cooldown Temperature in °C
090=Min °F (032°C)
160=Max °F (071°C)

Determining Dryness by Steam Ratio (Page B) See "HOW THE MILNOR® DRYER WORKS" for descriptions of this setting.

```
04F HIdFOdFSFRMMQRAC
S00 6------xxx
```

Only if *H=6 (Type of Step=Steam Ratio)*; a ratio of inlet temperature to outlet temperature is used to declare goods dry. Field experience indicates that 110 is a good beginning ratio. **If the goods are discharged too *damp, increase* the value; if too *dry, decrease* the value**.

SFR=Commanded Steam Ratio
100=Steam Ratio (minimum)
110=Steam Ratio (example)
150=Steam Ratio (maximum)

Determining Dryness by Humidity Sensing (Page B) See "HOW THE MILNOR® DRYER WORKS" (see Table of Contents) for descriptions of this setting.

```
04F HIdFOdFFDHMMQRAC
    7425165xxx
```

Only if *H=7 (Type of Step=Humidity Delta)*; the difference between the humidity of the air entering the dryer and the outlet air exiting the dryer is used to declare the goods dry. Field experience indicates that 009 is a good beginning delta. *If the goods are discharged too **damp, decrease** the value; if too **dry, increase** the value.*

FDH=Final Humidity Delta
001=Humidity Delta (minimum)
009=Humidity Delta (example)
100=Humidity Delta (maximum)

Controlling Step Time (Page B)

See "HOW THE MILNOR® DRYER WORKS" for descriptions of this setting.

```
04F HIdFOdF2IFMMQRAC
S00 3425185---xxx55
```

MMQ=Duration of step after all commanded parameters have been satisfied, in minutes, minutes, and quarter minutes

000=00.00 minutes (i.e., 00 minutes and 0 seconds—minimum; step ends when commanded values are satisfied)
001=00.25 minutes (i.e., 00 minutes and 15 seconds)
010=01.00 minutes (i.e., 1 minute and 0 seconds)
113=11.75 minutes (i.e., 11 minutes and 45 seconds)
633=63.75 minutes (i.e., 63 minutes and 45 seconds—maximum)

Should Basket Reverse? (Page B)

```
04F HIdFOdF2IFMMQRAC
S00 3425185---050x
```

Selects whether the basket should periodically reverse or not reverse for this step. This decision usually depends on the type of goods and their tendency to plaster or stick to cylinder (reversing helps prevent plastering; always reverse large pieces that might otherwise tangle).

R=Reversing
0=Not reversing (counterclockwise rotation only)
1=Reversing (time running in each direction is approximately 15 seconds plus a 2.5 second dwell)
Reversing starts immediately when the load door closes.

When To Reverse the Dryer Cylinder

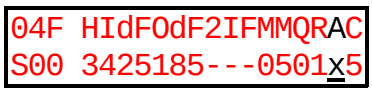
In each step in every drycode, the cylinder can be commanded to either reverse periodically or to run continuously in one direction.

Reversing should be commanded whenever drying long goods that might tangle (sheets, blankets, etc.). It is not necessary to reverse the cylinder when drying shorter goods that cannot tangle (terry towels, wiping rags, etc.).

However, regardless of length, reversing helps prevent the air flow from plastering the goods against the inside of the cylinder—a risk which increases as the goods lose moisture. Plastered goods restrict air flow, lengthen drying time, and increase energy consumption.

However, reversing can also increase energy consumption somewhat. Thus, it can be quite cost effective to run non-tangling goods in one direction, but only if the operator is willing to observe and optimize the drycodes—by commanding reduced air flow in subsequent steps as the goods become drier to assure that the goods do not plaster.

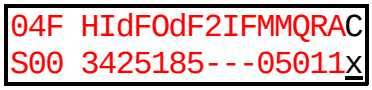
Setting Main Air Damper Position (Page B)



Selects the air damper position for this step. As the goods become drier, it is useful to close down the air damper to prevent plastering.

A=Main air damper position
0=Max air (damper 100% open)
1=Max-1 (damper 75% open)
2=Min+1 (damper 60% open)

Should Damper Recirculate? (Page B)



Selects whether the dryer opens the recirculation damper between inlet and exhaust ducts for reuse of air. Configure decision x (recirculation damper?) must = 1 (yes) for damper to come on.

B

C=Recirculating Damper
0=Recirculation off
1=Recirculation on

Setting Basket Speed (Page B1)

Page B1 appears only if dryer is configured for variable speed (*configure decision F=yes*).

For dryers with variable speed control, select cylinder speed for this step.

SPD=Cylinder speed in this step as % of nominal
050=Minimum basket speed (50% of nominal cylinder speed)
100=Nominal basket speed (normal speed of cylinder without variable speed drive)
120=Maximum basket speed (120% of nominal cylinder speed)

Page C—The General Decisions for the Entire Drycode

The following decisions are commanded once for each entire drycode.

```
04F MHTMCTMVPDSHU
GEN xxx
```

Timer starts at the onset of drying.

MHT=Maximum permissible drying time (not including cooldown time) in minutes, minutes, and quarter-minutes; if any step other than cooldown is running when this timer expires, dryer automatically advances to the commanded cooldown step.
010=01.00 minutes (i.e., 1 minute and 00 seconds—minimum)
083=08.75 minutes (i.e., 8 minutes and 45 seconds—example)
200-20.00 minutes (Default value—inserted if this decision is ignored)
633=63.75 minutes (i.e., 63 minutes and 45 seconds—maximum)

```
04F MHTMCTMVPDSHU
GEN 150xxx
```

Timer starts at the onset of cooling.

MCT=Maximum permissible cooldown time, in minutes, minutes, and quarter-minutes; if the commanded cooldown temperature is not achieved when this timer expires, dryer automatically advances to "Waiting To Discharge."
010=01.00 minute (i.e., 1 minute and 00 seconds—minimum)
050=05.00 minutes (Default value—inserted if this decision is ignored)
052=05.50 minutes (i.e., 05 minutes and 30 seconds—example)
100=10.00 minutes (i.e., 10 minutes and 00 seconds—example)
633=63.75 minutes (i.e., 63 minutes and 45 seconds—maximum)

⚠WARNING⚠

FIRE HAZARD—Commercial laundry dryers heated by flammable gas, steam, or thermal oil are capable of discharging goods that are hot enough to later combust spontaneously, possibly causing serious damage to property, personal injury, or death.

- ☞ **Always program sufficient cooldown times to cool the goods.**
- ☞ **Always discharge goods immediately after processing, and verify that the dryer is empty before beginning the machine shut-down procedures.**

```
04F MHTMCTMVPDSHU
GEN 150150xxx
```

Only if dryer equipped with and configured for modulating valve (*configure decision B=yes*). Useful when goods being dried can be damaged by a momentarily high temperature at the beginning of the drying cycle.

MVP=Maximum modulating valve position for this drycode.
050=slightly open (minimum)
127=approximately half open
175=maximum commandable for a partial load (default value—inserted if this decision is ignored)
255=maximum commandable for a full load (full open)

04F MHTMCTMVPDSHU GEN 150150175xx

Only if dryer is configured to pass destination per drycode (*configure decision L = yes*).

DS=Post-dry destination passed to Milnet®/Miltrac system for use by the next receiving device
00=destination code passed to unload device (minimum)
03=number to be assigned to a destination (example)
15= number to be assigned to a destination (maximum)

How Destinations Are Passed by the Dryer Using DS

- If a Milnet®/Miltrac system controls dryer loading and post-dry destinations, the dryer replaces the destination received from Milnet®/Miltrac system with this destination (range is 00-15).
- If a Milnet®/Miltrac system controls only dryer loading (dryer discharges to an allied system), the dryer replaces the Milnet®/Miltrac-passed destination with this destination (range is 00-03) and passes it to the allied device via the two destination output relays.
- If a Milnet®/Miltrac system controls only post-dry destinations (dryer loaded by an allied system), the discharging dryer passes this destination (range is 00-15) to Milnet®/Miltrac system.

04F MHTMCTMVPDSHU GEN 15015017503x

Selects the duration of Hard Start. Hard Start reduces motor strain during rotation with wet (heavy) goods. A short duration of Hard Start may cause motors to burn out during rotation. A especially long duration of Hard Start may be unnecessary and waste energy.

H=Hard Start Duration
0=Hard Start is never enabled (minimum)
4=Hard Start lasts four minutes from the beginning of the cycle (example)
9=Hard Start last nine minutes from the beginning of the cycle (maximum)

Inverter-driven dryers with software versions 20104b and later use this programming decision to actuate enhanced basket speeds. If this decision is set to a value greater than 0, a left-hand dryer rotates approximately 9 percent slower clockwise than when turning counter-clockwise. Likewise, a right-hand dryer rotates slower in the counter-clockwise direction.

To verify proper inverter connection, observe that all left-hand dryers rotate counter-clockwise while loading, and that all right-hand dryers rotate clockwise during loading.

04F MHTMCTMVPDSHU GEN 150150175032x

***Custom discharge* is normally used in post-sort installations, where dryer loads contain different types of goods and a custom discharge sequence is commanded to string the goods out along the receiving conveyor.**

U=Custom discharge desired?
0=No (see Page D1)
1=Yes (see Page D2)

Page D1—Programming Decisions for a Standard (Non-Custom) Discharge Sequence

***Page D1* (following three decisions) appears only if *U=0* on *page C*.**

How the Standard Discharge Sequence Works

1. When discharge is allowed, discharge door opens, and basket rotates counterclockwise for commanded *on* time. Main air blower is *off*.
2. Basket motor stops for commanded OF (*off*) time (dwell).
3. Basket restarts rotation in clockwise direction for ON time.
4. Discharge sequence ends after this sequence has occurred for the number of times commanded in RV.

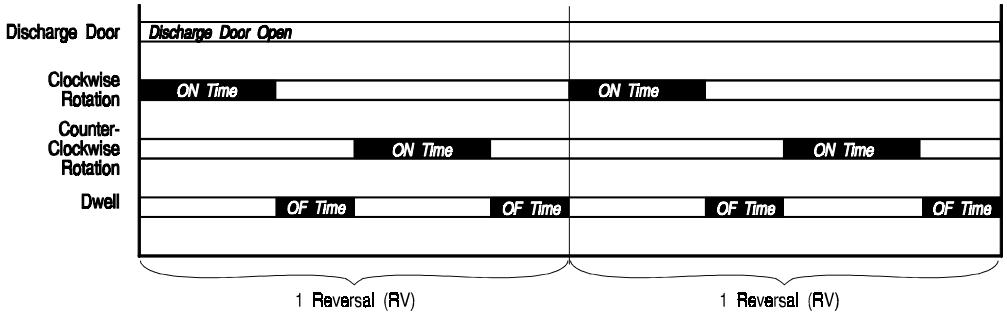


FIGURE 1 (MSOP0119BE)
Standard (Non-Custom) Discharge Sequence

```
04F ONOFRV
GEN xx
```

ON=Basket time on—time (in tenths of a second) that cylinder motor will be energized between reversals while discharging
05=0.5 seconds (minimum)
20=2.0 seconds (example)
99=9.9 seconds (maximum)

```
05F ONOFRV
GEN 50xx
```

OFF=Basket time off—time (in tenths of a second) that cylinder motor will be *off* between reversals while discharging
20=2.0 seconds (minimum)
25=2.5 seconds (example)
99=9.9 seconds (maximum)

```
04F 0N0FRV
GEN 5025xx
```

RV=Number of reversals—Number of reversals the cylinder will complete during discharge. A reversal is completed when the cylinder turns clockwise for *Discharge time on*, dwells for *Discharge time off*, turns counterclockwise for *Discharge time on*, and dwells for *Discharge time off*.
02=2 reversals (minimum)
04=4 reversals (example)
19=19 reversals (maximum)

Page D2—Programming Decisions for a Custom Discharge Sequence

How Custom Discharge Works (pre-20104)

1. When discharge is allowed, timer *TIM* begins counting; basket rotates in direction *B* (clockwise or counter-clockwise); main air damper goes to position *A* (Max, Max-1, or Min+1); and main air blower starts if *BLO* (Blower On Time) is commanded.

2. When timer reaches value *DD*, discharge door opens.

3. When timer reaches value *BLO*, main air blower stops.

4. When timer reaches value *TIM*, basket motor stops. Custom discharge sequence ends.

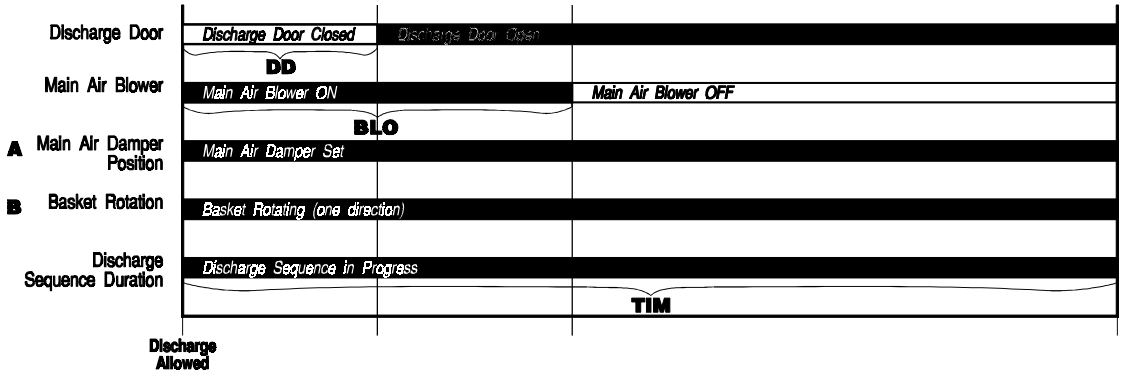
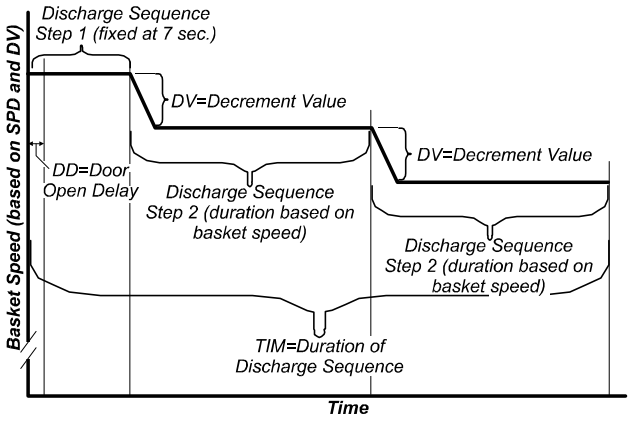


FIGURE 2 (MSOP0119AE)
Custom Discharge Sequence

How Custom Discharge Works (20104 and later)

1. When the custom discharge sequence begins, the basket turns in the specified direction for 7 seconds at the speed defined in SPD as a percentage of normal speed. The basket stops before beginning the discharge sequence to prevent unnecessary mechanical shocks to the drive system. The value for variable TIM begins counting down when the discharge sequence begins.
2. The discharge door opens after the discharge sequence begins plus the number of seconds defined in DD. Programming a non-zero value for variable DD has no effect on any action of the discharge sequence other than the opening of the discharge door.
3. After the 7-second fixed duration of step 1, the basket decelerates by the value of DV. Basket rotation continues at this speed for two revolutions, then decelerates again.
4. The discharge sequence ends when the value programmed in TIM expires.



***Page D2* appears only if *U=1* on *page C*.**

For software versions before 20104:

```
04F DDBLOABTIM
GEN xx
```

DD=**Door delay**—Number of seconds to delay opening the discharge door after the discharge sequence begins. Depending on the type of goods and the level of drying, this decision (together with the main air damper position) can influence how fast the goods fall out of the cylinder after the discharge door opens.
00=0 seconds (minimum)
10=10 seconds (example)
99=99 seconds (maximum)

For software version 20104 and later:

```
04F DVSPDDDBTIM
GEN xx
```

DV=Decrement speed value—After the first step in the custom discharge sequence, the decrement value determines the speed of the basket for each subsequent step. Valid values are from 0 to 15 percent of normal basket speed. Because normal basket speed is 32 RPMs, 4.8 RPMs is the maximum decrement value. Program DV to a value of 5 to slow the basket by 1.6 RPMs per custom discharge sequence step.
00=minimum; do not decrement speed
05=example; decrement by 1.6 RPMs per discharge sequence step
15=maximum; decrement by 4.8 RPMs per step

For software versions before 20104:

```
04F DDBLOABTIM
GEN 25xxx
```

BLO=Blower on time—Number of seconds for blower to run after the discharge sequence begins
000=0 seconds (0 minutes and 0 seconds, minimum)
020=20 seconds (example)
255=255 seconds (4 minutes and 15 seconds, maximum)

For software version 20104 and later:

```
04F DVSPDDDBTIM
GEN 15xxx
```

SPD=Speed—The speed value determines the speed of the basket for the first step of the custom discharge sequence. This value ranges from 20 percent to 120 percent of the 32 RPM normal basket speed.
020=minimum; start discharge sequence at 20 percent of normal basket speed, yielding 6.4 RPMs
100=example; start sequence at normal speed (32 RPMs)
120=maximum; start sequence at 120 percent of normal speed, yielding 38.4 RPMs

For software versions before 20104:

```
04F DDBLOABTIM
GEN 25120x
```

A=Main air damper position—Depending on the type of goods and level of dryness, this decision (together with whether the blower is running or not) can influence how fast the goods fall out of the cylinder when the discharge door opens.
0=Damper at Max (slowest discharge rate)
1=Damper at Max-1 (medium discharge rate)
2=Damper at Min+1 (fastest discharge rate)

For software version 20104 and later:

```
04F DVSPDDDBTIM
GEN 15100xx
```

DD=Discharge Open Door Delay—When the discharge door sequence begins, the discharge door remains closed for the number of seconds programmed here. The valid values range from 0 (open immediately) to 99 (open 99 seconds after beginning of discharge sequence).
00=minimum; open door immediately when discharge sequence begins
15=example; open door after 15 seconds
99=maximum; open door after 99 seconds

For software versions before 20104:

```
04F DDBLOABTIM
GEN 251201x
```

B=Basket direction—Should basket rotate clockwise or counterclockwise during discharge (reversing is not possible)
0=Clockwise Rotation
1=Counterclockwise Rotation

For software version 20104 and later:

```
04F DVSPDDDBTIM
GEN 1510015x
```

B=Basket Rotation Direction—The basket does not reverse during the discharge sequence. Select the desired rotation direction for the duration of discharge.
0=default; rotate basket clockwise during discharge sequence
1=counterclockwise

For software versions before 20104:

```
04F DDBLOABTIM
GEN 2512010xxx
```

TIM=Duration of discharge sequence, in seconds
Minimum value is the value programmed in DD *(Door Delay)* or *BLO (Blower on Time)*, whichever is greater
030=30 seconds (example)
255=255 seconds (i.e., 4 minutes and 15 seconds—maximum)

For software version 20104 and later:

```
04F DVSPDDDBTIM
GEN 15100150xxx
```

TIM=Unload Duration—This value determines the total duration of the discharge sequence. Start with a long duration, then adjust it downward according to the actual time required for the goods to discharge.
000=minimum; no discharge sequence
045=example; run discharge sequence for 45 seconds
255=maximum; run discharge sequence for 255 seconds (4:15)

The Decisions When Programming a Partial Drycode

After a full load drycode is completely programmed and if *configure decision G* (*MAX cakes to RCV*) is *2* or greater, the control will allow a partial drycode to be programmed.

If *configure decision G* is *1*, the control will display

```
PROGRAM  0  MENU
OK TURN KEY TO RUN
```

When the display =

```
EDIT PARTIAL DRYCODE
0 NO
```

ENTER/NEXT =

```
 PROGRAM  0  MENU
OK TURN KEY TO RUN
```

OR 1 ABC, ENTER/NEXT =

```
EDIT PARTIAL DRYCODE
1 YES
```

ENTER/NEXT =

```
04P HIdFCdF2IFMMQRA
S00
```

All other programming requirements and information are identical to that of full drycodes.

2=CONFIGURE (and Why It Is Necessary)

Because the microprocessor can control several different models, it is necessary to *configure* each machine to match its specific model and type of dryer, including such optional features as whether or not the machine is heated by steam, gas, or hot oil; has a modulating valve; a variable speed motor controller; etc. Such decisions are discrete to the specific machine and must never be changed unless options are later added or removed. However, certain other *configure* decisions, such as whether to display English or metric units and whether or not a password is required for manual intervention (and for changing the password itself) may be subsequently changed if desired.

⚠ CAUTION ⚠

If power is turned *off* while keyswitch is at , the memory will likely be corrupted, and the dryer will require general configuration, followed by reconfiguration of gains, then reloading the default drycodes.

WHEN TO RECONFIGURE AND WHAT CONFIGURE CODES TO USE

Reconfigure at installation and any time memory is corrupted. Although certain codes are discretionary and are so marked below, most *configure codes MUST* match those shown on the Metal Configure Nameplate, unless optional equipment has been added to or removed from the machine.

When the display=

PROGRAM 2 MENU
CONFIGURE DRYER

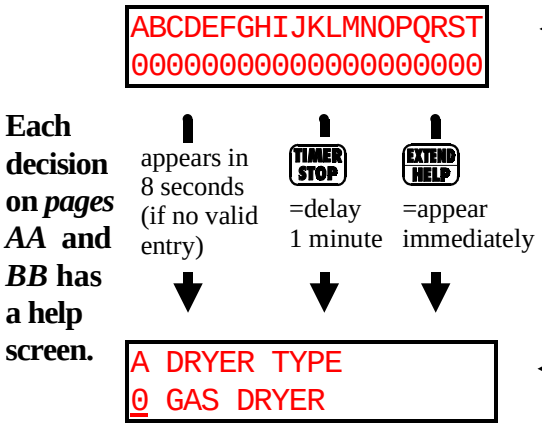
ENTER NEXT =

ABCDEFGHIJKLMNOPQRST
00000000000000000000

***Configure Page AA, decisions A-T* shown. With cursor at *T*, ENTER NEXT continues to the next page.**

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

How the Configure Help Screens Work



Page AA. **Any valid entry or ↑ or ENTER/NEXT advances the cursor to the next decision.** If a key is not pressed within 8 seconds of the cursor moving to the decision, the help screen for that decision appears.

Help screen for A=Dryer Type. **When any help screen is present, ↑ or ↓ scrolls the choices. ENTER/NEXT accepts the displayed choice and advances the cursor to the next decision.**

To Move the Cursor Backward and Forward in Configure

In the *configure pages* (*AA and BB*) **and if the help file is *not* displayed** (see "How the Configure Help Screens Work"),

↑ **or** ↓ **Moves the cursor forward or backward among the choices on this page, retaining each previously entered choice.** ENTER/NEXT is required to continue to *page BB* following d*ecision T* of *page AA*. **If the help file is displayed these keys scroll the choices.**

Several other displays that **move forward only** follow *pages AA and BB*. In any configure display, ENTER/NEXT **moves cursor forward among all pages and valid decisions.**

The Configure Decisions

```
A DRYER TYPE
0 GAS DRYER
```

0=**Gas Dryer**
1=**Steam Dryer** (also used for thermal oil dryers)

The following decision appears only if decision *A=1 (Dryer Type=Steam Dryer)*.

```
B MODULATING HEAT
1 YES
```

If *A=0 (Dryer type=Gas Dryer)*, control automatically inserts a *1* in this decision.

0=**No** (Non-modulating steam valve)
1=**Yes** (Modulating steam valve)

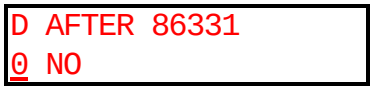
D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

The following decision appears only if decision A=0 (Dryer Type=Gas Dryer).

Does this dryer have a Landis & Gyr fire controller? (Landis & Gyr fire controllers are mandated by certain countries.)

0=**No**
1=**Yes**

The following decision appears only if decision *A=0 (Dryer Type=Gas Dryer)*.



Dryers built after Milnor® date code 86331 require the software to operate differently.

0=**No**
1=**Yes**

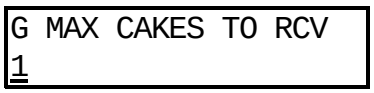
The following decision appears only if decision A=0 (Dryer Type=Gas Dryer).

Dryers built to CSA (Canadian Standards Association) require different programming and operating parameters.

0=**No**
1=**Yes**

Does this dryer have variable basket speed?

0=*No*
1=*Yes*



Maximum number of cakes dryer can be loaded with

1=**Minimum**
7=**Maximum**

D0=**Fahrenheit**
1=**Celsius**

Dryer receive level; only used in systems where dryer loads via Milnet®/Miltrac system. See Milnet®/Miltrac manual on Receive Level.

D0=**Minimum**
7=**Maximum**

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

J PASS DATA 0 NO

Must the controller prompt the operator to enter data other than the drycode? (Normally YES (1) in the Milnet®/Miltrac system); see "MANUALLY RUNNING A DRYCODE . . ."

D0=No
1=Yes

K LOADING DIRECTION 0 FORWARD

D0=**Forward** (conveyor belt loading this dryer must run forward; i.e., in the same direction in which the belt received the goods)
1=**Backward** (conveyor belt loading this dryer must run in reverse; i.e., in the direction opposite that in which the belt received the goods)

L DEST. PER DRYCODE 0 NO

In systems where a destination code is not passed to the dryer, if desired, this configure decision can permit the dryer to pass a specific destination for each dry code.

D0=No
1=Yes

M NODRY LOCATION 0 NO

Does this dryer control a no-dry station? Only operational if dryer is loaded via Miltrac.

D0=No
1=Yes

How No-Dry Works

Each dryer controller can be configured to control a separate and unique no-dry discharge station. This permits sending goods that do not need drying to a separate destination without buying a separate controller.

Dryer comes standard with an output to signal "Lower No-Dry Target" and an input to signal "Loading No-Dry is Allowed." Miltrac address for No-Dry is "Dryer Address + 1."

The following two decisions appear only if *configure decision M=1 (No-Dry Location=Yes)*.

N NODRY RCV LEVEL 0

No-dry station receive level. See Milnet®/Miltrac manual on receive level.

D0=Minimum
7=Maximum

O NODRY LOADING DIR. 0 FORWARD

D0=**Forward** (conveyor belt loading this station must run forward; i.e., in the same direction in which the belt received the goods)
1=**Backward** (conveyor belt loading this station must run in reverse; i.e., in the direction opposite that in which the belt received the goods)

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

P UNLOAD BEACON 0 AT START OF CD

Normally used in systems where the dryer discharges into a cart and it is required to prompt the operator to put the cart at the dryer before it discharges.

D0=Unload beacon operates **at *start* of cooldown**
1=Unload beacon operates **at *end* of cooldown**
2=Unload beacon operates ***xxx degrees (°F or °C) before end* of cooldown**

The following decision appears only if *P=2 (Unload Beacon=Deg Before End)*.

DEGREES BEFORE COOL- DOWN REACHED 000 df

Beacon turns on xxx degrees (°F or °C) above the cooldown temperature.

D000=*Min F* (000C)
050=*Max F* (028C)

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

```
Q LINT FILTER
0 NO
```

0=**No** (must be *no* for a wet type lint filter system)
1=**Yes** (must be *yes* for a Milnor® Autolint® system. May be *yes* for dry type lint filter system)

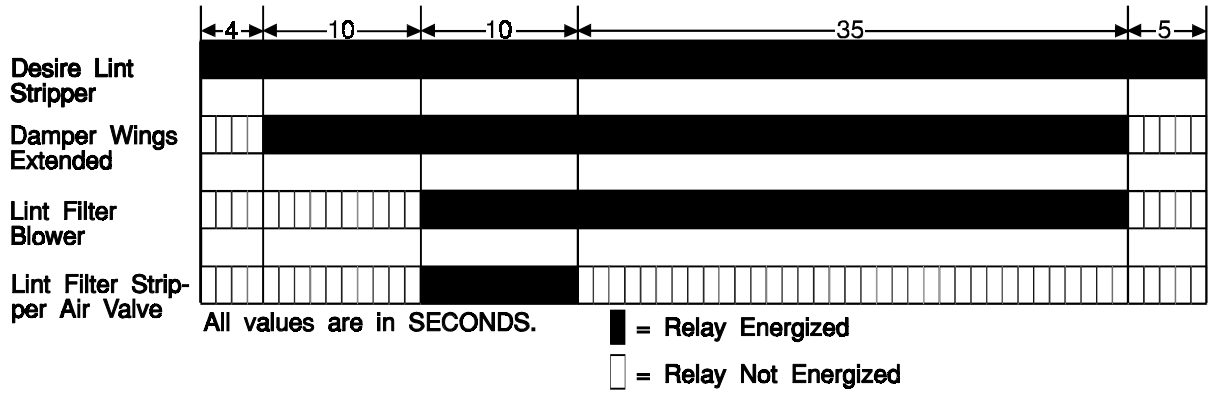
The following decisions required only if *Configure Decision Q=1 (Lint Filter=Yes)*.

```
R MILNOR FILTER
0 NO
```

Is the lint filter a Milnor® Autolint® system?

0=**No** (Allied (non-Milnor®) lint filter or no lint filter used)
1=**Yes** (Milnor® Autolint® lint filter) **This selection *required* if Milnor® Autolint® used by this dryer.**

Lint Stripping Timing Sequence for Milnor® Autolint® Lint Filters



D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

The following two decisions appear only if decisions *Q=1 (Lint Filter=Yes)* and *R=0 (Milnor® Filter=No)*.

LINT BLOW DOWN INTERVAL	MMQ 041

For dry type lint filters, it is sometimes necessary to blow down the screen while the dryer is in midcycle. This decision defines the blow down intervals when the dry code starts.

