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.

CSA®

C U S
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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, FOB our factory. 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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WE NEITHER ASSUME, NOR AUTHORIZE ANY EMPLOYEE OR OTHER PERSON TO ASSUME FOR US, ANY OTHER RESPONSIBILITY AND/OR LIABILITY IN CONNECTION WITH THE SALE OR FURNISHING OF OUR EQUIPMENT TO ANY BUYER.
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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Commissioning
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

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<td>2. DEF</td>
<td>3. Allows the user to modify configuration and programming.</td>
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<td>3. GHI</td>
<td>4. Output from control system to user.</td>
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<tr>
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<td>NEXT</td>
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<td>SKIP TO</td>
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<td>3. Down</td>
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<td>STOP</td>
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<td>1. Manual</td>
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<td>2. MAN.</td>
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<tr>
<td>LOAD</td>
<td></td>
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</tbody>
</table>

### 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.
About the User Controls—Machines with a Keypad

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.
<x> | This is an alternative way of depicting word and number entries when the exact values are determined by the user. <x> 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 satisfied before operation can continue.
About the User Controls—Machines with a Keypad

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 (R) 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). Productivity 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:

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<th>Machines Data Applies To</th>
<th>Ways Data Can Be Used and Altered</th>
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<td>Data can be read</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data can be over-written</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data can be up/downloaded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data can be cleared</td>
</tr>
<tr>
<td>Configure Data</td>
<td>dryer (includes gains)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>shuttle, single-stage press</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>two-stage press, Cobuc, Linear Costa, discharge sequencer</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>washer (and textile)-extractor, centrifugal extractor</td>
<td>Yes</td>
</tr>
<tr>
<td>Formula Data</td>
<td>washer (and textile)-extractor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>step, chemical names</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>formulas</td>
<td>Yes</td>
</tr>
<tr>
<td>Productivity Data</td>
<td>washer (and textile)-extractor, centrifugal extractor, dryer</td>
<td>No</td>
</tr>
</tbody>
</table>

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 —
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
Definitions of Terms and Abbreviations

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 range current which varies proportionally according to its temperature; used most frequently in dryers
Definitions of Terms and Abbreviations

**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 BIUUK05 —
Programming
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 ← before returning to run mode.

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

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.

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

Accesses the selected program.

example: SELECT DRYCODE

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 **enter**, unless the display says

![Program Menu](image)

Otherwise, the control may require clearing the entire memory.

If the control requires deleting its entire memory, it displays

![Error in Memory](image)

Then

![Clearing Memory](image)

Display returns to

![Program Menu](image)

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](image)

Then

![Clearing Memory](image)

Display returns to

![Program Menu](image)

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 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).

When the cursor is at the last decision on a page, 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.

Enables cursor on page B.

Moves the cursor forward among all the pages through each valid decision. This accepts the standard or default decision unless another choice is made.

Continues to the following page.

Skips backward to the beginning of the previous page.

Skips forward to the beginning of the next page.
1 = MODIFY DRYCODES

When the display = PROGRAM  MODIFY DRYCODES

To Access a Drycode

Selects drycode 04 (example)

Drycodes 00-15 are available for programming.

Scrolls the drycode numbers.

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.

Accesses the drycode name.

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

To Name the Drycode

Names the drycode the same as the drycode number, or

enters “BATHMATS” (example)

*Example: For “B,” press twice or hold it to scroll. displays a blank.

Moves cursor right/left.

Accepts drycode name.

This is page A, as described earlier in this section.
To Delete, Duplicate, or Access a Step in a Drycode

Permits deleting or duplicating a previously programmed step.

When cursor disappears,

**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.

**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.

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

Display =

```
04F HI dFCdF2IFMMQRAC
S00 3425115---101101
```

To Completely Delete an Entire Drycode

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

Display =

```
DELETE DRYCODE #04 ?
0 NO T
1 YES
```

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. Appears in 8 seconds (if no valid entry) = delay 1 minute = appear immediately

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, 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.

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 \textit{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.

\[ \text{Max allowed inlet temperature for this step. Only if dryer is equipped with and configured for a modulating valve (configure decision } B=\text{yes).} \]

\[ \text{IdF=}\text{Max Inlet Temperature in this step if configured for } ^\circ\text{F} \]
\[ \text{IdC=}\text{Max Inlet Temperature in this step if configured for } ^\circ\text{C} \]
\[ -=- =\text{Inlet Temperature not programmable (example: } H=2 \text{ for this step)} \]
\[ 200=\text{Min } ^\circ\text{F (093°C) for full or partial load} \]
\[ 450=\text{Max } ^\circ\text{F (232°C) for full or partial load} \]

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

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

\[ \text{OdF=}\text{Commanded Outlet Temperature in this step if configured for } ^\circ\text{F} \]
\[ \text{OdC=}\text{Commanded Outlet Temperature in this step if configured for } ^\circ\text{C} \]
\[ 090=\text{Min } ^\circ\text{F (032°C) for steam dryers and non-CSA gas dryers (CSA=} \text{Canadian Standards Association)} \]
\[ 214=\text{Max } ^\circ\text{F (101°C) for steam dryers and non-CSA gas dryers (CSA=} \text{Canadian Standards Association)} \]
\[ 185=\text{Max } ^\circ\text{F (085°C) for CSA gas dryers} \]

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

\[ \text{DdF=}\text{Commanded Delta Temperature if configured for } ^\circ\text{F} \]
\[ \text{DdC=}\text{Commanded Delta Temperature if configured for } ^\circ\text{C} \]
\[ 000=\text{Min } ^\circ\text{F or } ^\circ\text{C} \]
\[ 100=\text{Max } ^\circ\text{F or } ^\circ\text{C} \]

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

\[ \text{Commanded Second Inlet Temperature for this step. Only if } H=2 \text{ (Type of step=Inlet–) } \]

\[ \text{2IF=}\text{Commanded Second Inlet Temperature if configured for } ^\circ\text{F} \]
\[ \text{2IC=}\text{Commanded Second Inlet Temperature if configured for } ^\circ\text{C} \]
\[ 200=\text{Min } ^\circ\text{F (093°C) for full or partial} \]

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.

**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.

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.

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.

**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)

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).

\[
\begin{array}{ll}
R= & \text{Reversing} \\
0= & \text{Not reversing (counterclockwise rotation only)} \\
1= & \text{Reversing (time running in each direction is approximately 15 seconds plus a 2.5 second dwell)}
\end{array}
\]

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 dry-codes—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.

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)
The following decisions are commanded once for each entire drycode.

**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)

**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.

**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)
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.

**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.

**U**=Custom discharge desired?

- **0**=No (see Page D1)
- **1**=Yes (see Page D2)

*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.
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 ONOFRV
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 $T_{IM}$ begins counting; basket rotates in direction $B$ (clockwise or counterclockwise); main air damper goes to position $A$ (Max, Max-1, or Min+1); and main air blower starts if $B_{LO}$ (Blower On Time) is commanded.