000=Min (0 minutes and 0 seconds)
030=example (0 minutes and 30 seconds)
060=Max (6 minutes and 0 seconds)

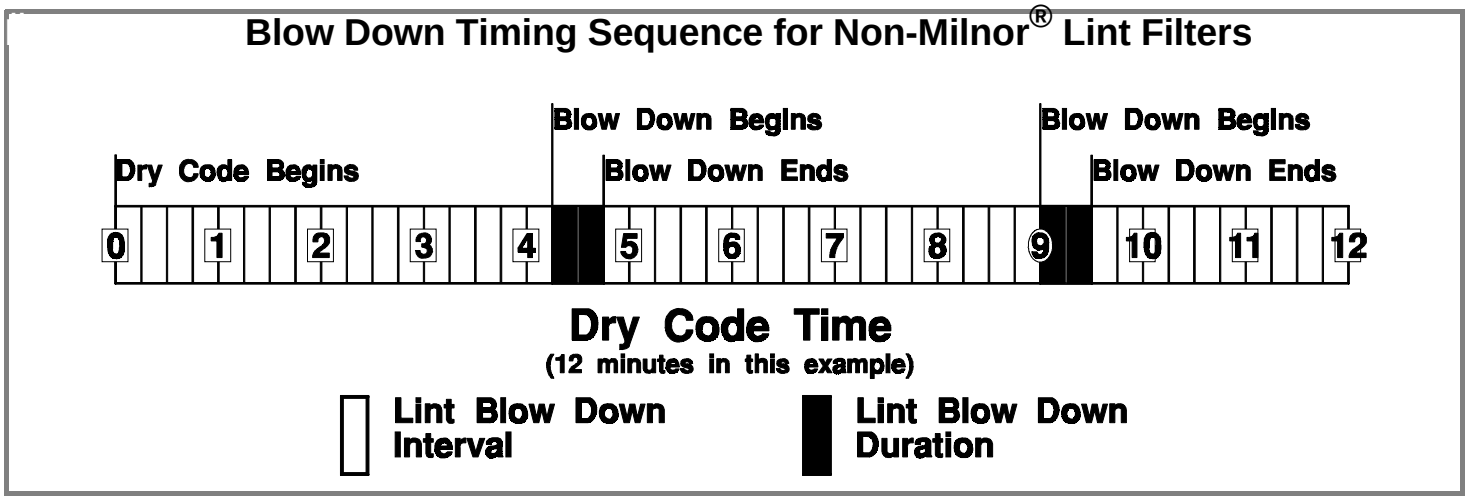
Setting this decision to 000 may chatter relay *LINT*, possibly leading to premature failure of the relay.

LINT BLOW DOWN DURATION	SSS 030

This decision defines the blow down duration once the interval time is reached.

000=Min (0 minutes and 0 seconds)
030=example (0 minutes and 30 seconds)
255=Max (4 minutes and 15 seconds)

Setting this decision to 000 may chatter relay *LINT*, possibly leading to premature failure of the relay.



D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

The following decision required only if *decisions Q=1 (Lint Filter=Yes)* and *R=1 (Milnor® Filter=Yes)*.

```
S LOADS BEFORE STRIP
1
```

The dryer will command to strip its Milnor® lint filter when it has run the number of loads configured with this decision, or if the cumulative timer exceeds 12 minutes (heating + cooling), regardless of how many loads were run. Because less lint is collected in conditioning dryers, it is useful to set this decision to ***4 (maximum)*** so the lint filter is not stripped too often, and thus does not reduce the dryer's availability.

D1=minimum loads allowed before stripping
4=maximum loads allowed before stripping

```
T MANUAL PASSWORD
0 NO
```

Does manual modification while running a drycode require password protection?

D0=*No*—No password required for manual modification of a running drycode
1=*Yes*—Password required

```
U HUMIDITY SENSORS
0 NO
```

Does dryer have humidity sensors?

0=*No*
1=*Yes*

```
V SIMULATOR VERSION
0 NO
```

Select *1=yes* only if this is a simulator. If *yes*, the CPU board will not operate a dryer or any outputs, but can send data to a printer or download to a machine or tape.

0=*No*
1=*Yes*

The following decision is *valid* only for dryers controlled by Milnet®/Miltrac.

```
W PASS PIECES
0 NO
```

0=*No* (Pass *weight*, if known, to Milnet®/Miltrac system)
1=*Yes* (Pass *pieces*, if known, to Milnet®/Miltrac system)

```
X RECIRC DAMPER
0 NO
```

Does dryer have recirculation damper?

0=*No*
1=*Yes*

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

The following decision is *valid* only for dryers controlled by Milnet®/Miltrac.

```
Y MILDATA MACHINE
0 NO
```

Will the dryer communicate with a Mildata® computer? If *1* (*yes*), the following display appears.

0=*No*—Machine does not communicate with Mildata® network
1=*Yes*—Machine does communicate with Mildata® network

```
Z LANGUAGE
0
```

Select the language the displays should appear in.

0=English
1=Foriegn

The following two decisions apply only to 72072 dryers configured for CSA controls with inverter-driven combustion air blowers and connected to 600 volt power through buck transformers. These decisions reduce certain exhaust gas emissions by slowing the combustion air blower motor as the modulating gas valve closes.

```
OUT1 ON, VP <   050
```

OUT1 is the minimum modulating valve position at which the combustion air blower motor runs at full speed. This value should be configured to 050 initially.

000=Machines other than the 72072TG1
050=72072TG1

```
OUT2 ON, VP <   015
```

OUT2 is the minimum modulating valve position at which the combustion air blower motor runs at 67 percent of full speed. This value should be configured to 015 initially. The blower motor runs at 42 percent of full speed when the modulating valve position is below the value configured here.

000=Machines other than the 72072TG1
015=72072TG1

```
MANUAL LOAD
0=NO 1=YES      0
```

Allows user to manually jog the basket during loading.

0=*No*
1=*Yes*

```
MANUAL DISCHARGE
0=NO 1=YES      0
```

Allows user to manually jog basket to unload dryer when discharge is allowed and the door is opened.

0=*No*
1=*Yes*

The following decision appears only if *decision T=1 (Manual Password=Yes)*.

```
PASSWORD :
0000
```

D0000 is any four-digit number

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

The following decision appears only for Mark IV and V models.

```
ALLIED DATA PASS
0=NO 1=YES          0
```

Allows the user to pass data to allied equipment. If set, the dryer requires I/O board #3, which contains outputs to pass four bits of destination code

```
MACHINE NAME
58058TG2 MACHINE 07
```

DAny name (up to 20 characters) to identify this machine. Name appears on print-outs when *program mode 7: Print Data* is used.

The following decision appears only for Mark IV and V models.

```
NUMBER OF BYTES IN
NETWORK STRING     00
```

00=Miltrac version 89100 or later
11=Milnet system
24=Miltrac system version 8624 and earlier
30=Miltrac system version 89001 and earlier

```
MACHINE ADDRESS FOR
MILTRAC/MILNET   000
```

Must enter number; cannot scroll. See Milnet®/Miltrac manual.

000=lowest and default address
010=address 10 (example)
255=highest address

```
MILDATA MACHINE
0 YES
```

Will the dryer communicate with a Mildata® computer? If *1* (*yes*), the following display appears.

0=*No*—Machine does not communicate with Mildata® network
1=*Yes*—Machine does communicate with Mildata® network

```
DWELL TIME
                    0
```

Allows operator to program a custom dwell time.

0=Standard (2.5 seconds)
1=Custom

The following decision appears only if *Dwell Time=1 (Custom)*

```
DWELL TIME
00 TENTH-SECONDS
```

Selects how long the basket “dwells” between reversals.

00=00 tenth-seconds (minimum)
45=45 tenth-seconds (example)
99=99 tenth-seconds (maximum)

The following decision appears only if *decision Y (MILDATA MACHINE) = 1(Yes)*

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

MACHINE ADDRESS FOR MILDATA 000

If *Mildata Machine =1* (*yes*), the dryer is a Mildata® device, and this display appears; a Mildata® address must be assigned. See Mildata® manual.

000=lowest and default address
025=address 025 (example)
255=highest address

DATA ENTRY DWGCEWPL 10000000

DRYCODE
WORK ORDER
GOODS CODE
CUSTOMER CODE
EMPLOYEE CODE
WEIGHT
PIECES
LOT NUMBER

Must enter **0**=No or **1**=Yes under each data entry type allowed by the control. Cannot scroll or move backward. ENTER/NEXT accepts each choice and advances to the next data entry type. See Mildata® technical manual.

D	**W**	**G**	**C**	**E**	**W**	**P**	**L**	
1	0	0	0	0	0	0	0	= Data entry by drycode only (example).

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

3=CONFIGURE GAINS

The PID gains are used to control the modulating valve in the dryer. Optimum values were determined at the Milnor® factory and are shown in the table below. These values are automatically inserted when the drycodes are defaulted (*4=Default Drycodes*). To ensure proper operation, verify that the commanded values match the values in this table before commissioning your dryer.

The control will not allow configuration of gains unless the dryer has a modulating valve (*configure decision B=yes*).

When the display=

PROGRAM 3 MENU CONFIGURE GAINS

ENTER NEXT =

KP 1/KP INLET 100 100

After entering the valve ENTER NEXT to program the next constant.

Dryer Type	Constants	Inlet Gains	Outlet Gains
Gas Dryer Only	KP 1/KP	100 100	100 100
	KI 1/KI	006 100	006 100
	KD 1/KD	060 100	060 100
Modulating Steam Dryer Only	KP 1/KP	050 100	070 100
	KI 1/KI	006 100	006 400
	KD 1/KD	063 600	060 500
Thermal Oil Dryer Only	KP 1/KP	030 010	030 010
	KI 1/KI	010 100	010 100
	KD 1/KD	010 010	010 010

D=discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.

4=DEFAULT DRYCODES

Never command *Default Drycodes* until machine is properly configured, as the default drycodes are determined by configuration (*gas* or *steam*).

When default drycodes are loaded, all current drycodes are erased and replaced with the standard drycodes, which then may be modified to suit current needs. **All previously programmed drycode data will be lost.**

When the display=

```
PROGRAM 4 MENU
DEFAULT DRYCODES
```

ENTER NEXT =

```
"SKIP" FOR NO CHANGE
"4-5-6" TO DEFAULT
```

4 JKL + 5 MNO + 6 PQR =

```
DRY CODES DEFAULTED
```

After keys are released

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

or

SKIP TO

```
PROGRAM 0 MENU
OK TURN KEY TO RUN
```

NOTE: The standard *default drycode* for full loads of terry towels commands a 275°F (135°C) second inlet temperature (2IF) in *mode 2*. (*Mode 2* means that the step ends when inlet temperature falls below commanded.) Such a 2IF value should result in the goods being absolutely dry—actually over-dried—which corresponds to what most laundry managers perceive as "fully dry."

However, most laundry managers tend to over-dry goods, despite the fact that 100% cotton goods automatically reabsorb moisture from the air equal to approximately 5%-6% of their bone dry weight (while 50/50 polycotton goods reabsorb about 2.5%-3% of their bone dry weight). It is thus truly counter-productive to dry goods below the percent retained moisture that the goods will reabsorb, especially since considerably more time and energy is required to remove the last 4%-5% of the moisture.

In Mode 2, a second inlet temperature (2IF) of 300°F (149°C) to 320°F (160°C) can save considerable time and energy, and will usually result in goods that are sufficiently dry for most purposes.

FIGURE 3 (MSOP0119BE)
Default Drycodes for Gas and Modulating Steam Dryers

P E L L E R I N M I L N O R C O R P O R A T I O N

DRYER: 58058TG2 **VERSION** 90213-S **DATE:** 11/08/1994 **PAGE:** 01

DRYCODES

H =HOW CODE	**FDH**=FINAL DELTA	**ON =**DISCHARGE ON
IdF=INLET TEMPERATURE	**MMQ=**STEP TIME	**OF =**DISCHARGE OFF
IdC=INLET TEMPERATURE	**R =**REVERSING	**RV =**# OF REVERSALS
OdF=OUTLET TEMPERATURE	**A =**DAMPER POSITION	**DD** =DOOR DELAY
OdC=OUTLET TEMPERATURE	**SPD=**% SPEED	**BLO=**BLOWER ON TIME
2IF=SECOND INLET	**MHT=**MAXIMUM HEAT TIME	**B =**BASKET DIRECTION
2IC=SECOND INLET	**MCT=**MAXIMUM COOL TIME	**TIM=**DURATION
SFR=FINAL RATIO	**MVP=**MAX VALVE POSITION	**DS** =DESTINATION

DRYCODE RANGE = 00-05

DRYCODE 00 REDRY

00F	**H**	**IdF**	**OdF**	**2IF**	**MMQ**	**R**	**A**	**SPD**	**MHT**	**MCT**	**MVP**	**DS**	**ON**	**OF**	**RV**	**DD**	**BLO**	**A**	**B**	**TIM**
									250	050	125	--	20	25	04	--	---	-	-	---
S00	3	375	165	---	010	1	1	---	OUTLET +											
S01	2	375	165	275	010	1	2	---	INLET -											
S02	0	---	150	---	000	1	2	---	COOLDOWN							**END DRYCODE 00F**				

00P	**H**	**IdF**	**OdF**	**2IF**	**MMQ**	**R**	**A**	**SPD**	**MHT**	**MCT**	**MVP**	**DS**	**ON**	**OF**	**RV**	**DD**	**BLO**	**A**	**B**	**TIM**
									150	050	100	--	20	25	04	--	---	-	-	---
S00	1	375	165	---	120	1	1	---	TIME ONLY											
S01	0	---	150	---	000	1	2	---	COOLDOWN							**END DRYCODE 00P**				

DRYCODE 01 CONDITION

01F	**H**	**IdF**	**OdF**	**2IF**	**MMQ**	**R**	**A**	**SPD**	**MHT**	**MCT**	**MVP**	**DS**	**ON**	**OF**	**RV**	**DD**	**BLO**	**A**	**B**	**TIM**
									030	020	220	--	20	25	04	--	---	-	-	---
S00	1	375	165	---	020	1	1	---	TIME ONLY											
S01	0	---	140	---	000	1	2	---	COOLDOWN							**END DRYCODE 01F**				

01P	**H**	**IdF**	**OdF**	**2IF**	**MMQ**	**R**	**A**	**SPD**	**MHT**	**MCT**	**MVP**	**DS**	**ON**	**OF**	**RV**	**DD**	**BLO**	**A**	**B**	**TIM**
									030	020	150	--	20	25	04	--	---	-	-	---
S00	1	375	165	---	020	1	1	---	TIME ONLY											
S01	0	---	140	---	000	1	1	---	COOLDOWN							**END DRYCODE 01P**				

All drycodes numbered higher than 04P (05F, 05P through 15F, 15P) have only a cooldown step until programmed differently.

FIGURE 4 (MSOP0119BE)
Default Drycodes for Gas and Modulating Steam Dryers (continued)

P E L L E R I N M I L N O R C O R P O R A T I O N

DRYER: 58058TG2 **VERSION** 90022 **DATE:** 11/08/1994 **PAGE:** 02

DRYCODE RANGE = 00-05 (Cont.)

DRYCODE 02 TERRY TOWELS

02F	H	IdF	OdF	2IF	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									250	050	125	--	20	25	04	--	---	-	-	---
S00	3	425	185	---	010	1	0	---	OUTLET +											
S01	2	425	185	275	010	1	1	---	INLET -											
S02	0	---	150	---	000	1	2	---	COOLDOWN							END DRYCODE 02F				

02P	H	IdF	OdF	2IF	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									200	050	150	--	20	25	04	--	---	-	-	---
S00	1	400	185	---	050	1	0	---	TIME ONLY											
S01	1	400	185	---	100	1	1	---	TIME ONLY											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 02P				

DRYCODE 03 PATIENT GOWNS

03F	H	IdF	OdF	2IF	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									200	050	150	--	20	25	04	--	---	-	-	---
S00	3	375	165	---	010	1	1	---	OUTLET +											
S01	2	375	165	290	010	1	2	---	INLET -											
S02	0	---	140	---	000	1	2	---	COOLDOWN							END DRYCODE 03F				

03P	H	IdF	OdF	2IF	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									200	050	150	--	20	25	04	--	---	-	-	---
S00	1	375	165	---	020	1	1	---	TIME ONLY											
S01	0	---	140	---	000	1	2	---	COOLDOWN							END DRYCODE 03P				

DRYCODE 04 BLANKETS

04F	H	IdF	OdF	2IF	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									200	050	150	--	20	25	04	--	---	-	-	---
S00	3	425	185	---	010	1	0	---	OUTLET +											
S01	2	425	185	275	010	1	1	---	COOLDOWN											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 04F				

04P	H	IdF	OdF	2IF	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									200	050	150	--	20	25	04	--	---	-	-	---
S00	3	400	185	---	010	1	0	---	OUTLET +											
S01	2	425	185	275	010	1	1	---	INLET											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 04P				

All drycodes numbered higher than 04P (05F, 05P through 15F, 15P) have only a cooldown step until programmed differently.

FIGURE 5 (MSOP0119BE)
Default Drycodes for Non-Modulating Steam Dryers

```
      P E L L E R I N   M I L N O R   C O R P O R A T I O N


DRYER: 58058TS1            VERSION 90022   DATE: 03/12/1992  PAGE: 01

_____________________________________________________________________

                          DRYCODES

 H =HOW CODE              MMQ=STEP TIME              OF =DISCHARGE OFF
IdF=INLET TEMPERATURE      R =REVERSING              RV =# OF REVERSALS
IdC=INLET TEMPERATURE      A =DAMPER POSITION        DD =DOOR DELAY
OdF=OUTLET TEMPERATURE   SPD=% SPEED                 BLO=BLOWER ON TIME
OdC=OUTLET TEMPERATURE   MHT=MAXIMUM HEAT TIME        B =BASKET DIRECTION
2IF=SECOND INLET         MCT=MAXIMUM COOL TIME      TIM=DURATION
2IC=SECOND INLET         MVP=MAX VALVE POSITION     DS =DESTINATION
SFR=FINAL RATION         ON =DISCHARGE ON


DRYCODE RANGE =  00-05
DRYCODE 00 REDRY
00F  H IdF OdF SFR MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B TIM
                                180 050 --- --  20 25 04  -- --- - - ---
S00  6 --- --- 110 000 1 1 ---  STEAM RATIO
S01  6 --- --- 116 010 1 2 ---  STEAM RATIO
S02  0 --- 150 --- 000 1 2 ---  COOLDOWN                  END DRYCODE 00F
00P  H IdF OdF SFR MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B TIM
                                180 050 --- --  20 25 04  -- --- - - ---
S00  6 --- --- 111 010 1 1 ---  STEAM RATIO
S02  0 --- 150 --- 000 1 1 ---  COOLDOWN                  END DRYCODE 00P
DRYCODE 01 CONDITION
01F  H IdF OdF 2IF MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B TIM
                                030 020 --- --  20 25 04  -- --- - - ---
S00  1 --- --- --- 030 1 1 ---  TIME ONLY
S01  0 --- 150 --- 000 1 1 ---  COOLDOWN                  END DRYCODE 01F
01P  H IdF OdF 2IF MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B TIM
                                030 020 --- --  20 25 04  -- --- - - ---
S00  1 --- --- --- 022 1 1 ---  TIME ONLY
S01  0 --- 150 --- 000 1 1 ---  COOLDOWN                  END DRYCODE 01P
```

All drycodes numbered higher than 04P (05F, 05P through 15F, 15P) have only a cooldown step until programmed differently.

FIGURE 6 (MSOP0119BE)
Default Drycodes for Non-Modulating Steam Dryers

P E L L E R I N M I L N O R C O R P O R A T I O N

DRYER: 58058TS1 **VERSION** 90022 **DATE:** 03/12/1992 **PAGE:** 02

DRYCODE RANGE = 00-05 (Cont.)

DRYCODE 02 TERRY TOWELS

02F	H	IdF	OdF	SFR	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									250	050	---	--	20	25	04	--	---	-	-	---
S00	6	---	---	104	000	1	0	---	STEAM RATIO											
S01	6	---	---	116	010	1	1	---	STEAM RATIO											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 02F				

02P	H	IdF	OdF	SFR	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									250	050	---	--	20	25	04	--	---	-	-	---
S00	6	---	---	104	000	1	0	---	STEAM RATIO											
S01	6	---	---	111	010	1	1	---	STEAM RATIO											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 02P				

DRYCODE 03 PATIENT GOWNS

03F	H	IdF	OdF	SFR	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									250	050	---	--	20	25	04	--	---	-	-	---
S00	6	---	---	110	000	1	1	---	STEAM RATIO											
S01	6	---	---	116	010	1	2	---	STEAM RATIO											
S02	0	---	140	---	000	1	2	---	COOLDOWN							END DRYCODE 03F				

03P	H	IdF	OdF	SFR	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									250	050	---	--	20	25	04	--	---	-	-	---
S00	6	---	---	111	010	1	1	---	STEAM RATIO											
S01	0	---	140	---	000	1	2	---	COOLDOWN							END DRYCODE 03P				

DRYCODE 04 BLANKETS

04F	H	IdF	OdF	SFR	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									290	050	---	--	20	25	04	--	---	-	-	---
S00	6	---	---	110	000	1	0	---	STEAM RATIO											
S01	6	---	---	116	010	1	1	---	STEAM RATIO											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 04F				

04P	H	IdF	OdF	SFR	MMQ	R	A	SPD	MHT	MCT	MVP	DS	ON	OF	RV	DD	BLO	A	B	TIM
									290	050	---	--	20	25	04	--	---	-	-	---
S00	6	---	---	107	000	1	0	---	STEAM RATIO											
S01	6	---	---	111	010	1	1	---	STEAM RATIO											
S02	0	---	150	---	000	1	1	---	COOLDOWN							END DRYCODE 04P				

All drycodes numbered higher than 04P (05F, 05P through 15F, 15P) have only a cooldown step until programmed differently.

5=DOWNLOAD

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*. 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.

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 5, 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 5, 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 05 MENU DOWN LOAD

When the *Program Menu* and *mode 5, 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 5* 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 Upload* on downloader box)	Serial Downloader to Machine (see *To Download* on downloader box)
1. **Designate master.** Downloading begins immediately.	1. **Clear memory in the serial downloader** as explained in the *To Upload* instructions on the serial downloader. 2. **Designate master.** Uploading begins immediately.	1. **Command *Transmit*,** as explained in the *To Download* instructions on the serial downloader.

Monitoring Downloading in Progress

Normal Displays During Downloading:

(M) 9600 BAUD xxxx RECEIVING DATA	(S) 9600 BAUD xxxx TRANSFERRING DATA
Slave (receiving) machines	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.

6=CLEAR ALL MEMORY (Voluntarily)

When the display =

PROGRAM 6 MENU
CLEAR ALL MEMORY

ENTER NEXT =

"SKIP" FOR NO CHANGE
"4-5-6" TO CLEAR

No cursor

SKIP TO **Exits this program mode without clearing memory.**

⚠ CAUTION ⚠

AVOID DATA LOSS—The following key strokes will delete all user programmed data. If this mode has been entered accidently, press CANCEL ESCAPE to cancel this procedure.

4 JKL + 5 MNO + 6 PQR **Clears all drycodes, step names, and configure.**

Display =

MEMORY CLEARED

or After keys are released

PROGRAM 0 MENU
OK TURN KEY TO RUN

See “IMPORTANT OWNER/USER INFORMATION” at beginning of this manual.

7=PRINT DATA

(see also "DRYCODE REPORTS" and "MANUAL MODE MENU . . . " in Table of Contents for other reports)

Print Data prints the currently programmed drycodes and configure codes on a serial printer which can be temporarily connected to the machine via a socket on the control. A mating plug to this socket is provided for the user's convenience in wiring the printer interface cable. See wiring instructions in "THE EXTERNAL SERIAL LINK CABLES AND HOW T6O CONSTRUCT THEM" (see Table of Contents). *Temperature Profiles* and *Dry Cycle Details* reports can also be printed, as described in "DRYCODE REPORTS" (see Table of Contents).

When the display =

```
PROGRAM 7 MENU
PRINT DATA
```

ENTER/NEXT =

```
PROGRAM 7 MENU
0 DRYCODES
```

0=*Drycodes* (Any specified range)
1=*Configuration*

↑ or ↓ **Scrolls the choices.**

ENTER/NEXT **Prompts for today's date.**

Display =

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

Enter today's date, where *mm* is a two digit number for the month (e.g., March = 03), *dd* is a two-digit number for the day of the month (e.g., 08) and *yyyy* is the year.

If **0 = DRYCODES** was selected the following display appears.

```
START          STOP
  xx           yy
```

Enter the range of drycodes to be printed, where *xx* is the starting drycode and *yy* is the ending drycode, inclusive.

00=*Lowest Drycode Number* (*yy* must be equal to or greater than *xx*)
15=*Highest Drycode Number* (*xx* must be equal to or less than *yy*)

When printing begins, display =

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

A sample printout of drycodes is shown in FIGURE 6.

When printing ends, display returns to

```
  PROGRAM 0 MENU
OK TURN KEY TO RUN
```

If ***1=Configuration*** was selected, a printout is produced similar to that shown in FIGURE 7.

When printing begins, display =

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

When printing ends, display returns to

```
  PROGRAM 0 MENU
OK TURN KEY TO RUN
```

FIGURE 7 (MSOP0119BE)
Sample Printout—Drycodes

```
     P E L L E R I N   M I L N O R   C O R P O R A T I O N

DRYER: DRYER TEST          VERSION 90213-S       DATE: 11/08/1994
PAGE: 01

                                DRYCODES
 H =HOW CODE              FDH=FINAL DELTA          ON =DISCHARGE ON
IdF=INLET TEMPERATURE     MMQ=STEP TIME            OF =DISCHARGE OFF
IdC=INLET TEMPERATURE      R =REVERSING            RV =# OF REVERSALS
OdF=OUTLET TEMPERATURE     A =DAMPER POSITION      DD =DOOR DELAY
OdC=OUTLET TEMPERATURE   SPD=% SPEED               BLO=BLOWER ON TIME
2IF=SECOND INLET         MHT=MAXIMUM HEAT TIME      B =BASKET DIRECTION
2IC=SECOND INLET         MCT=MAXIMUM COOL TIME    TIM=DURATION
SFR=FINAL RATIO          MVP=MAX VALVE POSITION    DS=DESTINATION

DRYCODE RANGE =  00-01
DRYCODE 00 REDRY
00F  H IdF OdF 2IF MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B
TIM
                                250 050 125  20 25 04  -- --- - - ---
S00  3 375 165 --- 010 1 1 ---  OUTLET +
S01  2 375 165 275 010 1 2 ---  INLET -
S02  0 --- 150 --- 000 1 2 ---  COOLDOWN                END DRYCODE
00F
00P  H IdF OdF 2IF MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B
TIM
                                 150 050 100 --  20 25 04  -- --- - -
---
S00  1 375 165 --- 120 1 1 ---  TIME ONLY
S01  0 --- 150 --- 000 1 2 ---  COOLDOWN                END DRYCODE
00P
DRYCODE 01 CONDITION
01F  H IdF OdF 2IF MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B
TIM
                                030 020 220 --  20 25 04  -- --- - -
---
S00  1 375 165 --- 020 1 1 ---  TIME ONLY
S01  0 --- 140 --- 000 1 2 ---  COOLDOWN                END DRYCODE
01F
```

FIGURE 7 (MSOP0119BE)
Sample Printout—Drycodes

```
01P  H IdF OdF 2IF MMQ R A SPD  MHT MCT MVP DS  ON OF RV  DD BLO A B
TIM
                                030 020 150 --  20 25 04  -- --- - -
---
S00  1 375 165 --- 020 1 1 ---  TIME ONLY
S01  0 --- 140 --- 000 1 1 ---  COOLDOWN                 END DRYCODE
01P
```

FIGURE 8 (MSOP0119BE)
Sample Printout—Configuration

```
          P E L L E R I N  M I L N O R  C O R P O R A T I O N

DRYER: DRYER TEST      VERSION 90213-S   DATE: 01/06/1992   PAGE: 01

                        CONFIGURATION

A=DRYER TYPE              J=PASS DATA              S=LOADS BEFORE STRIP
B=MODULATING VALVE        K=LOADING DIRECTION      T=MANUAL PASSWORD
C=LANDIS & GYR            L=DEST. PER DRYCODE      U=HUMIDITY SENSORS
D=AFTER 86331             M=NODRY LOCATION         V=SIMULATOR VERSION
E=CSA DRYER               N=NODRY RCV LEVEL        W=PASS PIECES
F=VAR. BASKET SPD         O=NODRY LOADING DIR      X=MILDATA MACHINE
G=MAX CAKES TO RCV        P=UNLOAD BEACON          Y=RECIRC DAMPER
H=TEMPERATURE UNITS       Q=LINT FILTER            Z=LANGUAGE
I=DRYER RCV LEVEL         R=MILNOR FILTER

                    ABCDEFGHIJKLMNOPQRSTUVWXYZ
                    01000110100000021120100 11*

                     dF BEFORE COOLDOWN :  20

                     BLOW DOWN INTERVAL :  020 (MMQ)

                     BLOW DOWN DURATION :  100 (SSS)

                     MANUAL LOAD        :  1

                     MANUAL DISCHARGE   :  1

                     MILTRAC ADDRESS    :  004

                     DWELL TIME         :  2.8 - CUSTOM

                     MILDATA ADDRESS    :  004

                     D=DRYCODE CODE
                     W=WORK ORDER CODE
                     G=GOODS CODE
                     C=CUSTOMER CODE
                     E=EMPLOYEE NUMBER
                     W=WEIGHT
                     P=NUMBER OF PIECES

                     DATA ENT. DWGCEWPL
                               10010000
```

BIYPDC01 (Published) Book specs- Dates: 20100902 / 20100902 / 20100902 Lang: ENG01 Applic: YPD

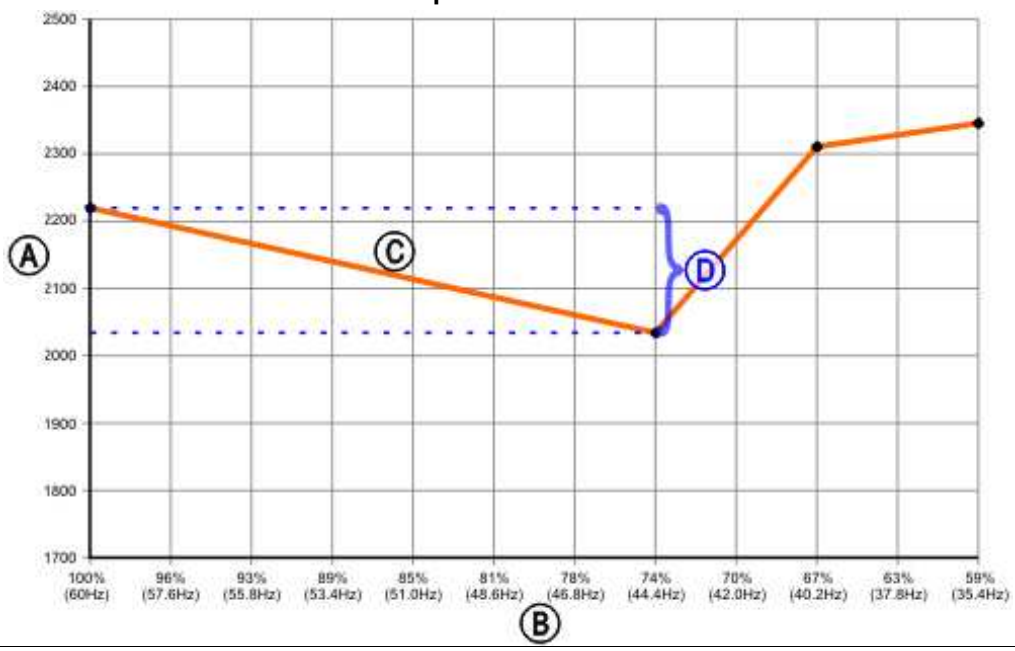
How to Adjust the Blower Speed

This document is about the adjustable blower speed of some dryers. Adjustable blower speed is available in versions after 21005 of the Milnor® *Dryer Programmer* software. This document is not for versions of the software before 21006.