2. When timer reaches value $D_{D}$, discharge door opens.

3. When timer reaches value $B_{LO}$, main air blower stops.

4. When timer reaches value $T_{IM}$, 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:

```
04 F 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 15xx
```

**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:

\[
\begin{array}{c}
04F\ DVSPDDBBTIM \\
GEN 15100xx \\
\end{array}
\]

**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:

\[
\begin{array}{c}
04F\ DDBLOABTIM \\
GEN 251201x \\
\end{array}
\]

**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:

\[
\begin{array}{c}
04F\ DVSPDDDBTIM \\
GEN 1510015x \\
\end{array}
\]

**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:

\[
\begin{array}{c}
04F\ DDBLOABTIM \\
GEN 2512010xxx \\
\end{array}
\]

**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:

\[
\begin{array}{c}
04F\ DVSPDDDBTIM \\
GEN 15100150xxx \\
\end{array}
\]

**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

<table>
<thead>
<tr>
<th>PROGRAM 0 MENU</th>
<th>OK TURN KEY TO RUN</th>
</tr>
</thead>
</table>

When the display = 

<table>
<thead>
<tr>
<th>EDIT PARTIAL DRYCODE</th>
<th>0 NO</th>
</tr>
</thead>
</table>

OR 

<table>
<thead>
<tr>
<th>1 ABC , ENTER NEXT</th>
<th>EDIT PARTIAL DRYCODE</th>
<th>1 YES</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ENTER NEXT</th>
<th>04P H1dFCd2IFMMQRA S00</th>
</tr>
</thead>
</table>

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             =           ABCDEFGHIJKLMNOPQRSTUVWXYZ

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

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

**A DRYER TYPE**
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).

C LANDIS AND GYR
0 = No
1 = Yes

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

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

D AFTER 86331
0 = No
1 = Yes

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

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

E CSA DRYER
0 = No
1 = Yes

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

F VAR. BASKET SPEED
0 = No
1 = Yes

Does this dryer have variable basket speed?

G MAX CAKES TO RCV

1 = Minimum
7 = Maximum

Maximum number of cakes dryer can be loaded with

H TEMPERATURE UNIT
0 = FAHRENHEIT

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.

I DRYER RCV LEVEL

0 = Minimum
7 = Maximum

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

\[ P \ \text{UNLOAD BEACON} \]
\[ 0 \ \text{AT START OF CD} \]

\[ D0 = \text{Unload beacon operates at start of cooldown} \]
\[ 1 = \text{Unload beacon operates at end of cooldown} \]
\[ 2 = \text{Unload beacon operates } xxx \text{ degrees (°F or °C) before end of cooldown} \]

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

\[ \text{DEGREES BEFORE COOL-DOWN REACHED 000 df} \]

\[ D000 = \text{Min } F \ (000 \text{C}) \]
\[ 050 = \text{Max } F \ (028 \text{C}) \]

\[ D = \text{discretionary. All other CONFIGURE CODES are discrete to, and must match, the specific machine.} \]
Q LINT FILTER
0 NO
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
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
1 YES (must be yes for a Milnor® Autolint® system. May be yes for dry type lint filter 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).

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.

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.

**Blow Down Timing Sequence for Non-Milnor® Lint Filters**

---

\( D= \) 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

1 = Yes

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

1 = Yes

Does dryer have humidity sensors?

**V SIMULATOR VERSION**

0 = No

1 = Yes

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.

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

**W PASS PIECES**

0 = No

1 = Yes

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

1 = Yes

Does dryer have recirculation damper?

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.

<table>
<thead>
<tr>
<th>Y MILDATA MACHINE</th>
<th>Will the dryer communicate with a Mildata® computer? If 1 (yes), the following display appears.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 NO</td>
<td>Machine does not communicate with Mildata® network</td>
</tr>
<tr>
<td>1 YES</td>
<td>Machine does communicate with Mildata® network</td>
</tr>
</tbody>
</table>

Select the language the displays should appear in.

<table>
<thead>
<tr>
<th>Z LANGUAGE</th>
<th>0 English</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Foreign</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>000 Machines other than the 72072TG1</th>
<th>050 = 72072TG1</th>
</tr>
</thead>
</table>

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.

<table>
<thead>
<tr>
<th>000 Machines other than the 72072TG1</th>
<th>015 = 72072TG1</th>
</tr>
</thead>
</table>

MANUAL LOAD

0 = No
1 = Yes

Allows user to manually jog the basket during loading.

<table>
<thead>
<tr>
<th>0 Manual Load</th>
<th>1 = YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 No</td>
<td></td>
</tr>
</tbody>
</table>

MANUAL DISCHARGE

0 = No
1 = Yes

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

<table>
<thead>
<tr>
<th>0 Manual Discharge</th>
<th>1 = YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 No</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PASSWORD :</th>
<th>0000</th>
</tr>
</thead>
</table>

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**

<table>
<thead>
<tr>
<th>0 = NO</th>
<th>1 = YES</th>
</tr>
</thead>
</table>

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`

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

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

**MILDATA MACHINE**

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

Will the dryer communicate with a Mildata® computer? If *Yes*, the following display appears.

**DWELL TIME**

| 0 = Standard (2.5 seconds) |
| 1 = Custom |

Allows operator to program a custom dwell time.

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

**DWELL TIME**

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

Selects how long the basket “dwells” between reversals.

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.
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

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

= 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 |

After entering the valve to program the next constant.

<table>
<thead>
<tr>
<th>Dryer Type</th>
<th>Constants</th>
<th>Inlet Gains</th>
<th>Outlet Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Dryer Only</td>
<td>KP</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>1/KP</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>KI</td>
<td>006</td>
<td>006</td>
</tr>
<tr>
<td></td>
<td>1/KI</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>KD</td>
<td>060</td>
<td>060</td>
</tr>
<tr>
<td></td>
<td>1/KD</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Modulating Steam Dryer Only</td>
<td>KP</td>
<td>050</td>
<td>070</td>
</tr>
<tr>
<td></td>
<td>1/KP</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>KI</td>
<td>006</td>
<td>006</td>
</tr>
<tr>
<td></td>
<td>1/KI</td>
<td>100</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>KD</td>
<td>063</td>
<td>060</td>
</tr>
<tr>
<td></td>
<td>1/KD</td>
<td>600</td>
<td>500</td>
</tr>
<tr>
<td>Thermal Oil Dryer Only</td>
<td>KP</td>
<td>030</td>
<td>030</td>
</tr>
<tr>
<td></td>
<td>1/KP</td>
<td>010</td>
<td>010</td>
</tr>
<tr>
<td></td>
<td>KI</td>
<td>010</td>
<td>010</td>
</tr>
<tr>
<td></td>
<td>1/KI</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>KD</td>
<td>010</td>
<td>010</td>
</tr>
<tr>
<td></td>
<td>1/KD</td>
<td>010</td>
<td>010</td>
</tr>
</tbody>
</table>