This value sets the dryer blower speed to make sure that less goods cause a blockage to the flow of air through the basket. This makes the dryer use less fuel.

- Goods cause a blockage to the flow of air when the air velocity through the basket pushes (or plasters) the goods against the basket. Goods that cause a blockage are more likely to scorch.
- Milnor® tests show that when you decrease the blower speed by 25 percent, 9 percent less BTUs are necessary to make the goods dry. The dry time increases by 3 to 4 minutes.

Figure 1: Efficiency by Blower Speed



Legend

A. BTUs per pound of water removed
B. Blower speed in percent of normal and approximate Hertz
C. Calculated efficiency
D. Energy savings

1. General Information

Milnor tested a model 6458TG1 dryer under controlled conditions to determine how to make goods dry with the least energy. These tests found that some goods require less energy to become dry when the blower runs at a slower speed. These specific tests showed a fuel savings of about 9 percent when the blower ran at 74 percent of the normal speed.

Tip: These tests were performed with one dryer model (Milnor 6458TG1) and one type of goods (terry towels). Similar energy savings can be realized with other dryer models and other goods, but we did not test these factors.

2. How to Allow Variable Blower Speeds

Do this before you try to set variable dryer blower speeds.

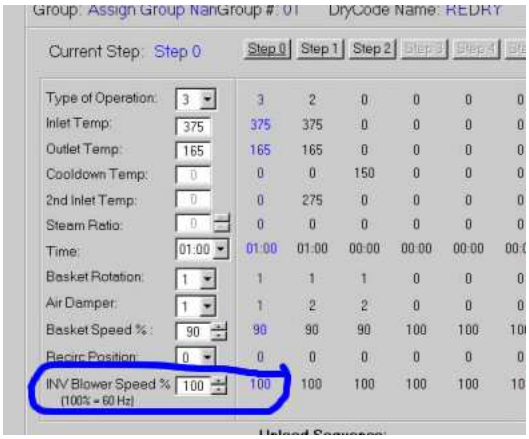
On the *Dryer Programmer* configuration display (Figure 2), set the *Variable Speed Blower* decision to 1. This setting lets the dryer controller send a value other than 100 percent to the inverter. If you set the *Variable Speed Blower* decision to 0, the blower will always run at 100 percent of the normal speed.

Figure 2: Dryer Configuration Settings

3. How to Set the Blower Speed

After you allow variable blower speeds (Section 2), you can set the blower speed for each drycode step.

Figure 3: Dry Code Step Settings



As Figure 1 shows, the amount of energy required to remove an amount of water from the goods decreases gradually as the speed of the blower approaches 74 percent of the normal speed. As the blower runs slower, more time is necessary to dry the goods. You must determine the best compromise between energy efficiency and production speed. Other blower speeds may be more efficient for other goods.

— End of BIYPDC01 —

Operating 3

RUNNING THE MARK II AND III DRYER IN AUTOMATIC SYSTEMS

⚠WARNING⚠

CRUSH AND ENTANGLE HAZARDS—When the dryer is operating automatically, drive motors will run/stop and other devices will move automatically and without warning. The *owner/user* must verify that all machine guards are in place, that there is no possibility of personnel entering or reaching into the machine, and that all *emergency stop switches* on the dryer will stop the machine.

Normal Automatic Operation

The dryer's normal operating mode is fully automatic. Once set for automatic operation, a new load of one or more cakes (and its batch codes) passes from the loading device (usually a Milnor® shuttle loading device) to the dryer each time the dryer requests a load. Before each load is received, the just-dried goods discharge, thus freeing the dryer for the next load.

The Power Up Sequence

Master Switch *on* — **Energizes *control power*,** but not dryer power.

COPYRIGHT PELLERIN MILNOR 1989	Copyright statement (appears one or more times)
ALL RIGHTS RESERVED MARK-II DRYER 90022	Number at lower right is software date code.
DRY FORMULA MEMORY CHECKSUM 8086	This number changes if drycode changes are made.
THREE WIRE DISABLED **********	
① **Energizes *dryer power* and silences operator alarm.** — WAITING FOR LOAD **********	Dryer set for automatic operation.

Switch Positions—For fully automatic operation in a Milnet®/Miltrac system, the *Load Allowed switch* on the dryer switch panel must be set to ***auto OK***, the *Discharge Allowed switch* must be set to ***off***, and the *Manual/Automatic* switch must be set to ***automatic***.

The Displays During Normal Operation

NOTE: When two or more dryers are served by a shuttle loading device (e.g., Milnor® shuttle), load-end flags (targets) are located on the shuttle rail in front of each dryer to stop the loading device at the next dryer to be loaded. For Miltrac® systems, the flag deploys when the Miltrac® control requests *Get Ready to Receive* (prior to *start transfer*) and retracts as soon as Miltrac® control requests *Do Nothing* (transfer sequence completed). For allied loading, the flag deploys when the *Dryer is Loading input* is made and retracts after the *Dryer is Loaded input* is made.

While the dryer is *idle*

```
WAITING FOR LOAD
******************
```

When Miltrac® requests start transfer or when the dryer closes the *Load Allowed output* to tell an allied loading device to discharge (*Dryer Is Loading input* is made)

```
LOADING
xxxxxxxxxxxxxx
```

Load door opens and cylinder starts turning.

See the Operator manual for ***Load Allowed*** *switch* operation.

When the Miltrac control commands *Do Nothing* or the allied control makes the *Dryer is Loaded input*, the dryer will command the load door closed. When the load door is closed, the normal run displays (similar to those below) will appear. See "Table A—Dryer Display Data" table in this section.

Gas and modulating steam dryers

```
04F  TIF TOF 001 AIR      alternates      04F  TIF TOF 001  VP
S00  425D185 011 000      with            S00  382A178 011 001
```

Non-modulating steam dryers

```
04F  TIF TOF 001 AIR      alternates      04F  TIF TOF 001  SR
S00  ---D--- 011 000      with            S00  382A178 011 100
```

When the dryer desires to discharge:

```
WAITING TO DISCHARGE      alternates      FM DC DS CC GC  WDT
                          with            15 04 02 12 11  123
```

When discharge is allowed:

```
UNLOADING                 alternates      FM DC DS CC GC  WDT
                          with            15 04 02 12 11  123
```

See "Switch Positions" in this section for ***Discharge Allowed*** *switch* operation.

Table A—Dryer Display Data

B

DATA	WHAT IT MEANS	DATA	WHAT IT MEANS
Displays during Heating or Cooldown			
04	Drycode number	VP	Valve position (varies from 000-255; current position shown below VP)
F	Load size (i.e., **F**ull or **P**artial)	SR	Steam Ratio (varies from 100 to 150; actual ratio shown below SR)
TIF	Inlet temperature ℉ or ℃ (**A**ctual temperature alternates with **D**esired temperature; current temperature below TIF)	S00	Current step of selected drycode
TOF	Outlet temperature ℉ or ℃ (**A**ctual alternates with **D**esired; current temperature shown below TOF)	D	Desired (programmed) temperatures
001	Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)	A	Actual temperature
AIR	Position of damper (varies from 000-002; current position shown below AIR)	011	Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)
Displays while Waiting to Discharge or Unloading			
FM	Wash formula number for this load	CC	Customer code for this load
DC	Dry code number for this load	GC	Goods code for this load
DS	Destination for this load	WDT	Elapsed time spent waiting to discharge

B

If dryer is configured as CSA dryer (Canada only):

- If modulating gas valve position falls below 49, maximum damper position is 1 (Max-1).
- If modulating gas valve position falls below 19, maximum damper position is 2 (Min+1).

NOTE: To modify a running drycode, press MANUAL. See "MANUAL DRYCODE MODIFICATIONS . . ." (see Table of Contents) for more information.

How Early Call Works

Early call is a software feature which causes the dryer to issue a *desire to load* or *desire to discharge signal* ahead of time to ensure the expedient transfer of goods. *Early call* from the dryer works with both Milnet®/Miltrac systems and allied devices (if the allied devices provide the necessary inputs, outputs, and control logic).

Receiving—The dryer issues a *Desire to Load signal* when discharge of the current load is allowed. Loading of the next load is allowed when discharge of the current load is completed, provided the *Load Allowed switch* on the dryer switch panel is set to *Auto OK*.

Discharging—The dryer issues a *Desire to Discharge signal* after cooldown of the current load is completed. Discharge is allowed when the dryer receives a signal from the Milnet®/Miltrac system to *Start Transfer*, if the *Discharge Allowed switch* on the dryer is at *off*, **OR** when the *Discharge Allowed switch* is switched to either *OK* or *Auto OK*.

Interruptions in Normal Dryer Operation

Holds Ahead of the Dryer—Whenever the flow of goods into the dryer stops (as might be caused by a *hold* condition in the tunnel), the dryer remains at *Waiting For Load*. Whenever the flow of goods resumes, the dryer resumes processing without manual intervention.

Holds Behind the Dryer—Whenever the dryer desires to discharge but cannot because the device to which the dryer sends its goods is not ready to receive, the dryer waits to discharge and displays *Waiting To Discharge*. As soon as the device that receives from the dryer is available, the transfer occurs and normal processing resumes without manual intervention.

Holds Caused by Lint Filter

WAITING FOR FILTER

Whenever the dryer is waiting for the Milnor® lint filter to start a strip cycle, this message will be displayed. Once the strip cycle has finished, the dryer will resume normal operation.

STILL STRIPPING **********

Whenever the dryer desires to begin a drycode while the lint filter is stripping, this message will be displayed. Once the lint filter has finished, the dryer will resume normal operation.

Power Loss or Three-Wire Disabled Condition—If the dryer loses power (*Master switch* turned *off*) or the three wire circuit drops out (as will occur if a *Stop switch* is pressed), the dryer stops immediately. The dryer can easily be returned to automatic operation regardless of how long the dryer was stopped or what portion of the cycle it was in when it stopped.

It is not necessary to use the *manual mode* to load or unload the dryer, but merely to return it on-line. It will resume normal automatic operation and synchronize with its interfacing devices (e.g., Miltrac®, shuttle) automatically once a *power restoration sequence* (explained below) is completed.

The Power Restoration Sequences

The dryer will execute one of two possible sequences to return on-line.

If the Three-Wire Circuit was Disabled without Power Loss

① closes the *three-wire circuit* and silences the *operator alarm*

Dryer operation resumes from where interrupted (example—three wire disabled while running a drycode).

If Power was Lost

A.) ***Dryer is empty.*** Start-up will be as described in "The Power Up Sequence" in this section.

B.) ***Dryer is loaded.***

1. Set the *Load Allowed switch* on the dryer control or at the dryer to "NOT OK" to tell the dryer that loading is *not allowed*. This is necessary because, after a power failure, the dryer controller does not know a load is still in the dryer.
2. If it is desired to discharge the load manually, or run the interrupted drycode manually, see "MANUALLY RUNNING A DRYCODE AND DISCHARGING A LOAD . . ." (see Table of Contents).
3. After the load is discharged manually or the manually run drycode is completed, enable the *Load Allowed switch* to allow the dryer to accept new loads.

Viewing Inputs and Outputs During Operation

The status of the microprocessor inputs and outputs may be viewed in the *run mode* (while the machine is running).

NOTE: This function displays inputs/outputs while the appropriate keys are held depressed. See "MANUAL MODE MENU FUNCTIONS . . ." (see Table of Contents) to display inputs/outputs for longer than a few moments or to manually actuate outputs.

To View Inputs

hold 7 STU — Displays the *first 16 inputs* (page (0) A-P)

```
(0) ABCDEFGHIJKLMNOP
    -+-+-+-+-+-+-+-+
```

+ = input *made*
- = input *not made*

hold 7 STU + 1 ABC — **Displays *second 16 inputs* (page (1) A-P)**

hold 7 STU + 2 DEF — Displays *third 16 inputs* (page (2) A-P)

The tables of inputs below identify each input.

B

Table B—Dryer Inputs

First 16 Inputs (Page 0)			Second 16 Inputs (Page 1)		
Display Code	**Input Name**	**Connector/Pin**	**Display Code**	**Input Name**	**Connector/Pin**
A	Mildata®	1MTA 38-8	A	Three-Wire	1MTA 4-1
B	Program Key	1MTA 38-4	B	Load Door Closed	1MTA 4-2
C	Signal Cancel	1MTA 38-2	C	Discharge Door Closed	1MTA 4-3
D	No More Loads	1MTA 38-5	D	Fire Eye Tripped	1MTA 4-4
E	Drycode in A	1MTA 38-6	E	Load Door Open	1MTA 4-5
F	Drycode in B	1MTA 38-7	F	Cylinder Not Turning	1MTA 4-6
G	not used		G	Load Shuttle Here	1MTA 4-7
H	not used		H	Discharge Allowed	1MTA 4-8
I	New Customer	1MTA 39-1	I	Loaded	1MTA 4-11
J	Drycode in C	1MTA 39-6	J	Jog CCW	1MTA 4-12
K	Little Load	1MTA 39-5	K	Auto Allowed	1MTA 4-13
L	Drycode in D	1MTA 39-4	L	Landis & Gyr Wants Gas	1MTA 4-14
M	Finished Receiving	1MTA 39-3	M	Jog CW	1MTA 4-15
N	not used		N	OK For More Loads	1MTA 4-16
O	not used		O	Manual Load Door Open	1MTA 4-17
P	not used		P	No-dry Ready	1MTA 4-18

D

Table B—Dryer Inputs (continued)

Third 16 Inputs (Page 2)		
Display Code	**Input Name**	**Connector/Pin**
A	Lint Stripper in Use	2MTA 4-1
B	Manual Load CW	2MTA 4-2
C	Manual Load CCW	2MTA 4-3
D	Discharge Complete	2MTA 4-4
E	not used	
F	not used	
G	not used	
H	not used	
I	Main Air Overload	2MTA 4-11
J	Combustion Air Overload	2MTA 4-12
K	Basket Motor Overload	2MTA 4-13
L	Gas Pressure High	2MTA 4-14
M	Gas Pressure Low	2MTA 4-15
N	Main Air Low	2MTA 4-16
O	Combustion Air Low	2MTA 4-17
P	not used	

NOTE: The control will permit displaying the last 16 inputs even if the Milnor® lint filter or Mildata® is not configured, but in this instance, these inputs will always remain – (not energized).

To View Outputs

hold 8 VWX — Displays the *first 16 outputs* (page (0) a-p)

```
(0) abcdefghijklmnop
    -+-+-+-+-+-+-+-+
```

\+ = output *energized*
\- = output *not energized*

hold 8 VWX + 1 ABC — Displays the *second 16 outputs* (page (1) a-p)

Table C—Dryer Outputs

First 16 Outputs (Page 0)			Second 16 Outputs (Page 1)		
Display Code	**Output Name**	**Connector/ Pins**	**Display Code**	**Output Name**	**Connector/ Pins**
a	Hard Start	1MTA5-10,19	a	Get Hot (Gas) Close Cooldown (Steam)	1MTA13-9,19
b	Unload Beacon	1MTA5-9,18	b	Strip Blower	1MAT13-10,14-1
c	Out 1	1MTA5-8,17	c	No-Dry Flag	1MTA14-2,11
d	Load Desired	1MTA5-7,16	d	Close Load Door	1MTA14-3,12
e	New Customer	1MTA5-4,14	e	Open Load Door	1MTA14-4,13
f	Out 2	1MTA5-3,13	f	Open Discharge Door	1MTA14-4,14
g	Load Me	1MTA5-2,12	g	Close Discharge Door	1MTA14-10,5
h	Sprinkler	1MTA5-1,11	h	Clockwise Rotation	1MTA14-10,15
i	C-Clockwise Rotation	1MTA13-1,11	i	not used	
j	Burner Blower (Gas) Cooldown Open (Steam)	1MTA13-2,12	j	not used	
k	Main Blower	1MTA13-3,13	k	not used	
l	Operator Signal	1MTA13-4,14	l	not used	
m	Enable Main Gas	1MTA13-5,15	m	not used	
n	Damper 2 (Long Stroke)	1MTA13-6,16	n	not used	
o	Damper 1 (Short Stroke)	1MTA13-7,17	o	not used	
p	Bypass Main Air	1MTA13-8,18	p	not used	

NOTE 1: The control will permit displaying the last eight outputs (second 16, i-p) even if the Milnor® lint filter or Mildata® is not configured, but in this instance, these outputs will always remain – (not energized).

NOTE 2: The following outputs cannot be viewed: Recirculation damper—2MTA5-2,6-10; CSA operation—3MTA5-8,9 and 3MTA6-4,5.

RUNNING THE MARK IV AND V DRYER IN AUTOMATIC SYSTEMS

⚠WARNING⚠

CRUSH AND ENTANGLE HAZARDS—When the dryer is operating automatically, drive motors will run/stop and other devices will move automatically and without warning. The *owner/user* must verify that all machine guards are in place, that there is no possibility of personnel entering or reaching into the machine, and that all *emergency stop switches* on the dryer will stop the machine.

Normal Automatic Operation

The dryer's normal operating mode is fully automatic. Once set for automatic operation, a new load of one or more cakes (and its batch codes) passes from the loading device (usually a Milnor® shuttle loading device) to the dryer each time the dryer requests a load. Before each load is received, the just-dried goods discharge, thus freeing the dryer for the next load.

The Power Up Sequence

Master Switch ON — **Energizes *control power*,** but not dryer power.

COPYRIGHT PELLERIN MILNOR 1989	Copyright statement (appears one or more times)
ALL RIGHTS RESERVED MARK-II DRYER 90022	Number at lower right is software date code.
DRY FORMULA MEMORY CHECKSUM 8086	This number changes if drycode changes are made.
THREE WIRE DISABLED **********	
WAITING FOR LOAD **********	Dryer set for automatic operation.

① — **Energizes *dryer power* and silences operator alarm.**

Switch Positions—For fully automatic operation in a Milnet®/Miltrac system, the *Load Allowed switch* on the dryer switch panel must be set to ***auto OK***, the *Discharge Allowed switch* must be set to ***off***, and the *Manual/Automatic* switch must be set to ***automatic***.

The Displays During Normal Operation

NOTE: When two or more dryers are served by a shuttle loading device (e.g., Milnor® shuttle), load-end flags (targets) are located on the shuttle rail in front of each dryer to stop the loading device at the next dryer to be loaded. For Miltrac® systems, the flag deploys when the Miltrac® control requests *Get Ready to Receive* (prior to *start transfer*) and retracts as soon as Miltrac® control requests *Do Nothing* (transfer sequence completed). For allied loading, the flag deploys when the *Dryer is Loading input* is made and retracts after the *Dryer is Loaded input* is made.

While the dryer is *idle*

```
WAITING FOR LOAD
******************
```

When Miltrac® requests start transfer or when the dryer closes the *Load Allowed output* to tell an allied loading device to discharge (*Dryer Is Loading input* is made)

```
LOADING
XXXXXXXXXXXXXX
```

Load door opens and cylinder starts turning.

See the Operator manual for ***Load Allowed*** *switch* operation.

When the Miltrac control commands *Do Nothing* or the allied control makes the *Dryer is Loaded input,* the dryer will command the load door closed. When the load door is closed, the normal run displays (similar to those below) will appear. See "Table A—Dryer Display Data" table in this section.

Gas and modulating steam dryers

```
04F  TIF TOF 001 AIR
S00  425D185 011 000
```

alternates with

```
04F  TIF TOF 001  VP
S00  382A178 011 001
```

Non-modulating steam dryers

```
04F  TIF TOF 001 AIR
S00  ---D--- 011 000
```

alternates with

```
04F  TIF TOF 001  SR
S00  382A178 011 100
```

When the dryer desires to discharge:

```
WAITING TO DISCHARGE
```

alternates with

```
FM DC DS CC GC  WDT
15 04 02 12 11  123
```

When discharge is allowed:

```
UNLOADING
```

alternates with

```
FM DC DS CC GC  WDT
15 04 02 12 11  123
```

See "Switch Positions" in this section for ***Discharge Allowed*** *switch* operation.

Table A—Dryer Display Data

DATA	WHAT IT MEANS	DATA	WHAT IT MEANS
Displays during Heating or Cooldown			
04	Drycode number	VP	Valve position (varies from 000-255; current position shown below VP)
F	Load size (i.e., **F**ull or **P**artial)	SR	Steam Ratio (varies from 100 to 150; actual ratio shown below SR)
TIF	Inlet temperature °F or °C (**A**ctual temperature alternates with **D**esired temperature; current temperature below TIF)	S00	Current step of selected drycode
TOF	Outlet temperature °F or °C (**A**ctual alternates with **D**esired; current temperature shown below TOF)	D	Desired (programmed) temperatures
001	Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)	A	Actual temperature
AIR	Position of damper (varies from 000-002; current position shown below AIR)	011	Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)
Displays while Waiting to Discharge or Unloading			
FM	Wash formula number for this load	CC	Customer code for this load
DC	Dry code number for this load	GC	Goods code for this load
DS	Destination for this load	WDT	Elapsed time spent waiting to discharge

If dryer is configured as CSA dryer (Canada only):

- If modulating gas valve position falls below 49, maximum damper position is 1 (Max-1).
- If modulating gas valve position falls below 19, maximum damper position is 2 (Min+1).

NOTE: To modify a running drycode, press  . See “MANUAL DRYCODE MODIFICATIONS . . .” (see Table of Contents) for more information.

How Early Call Works

Early call is a software feature which causes the dryer to issue a *desire to load* or *desire to discharge signal* ahead of time to ensure the expedient transfer of goods. *Early call* from the dryer works with both Milnet®/Miltrac systems and allied devices (if the allied devices provide the necessary inputs, outputs, and control logic).

Receiving—The dryer issues a *Desire to Load signal* when discharge of the current load is allowed. Loading of the next load is allowed when discharge of the current load is completed, provided the *Load Allowed switch* on the dryer switch panel is set to *Auto OK*.

Discharging—The dryer issues a *Desire to Discharge signal* after cooldown of the current load is completed. Discharge is allowed when the dryer receives a signal from the Milnet®/Miltrac system to *Start Transfer*, if the *Discharge Allowed switch* on the dryer is at *off*, **OR** when the *Discharge Allowed switch* is switched to either *OK* or *Auto OK*.

Interruptions in Normal Dryer Operation

Holds Ahead of the Dryer—Whenever the flow of goods into the dryer stops (as might be caused by a *hold* condition in the tunnel), the dryer remains at *Waiting For Load*. Whenever the flow of goods resumes, the dryer resumes processing without manual intervention.

Holds Behind the Dryer—Whenever the dryer desires to discharge but cannot because the device to which the dryer sends its goods is not ready to receive, the dryer waits to discharge and displays *Waiting To Discharge*. As soon as the device that receives from the dryer is available, the transfer occurs and normal processing resumes without manual intervention.

Holds Caused by Lint Filter

WAITING FOR FILTER

Whenever the dryer is waiting for the Milnor® lint filter to start a strip cycle, this message will be displayed. Once the strip cycle has finished, the dryer will resume normal operation.

STILL STRIPPING **********

Whenever the dryer desires to begin a drycode while the lint filter is stripping, this message will be displayed. Once the lint filter has finished, the dryer will resume normal operation.

Power Loss or Three-Wire Disabled Condition—If the dryer loses power (*Master switch* turned *off*) or the three wire circuit drops out (as will occur if a *Stop switch* is pressed), the dryer stops immediately. The dryer can easily be returned to automatic operation regardless of how long the dryer was stopped or what portion of the cycle it was in when it stopped.

It is not necessary to use the *manual mode* to load or unload the dryer, but merely to return it on-line. It will resume normal automatic operation and synchronize with its interfacing devices (e.g., Miltrac®, shuttle) automatically once a *power restoration sequence* (explained below) is completed.

The Power Restoration Sequences

The dryer will execute one of two possible sequences to return on-line.

If the Three-Wire Circuit was Disabled without Power Loss

① closes the *three-wire circuit* and silences the *operator alarm*

```
04F TIF TOF 001 AIR
S00 425D185 011 000
```

Dryer operation resumes from where interrupted (example—three wire disabled while running a drycode).

If Power was Lost

A.) ***Dryer is empty*****.** Start-up will be as described in "The Power Up Sequence" in this section.

B.) ***Dryer is loaded*****.**

1. Set the *Load Allowed switch* on the dryer control or at the dryer to "NOT OK" to tell the dryer that loading is *not allowed*. This is necessary because, after a power failure, the dryer controller does not know a load is still in the dryer.
2. If it is desired to discharge the load manually, or run the interrupted drycode manually, see "MANUALLY RUNNING A DRYCODE AND DISCHARGING A LOAD . . ." (see Table of Contents).
3. After the load is discharged manually or the manually run drycode is completed, enable the *Load Allowed switch* to allow the dryer to accept new loads.

Viewing Inputs and Outputs During Operation

The status of the microprocessor inputs and outputs may be viewed in the *run mode* (while the machine is running).

NOTE: This function displays inputs/outputs while the appropriate keys are held depressed. See "MANUAL MODE MENU FUNCTIONS . . ." (see Table of Contents) to display inputs/outputs for longer than a few moments or to manually actuate outputs.

To View Inputs

hold 7 STU — Displays the *first 16 inputs* (page (0) A-P)

```
(0) ABCDEFGHIJKLMNOP
    -+-+-+-+-+-+-+-+
```

+ = input *made*
- = input *not made*

hold 7 STU + 1 ABC — Displays *second 16 inputs* (page (1) A-P)

hold 7 STU + 2 DEF — Displays *third 16 inputs* (page (2) A-P)

The tables of inputs below identify each input.

Table B—Dryer Inputs

First 16 Inputs (Page 0)			Second 16 Inputs (Page 1)		
Display Code	**Input Name**	**Connector/Pin**	**Display Code**	**Input Name**	**Connector/Pin**
A	Mildata®	MTA 38-8	A	Three-Wire	1MTA 4-1
B	Program Key	MTA 38-4	B	Load Door Closed	1MTA 4-2
C	Signal Cancel	MTA 38-2	C	Discharge Door Closed	1MTA 4-3
D	No More Loads	MTA 38-5	D	Fire Eye Tripped	1MTA 4-4
E	Drycode in A	MTA 38-6	E	Load Door Open	1MTA 4-5
F	Drycode in B	MTA 38-7	F	Cylinder Not Turning	1MTA 4-6
G	not used		G	Load Shuttle Here	1MTA 4-7
H	not used		H	Discharge Allowed	1MTA 4-8
I	New Customer	MTA 39-3	I	Loaded	1MTA 4-11
J	Drycode in C	MTA 39-6	J	Jog CCW	1MTA 4-12
K	Little Load	MTA 39-7	K	Auto Allowed	1MTA 4-13
L	Drycode in D	MTA 39-4	L	Landis & Gyr Wants Gas	1MTA 4-14
M	Finished Receiving	MTA 39-3	M	Jog CW	1MTA 4-15
N	not used		N	OK For More Loads	1MTA 4-16
O	not used		O	Manual Load Door Open	1MTA 4-17
P	not used		P	No-dry Ready	1MTA 4-18

Table B—Dryer Inputs (continued)

Third 16 Inputs (Page 2)		
Display Code	**Input Name**	**Connector/Pin**
A	Lint Stripper in Use	2MTA 4-1
B	Manual Load CW	2MTA 4-2
C	Manual Load CCW	2MTA 4-3
D	Discharge Complete	2MTA 4-4
E	not used	
F	not used	
G	not used	
H	not used	
I	Main Air Overload	2MTA 4-11
J	Combustion Air Overload	2MTA 4-12
K	Basket Motor Overload	2MTA 4-13
L	Gas Pressure High	2MTA 4-14
M	Gas Pressure Low	2MTA 4-15
N	Main Air Low	2MTA 4-16
O	Combustion Air Low	2MTA 4-17
P	not used	

NOTE: The control will permit displaying the last 16 inputs even if the Milnor® lint filter or Mildata® is not configured, but in this instance, these inputs will always remain – (not energized).

To View Outputs

hold 8 VWX — Displays the *first 16 outputs* (page (0) a-p)

```
(0) abcdefghijklmnop
    -+-+-+-+-+-+-+-+
```

\+ = output *energized*
\- = output *not energized*

hold 8 VWX + 1 ABC — Displays the *second 16 outputs* (page (1) a-p)

Table C—Dryer Outputs

First 16 Outputs (Page 0)			Second 16 Outputs (Page 1)		
Display Code	**Output Name**	**Connector/ Pins**	**Display Code**	**Output Name**	**Connector/ Pins**
a	Hard Start	1MTA5-10,19	a	Get Hot (Gas) Close Cooldown (Steam)	1MTA13-9,19
b	Unload Beacon	1MTA5-9,18	b	Strip Blower	1MAT13-10,14-1
c	Out 1	1MTA5-8,17	c	No-Dry Flag	1MTA14-2,11
d	Load Desired	1MTA5-7,16	d	Close Load Door	1MTA14-3,12
e	New Customer	1MTA5-4,14	e	Open Load Door	1MTA14-4,13
f	Out 2	1MTA5-3,13	f	Open Discharge Door	1MTA14-4,14
g	Load Me	1MTA5-2,12	g	Close Discharge Door	1MTA14-10,5
h	Sprinkler	1MTA5-1,11	h	Clockwise Rotation	1MTA14-10,15
i	C-Clockwise Rotation	1MTA13-1,11	i	not used	
j	Burner Blower (Gas) Cooldown Open (Steam)	1MTA13-2,12	j	not used	
k	Main Blower	1MTA13-3,13	k	not used	
l	Operator Signal	1MTA13-4,14	l	not used	
m	Enable Main Gas	1MTA13-5,15	m	not used	
n	Damper 2 (Long Stroke)	1MTA13-6,16	n	not used	
o	Damper 1 (Short Stroke)	1MTA13-7,17	o	not used	
p	Bypass Main Air	1MTA13-8,18	p	not used	

NOTE 1: The control will permit displaying the last eight outputs (second 16, i-p) even if the Milnor® lint filter or Mildata® is not configured, but in this instance, these outputs will always remain – (not energized).
NOTE 2: The following outputs cannot be viewed: Recirculation damper—2MTA5-2,6-10; CSA operation—3MTA5-8,9 and 3MTA6-4,5.

MANUALLY RUNNING A DRYCODE AND DISCHARGING A LOAD WITH THE MARK III, IV, AND V DRYER CONTROL

⚠WARNING⚠

CRUSH AND ENTANGLE HAZARDS—When the dryer is operating automatically, door will open/close, drive motors will run/stop, and other devices will move automatically and without warning. The *owner/user* must verify that all machine guards are in place, that there is no possibility of personnel entering or reaching into the machine, and that all *emergency stop buttons* on the dryer will stop the machine.

Power Up Sequence

Master Switch *on* — **Energizes *control power*, but not dryer power.**

COPYRIGHT PELLERIN MILNOR 1989	Copyright statement **(appears one or more times)**.
ALL RIGHTS RESERVED MARK-III DRYER 90311	Number at lower right is software date code.
DRY FORMULA MEMORY CHECK SUM 8086	Number at lower right changes if formula changes are made.
THREE WIRE DISABLED **********	

① — **Energizes *dryer power* and silences operator alarm.**

WAITING FOR LOAD **********	Dryer ready for operation.

Selecting the Drycode from the Keypad

If Pass Data *Not Enabled* (*configure decision J=0*)

NOTE: If *pass data* is enabled *(configure decision J=1)*, see next page.

When the display =

```
WAITING FOR LOAD
******************
```

MANUAL LOAD **=**

```
SELECT DRYCODE
00 REDRY
```

<xx> **Selects a drycode number** where <xx> is any drycode—example:

```
RUN DRYCODE
04 BLANKETS
```

Drycode 04 selected. If an unprogrammed drycode is selected, the message *xx Not Used* will appear.

↑ or ↓ **Scrolls available drycode numbers.**

ENTER NEXT **Accepts displayed drycode.** The following display appears:

```
ENTER LOAD SIZE
0 FULL LOAD
```

Appears only if dryer configured for more than one cake in *configure decision G (Max cakes to RCV>1)*.

0= *Full load* (If dryer is to be loaded with number of cakes configured in *G*).
1= *Partial load* (If dryer is to be loaded with less than number of cakes configured in *G*) tells control to run appropriate partial drycode.

ENTER NEXT **Accepts displayed load size.**

Dryer prompts for load:

```
LOAD DRYER WITH
BLANKETS
```

Basket starts turning counterclockwise and the load door opens.

ENTER NEXT Declares that loading is completed.

```
LOADING
******************
```

The load door closes.

When the load door is closed, the normal run displays (similar to those below) will appear.

Gas and modulating steam dryers

```
04F  TIF TOF 001 AIR      alternates      04F  TIF TOF 001  VP
S00 425D185 011  000      <-- with -->    S00  382A178 011 001
```

Non-modulating steam dryers

```
04F  TIF TOF 001 AIR      alternates      04F  TIF TOF 001  SR
S00  ---D--- 011 000      <-- with -->    S00  382A178 011 100
```

When the dryer desires to discharge:

```
WAITING TO DISCHARGE      alternates      FM DC DS CC GC  WDT
                          <-- with -->    15 04 02 12 11  123
```

When discharge is allowed:

```
UNLOADING                 alternates      FM DC DS CC GC  WDT
                          <-- with -->    15 04 02 12 11  123
```

DATA	WHAT IT MEANS	DATA	WHAT IT MEANS
Displays during Heating or Cooldown			
04	Drycode number	VP	Valve position (varies from 000-255; current position shown below VP)
F	Load size (i.e., **F**ull or **P**artial)	SR	Steam Ratio (varies from 100 to 150; actual ratio shown below SR)
TIF	Inlet temperature °F or °C (**A**ctual temperature alternates with **D**esired temperature; current temperature below TIF)	S00	Current step of selected drycode
TOF	Outlet temperature °F or °C (**A**ctual alternates with **D**esired; current temperature shown below TOF)	D	Desired (programmed) temperatures
001	Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)	A	Actual temperatures
AIR	Position of damper (varies from 000-002; current position shown below AIR)	011	Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)
Displays while Waiting to Discharge or Unloading			
FM	Wash formula number for this load	CC	Customer code for this load
DC	Dry code number for this load	GC	Goods code for this load
DS	Destination for this load	WDT	Elapsed time spent waiting to discharge

If dryer is configured as CSA dryer (Canada only):

- If modulating gas valve position falls below 49, maximum damper position is 1 (Max-1).
- If modulating gas valve position falls below 19, maximum damper position is 2 (Min+1).

NOTE: To modify a running drycode. See “MANUAL DRYCODE MODIFICATIONS WITH THE . . . DRYER CONTROL” (see Table of Contents) for more information.

If Pass Data *Enabled* (*configure decision J=1*)

MANUAL LOAD

ENTER FORMULA FOR THE DRYER xxx

Enter wash formula number for this load to be passed to Milnet®/Miltrac® system, then press ENTER NEXT to accept the value. All display messages are described below.

DISPLAY MESSAGE	VALID VALUES	DESCRIPTION
ENTER FORMULA FOR THE DRYER	000-255	Enter wash formula number, as described above.
ENTER EXTRACTOR CODE FOR THE DRYER	00-15	Enter extractor code for this load to be passed to Milnet® system.
ENTER DRY CODE FOR THE DRYER	00-15	Enter drycode to be used for this load.
ENTER DESTINATION FOR THE DRYER	000-255	Enter shuttle discharge destination.
ENTER CUSTOMER FOR THE DRYER	000-999	Enter customer code to be passed on for accounting.
ENTER GOODS CODE FOR THE DRYER	000-999	Enter goods code to be passed on for accounting.
ENTER PIECES FOR THE DRYER	000-999	Enter quantity information (“WEIGHT” or “PIECES” determined by Configure decision) to be passed on for accounting.
ENTER CAKE NUMBER FOR THE DRYER	000-255	Enter cake number for FIFO (First In—First Out) handling during loading and unloading.
ENTER LOAD SIZE FOR THE DRYER	0, 1	Enter a number to designate full load or partial load to determine drycode.

<xxx>, ENTER NEXT **Accepts cake data**

Dryer prompts for load:

LOAD DRYER WITH BLANKETS

Basket starts turning counter-clockwise and the load door opens.

ENTER NEXT

Signifies to the dryer that the goods have been loaded.

LOADING
****

The load door begins closing.

When the load door is completely closed, the Normal Run Displays (similar to those below) appear.

Gas and modulating steam dryers

04F TIF TOF 001 AIR S00 425D185 011 000	alternates with	04F TIF TOF 001 VP S00 382A178 011 001

Non-modulating steam dryers

04F TIF TOF 001 AIR S00 ---D--- 011 000	alternates with	04F TIF TOF 001 SR S00 382A178 011 100

When the dryer *desires to discharge*:

WAITING TO DISCHARGE	alternates with	FM DC DS CC GC WDT 23 04 02 12 11 123

When *discharge is allowed*:

UNLOADING	alternates with	FM DC DS CC GC WDT 23 04 02 12 11 123

Interpret these displays according to the table earlier in this section.

If dryer is configured as CSA dryer (Canada only):

- If modulating gas valve position falls below 49, maximum damper position is 1 (Max-1).
- If modulating gas valve position falls below 19, maximum damper position is 2 (Min+1).

NOTE: To modify a running drycode. See "MANUAL DRYCODE MODIFICATIONS WITH THE . . . DRYER CONTROL" (see Table of Contents) for more information.

Manually Discharging a Load

To manually discharge a load, as after a power failure, use the following procedure and see FIGURE 1. See the operator manual for more control information.

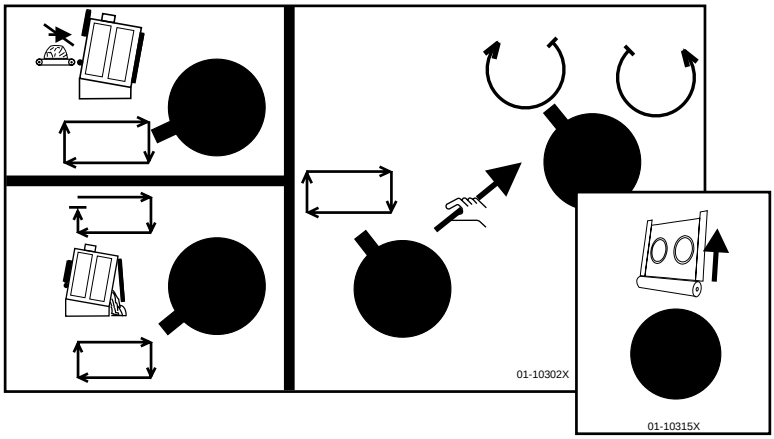


FIGURE 1 (MSOP0120BE)
Dryer Switch Panels

1. Set the *Load Allowed switch* on the dryer or the control panel to *Not OK* to prevent Miltrac from sending another load to the dryer.
2. Set the *Discharge Allowed switch* on the dryer or the control panel to *Manual*. The door opens and the basket stops rotating.
3. Set the *Manual/Automatic switch* on the dryer to *Manual*. The display shows *Manual Jog Allowed*, and the discharge door opens. This also enables the *Jog switch*.
4. Toggle the *Jog switch* between the clockwise and counter-clockwise positions until the load is discharged.
5. Set the *Manual/Automatic switch* back to *Automatic*. The discharge door will close and the display will show *Waiting For Load*.
6. Set the *Load Allowed switches* on the dryer and the control panel to *Auto OK*.

MANUAL DRYCODE MODIFICATIONS WITH THE MARK III, IV, AND V DRYER CONTROL

B

How the Manual Password Works

If *Manual Password=Yes* in *program mode 2=Configure,* decision *T*, the correct four-digit password must be entered before intervention under *manual mode A* or *B* is permitted.

For *manual mode A* (*without pressing*  **)**

Once a valid password is entered, any number of the functions available in this mode can be performed within the 10 seconds allowed by the manual password. After 10 seconds the password must be reentered.

Whenever the password is required, the control will prompt for it. For example, to change damper position:

 **If password protection is configured,**

Display = 

Password **is a four-digit number, previously configured.**

[*x, x, x, x*] (means type the password) **Must be entered within 10 seconds.**

 **Changes damper position** (if entered within 10 seconds after valid password entered).

As in the above example, any manual functions that require key(s) to be held depressed also require the necessary key stroke(s) to be *reentered* after entering the password.

If an invalid password is entered or after 10 seconds,

the display momentarily = 

then returns to *Automatic Run* displays.

For *manual mode B* (*after pressing*  **)**

Once the password has been used to enter *manual mode,* it is no longer required to start or stop any functions, or to escape.

Manual Mode A—Modifying a Running Drycode without Pressing [MANUAL]

Manual mode A is available from the normal operating display. It allows the operator to modify certain parameters of the drycode in progress without suspending it (without stopping the drycode timer). Most functions available in this mode affect only the current step.

Gas and modulating steam dryers

```
04F TIF TOF 001 AIR
S00 425D185 011 000
```

alternates with

```
04F TIF TOF 001  VP
S00 382A178 011 001
```

Non-modulating steam dryers

```
04F TIF TOF 001 AIR
S00 ---D--- 011 000
```

alternates with

```
04F TIF TOF 001  SR
S00 382A178 011 100
```

DATA	WHAT IT MEANS
04	Drycode number
F	Load size (i.e., **F**ull or **P**artial)
TIF	Inlet temperature ℉ or ℃ (**A**ctual temperature alternates with **D**esired temperature; current temperature below TIF)
TOF	Outlet temperature ℉ or ℃ (**A**ctual temperature alternates with **D**esired temperature; current temperature below TOF)
001	Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)
AIR	Position of damper (varies from 000-002; current position shown below AIR)
VP	Valve position (varies from 000-255; current position shown below VP)
SR	Steam Ratio (varies from 100 to 150; current ratio shown below SR)
S00	Current step of selected drycode
D	Desired (programmed) temperatures
A	Actual temperatures
011	Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)

FIGURE 1 (MSOP0122AE)
Typical Dryer Displays—Drycode Running

TIMER STOP

```
04F  TIF TOF 001  VP
S00  382A178 --- 001
```

Stops the drycode timer. All functions in progress continue until *Max Heat Time* or *Max Cool Time* is reached, depending upon whether this is a heating or a cooldown step. CANCEL ESCAPE or TIMER STOP resumes timing.

BSKT SPEED + ↑

```
MANUAL SPEED CONTROL
SPEED = 100%
```

Increases basket speed for step in progress (only if machine is so equipped). (The display skews approximately 2% per second.)

BSKT SPEED + ↓

Decreases basket speed for step in progress (only if machine is so equipped). (The display skews approximately 2% per second.)

BASKET 2-WAY

```
04F  TIF TOF 001  VP
S00  382A178 022 001
```

Toggles basket rotation between *one-way* and *reversing* for step in progress.

DAMPER + ↑

```
DAMPER POSITION
1 <==> MAX - 1
```

Increases damper setting (decreases airflow) for the step in progress.

DAMPER + ↓

Decreases damper setting (increases airflow) for the step in progress.

EXTEND HELP

```
04F TIF TOF 001 VP
S00 382A178 022 001
```

Extends step in progress one minute (repeat for each additional minute).

CANCEL ESCAPE

```
04F TIF TOF 001 VP
S01 382A178 022 001
```

Terminates the current step and proceeds to the next step.

DATA

```
ALL RIGHTS RESERVED
MARK-II DRYER  90022
```

Displays copyright information and software version number while the dryer is performing a valid drycode.

S0

```
DL IN OUT   AMB  003
06 13 31.28 081
```

Displays first screen of *humidity sensor* information.

DL = commanded differential humidity.
IN = actual inlet humidity
OUT = actual outlet humidity
AMB= ambient temperature
003 = value of sample timer (counts from 010 to 000)

ENTER NEXT Returns to normal operating display.

S1

```
IN SUM  #  IN   OUT
112.23  09 1632 2341
```

Displays second screen of *humidity sensor* information.

IN SUM = sum of inlet humidity samples
# = number of times inlet was sampled
IN = actual inlet humidity value returned by A/D board
OUT = actual outlet humidity value returned by A/D board

ENTER NEXT Returns to normal operating display.

0

```
THREE WIRE DISABLED
******************
```

Stops the drycode in progress.

CANCEL ESCAPE + **1**

```
WAITING FOR LOAD
******************
```

Clears previous display (caused by 0) and returns dryer to *ready mode* after drycode cancellation.

Manual Mode B—Modifying a Running Drycode after Pressing [MANUAL]

Manual mode B permits the operator to suspend the drycode in progress (stopping the drycode timer) and take over manual control. When *manual mode B* is exited, the interrupted drycode resumes. Once in *manual mode B,* the password is not required to start or stop any function or to escape.

⚠WARNING⚠

FIRE HAZARD—Goods can catch fire when *manual mode B* is accessed because the modulating valve remains at the position achieved when MANUAL is pressed.

- ☞ **Do not attempt to use this mode without a thorough understanding of the consequences.**
- ☞ **Do not permit overheating or overdrying goods under manual control.**

MANUAL **Enters *manual mode*.** The timer stops and the display appears as shown below.

CANCEL ESCAPE **Exits *manual mode*.** The *run display* returns and interrupted automatic drycode is resumed.

Display = **TIFHTOF LDA MVP BSPD**
392+154 -0+ 022 2100

DATA	WHAT IT MEANS
TIF	Actual inlet temperature Fahrenheit or Celsius
H	Heat enabled (+) or disabled (-)
TOF	Actual outlet temperature Fahrenheit or Celsius
L	AutoLint cycle is in progress (+) or not in progress (-) or not available (*)
D	Damper position: 0=MAX AIR, 1=MAX-1, 2=MIN+1 AIR
A	Main blower is operating (+) or not operating (-)
MVP	Modulating valve position; if dryer not equipped with modulating valve, displays "***"
B	Basket motor state: 0=OFF, 1=Rotating One Way, 2=Reversing
SPD	Basket motor speed; if dryer not equipped with variable speed controller, displays "***"

FIGURE 2 (MSOP0236AE)
Typical Display in Manual Mode

AUTO LINT	TIFHTOF LDA MVP BSPD 397-129 +0- 000 2110	**Initiates an automatic cycle of a Milnor® Autolint® system** (if machine so equipped). Heat and blower motor are both turned *off* if *on* when lint stripper cycle is commanded.
HEAT ON/OFF	TIFHTOF LDA MVP BSPD 397-129 -0+ 000 2110	**Turns *Get hot relay on (+)/off (-)* on gas dryers; *closes (+)/opens (-)* cooldown damper on steam dryers.** Heat cannot be turned on if blower motor or basket motor is off.
DAMPER + ↑	TIFHTOF LDA MVP BSPD 397+129 -1+ 000 2110	**Increases *damper setting* (decreases airflow).**
DAMPER + ↓		**Decreases *damper setting* (increases airflow).**
MOD VALVE POSITION + ↑	TIFHTOF LDA MVP BSPD 392+154 -0+ 022 2100	**Increases *modulating valve position* (only if machine so equipped) Maximum position is 255.** This value is replaced with "***" on non-modulating steam dryers.
MOD VALVE POSITION + ↓		**Decreases *modulating valve position* (only if machine so equipped). Minimum position is 000.** This value is replaced with "***" on non-modulating steam dryers.
BLWR ON/OFF	TIFHTOF LDA MVP BSPD 392-154 -0- 022 2100	**Turns blower motor *on/off*. Also turns heat *off* if *on* when blower motor turned *off*.**
BSKT ON/OFF	TIFHTOF LDA MVP BSPD 392-154 -0+ 022 0100	**Turns basket motor *on/off*. Also turns heat *off* if *on* when basket motor turned *off*.**
BASKET 2-WAY	TIFHTOF LDA MVP BSPD 392+154 -0+ 022 1100	**Toggles basket rotation between *one-way* and *reversing*.**
BSKT SPEED + ↑	TIFHTOF LDA MVP BSPD 392+154 -0+ 022 2110	**Increases basket speed (only if machine is so equipped). Maximum speed is 120 percent of nominal.** (The display skews approximately 2% per second.) Replaced with "***" on dryers with single speed basket motors.
BSKT SPEED + ↓		**Decreases basket speed (only if machine is so equipped). Minimum speed is 50 percent of nominal.** (The display skews approximately 2% per second.) Replaced with "***" on dryers with single speed basket motors.

DRYCODE REPORTS

(see "PROGRAMMING . . ." and "MANUAL MODE MENU . . ." (see Table of Contents) for other reports) B

When desired, two types of reports giving information on drycode operation can be generated and printed. The programmed drycodes can be printed with *program mode 7=Print Data* (see "PROGRAMMING THE . . . DRYER CONTROL"). Production data since the accumulator data was last cleared can be viewed or printed as described in "MANUAL MODE MENU FUNCTIONS . . ." (see Table of Contents).

Temperature Profile This report can only be generated while the drycode is *running*. It details the temperature profile, step parameters, and reason for step termination.

Dry Cycle Details This report can be viewed or printed only when the dryer is *not running*. It details step parameters and reasons for step termination for the 10 drycodes run most recently.

How To Interpret This Data

Both reports use similar formats which can be interpreted with the information described in Tables A and B.

Table A—Fields and Descriptions

Field			Description
Temperature Profile	**Dry Cycle Details (printed)**	**Dry Cycle Details (viewed)**	
DRYCODE	DRYCODE	04F TIF TOF 041 VP S00 423 183 NORM 0 05	Number of drycode currently running; "F" or "P" denotes *full* or *partial* load drycode, respectively
TIME	MMQ	04F TIF TOF 041 VP S00 423 183 NORM 0 05	**Temperature Profile:** Time (MMQ) into drycode at which measurement was made **Details:** Elapsed heat or cool time before end of step.
STEP	STEP	04F TIF TOF 041 VP S00 423 183 NORM 0 05	Current step of the drycode B
HOW	HOW	N/A	Type of step—see "PROGRAMMING THE . . . DRYER CONTROL" (see Table of Contents)
IdF (IdC)	IdF (IdC)	04F TIF TOF 041 VP S00 423 183 NORM 0 05	Inlet temperature in degrees Fahrenheit or Celsius.
2IF (2IC)	N/A	N/A	Second inlet temperature in degrees Fahrenheit or Celsius.
OdF (OdC)	OdF (OdC)	04F TIF TOF 041 VP S00 423 183 NORM 0 05	Outlet temperature in degrees Fahrenheit or Celsius.

VP	VP	04F TIF TOF 041 VP S00 423 183 NORM 0 05	Modulating valve position
AIR	N/A	N/A	Main air damper position
HI	N/A	N/A	Inlet humidity (only if dryer so equipped)
HO	N/A	N/A	Outlet humidity (only if dryer so equipped)
REASON FOR TERMINATION	REASON STEP ENDED	04F TIF TOF 041 VP S00 423 183 NORM 0 05	One of six possible reasons the step ended—see Table B for explanation

Table B—Termination Codes and Descriptions

Reason for Termination (both reports, printed)	Reason for Termination (viewing Details report)	Description
STEP PARAMETERS SATISFIED	NORM	Normal termination—all programmed parameters were met.
STEP CANCELLED BY OPERATOR	CNCL	Termination by operator—the operator pressed CANCEL ESCAPE during this step.
MAX TIME REACHED	MAXT	Maximum heat or cool time was reached (MHT or MCT expired) before the programmed parameters were satisfied.
OUTLET EXCEEDED 220F (104C)	>220	Maximum allowable outlet temperature (220°F) was exceeded for more than five seconds.
MIN FIRE FAULT	MINF	Outlet temperature continuted to rise after the modulating valve was commanded to its minimum position.
POWER FAILURE DURING THIS STEP	POWER FAILURE DURING THIS STEP	Power was interrupted during this step, therefore, no data was recorded.

How To Access *Temperature Profile*

If a printer is properly attached to the dryer, loaded with paper, and on-line during the time a drycode is running. One data line on the report (FIGURE 1) will be printed every 30 seconds. See sample printout on the next page. If a drycode is in progress at the time the printer is attached and placed on-line, the report will begin at the point at which the printer was attached (e.g., the header information will not be printed).

FIGURE 1 (MSOP0123BE)
Sample Printout—Temperature Profile

```
        P E L L E R I N  M I L N O R  C O R P O R A T I O N
DRYER: 58058TG2            DRYCODE 00 REDRY              FULL LOAD
_____________________________________________________________________________
                          TEMPERATURE PROFILE
MMQ STEP HOW  IdF  2IF  OdF   VP  AIR  IN OUT  MHT  MCT
022   0   3   375       165  150   1   -- ---  250  ---  <--COMMANDED
000   0   3   089       010  150   2
002   0   3   271       102  150   1
010   0   3   364       141  144   1
012   0   3   372       153  140   1
020   0   3   374       159  111   1
022   0   3   375       165  099   1
030   0   3   374       165  087   1
032   0   3   374       165  087   1
040   0   3   375       165  087   1
042   0   3   375       165  088   1
050   0   3   375       165  087   1
  REASON STEP ENDED: STEP PARAMETERS SATISFIED

000   1   2   ---  275  165  150   2   -- ---  210  ---  <--COMMANDED
051   1   2   340       165  085   1
052   1   2   285       165  072   2
  REASON STEP ENDED: STEP PARAMETERS SATISFIED

000   2   0   ---  ---  150  125   2   -- ---  ---  050  <--COMMANDED
053   2   0   240       148  007   2
060   2   0   200       118  000   2
  REASON STEP ENDED: STEP PARAMETERS SATISFIED

HOWCODE BELOW:  AIRFLOW -> 0=MAX; 1=LESS THAN MAX; 2=MORE THAN MIN
0 = COOLDOWN Step ends when outlet temperature falls below commanded.
1 = TIME ONLY Step ends when commanded time expires.
2 = INLET - Step ends when inlet temperature falls below commanded.
3 = OUTLET + Step ends when outlet temperature rises above commanded.
4 = TUMBLE Basket turns without heat or airflow.
5 = TUMBLE+AIR Basket turns with air only. (No heat.)
6 = STEAM RATIO Step ends at commanded steam ratio.
7 = HUMIDITY Step ends when final delta humidity achieved.
```

How To Access *Dry Cycle Details*

When the display =

WAITING FOR LOAD **********

DATA =

DRY CYCLE DETAILS 0 VIEW

0=VIEW
1=PRINT

↑ or ↓ **Scrolls the choices.**

0=VIEW

When the display =

DRY CYCLE DETAILS 0 VIEW

ENTER/NEXT

04F TIF TOF 041 VP S00 423 183 NORM 108

Displays data for the last load processed. Drycode 04F was the last drycode run. Step 00 terminated normally (*Norm*—all programmed parameters were met) after 4 minutes, 15 seconds (041) of elapsed heat time. At termination, the *inlet temperature (TIF)* was 423°Fahrenheit, the *outlet temperature (TOF)* was 183°Fahrenheit, and the *modulating valve* (VP) was at position 108.

ENTER/NEXT

04F TIF TOF 080 VP S01 230 185 NORM 005

Step 01 terminated normally after eight minutes of elapsed heat time. At termination, *inlet temperature* was 230°Fahrenheit, *outlet temperature* was 185°Fahrenheit, and the *modulating valve* was at position 005 (nearly closed).

ENTER/NEXT

04F TIF TOF 032 COOL S01 082 123 NORMDOWN

Step 02 terminated normally after 3 minutes, 30 seconds of elapsed cool time. *Inlet* and *outlet temperatures* were 82°Fahrenheit and 123°Fahrenheit, respectively.

ENTER/NEXT

"SKIP" TO EXIT "NEXT" FOR MORE DATA

SKIP TO

"SKIP" FOR NO CHANGE "4-5-6" TO CLEAR

SKIP TO

WAITING FOR LOAD **********

Returns dryer to *run mode*.

or

4 JKL + 5 MNO + 6 PQR

DATA CLEARED

Clears all previously accumulated dry cycle details (all 10 drycodes), then returns dryer to *run mode*.

WAITING FOR LOAD **********

ENTER/NEXT **Displays similar data for previously run drycode.**

1=PRINT

(see also "PROGRAMMING . . ." and "MANUAL MODE . . ." in Table of Contents for other reports)

When the display =

```
DRY CYCLE DETAILS
1 PRINT
```

The following actions will print this data for the last 10 drycodes.

Make sure printer is properly attached, loaded with paper, and on-line. See "REQUIREMENTS AND SETTINGS FOR THE EPSON LX300 PRINTER" (see Table of Contents).

ENTER/NEXT

```
DATE: MM-DD-YYYY
  XX-XX-XXXX
```

Enables printing of *accumulated dry cycle details* and prompts for the date. The control provides for entering today's date at the top of the printout.