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 | NEXT | "SKIP" FOR NO CHANGE | "4-5-6" TO DEFAULT |

4 JEL + 5 MWG + 6 FOR = DRY CODES DEFAULTED

After keys are released

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

or

| 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  

<table>
<thead>
<tr>
<th>DRYER: 58058TG2</th>
<th>VERSION 90213-S</th>
<th>DATE: 11/08/1994</th>
<th>PAGE: 01</th>
</tr>
</thead>
</table>

**DRYCODES**

- **H** = HOW CODE
- **IdF** = INLET TEMPERATURE
- **OdF** = OUTLET TEMPERATURE
- **2IF** = SECOND INLET
- **SFR** = FINAL RATIO
- **MMQ** = STEP TIME
- **Spd** = % SPEED
- **OdC** = OUTLET TEMPERATURE
- **MCT** = MAXIMUM COOL TIME
- **2IC** = SECOND INLET
- **V** = REVERSING
- **Spd** = % SPEED
- **OdC** = OUTLET TEMPERATURE
- **MVP** = MAX VALVE POSITION
- **IdC** = INLET TEMPERATURE
- **MHT** = MAXIMUM HEAT TIME
- **OdC** = OUTLET TEMPERATURE
- **TIM** = DURATION
- **Spd** = % SPEED
- **OdC** = OUTLET TEMPERATURE
- **DS** = DESTINATION

**DRYCODE RANGE** = 00-05

**DRYCODE 00** REDRY

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

**DRYCODE 01** CONDITION

| CODE | H | IdF | OdF | 2IF | MMQ | R | A | SPD | MHT | MCT | MVP | DS | ON | OF | RV | DD | BLO | A | B | TIM |
|------|---|-----|-----|-----|-----|---|---|-----|-----|-----|-----|----|----|----|----|-----|---|---|-----|
| 01F  | 3 | 375 | 165 | --- | 020 | 1 | 1 | --- | TIME ONLY | 030 | 020 | 220 | 20 | 25 | 04 | --- | --- | --- | --- |
| S00  | 0 | --- | 140 | 1 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S01  | 0 | --- | 140 | 1 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| CODE | H | IdF | OdF | 2IF | MMQ | R | A | SPD | MHT | MCT | MVP | DS | ON | OF | RV | DD | BLO | A | B | TIM |
|------|---|-----|-----|-----|-----|---|---|-----|-----|-----|-----|----|----|----|----|-----|---|---|-----|
| 01P  | 3 | 375 | 165 | --- | 020 | 1 | 1 | --- | TIME ONLY | 030 | 020 | 150 | 20 | 25 | 04 | --- | --- | --- | --- |
| S00  | 0 | --- | 140 | 1 | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**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)

<table>
<thead>
<tr>
<th>DRYER</th>
<th>VERSION</th>
<th>DATE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>58058TG2</td>
<td>90022</td>
<td>11/08/1994</td>
<td>02</td>
</tr>
</tbody>
</table>

**DRYCODE RANGE = 00-05 (Cont.)**

**DRYCODE 02 TERRY TOWELS**

<table>
<thead>
<tr>
<th>Drycode</th>
<th>Steps</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>02F</td>
<td>S00</td>
<td>3 425 185 --- 010 1 0 --- OUTLET +</td>
</tr>
<tr>
<td></td>
<td>S01</td>
<td>2 425 185 275 010 1 1 --- INLET -</td>
</tr>
<tr>
<td></td>
<td>S02</td>
<td>0 --- 150 --- 000 1 2 --- COOLDOWN</td>
</tr>
</tbody>
</table>

**DRYCODE 03 PATIENT GOWNS**

<table>
<thead>
<tr>
<th>Drycode</th>
<th>Steps</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>03F</td>
<td>S00</td>
<td>3 375 165 --- 010 1 1 --- OUTLET +</td>
</tr>
<tr>
<td></td>
<td>S01</td>
<td>2 375 165 290 010 1 2 --- INLET -</td>
</tr>
<tr>
<td></td>
<td>S02</td>
<td>0 --- 140 --- 000 1 2 --- COOLDOWN</td>
</tr>
</tbody>
</table>

**DRYCODE 04 BLANKETS**

<table>
<thead>
<tr>
<th>Drycode</th>
<th>Steps</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F</td>
<td>S00</td>
<td>3 425 185 --- 010 1 0 --- OUTLET +</td>
</tr>
<tr>
<td></td>
<td>S01</td>
<td>2 425 185 275 010 1 1 --- COOLDOWN</td>
</tr>
<tr>
<td></td>
<td>S02</td>
<td>0 --- 150 --- 000 1 1 --- COOLDOWN</td>
</tr>
</tbody>
</table>

*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

---

**DRYER: 58058TS1**

**VERSION 90022**

**DATE: 03/12/1992**

**PAGE: 01**

---

**DRYCODES**

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

**DRYCODE RANGE = 00-05**

**DRYCODE 00**  REDRY

<table>
<thead>
<tr>
<th>Code</th>
<th>H (How Code)</th>
<th>IdF (Inlet Temp)</th>
<th>OdF (Outlet Temp)</th>
<th>SFR (Final Ration)</th>
<th>MMQ (Step Time)</th>
<th>R (Reversing)</th>
<th>A (Damper Position)</th>
<th>SPD (% Speed)</th>
<th>OF (Discharge Off)</th>
<th>RV (# of Reversals)</th>
<th>DD (Door Delay)</th>
<th>BLO (BLOWER)</th>
<th>MHT (Max Heat Time)</th>
<th>MCT (Max Cool Time)</th>
<th>MVP (Max Valve Position)</th>
<th>DS (Destination)</th>
<th>TIM (Duration)</th>
<th>ON (Discharge On)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>00F</td>
<td>180 050</td>
<td>20 25</td>
<td>04</td>
<td>---</td>
<td>---</td>
<td>030 020</td>
<td>20 25 04</td>
<td>000 1 1</td>
<td>110</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>000</td>
<td>0000</td>
<td>0000</td>
<td>111</td>
<td>010 1 1</td>
<td>STEAM RATIO</td>
</tr>
<tr>
<td>S00</td>
<td>110</td>
<td>11</td>
<td>000</td>
<td>1 1</td>
<td>110</td>
<td>116</td>
<td>0010 1 2</td>
<td>000 1 2</td>
<td>---</td>
<td>150</td>
<td>1 2</td>
<td>1</td>
<td>---</td>
<td>000</td>
<td>1100</td>
<td>0000</td>
<td>1 2</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>S01</td>
<td>116</td>
<td>010</td>
<td>010</td>
<td>1 2</td>
<td>116</td>
<td>150</td>
<td>000 1 2</td>
<td>000 1 2</td>
<td>---</td>
<td>150</td>
<td>1 1</td>
<td>1</td>
<td>110</td>
<td>000</td>
<td>1100</td>
<td>0000</td>
<td>1 1</td>
<td>000 1 1</td>
<td>STEAM RATIO</td>
</tr>
<tr>
<td>S02</td>
<td>000 1 2</td>
<td>150</td>
<td>000</td>
<td>1 1</td>
<td>000 1 2</td>
<td>111</td>
<td>010 1 2</td>
<td>000 1 2</td>
<td>---</td>
<td>150</td>
<td>1 1</td>
<td>1</td>
<td>100</td>
<td>000</td>
<td>0000</td>
<td>0000</td>
<td>1 1</td>
<td>000 1 1</td>
<td>COOLDOWN</td>
</tr>
</tbody>
</table>

**DRYCODE 01**  CONDITION

<table>
<thead>
<tr>
<th>Code</th>
<th>H (How Code)</th>
<th>IdF (Inlet Temp)</th>
<th>OdF (Outlet Temp)</th>
<th>SFR (Final Ration)</th>
<th>MMQ (Step Time)</th>
<th>R (Reversing)</th>
<th>A (Damper Position)</th>
<th>SPD (% Speed)</th>
<th>OF (Discharge Off)</th>
<th>RV (# of Reversals)</th>
<th>DD (Door Delay)</th>
<th>BLO (BLOWER)</th>
<th>MHT (Max Heat Time)</th>
<th>MCT (Max Cool Time)</th>
<th>MVP (Max Valve Position)</th>
<th>DS (Destination)</th>
<th>TIM (Duration)</th>
<th>ON (Discharge On)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>01F</td>
<td>030 020</td>
<td>20 25</td>
<td>04</td>
<td>---</td>
<td>---</td>
<td>030 020</td>
<td>20 25 04</td>
<td>000 1 1</td>
<td>111</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>000</td>
<td>0000</td>
<td>0000</td>
<td>010</td>
<td>1 1</td>
<td>TIME ONLY</td>
</tr>
<tr>
<td>S00</td>
<td>030</td>
<td>11</td>
<td>000</td>
<td>1 1</td>
<td>030</td>
<td>150</td>
<td>000 1 1</td>
<td>000 1 1</td>
<td>---</td>
<td>150</td>
<td>1 1</td>
<td>1</td>
<td>100</td>
<td>000</td>
<td>0000</td>
<td>0000</td>
<td>1 1</td>
<td>000 1 1</td>
<td>COOLDOWN</td>
</tr>
<tr>
<td>S01</td>
<td>150</td>
<td>000</td>
<td>000</td>
<td>1 1</td>
<td>150</td>
<td>022</td>
<td>000 1 1</td>
<td>000 1 1</td>
<td>---</td>
<td>150</td>
<td>1 1</td>
<td>1</td>
<td>100</td>
<td>000</td>
<td>0000</td>
<td>0000</td>
<td>1 1</td>
<td>000 1 1</td>
<td>TIME ONLY</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DRYCODE</th>
<th>TOWEL TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>02F</td>
<td>TERRY TOWELS</td>
</tr>
<tr>
<td>S00</td>
<td></td>
</tr>
<tr>
<td>S01</td>
<td></td>
</tr>
<tr>
<td>S02</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRYCODE</th>
<th>GOWN TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03F</td>
<td>PATIENT GOWNS</td>
</tr>
<tr>
<td>S00</td>
<td></td>
</tr>
<tr>
<td>S01</td>
<td></td>
</tr>
<tr>
<td>S02</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRYCODE</th>
<th>BLANKET TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F</td>
<td>BLANKETS</td>
</tr>
<tr>
<td>S00</td>
<td></td>
</tr>
<tr>
<td>S01</td>
<td></td>
</tr>
<tr>
<td>S02</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Similarity between sending and receiving machines</th>
<th>Should you download?</th>
<th>Actions required after downloading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identical Identical Identical</td>
<td>Yes—including configure.</td>
<td>none</td>
</tr>
<tr>
<td>Identical Identical Different</td>
<td>Ok—probably exclude configure.</td>
<td>Check configure (see caution).</td>
</tr>
<tr>
<td>Identical Different Different</td>
<td>Probably not.</td>
<td>Reconfigure then revise formulas.</td>
</tr>
<tr>
<td>Different doesn’t matter doesn’t matter</td>
<td>No—will result in scrambled, unusable data.</td>
<td></td>
</tr>
</tbody>
</table>

⚠️ 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 name-plate. 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 susceptible 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, Download* is displayed,

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

**For a Quick Return to the Program Menu**

**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> 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]**

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.

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 *I=M- 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**

<table>
<thead>
<tr>
<th>Between Machines</th>
<th>Machine to Serial Downloader (see To Upload on downloader box)</th>
<th>Serial Downloader to Machine (see To Download on downloader box)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Designate master.</strong> Downloading begins immediately.</td>
<td><strong>1. Clear memory in the serial downloader</strong> as explained in the To Upload instructions on the serial downloader. <strong>2. Designate master.</strong> Uploading begins immediately.</td>
<td><strong>1. Command Transmit, as explained in the To Download instructions on the serial downloader.</strong></td>
</tr>
</tbody>
</table>

**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

Error Displays During Downloading:

- **(S) 9600 BAUD 000** WAITING FOR MASTER.
- **ERROR IN CHECK SUM** 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,

On each machine, returns to Program Menu.

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

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**

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 =

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>6</th>
<th>MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLEAR ALL MEMORY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 to cancel this procedure.

<table>
<thead>
<tr>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>JKL</td>
<td>ABC</td>
<td>DEF</td>
</tr>
</tbody>
</table>

Clears all drycodes, step names, and configure.

Display =

| MEMORY CLEARED |

or

After keys are released

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>0</th>
<th>MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK TURN KEY TO RUN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 TO 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

or

PROGRAM 0 DRYCODES

Scrolls the choices.

Prompts for today’s date.

Display =

DATE: DD - MM - 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 xx STOP 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 . . .

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 . . .