ENTER/NEXT, ENTER/NEXT, ENTER/NEXT **Retains the date shown.**

If desired, enter a new date as in the following example:

0, 9 WXYZ-, ENTER/NEXT **Enters 09 for the day.** Cursor advances to month.

```
DATE: DD-MM-YYYY
  09-XX-XXXX
```

1, 2 ABC, ENTER/NEXT **Enters 12 for the month.** Cursor advances to year.

```
DATE: DD-MM-YYYY
  09-12-XXXX
```

1, 9 WXYZ-, 9 WXYZ-, 2 ABC **Enters 1992 for year.**

```
DATE: DD-MM-YYYY
  09-12-1992
```

ENTER/NEXT **Accepts year and *begins printing*.**

```
PRINTING…
 **PLEASE WAIT**
```

A sample printout is shown in FIGURE 2.

After printing, display returns to

```
WAITING FOR LOAD
********************
```

FIGURE 2 (MSOP0123BE)
Sample Printout—Dry Cycle Details

P E L L E R I N M I L N O R C O R P O R A T I O N
DRYER: 58058TG2 **VERSION** 90213-S **DATE:** 11/08/1994 **PAGE:** 01

DRY CYCLE DETAILS

03F **PATIENT GOWNS** MMQ

STEP	HOW	IdF	OdF	STEP TOTAL	VP	REASON FOR TERMINATION
00	3	375	180	013 013	108	STEP PARAMETERS SATISFIED
01	2	251	179	020 020	007	STEP PARAMETERS SATISFIED
02	0	118	127	032 032	000	STEP PARAMETERS SATISFIED

03F **PATIENT GOWNS** MMQ

STEP	HOW	IdF	OdF	STEP TOTAL	VP	REASON FOR TERMINATION
00	3	375	179	022 022	087	STEP PARAMETERS SATISFIED
01	2	249	179	020 020	013	STEP PARAMETERS SATISFIED
02	0	118	127	032 032	000	STEP PARAMETERS SATISFIED

04F **BLANKETS** MMQ

STEP	HOW	IdF	OdF	STEP TOTAL	VP	REASON FOR TERMINATION
00	3	400	224	031 031	123	OUTLET EXCEEDED 220°F (104°C)
01	2	401	221	000 000	000	OUTLET EXCEEDED 220°F (104°C)
02	0	092	127	032 032	000	STEP PARAMETERS SATISFIED

04F **BLANKETS** MMQ

STEP	HOW	IdF	OdF	STEP TOTAL	VP	REASON FOR TERMINATION
00	3	374	175	031 031	056	STEP CANCELLED MANUALLY
01	2	251	180	020 020	007	STEP PARAMETERS SATISFIED
02	0	112	127	032 032	000	STEP PARAMETERS SATISFIED

03F **PATIENT GOWNS** MMQ

STEP	HOW	IdF	OdF	STEP TOTAL	VP	REASON FOR TERMINATION
00	3	375	170	150 150	087	MAX TIME REACHED
01	2	250	181	020 020	013	STEP PARAMETERS SATISFIED
02	0	118	127	032 032	000	STEP PARAMETERS SATISFIED

MANUAL MODE MENU FUNCTIONS ON THE MARK III, IV, AND V DRYER CONTROL

D

How To Access This Menu

The Available Functions in This Menu

01 = BASKET FUNCTIONS (rotate the basket clockwise, counterclockwise, or enable reversing)
02 = BLOWER FUNCTIONS (operate the main blower or the main blower stripper air valve)
03 = HEATING FUNCTIONS (operate the burner blower or the cooldown damper)
04 = DAMPER FUNCTIONS (operate the main air damper)
05 = DOOR FUNCTIONS (open and close the loading and discharge doors)
06 = LOADING FUNCTIONS (operate the load end flag, nodry load end flag, and load desired outputs)
07 = DATA PASSING (operate the new customer, destination 0, and destination 1 outputs)
08 = FILTER FUNCTIONS
09 = TEST SIGNALS (operate the signal and unload beacon outputs)
10 = TEST SPRINKLER (operate the sprinkler output)
11 = TEST INPUTS (view any input for testing)
12 = SETUP PROCEDURE
13 = DATA ACCUMULATION (display, print, and clear accumulated drycode data)
(see also "PROGRAMMING . . ." and "DRYCODE REPORTS" in Table of Contents for other reports)

To Access the Menu

When the display =

WAITING FOR LOAD	
**********	

MANUAL — ***Accesses* the menu**

RETURN TO AUTOMATIC	
00	

Underline indicates blinking cursor, select one of 13 *manual modes* or return to the *run mode* as explained below.

↑ or ↓ — ***Scrolls* the available functions**.

or <xx> — ***Selects* function xx**

BLOWER FUNCTIONS	
02	

Manual function 02 selected.

For Return to Run Mode From This Menu

When the display =

BLOWER FUNCTIONS	
02	

Example: *manual function 02* selected

0, 0 —

RETURN TO AUTOMATIC	
00	

Selects *manual function 00*.

ENTER NEXT —

WAITING FOR LOAD	
**********	

Dryer ready for normal automatic operation.

With *manual mode (1-13)* selected:		BLOWER FUNCTIONS 02	Example: *manual mode 2* selected.
ENTER NEXT	***Accesses* the selected mode.**	1 = MAIN BLOWER 2 = STRIPPER	*Manual mode 2* accessed. See instructions elsewhere in this section.

⚠ WARNING ⚠

CRUSH AND ENTANGLE HAZARDS—When dryer is operating automatically or manually, drive motors will run/stop, conveyors will run/stop, and other devices will move automatically and without warning. The *owner/user* must verify that all machine guards are in place, personnel cannot enter or reach into the machine, and the red *emergency stop buttons* on dryer and pull cords on conveyor(s) stop the machine.

01=Basket Functions

When the display =

BASKET FUNCTIONS 01

The basket may be manually operated to test the dryer.

ENTER/NEXT =

1 = TURN TWO WAYS 2 = CW 3= CCW

CW=clockwise
CCW=counterclockwise

1 ABC / 1 ABC **Starts/stops the basket reversing (CW and CCW):**

How the Basket Reversing Sequence Works

Assume reversing begins with *clockwise* rotation. See figure below.

1. *Relay CW* is turned *on*.
2. After one second, *relay Hard Start* is turned *on*. *Relay CW* remains *on*.
3. After one second, *relay Hard Start* is turned *off*. *Relay CW* remains *on*.
4. After a total of 15 seconds, *relay CW* is turned *off*.
5. Motor dwells (coasts) for 2.5 seconds.
6. *Relay CCW* is turned *on*.
7. Sequence continues with step 2, except *relay CCW* replaces *relay CW*.

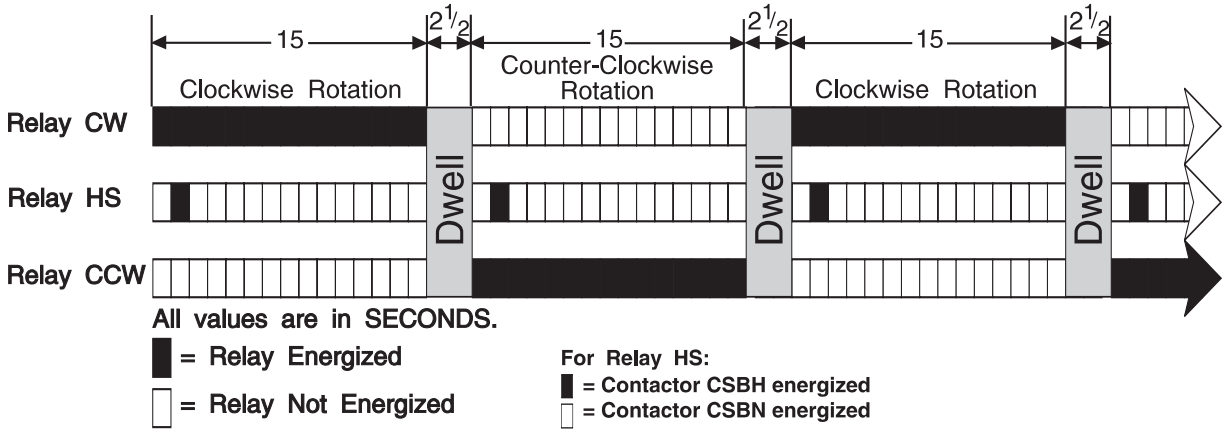


FIGURE 1 (MSOP0109CE)
Reversing Rotation Sequence

2 DEF / 2 DEF **Starts/stops the basket clockwise:**

1. *Relay CW* is turned *on*.
2. After one second, *relay Hard Start* is turned *on*. *Relay CW* remains *on*.
3. After one second, *relay Hard Start* is turned *off*. *Relay CW* remains *on* until rotation is terminated by pressing 2 DEF.

3 GHI / 3 GHI Starts/stops the basket counterclockwise:

1. *Relay CCW* is turned *on*.
2. After one second, *relay Hard Start* is turned *on*. *Relay CCW* remains *on*.
3. After one second, *relay Hard Start* is turned *off*. *Relay CCW* remains *on* until rotation is terminated by pressing 3 GHI.

Functions **cannot** be enabled simultaneously. The 2.5-second dwell (coast) time must be observed when manually changing from CW to CCW or vice-versa. When reversing operation is commanded, blinking cursors highlight both *1 = Turn Two Ways* and either *2 = CW, or 3 = CCW*, depending upon the direction of rotation.

ENTER NEXT or CANCEL ESCAPE Turns all outputs *off* and returns to

02=Blower Functions

When the display =

```
BLOWER FUNCTIONS
02
```

The main blower and/or the main blower stripper air valve may be operated.

ENTER/NEXT =

```
1 = MAIN BLOWER
2 = STRIP
```

These functions can be enabled simultaneously.

1 ABC / 1 ABC ***Starts/stops* the main blower.**

2 DEF / 2 DEF ***Enables/disables* the main blower stripper air valve.**

ENTER/NEXT or CANCEL/ESCAPE Returns to

```
BLOWER FUNCTIONS
02
```

03=Heating Functions

When the display =

```
HEATING FUNCTIONS
03
```

This mode allows the operator to perform functions related to heating the dryer. The available functions depend upon whether the dryer is heated by *gas* or *steam*.

For *Gas* Dryers

ENTER/NEXT =

```
1 = BURNER BLOWER
2 = GET HOT
```

These functions can be enabled simultaneously.

1 ABC / 1 ABC **Turns *on/off* the combustion air blower.**

2 DEF / 2 DEF **Turns *on/off* the *get hot output.***

ENTER/NEXT or CANCEL/ESCAPE **Turns all outputs *off*** and returns to

```
HEATING FUNCTIONS
03
```

For *Steam* Dryers

ENTER/NEXT =

```
1 = OPEN COOLDOWN
2 = CLOSE COOLDOWN
```

These functions can **never** be enabled simultaneously.

1 ABC = ***Opens* the cooldown damper.**

2 DEF = ***Closes* the cooldown damper.**

ENTER/NEXT or CANCEL/ESCAPE **Turns all outputs *off*** and returns to

```
HEATING FUNCTIONS
03
```

04=Damper Functions

When the display =

```
DAMPER FUNCTIONS
04
```

The main air damper may be manually operated to verify MAX, MAX-1, MIN +1, and MIN settings.

ENTER/NEXT =

```
1 = SHORT STROKE
2 = LONG STROKE
```

1 ABC / 1 ABC ***Enables/disables*** **short (2") air cylinder.**

2 DEF / 2 DEF ***Enables/disables*** **long (3") air cylinder.**

MAIN AIR DAMPER SETTING	SHORT STROKE	LONG STROKE
MAX AIR	OFF	OFF
MAX - 1	ON	OFF
MAIN + 1	OFF	ON
*MIN	ON	ON

* MIN AIR not available in programming; it is used automatically by the control when the pilot is being lighted in gas dryers only.

ENTER/NEXT **or** CANCEL/ESCAPE **Turns all outputs *off*** and returns to

```
DAMPER FUNCTIONS
04
```

05=Door Functions

When the display =

```
DOOR FUNCTIONS
05
```

The load and discharge doors may be opened or closed.

ENTER NEXT =

```
LOAD  1=OPEN 2=CLOSE
DISCH 3=OPEN 4=CLOSE
```

1 ABC **Opens the load door.**

2 DEF **Closes the load door.**

3 GHI **Opens the discharge door.**

4 JKL **Closes the discharge door.**

These functions can be enabled simultaneously, but never *Load Open (1)* and *Load Close (2)* or *Disch Open (3)* and *Disch Close (4)*.

⚠ CAUTION ⚠

The discharge and load doors *close* when the operator exits this mode by pressing ENTER NEXT or CANCEL ESCAPE. The discharge door is forced closed via an output. The load door is closed by gravity.

ENTER NEXT **or** CANCEL ESCAPE **Turns all outputs *off*** and returns to

```
DOOR FUNCTIONS
05
```

06=Loading Functions

When the display =

```
LOADING FUNCTIONS
06
```

ENTER NEXT =

```
1=FLAG 2=NODRY FLAG
3=LOAD DESIRED
```

1 ABC / 1 ABC **Turns the *load end flag (FLAG) output on/off*.**

2 DEF / 2 DEF **Turns the *load end no flag (NODRY FLAG) output on/off*.**

3 GHI / 3 GHI **Turns the *load desired output on/off*.**

These functions can be enabled simultaneously. Devices that interface to the dryer depend on these outputs for proper operation. Ensure that those devices can *not* be effected before testing these functions.

ENTER NEXT **or** CANCEL ESCAPE **Turns all outputs *off*** and returns to

```
LOADING FUNCTIONS
06
```

07=Data Passing

When the display =

DATA PASSING
07

ENTER NEXT =

1=NEW CUSTOMER
2=DEST 0 3=DEST 1

1 ABC / 1 ABC = **Turns *new customer output on/off*.**

2 DEF / 2 DEF = **Turns *destination 0 (DEST 0) output on/off*.**

3 GHI / 3 GHI = **Turns *destination 1 (DEST 1) output on/off*.**

These outputs can all be enabled simultaneously.

Table of Destination Codes

Destination	Status of DESTINATION 0	Status of DESTINATION 1
0	0=off	0=off
1	1=on	0=off
2	0=off	1=on
3	1=on	1=on

ENTER NEXT or CANCEL ESCAPE = **Turns all outputs *off*** and returns to

DATA PASSING
07

08=Filter Functions

When the display =

```
FILTER FUNCTIONS
08
```

ENTER/NEXT =

```
1=AUTOMATIC 2=WINGS
3=BLOWER 4=STRIPPER
```

1 ABC / 1 ABC — ***Starts/stops*** **an automatically sequenced (*Automatic*) cycle of the Milnor® Dryvac lint collector as described below (only if machine is so equipped).**

2 DEF / 2 DEF — ***Extends/retracts*** **lint filter wings (*Wings*).**

3 GHI / 3 GHI — **Turns the lint filter blower (*Blower*) *on/off*.**

4 JKL / 4 JKL — **Turns the internal lint screen stripper air valve (*Stripper*) *on/off*.**

ENTER/NEXT or CANCEL/ESCAPE — **Turns all outputs *off*** and returns to

```
FILTER FUNCTIONS
08
```

How the Autolint®/Autovac® Lint Stripper Cycle Works

When 1 ABC is pressed to start an automatic lint stripper cycle, the following sequence occurs:

1. Relay *Desire Lint Stripper* is turned *on*. This relay remains *on* for the duration of the cycle.
2. If Autovac® is in use, requested cycle holds until cycle in progress is finished. If Autovac® is not in use, damper wings extend 4 seconds after 1 ABC is pressed, and remain extended for the duration of the cycle.
3. Ten seconds after wings extend, the Autovac® blower motor starts, and the dryer internal lint screen stripper air valve opens to break lint from filter.
4. Air valve remains open for 10 seconds.
5. Blower runs for 35 seconds after air valve closes (45 seconds total).
6. Wings retract after blower stops.
7. Relay *Desire Lint Stripper* turns *off* five seconds after wings retract.

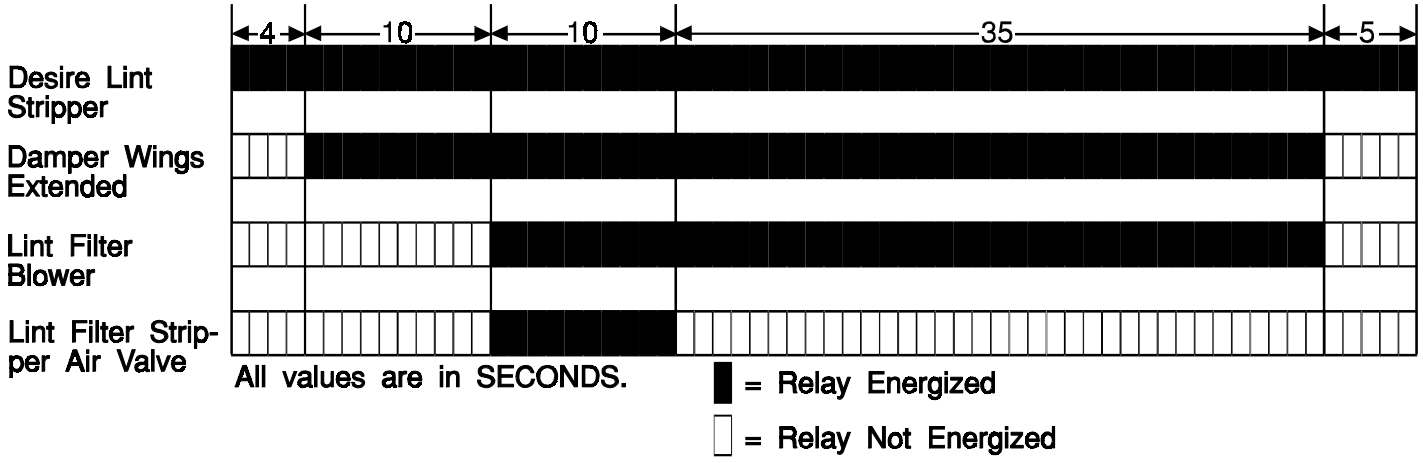


FIGURE 2 (MSOP0109CE)
Automatic Lint Stripper Sequence

09=Test Signals

When the display =

```
TEST SIGNALS
09
```

ENTER/NEXT =

```
1 = MAIN SIGNAL
2 = UNLOAD BEACON
```

1 ABC / 1 ABC **Turns the *main (operator) signal output* on the control panel *on/off*.**

2 DEF / 2 DEF **Turns the *unload beacon output* on the dryer *on/off*.**

ENTER/NEXT **or** CANCEL/ESCAPE **Turns all outputs *off*** and returns to

```
TEST SIGNALS
09
```

These functions can be enabled simultaneously.

10=Test Sprinkler

When the display =

```
TEST SPRINKLER
10
```

⚠ CAUTION ⚠

This output will *enable* sprinkler, causing water to enter the dryer if the manual shut-off valve is open. For testing only: *close* the manual shut-off valve, turn output *on* then *off*, reset red knob, and reopen manual shut-off valve. See the nameplate near the sprinkler control or the Installation and Service manual for complete sprinkler testing procedure.

ENTER/NEXT =

```
1 = RELEASE VALVE
```

1 ABC / 1 ABC **Turns the sprinkler (*release valve*) output *on/off*.**

11=Test Inputs

The *on/off* status of each input to the microprocessor can be displayed via the *manual menu* while the dryer is *not* running.

NOTE: Inputs can also be viewed while the machine is operating. See "RUNNING THE . . . DRYER IN AUTOMATIC SYSTEMS" (see Table of Contents).

When the display=

```
TEST INPUTS
11
```

ENTER NEXT — **Displays the *first* *16 inputs* (Page 0: A-P)**

```
(0) ABCDEFGHIJKLMNOP
    --+--+----------
```

1 ABC — **Displays the *second* *16 inputs* (Page 1: A-P)**

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

2 DEF — **Displays the *third* *16 inputs* (Page 2: A-P)**

```
(2) ABCDEFGHIJKLMNOP
    ----------------
```

Input display code shown on the top line (see "RUNNING THE . . ." for tables of standard inputs) and the status of the input is shown below its code ("+"=input energized or "-"=input not energized).

To test an input requiring you to move away from the keypad, press SKIP TO until the desired input is highlighted, then test the input. When the input is made, the unload beacon on the dryer illuminates and the main signal on the control panel sounds.

12=Setup Procedure

This function simplifies adjustment of the gas train when first commissioning a gas dryer. See "GAS AND AIR ADJUSTMENTS FOR MILNOR® GAS DRYERS" in the Installation and Service manual for complete instructions on the use of this function.

13=Data Accumulation

(see also "PROGRAMMING . . ." and "DRYCODE REPORTS" in Table of Contents for other reports)

B

Data Available—The control stores loads produced data for accounting and to measure operating efficiency. This data is available, since the last time data was cleared, for the last load processed, for accumulated totals for each drycode, and for all drycodes combined. See FIGURE 3 in this section for a sample printout. The data includes the following:

- Drycode number
- Loads—The number of loads processed.
- Run time—Total time required to process a load from start to end of drycode including error and wait time.
- Wait time—time during which Dryer is *Waiting For Load* or *Waiting To Discharge*.
- Error time—Time during which normal operation is suspended because of an error condition.

The dryer is also capable of producing other reports, as described in this section and "DRYCODE REPORTS." See Table of Contents.

Available Modes in Data Accumulation

0=Display Data **(view accumulated data on the display)**

1=Print **(print accumulated data if a printer is installed)**

2=Clear **(clear all accumulated totals)**

To Access the Accumulated Data

When the display=

DATA ACCUMULATION 13	ENTER/NEXT =	0 0=DISPLAY DATA 1=PRINT 2=CLEAR

This is the *data accumulator sub-menu*.

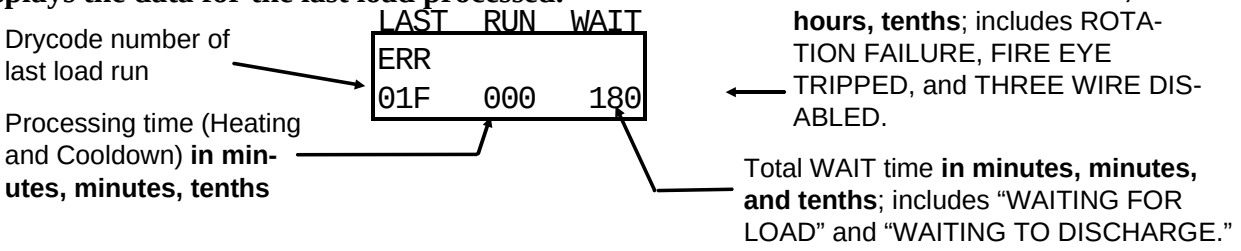
For Quick Exit From Anywhere in Data Accumulation

CANCEL/ESCAPE **Returns to the next higher menu.** Repeat until desired menu appears.

Data Accumulation: 0=Display Data

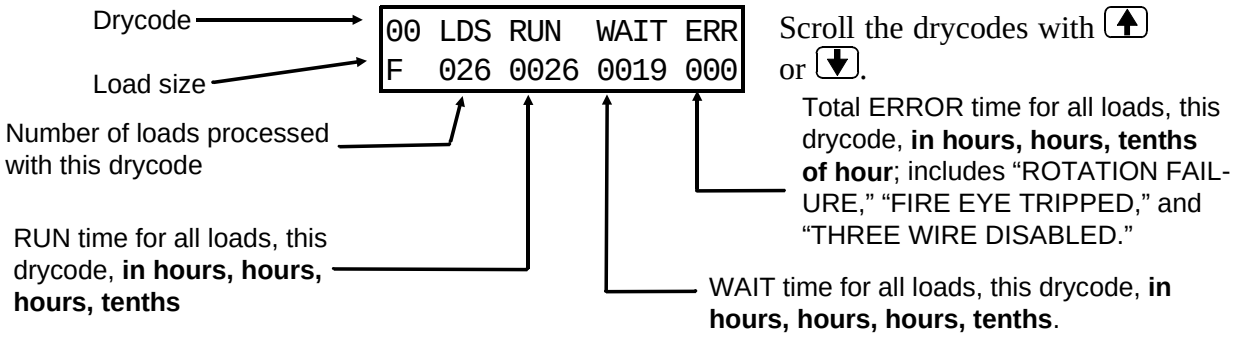
When the display= | 0 0=DISPLAY DATA
1=PRINT 2=CLEAR | ENTER NEXT = | 0 0=LAST LOAD
1=DRYCODES 2=TOTAL |

0, ENTER NEXT **Displays the data for the last load processed.**



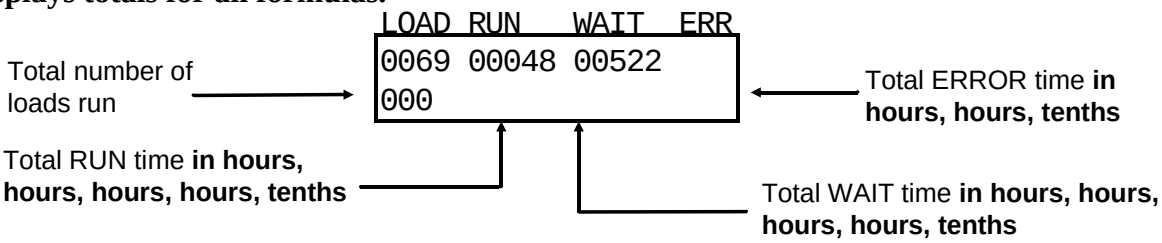
Hold SKIP TO to view the same information for partial loads.

or 1 ABC, ENTER NEXT **Permits displaying a specific drycode.**



Hold SKIP TO to view the same information for partial loads.

or 2 DEF, ENTER NEXT **Displays totals for all formulas.**



Hold SKIP TO to view the same information for partial loads.

Data Accumulation: 1=Print

When the display =

```
0 0=DISPLAY DATA
  1=PRINT 2=CLEAR
```

The dryer is also capable of producing other reports, as described in this section and "DRYCODE REPORTS." See Table of Contents.

Make sure printer is properly attached, loaded with paper, and on-line. See "REQUIREMENTS AND SETTINGS FOR THE EPSON LX300 PRINTER" (see Table of Contents).

1 ABC, ENTER NEXT — **Enables printing of accumulated data and prompts for the date.**

```
DATE: DD-MM-YYYY
      XX-XX-XXXX
```

The control provides for entering today's date at the top of the printout.

ENTER NEXT, ENTER NEXT, ENTER NEXT — **Retains the date shown.**

Or enter a new date as in the following example:

0, 9 YZ-, ENTER NEXT — ***Enters 09* for the day.** Cursor advances to month.

```
DATE:  DD-MM-YYYY
       09-XX-XXXX
```

1 ABC, 2 DEF, ENTER NEXT — ***Enters 12* for the month.** Cursor advances to year.

```
DATE:  DD-MM-YYYY
       09-12-XXXX
```

1 ABC, 9 YZ-, 9 YZ-, 1 ABC — ***Enters 1991* for year.**

```
DATE:  DD-MM-YYYY
       09-12-1991
```

ENTER NEXT — **Accepts year and *begins printing*.**

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

A sample printout is shown in FIGURE 3.

After printing, display returns to

```
1 0=DISPLAY DATA
  1=PRINT 2=CLEAR
```

Data Accumulation: 2=Clear

When the display =

```
0 0=DISPLAY DATA
1=PRINT 2=CLEAR
```

2 DEF, ENTER NEXT — **Enables clearing of all accumulated data**

```
NEXT TO CLEAR DATA
CANCEL = ESCAPE
```

ENTER NEXT — **Clears all accumulated data from memory.** Display returns to the *data accumulation menu*.

or CANCEL ESCAPE — **Returns to the *data accumulation menu* without clearing data.**

P E L L E R I N M I L N O R C O R P O R A T I O N

DRYER: 58058TS1 **VERSION 90213-S DATE:** 11\08\94 **PAGE:** 01

DATA ACCUMULATION

0 = LAST DRYCODE RUN

DRYCODE #	RUN TIME MMT	WAIT TIME MMT	ERROR TIME MMT
04P	**121**	**002**	**000**

1 = DATA PER DRYCODE

DRYCODE #	# OF LOADS #	RUN TIME HHHT	WAIT TIME HHHT	ERROR TIME HHT
00F	001	0001	0038	000
00P	001	0001	0010	000
01F	001	0001	0005	000
01P	001	0001	0004	000
02F	002	0007	0009	000
03F	002	0005	0010	000
04F	001	0002	0008	000
04P	001	0001	0040	000

2 = TOTAL ACCUMULATION DATA

TOTAL	# OF LOADS #	RUN TIME **HHHHT**	WAIT TIME HHHHT	ERROR TIME HHT
FULL	0007	00016	00070	000
PARTIAL	0003	00003	00054	000

NOTES:

# = Number
HHT = Hours-Hours-Tenth of hour
HHHT = Hours-Hours-Hours-Tenth of hour
HHHHT = Hours-Hours-Hours-Hours-Tenth of hour
MMT = Minutes-Minutes-Tenth of minute
***** = Data has reached maximum stored value
F = Full load
P = Partial load

FIGURE 3 (MSOP0109CE)
Sample Printout—Data Accumulation

Troubleshooting 4

DRYER ERROR MESSAGES

The following are the messages that can result from an *error condition* (e.g., improper procedure, microprocessor component failure, mechanical malfunction) or while correcting an error condition.