When printing ends, display returns to

PROGRAM 0 MENU
OK TURN KEY TO RUN
### FIGURE 7 (MSOP0119BE)
Sample Printout—Drycodes

<table>
<thead>
<tr>
<th>Dryer: Dryer Test</th>
<th>Version: 90213-S</th>
<th>Date: 11/08/1994</th>
</tr>
</thead>
</table>

#### DRYCODES

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>HOW CODE</td>
<td>FDH=FINAL DELTA</td>
</tr>
<tr>
<td>IdF</td>
<td>INLET TEMPERATURE</td>
<td>MMQ=STEP TIME</td>
</tr>
<tr>
<td>IdC</td>
<td>INLET TEMPERATURE</td>
<td>R =REVERSING</td>
</tr>
<tr>
<td>OdF</td>
<td>OUTLET TEMPERATURE</td>
<td>A =DAMPER POSITION</td>
</tr>
<tr>
<td>OdC</td>
<td>OUTLET TEMPERATURE</td>
<td>MMQ=STEP TIME</td>
</tr>
<tr>
<td>2IF</td>
<td>SECOND INLET</td>
<td>MHT=MAXIMUM HEAT TIME</td>
</tr>
<tr>
<td>2IC</td>
<td>SECOND INLET</td>
<td>MCT=MAXIMUM COOL TIME</td>
</tr>
<tr>
<td>SFR</td>
<td>FINAL RATIO</td>
<td>MMP=MAX VALVE POSITION</td>
</tr>
</tbody>
</table>

**Drycode Range:** 00-01

**Drycode 00 REDRY**

| Step | H | IdF | OdF | 2IF | MMQ | R | A | SPD | MHT | MCT | MVP | DS | ON | OF | RV | DD | BLO | A | B |
|------|---|-----|-----|-----|-----|---|---|-----|-----|-----|-----|----|----|----|----|-----|---|---|
| 00F  | 0375 | 165 | 010 | 1 | 1       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       |
| S00  | 375 | 165 | 010 | 1 | 1       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       |
| S01  | 275 | 165 | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       |
| S02  | 0   | 150 | 000 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       | 010 | 1 | 2       |

**Drycode 01 CONDITION**

| Step | H | IdF | OdF | 2IF | MMQ | R | A | SPD | MHT | MCT | MVP | DS | ON | OF | RV | DD | BLO | A | B |
|------|---|-----|-----|-----|-----|---|---|-----|-----|-----|-----|----|----|----|----|-----|---|---|
| 01F  | 0375 | 165 | 020 | 1 | 1       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       |
| S00  | 1375 | 165 | 020 | 1 | 1       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       |
| S01  | 0   | 140 | 000 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       | 020 | 1 | 2       |

---

**PROGRAMMING THE MARK III, IV, AND V DRYER CONTROL MSOP0119BE/200**

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### 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
## FIGURE 8 (MSOP0119BE)
### Sample Printout—Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>A=DRYER TYPE</th>
<th>B=MODULATING VALVE</th>
<th>C=LANDIS &amp; GYR</th>
<th>D=AFTER 86331</th>
<th>E=CSA DRYER</th>
<th>F=VAR. BASKET SPD</th>
<th>G=MAX CAKES TO RCV</th>
<th>H=TEMPERATURE UNITS</th>
<th>I=DRYER RCV LEVEL</th>
<th>J=PASS DATA</th>
<th>K=LOADING DIRECTION</th>
<th>L=DEST. PER DRYCODE</th>
<th>M=NODRY LOCATION</th>
<th>N=NODRY RCV LEVEL</th>
<th>O=NODRY LOADING DIR</th>
<th>P=UNLOAD BEACON</th>
<th>Q=LINT FILTER</th>
<th>R=MILNOR FILTER</th>
<th>S=LOADS BEFORE STRIP</th>
<th>T=MANUAL PASSWORD</th>
<th>U=HUMIDITY SENSORS</th>
<th>V=SIMULATOR VERSION</th>
<th>W=PASS PIECES</th>
<th>X=MILDATA MACHINE</th>
<th>Y=RECIRC DAMPER</th>
<th>Z=LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dF BEFORE COOLDOWN</strong></td>
<td>20</td>
<td><strong>BLOW DOWN INTERVAL</strong></td>
<td>020 (MMQ)</td>
<td><strong>BLOW DOWN DURATION</strong></td>
<td>100 (SSS)</td>
<td><strong>MANUAL LOAD</strong></td>
<td>1</td>
<td><strong>MANUAL DISCHARGE</strong></td>
<td>1</td>
<td><strong>MILTRAC ADDRESS</strong></td>
<td>004</td>
<td><strong>DWELL TIME</strong></td>
<td>2.8 - CUSTOM</td>
<td><strong>MILDATA ADDRESS</strong></td>
<td>004</td>
<td><strong>DRYCODE CODE</strong></td>
<td>0100011010000002112010011*</td>
<td><strong>WORK ORDER CODE</strong></td>
<td><strong>GOODS CODE</strong></td>
<td><strong>CUSTOMER CODE</strong></td>
<td><strong>EMPLOYEE NUMBER</strong></td>
<td><strong>WEIGHT</strong></td>
<td><strong>NUMBER OF PIECES</strong></td>
<td><strong>DATA ENT. DWGCEWPL</strong></td>
<td>10010000</td>
<td></td>
</tr>
</tbody>
</table>
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

Example Trials Results

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 BIYPC01 —
Operating
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

<table>
<thead>
<tr>
<th>Master Switch on</th>
<th>Energizes control power, but not dryer power.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energizes dryer power and silences operator alarm.</td>
</tr>
</tbody>
</table>

COPYRIGHT PELLERIN MILNOR 1989

ALL RIGHTS RESERVED MARK-II DRYER 90022

DRY FORMULA MEMORY CHECKSUM 8086

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

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

Copyright statement (appears one or more times)

Number at lower right is software date code.

This number changes if drycode changes are made.

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

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)

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

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F TIF TOF 001 AIR S00 425D185 011 000</td>
<td>Alternates with</td>
<td>04F TIF TOF 001 VP S00 382A178 011 000</td>
</tr>
<tr>
<td>04F TIF TOF 001 AIR S00 ---D--- 011 000</td>
<td>Alternates with</td>
<td>04F TIF TOF 001 SR S00 382A178 011 100</td>
</tr>
</tbody>
</table>

Non-modulating steam dryers

When the dryer desires to discharge:

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAITING TO DISCHARGE</td>
<td>Alternates with</td>
<td>FM DC DS CC GC WDT 15 04 02 12 11 123</td>
</tr>
</tbody>
</table>

When discharge is allowed:

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNLOADING</td>
<td>Alternates with</td>
<td>FM DC DS CC GC WDT 15 04 02 12 11 123</td>
</tr>
</tbody>
</table>

See “Switch Positions” in this section for Discharge Allowed switch operation.
### Table A—Dryer Display Data

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

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  
   000 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

- To View Inputs
  - Displays the first 16 inputs (page (0) A-P)
    - hold +
  - Displays second 16 inputs (page (1) A-P)
    - hold + +
  - Displays third 16 inputs (page (2) A-P)
    - hold + +

The tables of inputs below identify each input.