Power Up Error Messages

ERROR IN MEMORY TURN KEY TO PROGRAM	*Configure data and/or programming data is corrupt* (possibly as a result of turning power *off* while in the *program mode*). Machine must be reconfigured.
 CLEAR MEMORY NOW PRESS 4+5+6	Control detected an *error in configuration or program memory*, usually because power was lost (or master switch turned *off*) while keyswitch was at  *and*, upon power up, the CPU could not be certain that the memory was not corrupted. When the CPU can be confident that memory is *not* corrupted, the control will power up in the *program menu* and display "OK Turn Key To Run."
	Enables clearing drycode memory.
4 JKL + 5 MNO + 6 PQR	*Clears entire drycode memory.* All drycodes revert to their default values.
CLEARING MEMORY **PLEASE WAIT**	See "*2=Configure, 4=Default Drycodes*," and "*1=Modify Drycodes*" in "PROGRAMMING THE . . . DRYER CONTROL" (see Table of Contents).
PROGRAM 0 MENU OK TURN KEY TO RUN	*Keyswitch* was incorrectly in  position at power up, but the control has determined that *configure and programming data are reliable.*
	Returns to the *run mode*. Display = WAITING FOR LOAD **********
THREE WIRE DISABLED **********	**At power up this message appears following the power up displays until ① is pressed to close the three-wire circuit and provide 110-120VAC control circuit voltage to the dryer. ① may be pressed at any time during the power up displays, thus silencing the operator signal and overriding this message. If ① fails to clear this message, see "Operational Error Messages" in this section.**

ACCUM. DATA ERROR NEXT TO CLEAR DATA	**The control detected invalid** *accumulator data* **(usually because of a power surge at power on). ENTER/NEXT clears all totals. See "***13=Data Accumulation***" in "MANUAL MENU FUNCTIONS . . ." for consequences.**
name BOARD FAILED PRESS SIGNAL CANCEL	**"Name" is replaced with one of the following peripheral board names: I/O #1, 16 OUT, A TO D, D TO A, or I/O #2. When the controller displays this message, there is a malfunction in the communications link between the processor board and the indicated peripheral board. Possible causes include a poor electrical contact or failure of processor board, serial link, or indicated peripheral board. If the dryer control displays one of these messages, press SIGNAL CANCEL to clear. If the message indicates that I/O #1 failed and does not clear after checking the board and pressing SIGNAL CANCEL , check all connections in the serial link between the processor board and the peripheral boards.**

Configuration/Programming Error Messages

ERROR IN CHECK SUM NEXT TO PROCEED	**On a machine** *receiving data* **during a download operation, this message indicates that downloading was unsuccessful. See "***5=Download***" (see Table of Contents).**
ILLEGAL INSERT! ILLEGAL DELETE!	**An attempt to duplicate the last step in a drycode** *(How=0)* **causes "Illegal Insert!" to appear. An attempt to delete the last step in a drycode (***How=0***), or to delete a** *How=3* **step before a** *How=2* **step causes "Illegal Delete!" to appear. There must be** *exactly one cooldown* **in each drycode.**
MEMORY IS FULL STEP NOT DUPED	**This display appears for two seconds to signal the operator that the addition of the current step was not allowed, then the normal programming display reappears. This display may occur for one of two reasons:**

1. The correct procedure for commissioning a dryer (see "IMPORTANT OWNER/USER INFORMATION . . .") was not followed. If these steps are not followed, invalid data in memory prevents entering further steps in any drycodes.
2. The total number of steps allowed for all drycodes has been exceeded. However, there is enough memory to accommodate 16 full and 16 partial drycodes with up to 10 steps each. It is highly unlikely that the memory capacity will ever be exceeded if "IMPORTANT OWNER/USER INFORMATION . . ." is observed.

Operational Error Messages

⚠ WARNING ⚠

SHOCK HAZARD—When troubleshooting any electrical fault, lock OFF and tag out power at the external disconnect switch before accessing any electric box or electrical component.

⚠ WARNING ⚠

CRUSH AND ENTANGLE HAZARDS—When troubleshooting any mechanical fault, lock OFF and tag out power at the external disconnect switch before accessing any dryer mechanism. Make sure all personnel are clear of dryer mechanisms before resuming operation.

`name BOARD FAILED`
`PRESS SIGNAL CANCEL`

See explanation in "Power-up Error Messages" in this section.

`OUTLET TEMP EXCEEDED`
`240dF -POWER DOWN-`

If the temperature exceeds 240°F (116°C), the microprocessor closes the *gas valve*, stops the main air blower and cylinder motor, and activates the sprinkler. Sprinkler activation opens the three-wire circuit, causing this message to appear. Clear this error by pulling the red sprinkler handle (located at right rear of dryer, near discharge chute) down until it locks into position. After clearing the error condition, press ① to resume operation. The thermocouple must be allowed to cool below 214°F (101°C) before further operation is attempted. Possible causes of this fault include goods burning in the dryer cylinder or a malfunctioning gas valve.

NOTE: Under normal operation the discharge air temperature of a gas heated dryer should not exceed 214°F (101°C). If the microprocessor senses a temperature greater than 220°F (104°C), it skips immediately to the programmed cooldown step.

`ROTATION FAILURE`

To prevent excess heat from damaging goods in a cylinder that has stopped rotating, a proximity sensor monitors rotation of the left rear cylinder support roller. If the cylinder stops turning for more than eight seconds, the microprocessor closes the gas valve, stops the main air blower, and displays this message. Press SIGNAL CANCEL to clear the message. The cylinder should start rotating. Proper rotation of the *cylinder* during a reversing operation consists of rotating in one direction for 15 seconds, dwelling for 2.5 seconds, then reversing. See explanation in "01=Basket Functions" in "MANUAL MODE MENU . . ."

ILLEGAL DRYCODE xxF SEE MANUAL

All 16x2 available drycodes have a mandatory cooldown in the last step, and all unprogrammed drycodes will start with a cooldown. If such a drycode is requested, this message is displayed immediately after loading, otherwise the dryer will immediately discharge the wet load, having already achieved the desired cooldown temperature. To correct this error, press SIGNAL CANCEL. The controller displays Select Drycode (or Remote Drycode" if Mildata). Goods are still in the basket, so you must run a drycode manually (see "MANUALLY RUNNING A DRY-CODE . . ."). If it is desired to discharge wet goods, cancel the temperature steps. To prevent this fault from occurring again, program the drycode (xxF or xxP) or make sure it is not requested again. See "PROGRAMMING THE . . . DRYER CONTROL."

CHECK ERROR LIGHTS

There are 12 lights on the right front panel of the gas dryer, as shown in FIGURE 1—six of which cause this message to appear. Note which lights are illuminated. Press SAFETY RESET to clear error lights, then SIGNAL CANCEL to clear display and if the error does not clear, see below for the cause and solution. See also control information in the Operator manual.

GAS PRESSURE LOW—If gas pressure either (1) delivered to the dryer, or (2) as controlled by the gas pressure regulator in the dryer is too low for proper operation, this light is illuminated and *Check Error Lights* is displayed. This is part of the safety reset circuit, and will cause the *Fire Eye Not Allowed light* to illuminate and the operator signal to sound. To clear this error, adjust the gas pressure to within Milnor® specifications and press SAFETY RESET. Press SIGNAL CANCEL to clear display and return to normal operation.

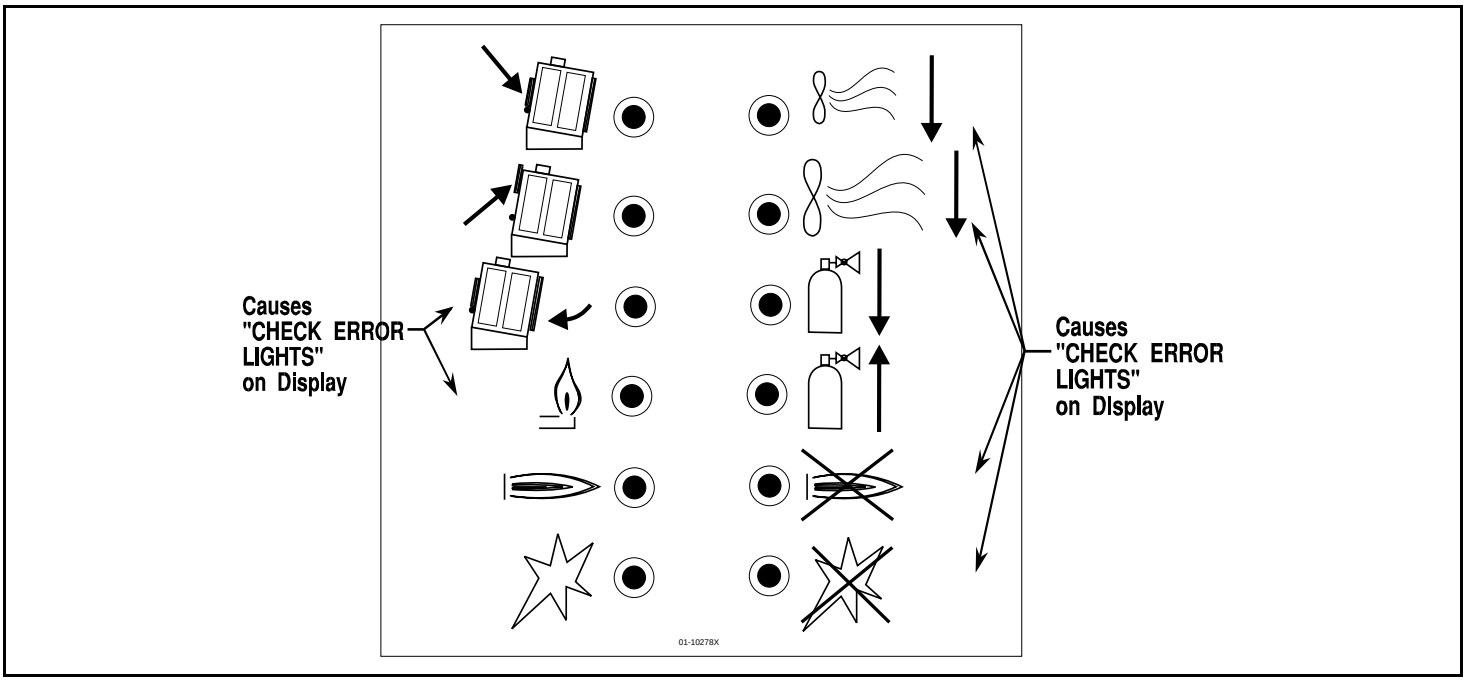


FIGURE 1 (MSTS0104AE)
Gas-Fired Dryer Warning Light Panel

GAS PRESSURE HIGH—If the gas pressure (which is controlled by the gas pressure regulator in the dryer) is too high for proper operation, this light is illuminated and "Check Error Lights" is displayed. This is part of the safety reset circuit, and will cause the *Fire Eye Not Allowed light* to illuminate and the operator signal to sound. To clear this error, adjust the gas pressure to within Milnor® specifications and press SAFETY RESET. Press SIGNAL CANCEL to clear the display and return to normal operation.

COMBUSTION AIR LOW—If the combustion air flow is too low for proper operation, this light is illuminated and "Check Error Lights" is displayed. This is part of the safety reset circuit, and will cause the *Fire Eye Not Allowed light* to illuminate and the operator signal to sound. Acceptable combustion air flow is sensed by a pressure switch located in the combustion air flow. To clear this error, clean the combustion air inlet screen, check the combustion air blower for proper operation, or adjust the combustion air pressure switch (SPCA) to within Milnor® specifications and press SAFETY RESET. Press SIGNAL CANCEL to clear display and return to normal operation.

MAIN AIR LOW—If the main air flow and/or the combustion air damper is too low for proper operation, this light is illuminated and "Check Error Lights" is displayed. This is part of the safety reset circuit and will cause the *Fire Eye Not Allowed light* to illuminate and the operator signal to sound. Acceptable main air flow is sensed by a pressure switch located in the main air flow. To clear this error, check for excessive discharge air back pressure. This can be caused by a blocked lint filter, a blocked discharge air duct, or a lint-laden air blower wheel. If the dryer takes air from inside the laundry and most of the doors and windows of the laundry are closed, the negative air pressure that will exist inside the laundry can also cause this error. It may also be necessary to adjust the main air pressure switch (SPCA) to within Milnor® specifications and press SAFETY RESET. Press SIGNAL CANCEL to clear display and return to normal operation.

FIRE EYE TRIPPED—If the flame control unit senses a loss of flame by the flame sensing rod after it had successfully ignited, this light illuminates and, "Check Error Lights" is displayed, and the operator signal sounds. This message is also displayed when the microprocessor calls for fire, but cannot ignite the flame after about 45 seconds. To correct this error, press both the reset button on the flame control unit and SAFETY RESET. Press SIGNAL CANCEL to clear the display and return to normal operation. The flame control unit will then attempt to reignite the flame. It may also be necessary to check the wiring between the flame sensing rod and the flame controller, or to replace the flame sensing rod or even the flame control unit (although the latter is infrequent). If the reignition is successful, the air damper will remain at position MIN+1 for 25 seconds, then function normally.

FIRE EYE NOT ALLOWED—If the microprocessor requests fire but the flame control unit is not allowed to light because one of the requirements of the safety reset circuit is not met, this light illuminates, "Fire Eye Not Allowed" is displayed, and the operator signal sounds. Correct this error by verifying that all requirements of the safety reset circuit are met. Press SAFETY RESET and SIGNAL CANCEL to clear the error and return to normal operation.

DISCHARGE SEQUENCE ERROR DRYCODE # xxF	If the limits on the standard unload sequence parameters are exceeded, this message is displayed immediately after all goods are discharged. Press CANCEL to clear this error. To prevent this error during future runs of this drycode, modify the drycode; the parameters will automatically adjust to within acceptable limits.
INVALID PASSWORD	If the operator enters an invalid password when attempting manual intervention, this message is displayed momentarily. The password may be changed, added, or deleted from the configure option of the programming menu. The *Run/Program keyswitch* must be set to  to change the manual password (see "2=Configure" in "PROGRAMMING THE . . . DRYER CONTROL," see Table of Contents). Therefore, the programming key should be accessible only to authorized personnel.
LOAD DOOR OPEN	Load door closed proximity switch is not made. The basket continues to turn, but the *get hot relay* is not energized, the main air blower is not energized, and the timer does not start until the load door is closed. Recovery is automatic when the load door closes.
LOAD DOOR NOT OPEN	Load door open proximity switch not made when dryer desires load. The basket turns, and the loading device waits for load door to open. Recovery is automatic when the load door opens.
DISCHARGE DOOR OPEN	Discharge door closed switch is not made. Main air blower and combustion air blower are *off*. Recovery is automatic when discharge door closes.

MILDATA Error Messages

INVALID WORK ORDER	*Work order* number entered at keypad was not found in the Milnor® Report Generator.
INVALID GOODS CODE	*Goods code* number entered at keypad was not found in the Milnor® Report Generator.
INVALID CUST CODE	*Customer code* number entered at keypad was not found in the Milnor® Report Generator.
INVALID EMPLOYEE #	*Employee identification* number entered at keypad was not found in the Milnor® Report Generator.
DATA UNLOCATABLE	Address of this machine does not match the address in the programmer for PC==> MACHINE download.

Fire Safety System Operation and Maintenance

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NOTICE: If the fire safety system is in operation (if there is a flow of water from the rear of the dryer)—go to Section 5 : If Water Flow Occurs, page 5.

fire safety system the water nozzles and related equipment that put water in the dryer to stop a fire in the basket.

Water flow will start automatically if the temperature becomes too high, as told in Section 1 : Fire Safety Functions and Components, page 1. You can also start it manually. Pull the operation handle or use the control panel as told in Section 4 : How to Do a Test of the Fire Safety System, page 4. The system will start a flow of water. The water will go into the basket through the perforations. Do a test of this system at the intervals given in the routine maintenance schedule.

1. Fire Safety Functions and Components

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This section gives the fire safety functions and components for 6464_ and 7272_ models. Components and their locations can be different on other dryer models but the functions are the same.

Table 1. Fire Safety Functions for 6464_ and 7272_ Dryer Models

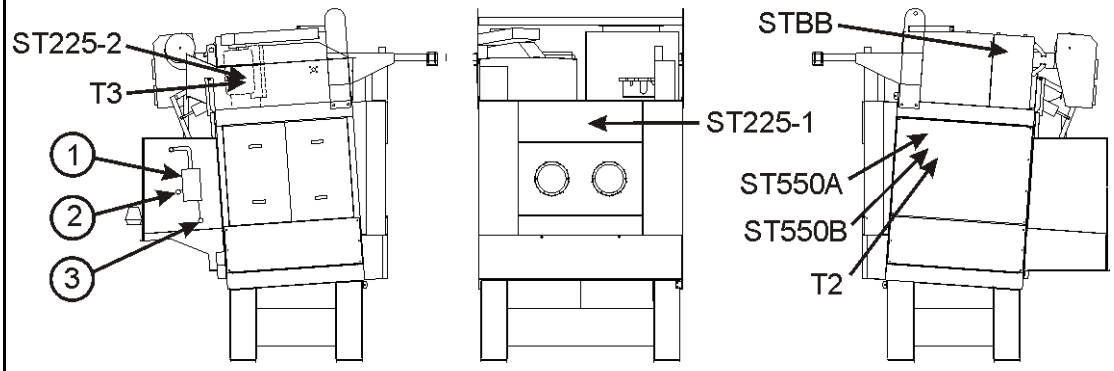
Sensor type	**Temperature switch (closes at specified temperature)**			**Thermocouple (gives continuous temperature data to the controller)**		
Sensor name	ST225-1 & 2	ST550A & B	STBB	T3		
Location	Basket/outlet duct (Figure 1, page 2, Figure 3, page 2, Figure 4, page 2)	Inlet duct Figure 1, page 2, Figure 2, page 2	At burner (Figure 1, page 2, Figure 5, page 2)	Outlet duct (Figure 3, page 2)		
Safety limit (the temperature or condition that causes the given result)	225° F (107° C)	550° F (288° C)	175° F (79° C)	**–Three safety limits in software–**		
				5° F increase for 15 seconds or 15° F increase for 5 seconds during min fire*	Higher than 220° F (104° C) for 5 seconds**	240°F (116°C)
Occurs when temperature is too high	Water flows and all dryer actions stop.	Flame goes off. If the flame will not come on, see the line below this one.		Each step before the cooldown is subsequently cancelled while the condition continues.		Water flows and all dryer functions stop.
Display when temperature is too high	THREE WIRE DISABLED error and operator alarm.	Initially none. If the flame will not come on, the CHECK ERROR LIGHTS error and operator alarm occur.		The controller shows “MINF” and puts data in the record of dry cycle details.	The controller shows “>220” and puts data in the record of dry cycle details.	OUTLET TEMP EXCEEDED 240 Df - POWER DOWN error and operator alarm.
Necessary procedure	See Section 5 : If Water Flow Occurs, page 5	If the error given in the line above this one occurs, see “Error Messages” in the operator guide.		See Section 2 : About the **Min Fire** and **Outlet Temperature Exceeded 220°** Faults, page 3		See Section 5 : If Water Flow Occurs, page 5

*** This does not apply to steam dryers.**

**** This does not apply to steam dryers if they do not use modulation.**

Figure 1. Component Locations for 6464_ Models

Left, Front, and Right-side Views (model 6464TG1L shown)



Legend

ST225-1 . . Basket temperature switch (upstream of blower). The switch closes at 225° F (107° C).
ST225-2 . . Outlet temperature switch (downstream). The switch closes at 225°F (107°C).
ST550A . . Inlet temperature switch. This switch closes at 550° F (288° C).
ST550B . . Secondary inlet temperature switch. This switch closes at 550° F (288° C).
STBB . . Burner housing temperature switch. This switch closes at 175° F (79° C).
T2 . . Inlet temperature thermocouple. The fire safety system does not use this component.
T3 . . Outlet temperature thermocouple. This component gives temperature data to the controller.
1 . . . Sprinkler valve assembly
2 . . . Reset handle
3 . . . Operation handle

Figure 2. View of ST550A, ST550B and T2

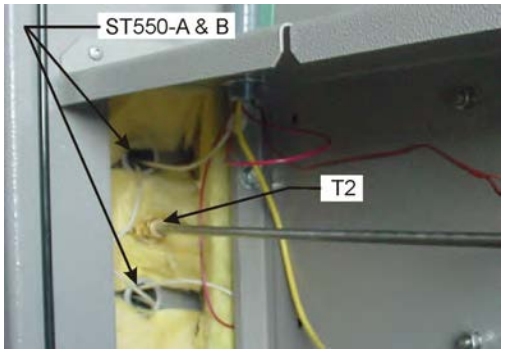


Figure 3. View of ST225-1

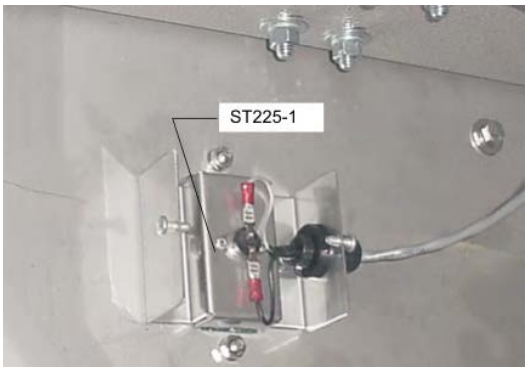


Figure 4. View of ST225-2 and T3

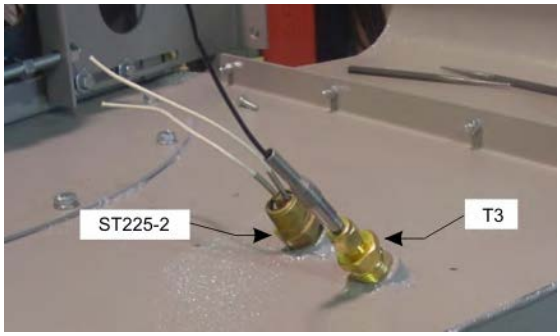


Figure 5. View of STBB

2. About the Min Fire and Outlet Temperature Exceeded 220° Faults

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The function of these faults is to prevent conditions that can cause a fire. The controller does the necessary steps. There are no other steps for the operator to do immediately. But the controller puts data about the fault in the record of dry cycle details. These faults usually cause unsatisfactory operation. To prevent these faults, it can be necessary to change some procedures as told in the subsequent sections. Heat system adjustments and repairs are not routine maintenance. Speak to your dealer or Milnor®.

2.1. Min Fire (MINF)

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This condition applies to dryers that use gas or propane. Minimum fire is when the controller tells the modulating gas valve to go to the position 000. The correct condition is when the gas valve is open a small, stable increment. Under this condition, a **min fire** fault occurs if the controller senses that the outlet temperature increases. This fault usually shows that the goods became too hot and could catch fire. (One more symptom is if the goods have a burned smell.) When this fault occurs, the controller immediately goes to the subsequent cool down step. Some causes of **min fire** faults include:

- **The goods are held against the basket**—The correct condition is that the goods tumble in the basket. If the basket speed is too high, centrifugal force can hold the goods against the basket. Then the part of the goods that is against the basket can become too hot.
- **The gas valve does not operate correctly**—For example, the valve throttle cannot move down fully because it is damaged. This can prevent the min fire position.
- **Min fire is set too high**—The min fire position must be adjusted correctly when the gas and air as told in the procedure to set the heat system. Damage to components can cause this adjustment to change.

2.2. Outlet Temperature Exceeded 220° (degrees Fahrenheit)

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This fault applies to all dryers except those with steam valves that do not modulate. The value 220° F (104° C) is 5°F (3° C) below the temperature that will close the outlet temperature switches (Fenwal switches) and start water flow. It cancels each subsequent heat step if the outlet temperature is higher than 220° F (104° C) for five seconds or more at the start of the step. This fault can also occur if the goods are held against the cylinder or the gas valve is damaged. The function of this fault is to make water flow not necessary, if the goods are not on fire. But if the goods catch fire, the temperature switches will quickly close to start water flow.

3. How to Prevent Water Flow When No Fire Occurs

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If water flow occurs when there is no fire, two possible causes are:

- **A temperature switch is damaged.** This is the usual cause. For example, material can hit a temperature probe and bend it. This can be a piece of goods that goes through a space where

seals are worn. It is necessary to replace a damaged probe. The probe can also give an incorrect value if it has plastic contamination. It is necessary to remove the contamination.

- **Temperatures are not in the correct range.** The conditions described in Section 2.1 : Min Fire (MINF), page 3 can cause water flow if they are severe enough.

If water flow occurs when there is no fire, correct the cause. **Do not remove the fire safety system from operation.** If a fire occurs, this system is your first and best protection against a fire that is out of control.

4. How to Do a Test of the Fire Safety System

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1. **Prevent a new load:** Set the **Load Allowed/ Not Allowed** (/) switch to **Not Allowed** ( ) to prevent a new load.
2. **Let the dryer empty:** Let the dryer operate until it releases the load it has.
3. **Close the manual water valve:** Close the valve to prevent water flow. This valve is on the sprinkler assembly. The assembly is usually on the side of the dryer discharge shroud.
4. **Start a test of sprinkler AUTOMATIC operation:**
   - If there is a controller on the dryer, see “Manual Mode Menu Functions” in the reference manual.
   - If this dryer is part of a Dryer/Shuttle (Drynet™) system, do the steps listed below at the Drynet™ controller:

   a. Select **Admin Logon** and enter the administrator password.

   b. Select (click) the display for the dryer you will do the test on.

   c. Select (click) **Manual** mode.

   d. Go to **Sprinkler Functions** on the right side of the screen and select (click) **Sprinkler [Off]** to release the sprinkler valve. This is a toggle. The display shows **Sprinkler [On]**.
5. Examine the automatic sprinkler valve.

CAUTION: **Sluggish valve operation —** can interfere with fire suppression.

- ▶ Remove any build-up of foreign matter on components.
- ▶ Make sure components move freely.

6. **Let the water flow for a short while:** Open the manual valve on the sprinkler assembly. Make sure that water flows from the rear of the dryer. Close the valve for the subsequent part of the test.
7. **Set the system again:** Pull the sprinkler reset handle down fully. It must latch.
8. **Start a test of sprinkler MANUAL operation:** Select a dry code and run it manually.

CAUTION: The manual water valve must be closed to prevent water flow during this test.

9. **Opereate the fire safety system manually:** When the heat source starts to make heat, pull down the sprinkler operation handle.
10. **Make sure that a shutdown occurs:**
    - The automatic valve opens (the reset handle releases).
    - The `THREE WIRE DISABLED` message appears.
    - The operator alarm sounds.
    - All dryer functions stop.
11. **Stop the dry code.**
12. **Set the system again:** Pull the sprinkler reset handle down fully. It must latch.
13. **Open the manual valve.**

    WARNING: A closed manual valve — will prevent water flow in an emergency.

    

    ▶ Make sure the manual valve is open and remains open during operation.

14. **Put the dryer in operation again.**

    This concludes the fire safety system test.

5. If Water Flow Occurs

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A serviceable fire safety system will operate if a fire in the basket occurs. But it can also operate for other causes. Temperature switches (Fenwal switches) in the outlet duct operate the system at 225° F (107° C). If the Fenwal switches are not serviceable, the dryer software operates the system at 240° F (116° C).

1. **Examine the dryer condition:** If there is a fire, let water flow continue until the fire is extinguished.

   CAUTION: Use extreme care if you must look through the door glass or get near a part of the machine.

2. **Set the system again when it is safe:**

   a. Turn the Master switch off, then on again. If the software caused the fire safety system to operate, this is necessary to remove the "Desires Sprinkler" output signal.

   b. Pull the sprinkler reset handle down fully. It must latch.

   This step helps to keep water damage to a minimum and allows you to use the manual controls.

3. **Did a fire occur?**
   - **NO:** Put the dryer in operation again.
   - **YES:** Continue these steps.

4. **Do a test of basket movement:**
   a. Set the **Load Allowed/Not Allowed** (/) switch to **Not Allowed** ( ) to prevent a new load.
   b. Press **Start** (①). The operator alarm stops and the display shows `WAITING FOR LOAD. LOADING NOT ALLOWED`.
   c. Set the **Automatic/Manual Rotation** switch (/) to **Manual Rotation** ( ).
   d. Hold the **Jog Direction** switch (/) in one of the two directions **no longer than necessary to make sure that the basket turns.**
5. **Did the basket turn?**
   - **NO:** Stop. Repairs are necessary. Consult your dealer or the Milnor® factory.
   - **YES:** Continue these steps.
6. **Carefully remove the goods:** Use the manual controls to release the goods.

   WARNING: Hot goods — can catch fire spontaneously,

   

   - Keep fire equipment available.
   - Stay away from the goods.
7. **Remove power. Look for damage.** With power removed from the machine, examine the full machine for damage.

   Look carefully at the air seals, support rollers, primary blower, and electrical cables on top of the machine. Also examine electrical components for moisture.
8. **Connect power. Examine dryer functions:** In the manual mode, operate all outputs. For example, the gas valve, lint removal.
9. **Damage?**
   - **YES:** Stop. Repairs are necessary. Consult your dealer or the Milnor® factory.
   - **NO:** Continue.
10. **Put the dryer in operation again:** Put all manual controls in the automatic position ( ) again.

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Supplemental Information 5

HOW THE MILNOR® DRYER WORKS

Mode 3 Drying Sequence—Modulating Dryers (Step 00: H=3, Step 01: H=2)

Graph Reference	Programming Parameter
Maximum Heat Time	MHT
Commanded Outlet Temp	OdF/OdC
Maximum Inlet Temperature	IdF/IdC
Commanded 2nd Inlet Temp	2IF/2IC
Commanded Cooldown Temp	CdF/CdC
Maximum Cooldown Time	MCT

What is Mode 3 Drying?—As the goods become drier, successively lower inlet temperatures are required to maintain the commanded outlet temperature. The goods can be considered dry when, while maintaining the commanded outlet temperature, the actual inlet temperature drops below the 2nd inlet temperature. The 2nd inlet temperature is an empirical value determined by goods class, load size, and amount of moisture desired in the goods after drying. Mode 3 drying is an excellent method for Full Drying when the dryer is properly maintained and the load size is consistent.