### Table B—Dryer Inputs

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

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

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** Displays the *first 16 outputs* (page (0) a-p)
- **Hold** + Displays the *second 16 outputs* (page (1) a-p)

---

### Table C—Dryer Outputs

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

**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

<table>
<thead>
<tr>
<th>Master Switch ON</th>
<th>Energizes control power, but not dryer power.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COPYRIGHT PELLERIN MILNOR 1989</td>
</tr>
<tr>
<td></td>
<td>ALL RIGHTS RESERVED MARK-II DRYER 90022</td>
</tr>
<tr>
<td></td>
<td>DRY FORMULA MEMORY CHECKSUM 8086</td>
</tr>
<tr>
<td></td>
<td>THREE WIRE DISABLED *****</td>
</tr>
<tr>
<td>![ ]</td>
<td>Energizes dryer power and silences operator alarm.</td>
</tr>
<tr>
<td>![ ]</td>
<td>WAITING FOR LOAD *****</td>
</tr>
</tbody>
</table>

Copyright statement (appears one or more times)
Number at lower right is software date code.
This number changes if drycode changes are made.
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](image)

Load door opens and cylinder starts turning.

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](image)

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

<table>
<thead>
<tr>
<th>Operation</th>
<th>Display</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F TIF TOF 001 AIR</td>
<td>04F TIF TOF 001 VP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S00 425D185 011 000</td>
<td>S00 382A178 011 001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-modulating steam dryers

<table>
<thead>
<tr>
<th>Operation</th>
<th>Display</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F TIF TOF 001 AIR</td>
<td>04F TIF TOF 001 SR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S00 ---D--- 011 000</td>
<td>S00 382A178 011 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When the dryer desires to discharge:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Display</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAITING TO DISCHARGE</td>
<td>FM DC DS CC GC WDT 15 04 02 12 11 123</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When discharge is allowed:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Display</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNLOADING</td>
<td>FM DC DS CC GC WDT 15 04 02 12 11 123</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See “Switch Positions” in this section for *Discharge Allowed switch* operation.
Table A—Dryer Display Data

<table>
<thead>
<tr>
<th>DATA</th>
<th>WHAT IT MEANS</th>
<th>DATA</th>
<th>WHAT IT MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>Drycode number</td>
<td>VP</td>
<td>Valve position (varies from 000-255; current position shown below VP)</td>
</tr>
<tr>
<td>F</td>
<td>Load size (i.e., Full or Partial)</td>
<td>SR</td>
<td>Steam Ratio (varies from 100 to 150; actual ratio shown below SR)</td>
</tr>
<tr>
<td>TIF</td>
<td>Inlet temperature °F or °C (Actual temperature alternates with Desired temperature; current temperature shown below TIF)</td>
<td>S00</td>
<td>Current step of selected drycode</td>
</tr>
<tr>
<td>TOF</td>
<td>Outlet temperature °F or °C (Actual alternates with Desired; current temperature shown below TOF)</td>
<td>D</td>
<td>Desired (programmed) temperatures</td>
</tr>
<tr>
<td>001</td>
<td>Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)</td>
<td>A</td>
<td>Actual temperature</td>
</tr>
<tr>
<td>AIR</td>
<td>Position of damper (varies from 000-002; current position shown below AIR)</td>
<td>011</td>
<td>Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)</td>
</tr>
</tbody>
</table>

Displays while Waiting to Discharge or Unloading

<table>
<thead>
<tr>
<th>DATA</th>
<th>WHAT IT MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM</td>
<td>Wash formula number for this load</td>
</tr>
<tr>
<td>DC</td>
<td>Dry code number for this load</td>
</tr>
<tr>
<td>DS</td>
<td>Destination for this load</td>
</tr>
<tr>
<td>CC</td>
<td>Customer code for this load</td>
</tr>
<tr>
<td>GC</td>
<td>Goods code for this load</td>
</tr>
<tr>
<td>WDT</td>
<td>Elapsed time spent waiting to discharge</td>
</tr>
</tbody>
</table>

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 [Drycode]. 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

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.

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 displays the first 16 inputs (page (0) A-P)

Hold + displays second 16 inputs (page (1) A-P)

Hold + displays third 16 inputs (page (2) A-P)

The tables of inputs below identify each input.

#### Table B—Dryer Inputs

<table>
<thead>
<tr>
<th>First 16 Inputs (Page 0)</th>
<th>Second 16 Inputs (Page 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Code</strong></td>
<td><strong>Input Name</strong></td>
</tr>
<tr>
<td>A</td>
<td>Mildata®</td>
</tr>
<tr>
<td>B</td>
<td>Program Key</td>
</tr>
<tr>
<td>C</td>
<td>Signal Cancel</td>
</tr>
<tr>
<td>D</td>
<td>No More Loads</td>
</tr>
<tr>
<td>E</td>
<td>Drycode in A</td>
</tr>
<tr>
<td>F</td>
<td>Drycode in B</td>
</tr>
<tr>
<td>G</td>
<td>not used</td>
</tr>
<tr>
<td>H</td>
<td>not used</td>
</tr>
<tr>
<td>I</td>
<td>New Customer</td>
</tr>
<tr>
<td>J</td>
<td>Drycode in C</td>
</tr>
<tr>
<td>K</td>
<td>Little Load</td>
</tr>
<tr>
<td>L</td>
<td>Drycode in D</td>
</tr>
<tr>
<td>M</td>
<td>Finished Receiving</td>
</tr>
<tr>
<td>N</td>
<td>not used</td>
</tr>
<tr>
<td>O</td>
<td>not used</td>
</tr>
<tr>
<td>P</td>
<td>not used</td>
</tr>
</tbody>
</table>
### Table B—Dryer Inputs (continued)

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

**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 \[ \text{Display} \] Displays the first 16 outputs (page 0 a-p)

Hold \[ \text{Display} + \text{Display} \] Displays the second 16 outputs (page 1 a-p)

---

**Table C—Dryer Outputs**

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

**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**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Master Switch on</strong> Energizes <em>control power</em>,</td>
<td><strong>COPYRIGHT PELLERIN MILNOR 1989</strong></td>
</tr>
<tr>
<td></td>
<td>but not dryer power.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>ALL RIGHTS RESERVED</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>MARK-III DRYER 90311</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>DRY FORMULA MEMORY</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CHECK SUM 8086</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>THREE WIRE DISABLED</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*******************************************</td>
</tr>
<tr>
<td></td>
<td><strong>Energizes dryer power and silences operator</strong></td>
<td><strong>WAITING FOR LOAD</strong></td>
</tr>
<tr>
<td></td>
<td><strong>alarm.</strong></td>
<td>*******************************************</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dryer ready for operation.</strong></td>
</tr>
</tbody>
</table>
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 =

<table>
<thead>
<tr>
<th>WAITING FOR LOAD</th>
<th>=</th>
<th>SELECT DRYCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>00 REDRY</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<xx> Selects a drycode number where <xx> is any dry-code—example:

<table>
<thead>
<tr>
<th>RUN DRYCODE</th>
<th>04 BLANKETS</th>
</tr>
</thead>
</table>

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

Scrolls available drycode numbers.

Accepts displayed drycode. The following display appears:

<table>
<thead>
<tr>
<th>ENTER LOAD SIZE</th>
<th>=</th>
<th>SELECT DRYCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 FULL LOAD</td>
<td></td>
<td>00 REDRY</td>
</tr>
</tbody>
</table>

Accepts displayed load size.

Dryer prompts for load:

<table>
<thead>
<tr>
<th>LOAD DRYER WITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLANKETS</td>
</tr>
</tbody>
</table>

Basket starts turning counterclockwise and the load door opens.

Declares that loading is completed.

<table>
<thead>
<tr>
<th>LOADING</th>
<th>=</th>
</tr>
</thead>
<tbody>
<tr>
<td>*********</td>
<td></td>
</tr>
</tbody>
</table>
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 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

<table>
<thead>
<tr>
<th>DATA</th>
<th>WHAT IT MEANS</th>
<th>DATA</th>
<th>WHAT IT MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>Drycode number</td>
<td>VP</td>
<td>Valve position (varies from 000-255; current position shown below VP)</td>
</tr>
<tr>
<td>F</td>
<td>Load size (i.e., Full or Partial)</td>
<td>SR</td>
<td>Steam Ratio (varies from 100 to 150; actual ratio shown below SR)</td>
</tr>
<tr>
<td>TIF</td>
<td>Inlet temperature °F or °C (Actual temperature alternates with Desired temperature; current temperature shown below TIF)</td>
<td>S00</td>
<td>Current step of selected drycode</td>
</tr>
<tr>
<td>TOF</td>
<td>Outlet temperature °F or °C (Actual alternates with Desired; current temperature shown below TOF)</td>
<td>D</td>
<td>Desired (programmed) temperatures</td>
</tr>
<tr>
<td>001</td>
<td>Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)</td>
<td>A</td>
<td>Actual temperatures</td>
</tr>
<tr>
<td>AIR</td>
<td>Position of damper (varies from 000-002; current position shown below AIR)</td>
<td>011</td>
<td>Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)</td>
</tr>
</tbody>
</table>

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)*

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

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

**<xxx>, Accepts cake data**

Dryer prompts for load:

<xxx>, **Accepts cake data**

LOAD DRYER WITH BLANKETS

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

LOADING

Signifies to the dryer that the goods have been loaded.

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**

<table>
<thead>
<tr>
<th>Display</th>
<th>Alternates with</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F TIF TOF 001 AIR</td>
<td>04F TIF TOF 001 VP</td>
</tr>
<tr>
<td>S00 425D185 011 000</td>
<td>S00 382A178 011 001</td>
</tr>
</tbody>
</table>

**Non-modulating steam dryers**

<table>
<thead>
<tr>
<th>Display</th>
<th>Alternates with</th>
</tr>
</thead>
<tbody>
<tr>
<td>04F TIF TOF 001 AIR</td>
<td>04F TIF TOF 001 SR</td>
</tr>
<tr>
<td>S00 ---D--- 011 000</td>
<td>S00 382A178 011 100</td>
</tr>
</tbody>
</table>

When the dryer desires to discharge:

<table>
<thead>
<tr>
<th>Display</th>
<th>Alternates with</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAITING TO DISCHARGE</td>
<td>FM DC DS CC GC WDT 23 04 02 12 11 123</td>
</tr>
</tbody>
</table>

When discharge is allowed:

<table>
<thead>
<tr>
<th>Display</th>
<th>Alternates with</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNLOADING</td>
<td>FM DC DS CC GC WDT 23 04 02 12 11 123</td>
</tr>
</tbody>
</table>

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.

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.


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*. 

![FIGURE 1 (MSOP0120BE) Dryer Switch Panels](image-url)
MANUAL DRYCODE MODIFICATIONS
WITH THE MARK III, IV, AND V DRYER CONTROL

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 MANUAL)

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 = ENTER PASSWORD: [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 = INVALID PASSWORD then returns to Automatic Run displays.

For manual mode B (after pressing MANUAL)

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.

<table>
<thead>
<tr>
<th>DATA</th>
<th>WHAT IT MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>Drycode number</td>
</tr>
<tr>
<td>F</td>
<td>Load size (i.e., Full or Partial)</td>
</tr>
<tr>
<td>TIF</td>
<td>Inlet temperature °F or °C (Actual temperature alternates with Desired temperature; current temperature below TIF)</td>
</tr>
<tr>
<td>TOF</td>
<td>Outlet temperature °F or °C (Actual temperature alternates with Desired temperature; current temperature below TOF)</td>
</tr>
<tr>
<td>001</td>
<td>Total run time (minutes, minutes, quarter minutes; e.g., 001=15 seconds)</td>
</tr>
<tr>
<td>AIR</td>
<td>Position of damper (varies from 000-002; current position shown below AIR)</td>
</tr>
<tr>
<td>VP</td>
<td>Valve position (varies from 000-255; current position shown below VP)</td>
</tr>
<tr>
<td>SR</td>
<td>Steam Ratio (varies from 100 to 150; current ratio shown below SR)</td>
</tr>
<tr>
<td>S00</td>
<td>Current step of selected drycode</td>
</tr>
<tr>
<td>D</td>
<td>Desired (programmed) temperatures</td>
</tr>
<tr>
<td>A</td>
<td>Actual temperatures</td>
</tr>
<tr>
<td>011</td>
<td>Time remaining in this step (minutes, minutes, quarter minutes; i.e., 011=1 minute, 15 seconds)</td>
</tr>
</tbody>
</table>

FIGURE 1 (MSOP0122AE)
Typical Dryer Displays—Drycode Running
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. (or ) resumes timing.

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

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

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

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

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

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

Terminates the current step and proceeds to the next step.

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

Returns to normal operating display.

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

Returns to normal operating display.

 Stops the drycode in progress.

Clears previous display (caused by ) 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 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.

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

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

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

FIGURE 2 (MSOP0236AE)
Typical Display in Manual Mode
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.

Turns 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.

Increases damper setting (decreases airflow).

Decreases damper setting (increases airflow).

Increases modulating valve position (only if machine so equipped). Maximum position is 255. This value is replaced with “***” on non-modulating steam dryers.

Decreases modulating valve position (only if machine so equipped). Minimum position is 000. This value is replaced with “***” on non-modulating steam dryers.

Turns blower motor on/off. Also turns heat off if on when blower motor turned off.

Turns basket motor on/off. Also turns heat off if on when basket motor turned off.

Toggles basket rotation between one-way and reversing.

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.