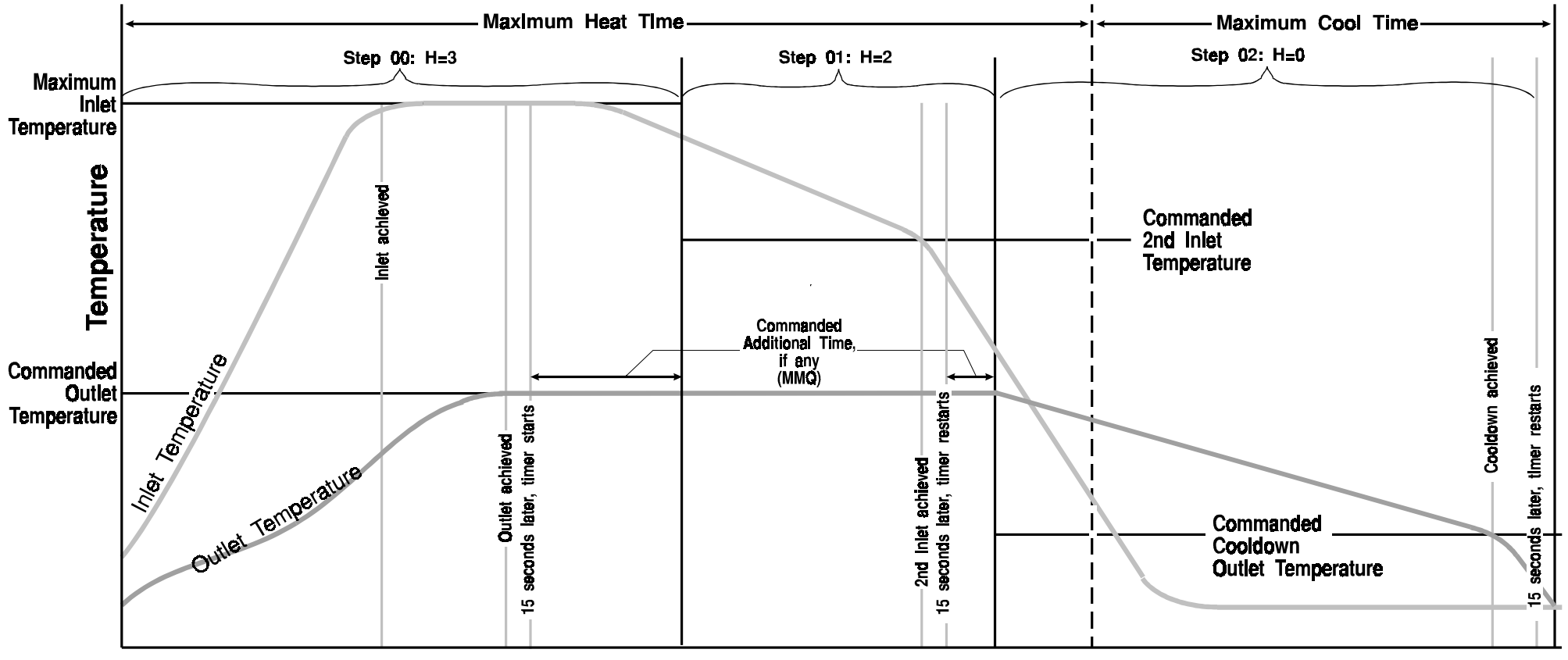

FIGURE 1 (MSOP0119AE)
Typical Drying Sequence

Step 00
H=3 (Outlet+)
[Outlet Temperature equals or exceeds commanded for 15 seconds]

Modulating valve opens, causing actual inlet temperature to rise to the commanded inlet temperature. (The modulating valve will start closing before the commanded inlet temperature is reached to prevent the actual outlet temperature from exceeding the commanded outlet temperature.)

As the goods dry, the outlet temperature gradually rises. When the actual outlet temperature reaches the commanded outlet temperature, the modulating valve will start closing, lowering the actual inlet temperature, to prevent the actual outlet temperature from exceeding the commanded outlet temperature. After the actual outlet temperature has been equal to or greater than the commanded outlet temperature for 15 seconds, the timer starts. The step ends after the temperature is maintained for the commanded additional time (if any).

Step 01
H=2 (Inlet-)
[Inlet temperature falls to equal or less than commanded for 15 seconds]

The modulating valve continues to slowly close to maintain the commanded outlet temperature. When the actual inlet temperature equals or falls below the commanded 2nd inlet temperature for 15 seconds, and the actual outlet temperature is within two degrees of the commanded outlet temperature, the timer restarts. The step ends after the outlet temperature is maintained for the commanded additional time (if any).

Step 02
H=0 (Cooldown)
[Outlet temperature is equal or less than commanded for 15 seconds]

After the actual outlet temperature is equal or lower than the commanded cooldown temperature for 15 seconds, the timer restarts. The step ends and the dryer desires to discharge when the timer expires.

If any step other than cooldown is running when the *maximum heat time timer* expires, the control automatically skips to the cooldown step. Similarly, once the *maximum cool time timer* expires, the dryer automatically desires to discharge, even if the commanded cooldown temperature is not achieved.

⚠ WARNING ⚠

FIRE HAZARD—Always program sufficient cooldown times to cool the goods. Otherwise, the dryer can discharge goods that are still hot enough to later ignite by spontaneous combustion and cause serious property damage, personal injury, or death .

On-Off Drying Sequence
(H=3 in Non-modulating Steam Dryers Only)

What is On-Off Drying?—As the goods become dryer, the outlet temperature rises. How Code 3 (On-Off) can be used to maintain the outlet temperature near the commanded value. How Code 3 allows commanding a delta (differential) temperature which defines a range of outlet temperatures. This is a standard feature of all Milnor® steam dryers having software date code 90017 or higher.

Graph Reference	Programming Parameter
Maximum Heat Time	MHT
Commanded Outlet Temp	OdF/OdC
Commanded Delta	DdF/DdC
Commanded Cooldown Temp	CdF/CdC
Maximum Cooldown Time	MCT

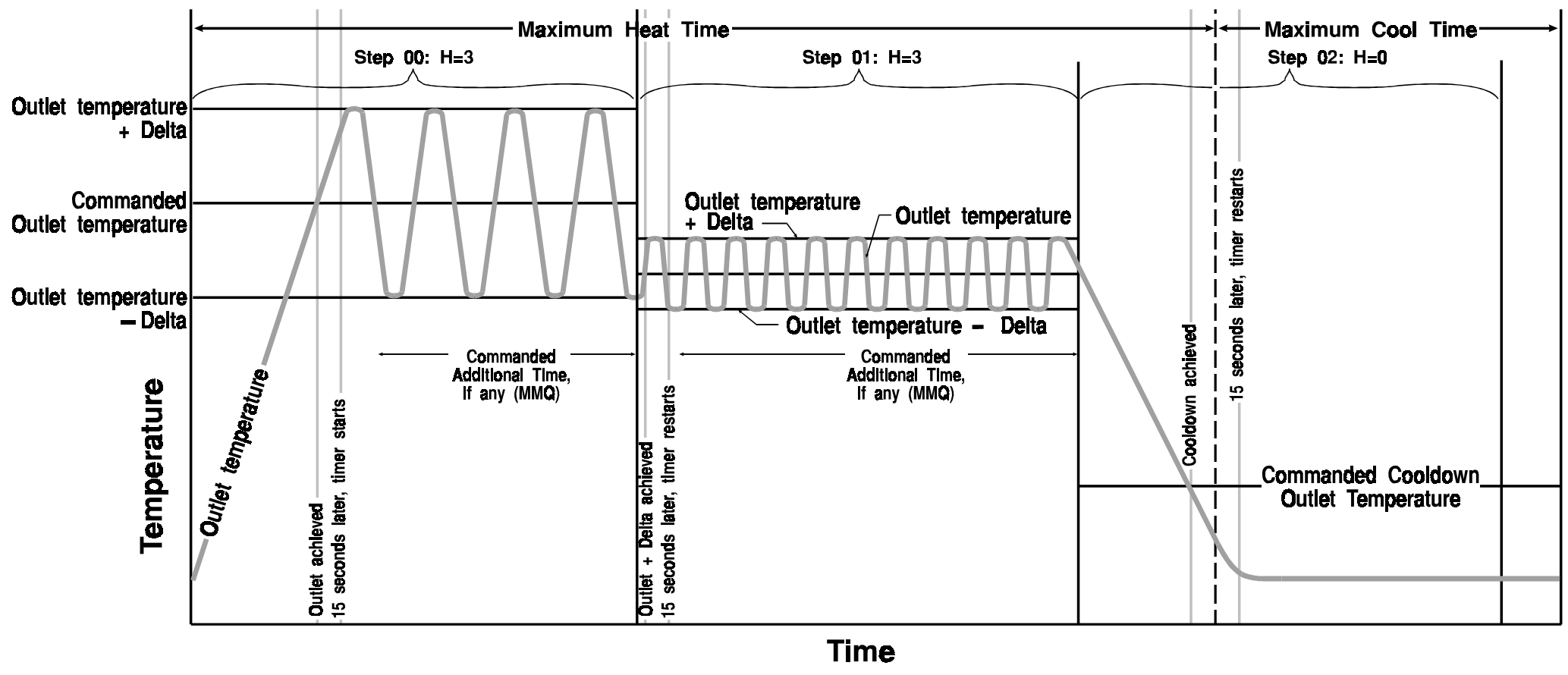

FIGURE 2 (MSOP0119AE)
Typical On-Off Drying Sequence

Step 00
H=3 (On-Off)
[Outlet temperature equals or exceeds commanded for 15 seconds]

Main steam valve opens and remains open until actual outlet temperature exceeds the commanded outlet temperature by the programmed *delta* (outlet temperature + *delta*). The valve then closes and remains closed until the actual temperature falls below the commanded outlet temperature minus *delta*. The step starts once the actual outlet temperature has been equal to or greater than the commanded outlet temperature for 15 seconds. The cycle of the valve's opening and closing continues until this step expires.

⚠ CAUTION ⚠

If the commanded outlet temperature is greater than that available from the heat source, the commanded Maximum Heat Time (MHT) will prevail.

Step 01
H=3 (On-Off)
[Outlet temperature equals or exceeds commanded for 15 seconds]

The sequence in this step is identical to that followed in Step 00, except a different (usually lower commanded outlet temperature and a smaller commanded *delta* have been programmed to show operational differences.

Step 02
H=0 (Cooldown)
[Outlet temperature is equal or less than commanded for 15 seconds]

After the actual outlet temperature is equal or lower than the commanded cooldown temperature for 15 seconds, the timer restarts. The step ends and the dryer desires to discharge when the timer expires.

If any step other than cooldown is running when the *maximum heat time timer* expires, the control automatically skips to the cooldown step. Similarly, once the *maximum cool time timer* expires, the dryer automatically desires to discharge, even if the commanded cooldown temperature is not achieved.

⚠ WARNING ⚠

FIRE HAZARD—Always program sufficient cooldown times to cool the goods. Otherwise, the dryer can discharge goods that are still hot enough to later ignite by spontaneous combustion and cause serious property damage, personal injury, or death.

Steam Ratio Drying Sequence (H=6 in Non-modulating Steam Dryers Only)

What is Steam Ratio Drying?—The control monitors the actual inlet and outlet temperatures, and by means of a proprietary algorithm, determines the ratio of inlet to outlet temperatures. This is a standard feature of all Milnor® non-modulating steam dryers.

Graph Reference	Programming Parameter
Maximum Heat Time	MHT
Commanded Outlet Temp	OdF/OdC
Maximum Inlet Temperature	IdF/IdC
Commanded Cooldown Temp	CdF/CdC
Maximum Cooldown Time	MCT

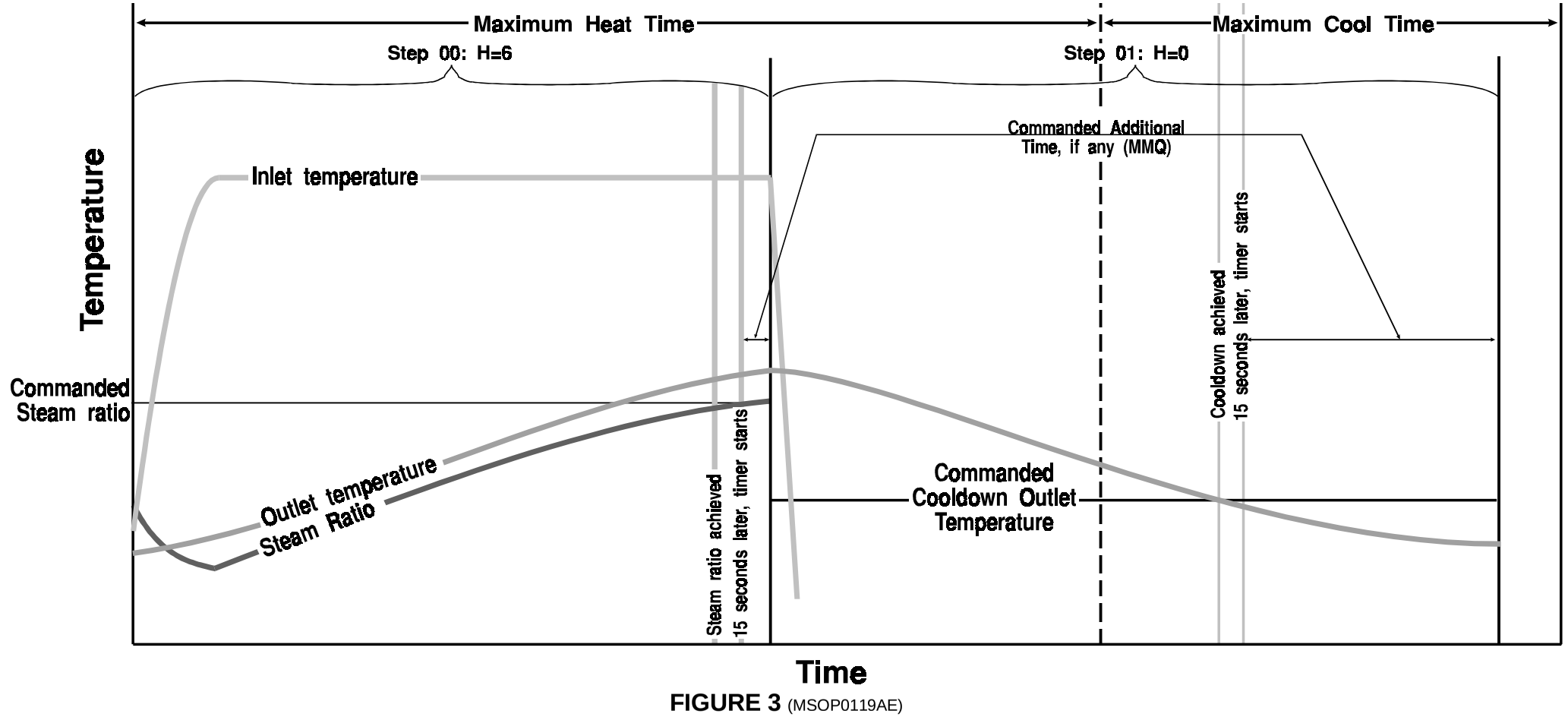

FIGURE 3 (MSOP0119AE)
Typical Final Ratio Drying Sequence

Step 00 H=6 (Steam Ratio) [Steam ratio equals or exceeds commanded for 15 seconds] Main steam valve remains open throughout this step. As the goods become drier, the actual outlet temperature rises which causes the calculated steam ratio to become larger. The step timer starts once the actual steam ratio remains equal to or greater than the commanded steam ratio for 15 seconds. If desired, the step timer may add MMQ to this step. The step ends when the step timer expires.

⚠ CAUTION ⚠

If the commanded outlet temperature is greater than that available from the heat source, the commanded Maximum Heat Time (MHT) will prevail.

Step 01 H=0 (Cooldown) [Outlet temperature is equal or less than commanded for 15 seconds] The timer restarts when the achieved outlet temperature equals or falls below the commanded cooldown temperature for 15 seconds. When the timer expires, the dryer desires to discharge.

If any step other than cooldown is running when the *maximum heat time timer* expires, the control automatically advances to the cooldown step. Similarly, if the commanded cooldown temperature is not achieved before the *maximum cool time timer* expires, the dryer automatically desires to discharge.

⚠ WARNING ⚠

FIRE HAZARD—Always program sufficient cooldown times to cool the goods. Otherwise, the dryer can discharge goods that are still hot enough to later ignite by spontaneous combustion and cause serious property damage, personal injury, or death.

Humidity-Sensing Drying Sequence (Dryers with Optional Humidity Sensors Only)

What is Humidity-Sensing Drying?—At the beginning of the heating cycle, the inlet temperature rises, causing the outlet humidity to rise. The control measures the humidity of the inlet air as it enters the dryer and the humidity of the outlet air as it exits the dryer. It compares these values to the programmed *humidity delta* for the step. As the goods become more dry, the outlet humidity falls, thus reducing the value. The step timer starts when the value is equal to or less than the programmed *humidity delta* for 15 seconds.

Graph Reference	Programming Parameter
Maximum Heat Time	MHT
Commanded Outlet Temp	OdF/OdC
Maximum Inlet Temperature	IdF/IdC
Commanded Cooldown Temp	CdF/CdC
Maximum Cooldown Time	MCT
Humidity Delta	HDF

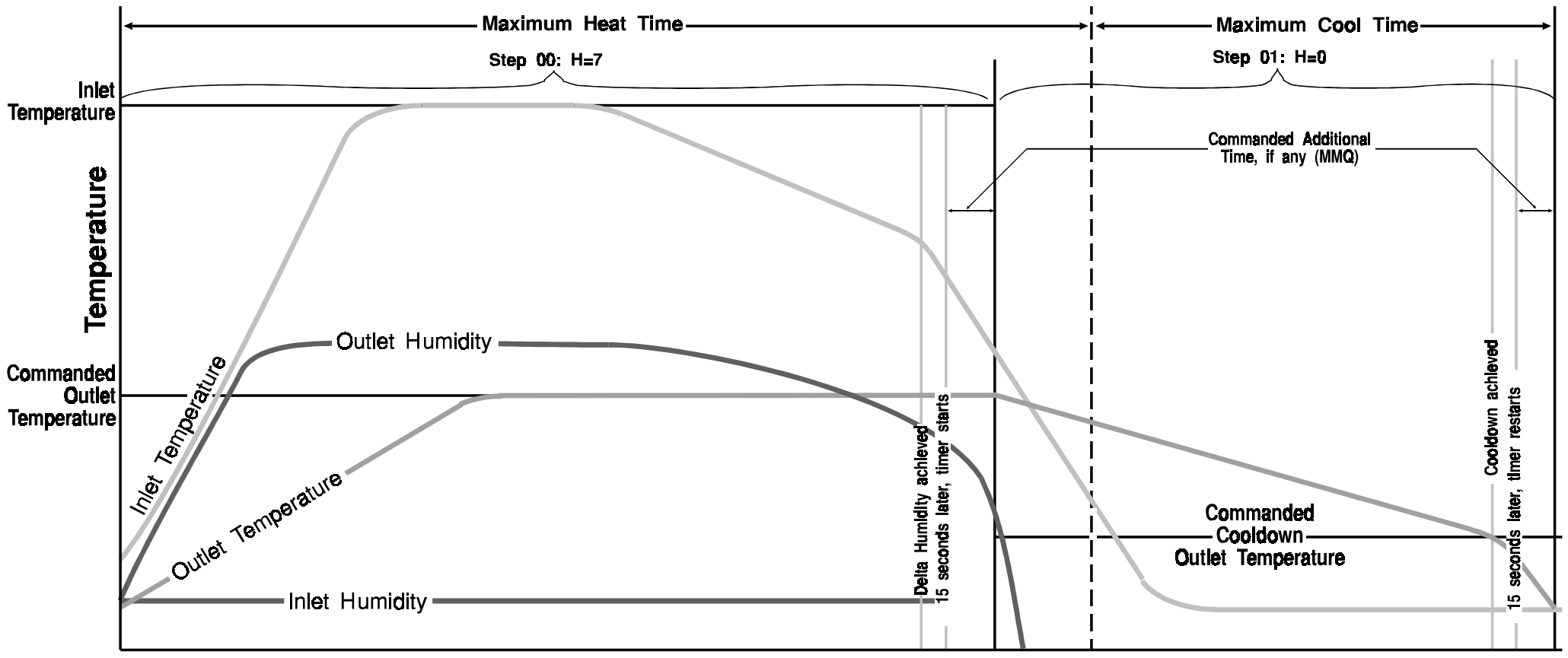

FIGURE 4 (MSOP0119AE)
Typical Humidity-Sensed Drying Sequence

Step 00 H=7 (Humidity) As the goods dry, the outlet humidity becomes less. The step timer starts when the outlet humidity minus inlet humidity reaches the commanded *humidity delta* for 15 seconds.

⚠ CAUTION ⚠

If the commanded humidity delta is not attained within the commanded Maximum Heat Time, the step will end when timer MHT expires.

Step 01 H=0 (Cooldown) The step timer starts when the actual outlet temperature falls below the commanded outlet temperature for 15 seconds. When the timer expires, the dryer desires to discharge.

For Dryers with Modulating Valves (Programmable Inlet and Outlet Temperatures)

The modulating valve causes the actual inlet temperature to rise to the commanded inlet temperature. When the actual outlet temperature reaches the commanded outlet temperature, the modulating valve starts closing, lowering the inlet temperature to prevent the outlet temperature from exceeding the commanded value. The control will start closing the modulating valve before the commanded inlet temperature is reached to prevent the actual outlet temperature from exceeding the commanded value.

For Steam Dryers without Modulating Valves (Programmable Outlet Temperature and On-Off Delta)

The main steam valve remains open until the actual outlet temperature exceeds the commanded value by the programmed *on-off delta*. The valve then closes until the actual temperature falls below the commanded outlet temperature minus the *on-off delta*.

If any step other than cooldown is running when the *maximum heat time timer* expires, the control automatically advances to the cooldown step. Similarly, if the commanded cooldown temperature is not achieved before the *maximum cool time timer* expires, the dryer automatically desires to discharge.

⚠ WARNING ⚠

FIRE HAZARD—Always program sufficient cooldown times to cool the goods. Otherwise, the dryer can discharge goods that are still hot enough to later ignite by spontaneous combustion and cause serious property damage, personal injury, or death.

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.

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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		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 —

Summary of Milnor® Allied Interface Capability, Dryer

A Milnor system machine may need to load from, or discharge to a non-Milnor machine. This document summarizes allied interface capability for the Milnor system machine equipped with Mark 5 microprocessor or later controls, as of this writing (see Note 2).

Note 1: Refer to the document "About Milnor® Allied Interfaces for Automated Laundering System Machines" for a general explanation of allied interfaces. Refer to "Milnor® Allied Interface Specifications and Signals" for technical information needed to implement an allied interface.

Note 2: The allied interfaces offered by Milnor are continually evolving and the available signals can vary from one software version (date code) to another. Milnor Tehnical Support can assist in determining data-passing capacities for specific software versions.

1. How Batch Data Travels Through a System

The types and ranges of batch codes that the devices within an automated laundering system can handle depend on both the individual device controller and the means of communication used to pass this data from device to device. Generally, allied interfaces provide less capacity then the Miltrac controller because they are much more limited by hardware constraints and are developed on an as-needed basis. You will notice in Table 1 that certain types of codes and code ranges do not carry over from device to device, or even from the loading to the discharge interface within the same device. Keep in mind that both down stream and upstream of a given allied interface, data will most likely be passed not via an allied interface, but rather, by the Miltrac controller or a similar system controller supplied by another equipment manufacturer. As of this writing, Miltrac is capable of passing the following codes and code ranges throughout the entire system (among all Miltrac devices): 256 formula codes, 16 press/extract codes, 16 dry codes, 256 goods code, 1000 customer codes, 64 destination codes, 1000 weight values, 256 cake numbers, and the following flags: single cake, empty load, low pressure, third pressure, no pressure.

2. Batch Data Signals

This section summarizes the types and number of batch codes for which, as of this writing, batch data allied interface signals are available. As shown in Table 1, the signals that carry batch data are divided into two general categories, those that pass multi-digit batch codes (e.g., drycode) in binary, and must therefore, function in groups and those that pass a single on/off value (e.g., the "new customer" code).

Both the need for, and the specific use that any type of batch code serves can vary significantly from one installation to another. Signals traditionally used for certain batch codes can sometimes be adapted to new types of batch data. The following are the batch codes traditionally associated with allied interfaces and their traditional definitions.

Formula code—identifies the wash formula used in the tunnel. Although in some systems, the wash formula may affect post-wash processing, formula codes are passed to post-wash devices primarily for accounting and record-keeping purposes (see Note 3).

Extract code—Sometimes called press code, this identifies the extract formula, if a Milnor centrifugal extractor is used, or the press formula, if a Milnor single stage press is used (see Note 3). Extract codes do not apply to the Milnor two-stage press which does not have formulas as such, but can be made to vary the pressure of the main bell via the Low, 3rd, and No Pressure (on/off) signals.

Note 3: Although formula code and extract code are technically different things, they can be thought of as the same by programming the Milnor centrifugal extractor or single stage press so that the proper extract formula is invoked by a formula code of the same number. For example, program extract code 05 so that it is the proper extraction process for batches processed with formula code 05. Then simply pass the formula code to the extractor or single stage press as the extract code.

Dry code—identifies the drying formula to be used in the drying or conditioning equipment.

Cooldown code—identifies the cooldown procedure to be used in the dryer.

Customer code—identifies the customer (commercial laundry) or department (institutional laundry) the batch belongs to.

Goods code—in older Milnor CBW®'s (with Miltron™ controllers), identifies a subset of a general class of goods. All batches conforming to the general class are processed using the same wash formula. But each specific goods code within that class causes variations in processing, essentially extending the range of available wash formulas. Although in some systems, the goods code may affect post-wash processing, goods codes are passed to post-wash devices primarily for accounting and record-keeping purposes.

Destination code—identifies a storage location within the laundry to send the load.

Weight—the dry, soiled weight of a batch, as measured by a weighing device, such as a weighing type load conveyor, upstream of the tunnel. Although in some systems, weight may affect post-wash processing, weights are passed to post-wash devices primarily for accounting and record-keeping purposes.

Cake Number—in older Milnor CBW®'s (with Miltron™ controllers), this is an identification number associated with each batch. The Miltron automatically assigns the numbers 000 to 255 in sequence and starts over at 255. As indicated in Table 1, allied signals are not currently available on any machine for passing this code.

New formula—indicates that the batch being transferred was processed using a different formula than the previous batch (see Note 4).

New customer—indicates that the batch being transferred belongs to a different customer than the previous batch (see Note 4).

> **Note 4:** The intent of both of these signals is to provide a means of segregating batches with different formula, goods, and/or customer codes, in post-dry. They are typically used in systems that are not capable of passing (or do not need to pass) formula, goods, or customer codes. Depending on the specific situation, the signal would be actuated by the washer whenever the formula, goods, and/or customer code changes. In the Milnor dryer controller, the "new customer" signal causes the customer code to increment by one (e.g., from 07 to 08). In such a system, the value of the customer code is irrelevant, but changing it signals downstream devices not to combine these loads.

Single cake—also called "small load" or "little load", this signal tells a shuttle to deliver, and a multi-cake dryer to accept this cake (load) by itself. This is usually done when the cake that follows belongs to a different customer and the goods should not be intermingled.

Empty load—also called "empty pocket" or "pass-empty", this signal tells the receiving device that it will not receive any goods with the batch data it is receiving. Empty pockets are sometimes used in the tunnel to perform a cleaning process or to segregate goods from incompatible baths.

Low (main) pressure—tells the Milnor two-stage press to use the lowest main bell pressure (see Note 5).

3rd (main) pressure—tells the Milnor two-stage press to use a lower than normal main bell pressure (see Note 5).

No (main) pressure—tells the Milnor two-stage press to use no main bell pressure (see Note 5).

> **Note 5:** If the Low, 3rd, and No pressure signals are all off, the press will use standard (high) main bell pressure.

Table 1: Batch Data-passing Capacity for Milnor® Allied Interfaces

Data Format-->	Numeric: Groups of signals pass multi-digit batch codes in binary (number of available batch codes shown)									Non-Numeric: One signal passes a single on/off value (X indicates signal is available)				
Code Name--> Type of Interface	Formula code	Press/ Extract code	Dry code	Cool-down code	Customer code	Goods code	destination code	weight (tenths of units)	Cake number	New formula	New customer	Single cake	Empty load	Low, 3rd, No pressure*
Dryer														
Loading			16								X	X		
Discharge							16				X			
» Destination codes only available if optional I/O board #3 supplied.														
* Low, 3rd, and No Pressure are three separate signals.														

3. Operational Signals

A set of generic functions can be defined that encompasses most operational information that might be needed for any interface. The generic functions are helpful in understanding interfacing in general, even though it is usually possible to successfully interface any two specific machines using only a few of these functions. Table 2 lists the generic functions and which corresponding signals are actually provided on the device(s).

The generic functions only describe the general purpose for a signal. A given signal may have a more specific meaning pecular to the device. The signal names are taken from the schematics (may be abbreviated) and may vary from device to device. As shown in Table 2, the generic functions can be grouped into three categories: directional functions, transfer functions, and confirmation functions.

Directional functions apply specifically to communication with the shuttle or COBUC and tell the shuttle / COBUC where it must travel to align with the device it will receive from or discharge to. These are all inputs to the shuttle / COBUC and include the following:

2nd level—The shuttle/COBUC must elevate to the higher of two possible levels. 2nd level is usually referred to in the documentation as “level 1” (the first level is level 0).

opposite side—The shuttle must run its belt(s) backwards because the device it is receiving from or discharging to is on the opposite side of the rail from normal. See Note 6.

> **Note 6:** Although the Mark 5 COBUC controls provide a signal for this function, it is not needed because the COBUC can only receive and discharge forward.

at left—The shuttle/COBUC must traverse leftward.

at right—The shuttle/COBUC must traverse rightward.

Transfer functions either declare that the device is now in a certain state with respect to transfer, or request that the other device achieve a certain state. The transfer functions include:

early call—applies only to communication between the tunnel and a Milnor centrifugal extractor. This function tells the extractor to end the current cycle in preparation for transfer if minimum extract time has elapsed. The Milnor extractor input is called end extract.

discharge desired—There are actually two possible functions: 1) Allied discharge desired (loading interface input) which tells the Milnor device that the allied loading device is or soon will be ready to send a batch to it, and 2) Milnor discharge desired (discharge interface output) which tells the allied discharge device that the Milnor device is or soon will be ready to send a batch to it.

load desired—There are actually two possible functions: 1) Milnor load desired (loading interface output), which tells the allied loading device that the Milnor device is or soon will be ready to receive a batch from it, and 2) allied load desired (discharge interface input), which tells the Milnor device that the allied discharge device is or soon will be ready to receive a batch from it.

loading mode—tells the receiving device to perform the actions that facilitate receiving. In the centrifugal extractor, the input is called start extractor and causes the load door to open or the load chute to lower, and the cylinder to turn. In the dryer, the input is called dryer is loading and causes the load door to open and the cylinder to turn.

discharge allowed—There are actually two possible functions: 1) allied discharge allowed (loading interface input), which tells the Milnor device that the allied loading device can now send, and 2) Milnor discharge allowed (discharging interface output), which tells the allied discharge device that the Milnor device can now send.

load allowed—There are actually two possible functions: 1) Milnor load allowed (loading interface output), which tells the allied loading device to begin sending, and 2) allied load allowed (discharge interface input), which tells the Milnor device to begin sending.

Confirmation functions provide information on the completion status of transfer and include the following:

transfer not completed—not an error condition (see below) but simply the inverse of transfer completed.

error: cancel transfer—says that an illegal condition was detected when transfer was attempted and to stop the transfer. Currently, this function is only provided as an allied output/Milnor input signal.

data valid—tells the Milnor device (in a loading interface) or the allied discharge device (in a discharge interface) that batch data are set and should now be read. See Note 7.

transfer completed—says that all goods have been transferred. The signal usually passes from discharging device to receiving device. Hence, this is usually an input signal in a loading interface and an output signal in a discharging interface. However, the Milnor shuttle is also capable, via the belt photoeyes, of detecting when it has received a complete load. So if needed, it can communicate this information (in the opposite direction) to the loading device. The signal name varies, depending on the device and type of interface. See Note 7.

Note 7: In most cases, an explicit data valid signal is not needed because another operational signal serves this purpose. Where the data valid signal is not provided, the various tables of non-numeric signals in the document "Milnor® Allied Interface Specifications and Signals" indicate which signal should be used for this purpose.

Table 2: Operational Functions and Available Signals

Function Type-->	Directional Functions				Transfer Functions						Confirmation Functions			
Function Name--> Type of Interface	2nd level	Oppo-site side	At left	At right	Early call	Dis-charge desired	Load desired	Load-ing mode	Dis-charge al-lowed	Load al-lowed	Trans-fer not com-plete	Error: cancel trans-fer	data valid	trans-fer com-plete
Dryer														
Loading							output: load desired	input: dryer load-ing		output: load door open				»
Dis-charge						output: dis-charge desired			input: dis-charge allowed					output: dis-charge door closed
» The dryer expects a "dryer is loaded" input. It also provides a "load door closed" output.														

— End of BICALC13 —

BICMUM01 (Published) Book specs- Dates: 20040817 / 20040817 / 20040817 Lang: ENG01 Applic: CDU

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.

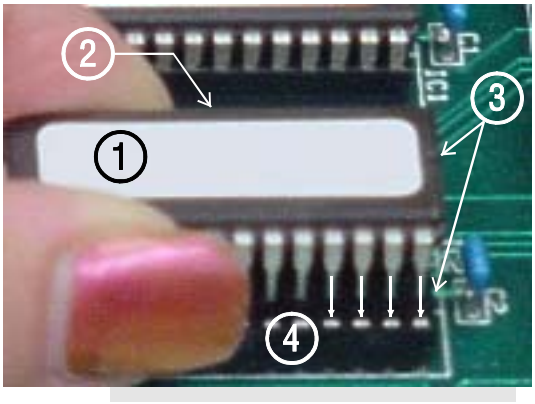
- Do not attempt unauthorized servicing, repairs, or modification.
- Lock out and tag out power at the main machine disconnect before servicing, or in accordance with factory service procedures.

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.

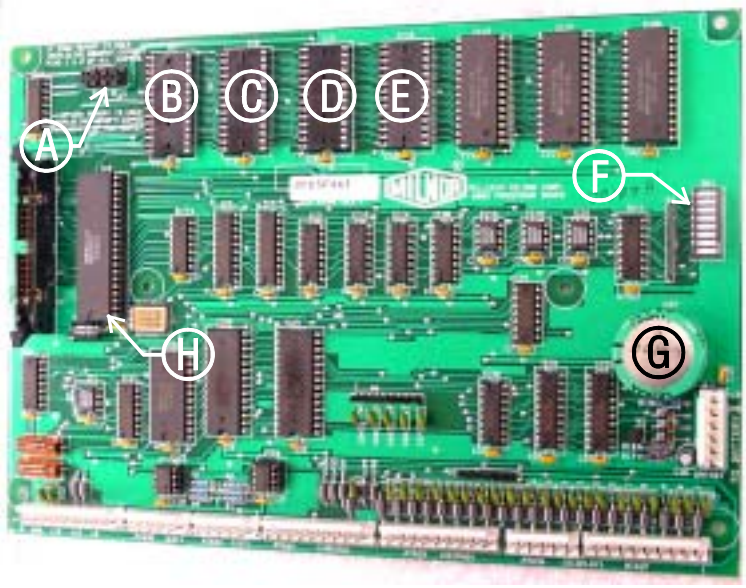
Table 1: Processor Boards and Applications

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_

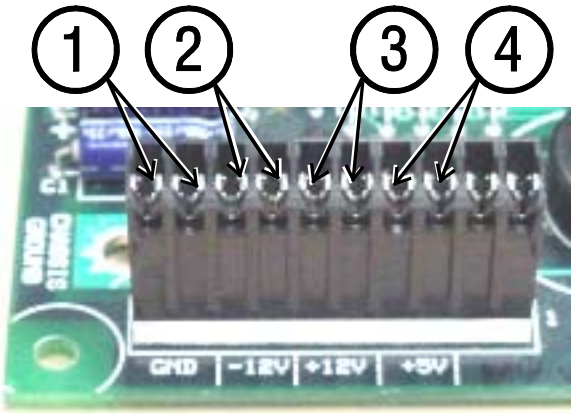


Legend

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

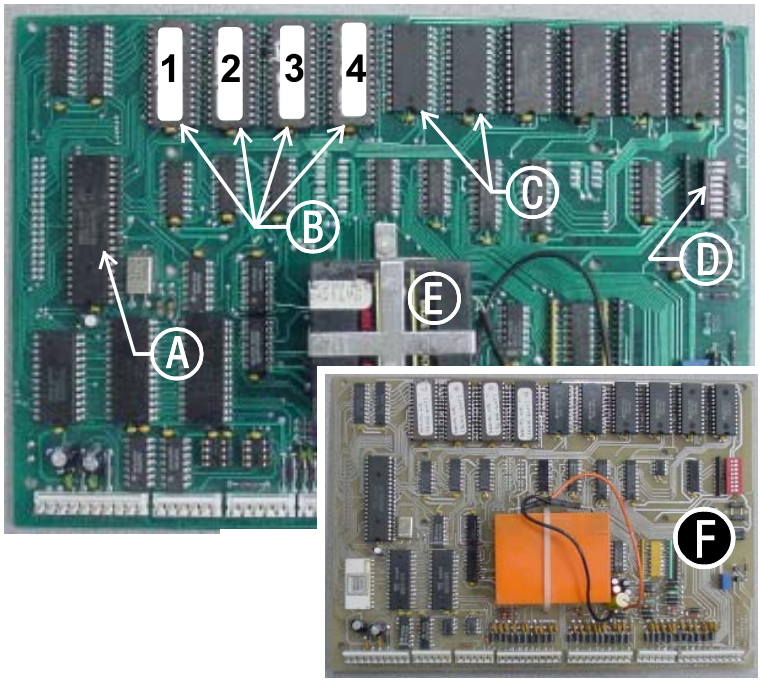


Legend

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



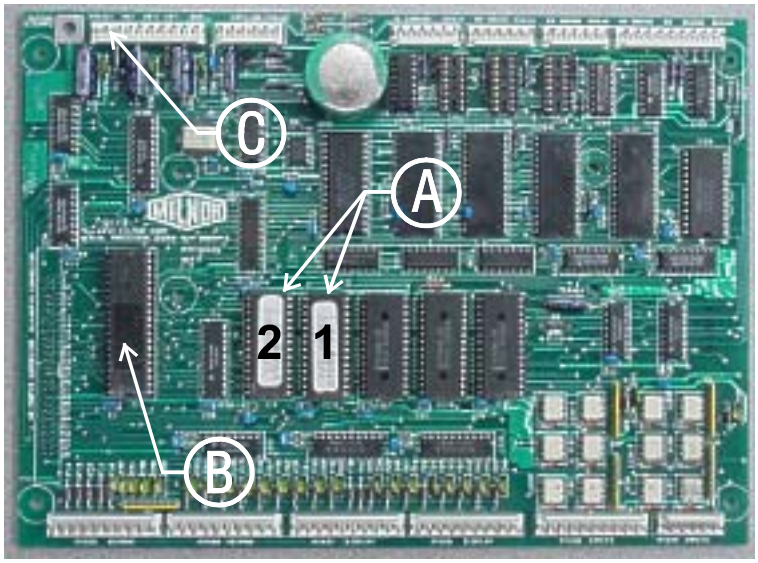
Legend

- **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



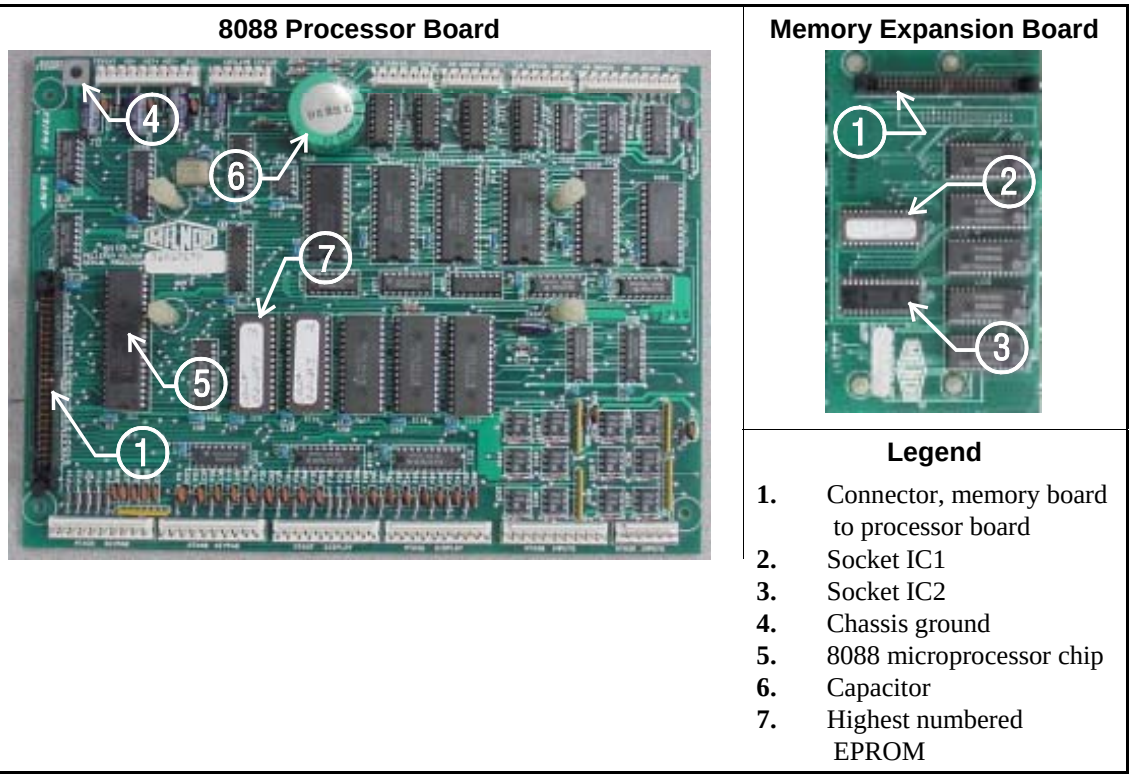
Legend

- **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



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

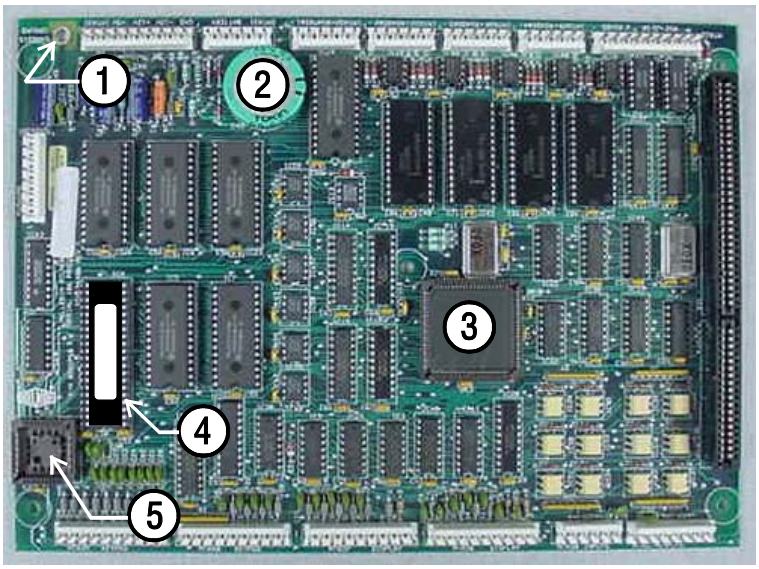
Rules for Replacing 80186 Processor Boards

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

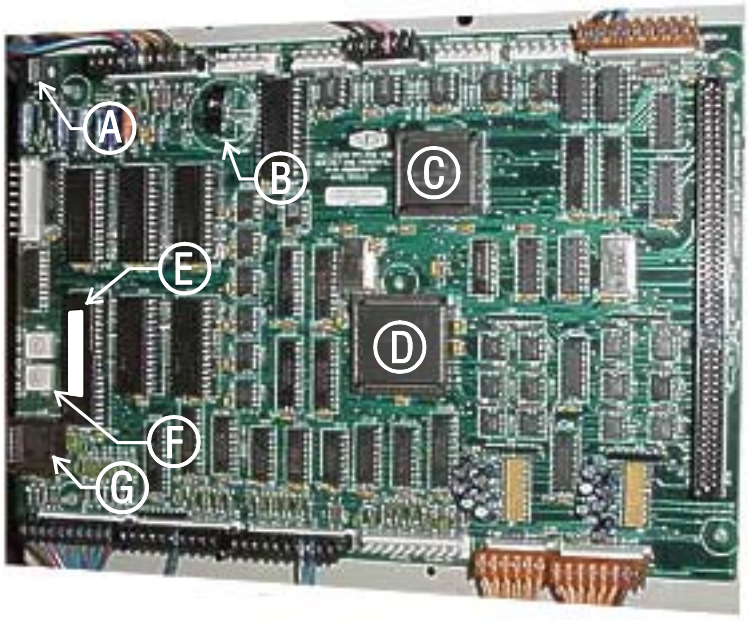


Legend

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

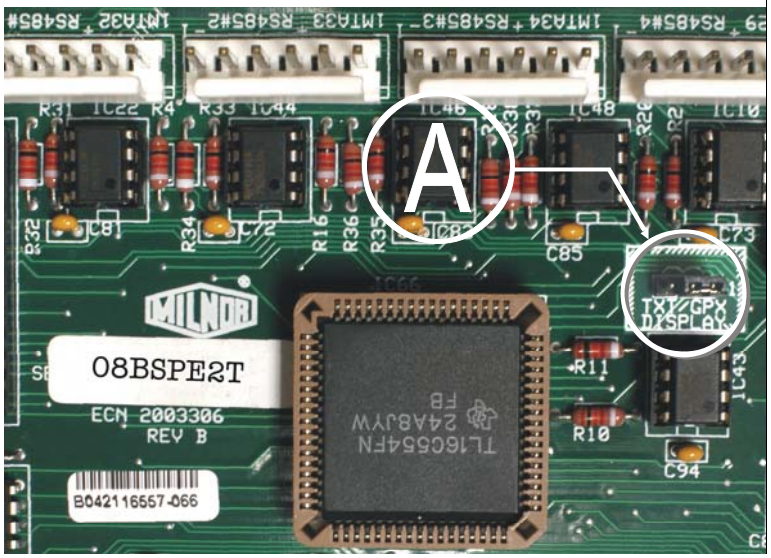


Legend

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

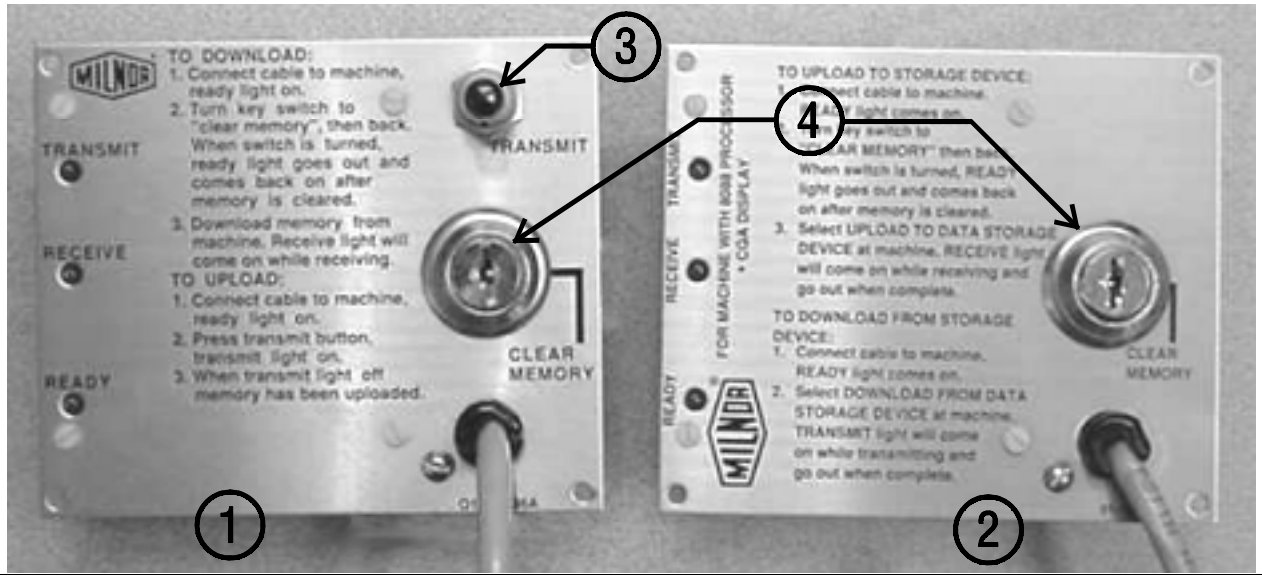
Document..... BICUDC01
Specified Date..... 20010807
As-of Date..... 20010807
Access Date..... 20010807

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

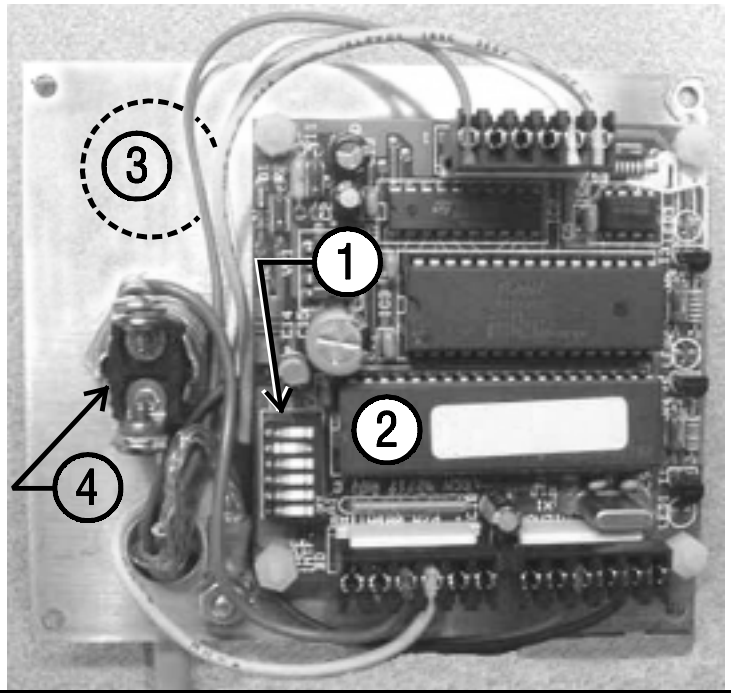
Faceplate Comparison



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.

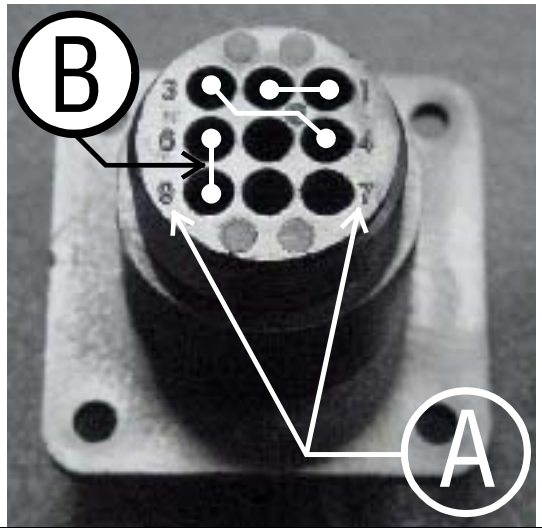
Applicable machines are provided with a single DIN receptacle for both downloading and printing. Only one function at a time (downloading or printing) can be performed using this connection.

1. Pin Identification

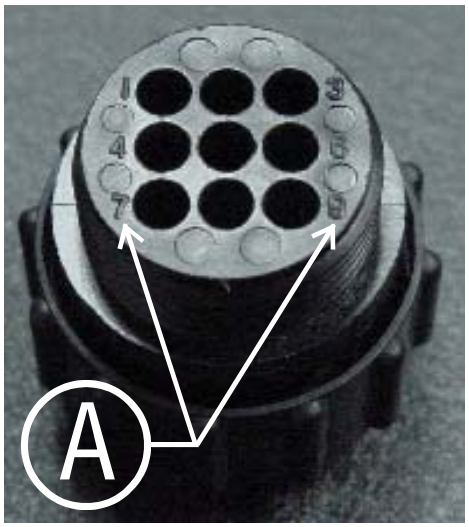
The download and printing functions use different data communication lines, but the DIN receptacle on the machine contains all of the pins used for either function. Figure 1 illustrates the DIN receptacle (which uses male pins) and the mating plug (which uses female pin sockets), each viewed from the **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.

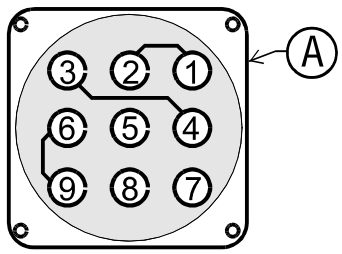
2.1. Cable Specifications—Multi-conductor shielded cable that meets the following minimum requirements must be used in the applications covered herein. Conforming cable may be purchased from Milnor (P/N 09V300A04S) or purchased from another source:

- 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

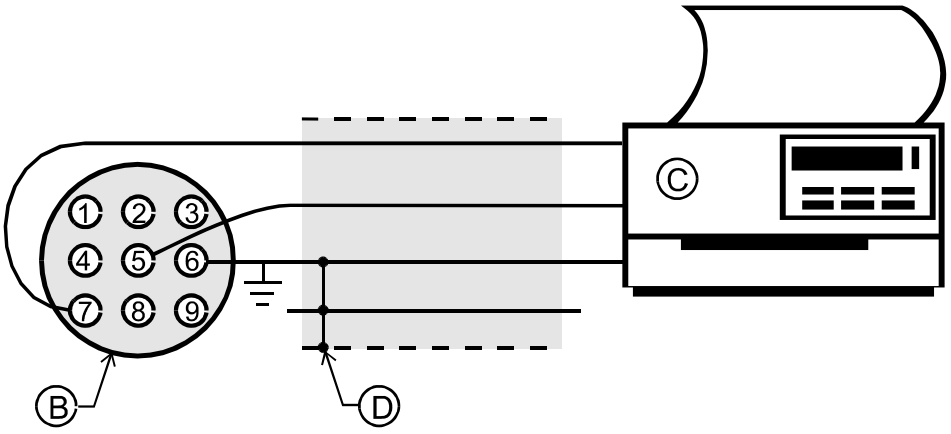


Legend

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.

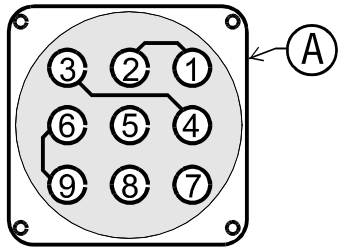
Cable Wiring



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** .

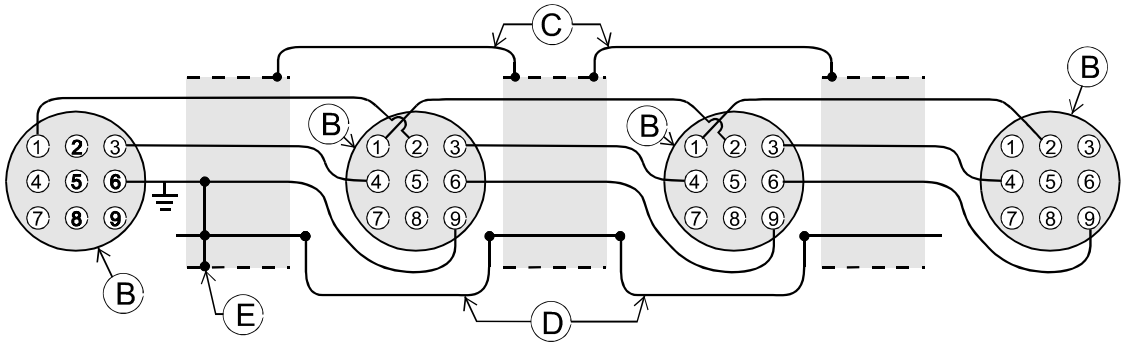
B. Plug on cable (with female pin sockets)

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



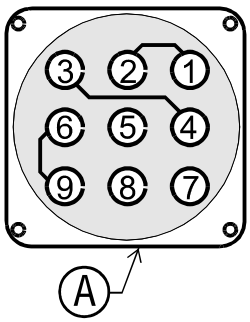
The internal connections on each receptacle (machine) between pins 1 and 2, 3 and 4, and 6 and 9 make it easier to wire the cable because it is not necessary to jumper these pins together on the cable. However, this also means that every plug on the daisy chain must be plugged into a receptacle. Otherwise, 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

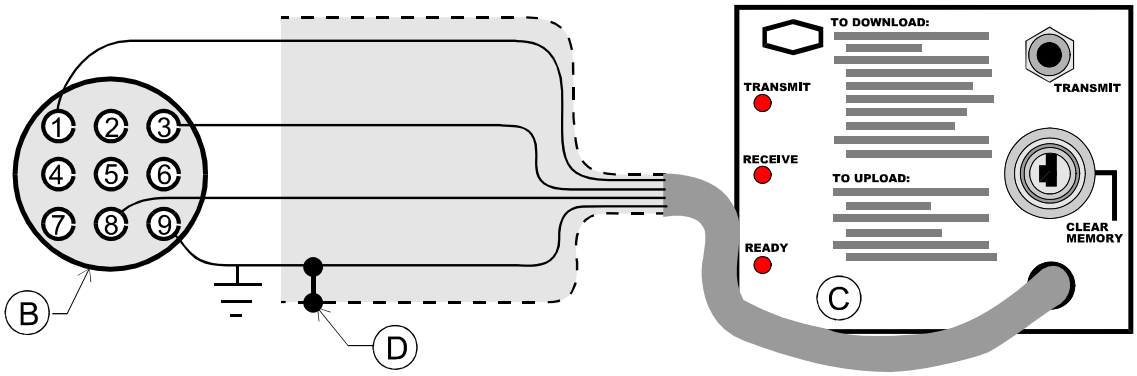
A. Receptacle on machine (with male pins). Pin functions are as follows:
- **1&2.** Serial low. This application only uses Pin 1.
- **3&4.** Serial high. This application only uses Pin 3.
- **6&9.** Ground. This application only uses Pin 9.
- **5&7.** Not used in this application.
- **8.** +5VDC. Provides 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



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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 —