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)

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRYCODE</strong></td>
<td>Number of drycode currently running; “F” or “P” denotes full or partial load drycode, respectively</td>
</tr>
<tr>
<td><strong>TIME</strong></td>
<td>Temperature Profile: Time (MMQ) into drycode at which measurement was made Details: Elapsed heat or cool time before end of step.</td>
</tr>
<tr>
<td><strong>STEP</strong></td>
<td>Current step of the drycode</td>
</tr>
<tr>
<td><strong>HOW</strong></td>
<td>Type of step—see “PROGRAMMING THE . . . DRYER CONTROL” (see Table of Contents)</td>
</tr>
<tr>
<td><strong>IdF (IdC)</strong></td>
<td>Inlet temperature in degrees Fahrenheit or Celsius.</td>
</tr>
<tr>
<td><strong>2IF (2IC)</strong></td>
<td>Second inlet temperature in degrees Fahrenheit or Celsius.</td>
</tr>
<tr>
<td><strong>OdF (OdC)</strong></td>
<td>Outlet temperature in degrees Fahrenheit or Celsius.</td>
</tr>
<tr>
<td>VP</td>
<td>VP</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>AIR</td>
<td>N/A</td>
</tr>
<tr>
<td>HI</td>
<td>N/A</td>
</tr>
<tr>
<td>HO</td>
<td>N/A</td>
</tr>
<tr>
<td>REASON FOR TERMINATION</td>
<td>REASON STEP ENDED</td>
</tr>
</tbody>
</table>

### Table B—Termination Codes and Descriptions

<table>
<thead>
<tr>
<th>Reason for Termination (both reports, printed)</th>
<th>Reason for Termination (viewing Details report)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP PARAMETERS SATISFIED</td>
<td>NORM</td>
<td>Normal termination—all programmed parameters were met.</td>
</tr>
</tbody>
</table>
| STEP CANCELLED BY OPERATOR                     | CNCL                                          | Termination by operator—the operator pressed \( 
\text{CNCL}\) 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 220°F (104°C)                   | >220                                          | Maximum allowable outlet temperature (220°F) was exceeded for more than five seconds. |
| MIN FIRE FAULT                                  | MINF                                         | Outlet temperature continued 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).
### Temperature Profile

<table>
<thead>
<tr>
<th>MMQ</th>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>2IF</th>
<th>OdF</th>
<th>VP</th>
<th>AIR</th>
<th>IN</th>
<th>OUT</th>
<th>MHT</th>
<th>MCT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>022</td>
<td>0</td>
<td>3</td>
<td>375</td>
<td>165</td>
<td>150</td>
<td>1</td>
<td>--</td>
<td>250</td>
<td>---</td>
<td>099</td>
<td>087</td>
<td>1</td>
</tr>
<tr>
<td>000</td>
<td>0</td>
<td>3</td>
<td>089</td>
<td>010</td>
<td>150</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>002</td>
<td>0</td>
<td>3</td>
<td>271</td>
<td>102</td>
<td>150</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>010</td>
<td>0</td>
<td>3</td>
<td>364</td>
<td>141</td>
<td>144</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>012</td>
<td>0</td>
<td>3</td>
<td>372</td>
<td>153</td>
<td>140</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>020</td>
<td>0</td>
<td>3</td>
<td>374</td>
<td>159</td>
<td>111</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>022</td>
<td>0</td>
<td>3</td>
<td>375</td>
<td>165</td>
<td>099</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>030</td>
<td>0</td>
<td>3</td>
<td>374</td>
<td>165</td>
<td>087</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>032</td>
<td>0</td>
<td>3</td>
<td>374</td>
<td>165</td>
<td>087</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>040</td>
<td>0</td>
<td>3</td>
<td>375</td>
<td>165</td>
<td>087</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>042</td>
<td>0</td>
<td>3</td>
<td>375</td>
<td>165</td>
<td>088</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>050</td>
<td>0</td>
<td>3</td>
<td>375</td>
<td>165</td>
<td>087</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**REASON STEP ENDED:** STEP PARAMETERS SATISFIED

<table>
<thead>
<tr>
<th>MMQ</th>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>2IF</th>
<th>OdF</th>
<th>VP</th>
<th>AIR</th>
<th>IN</th>
<th>OUT</th>
<th>MHT</th>
<th>MCT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>1</td>
<td>2</td>
<td>---</td>
<td>275</td>
<td>165</td>
<td>150</td>
<td>2</td>
<td>--</td>
<td>210</td>
<td>---</td>
<td>050</td>
<td>085</td>
</tr>
<tr>
<td>051</td>
<td>1</td>
<td>2</td>
<td>340</td>
<td>165</td>
<td>085</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>052</td>
<td>1</td>
<td>2</td>
<td>285</td>
<td>165</td>
<td>072</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**REASON STEP ENDED:** STEP PARAMETERS SATISFIED

<table>
<thead>
<tr>
<th>MMQ</th>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>2IF</th>
<th>OdF</th>
<th>VP</th>
<th>AIR</th>
<th>IN</th>
<th>OUT</th>
<th>MHT</th>
<th>MCT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>2</td>
<td>0</td>
<td>---</td>
<td>150</td>
<td>125</td>
<td>2</td>
<td>--</td>
<td>118</td>
<td>000</td>
<td></td>
<td></td>
<td>050</td>
</tr>
<tr>
<td>053</td>
<td>2</td>
<td>0</td>
<td>240</td>
<td>148</td>
<td>007</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>060</td>
<td>2</td>
<td>0</td>
<td>200</td>
<td>118</td>
<td>000</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**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 *****************************,

0 = VIEW 1 = PRINT

or Scrolls the choices.

0 = VIEW

When the display = ***DRY CYCLE DETAILS***

Displays data for the last load processed. Drycode 04F was the last dry-code 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.

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).

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

"SKIP" TO EXIT
"NEXT" FOR MORE DATA

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

Returns dryer to *run mode*.

or

DATA CLEARED

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

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.

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.

Retains the date shown.

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

\[\begin{array}{ll}
\text{DATE: DD-MM-YYYY} & \\
\text{09-XX-XXXX} & \\
\text{DATE: DD-MM-YYYY} & \\
\text{09-12-XXXX} & \\
\text{DATE: DD-MM-YYYY} & \\
\text{09-12-1992} & \\
\end{array}\]

Accepts year and begins printing.

A sample printout is shown in FIGURE 2.

After printing, display returns to

**PLEASE WAIT**

***PLEASE WAIT***
## FIGURE 2 (MSOP0123BE)
Sample Printout—Dry Cycle Details

### DRY CYCLE DETAILS

<table>
<thead>
<tr>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>OdF</th>
<th>STEP TOTAL</th>
<th>VP</th>
<th>REASON FOR TERMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>3</td>
<td>375</td>
<td>180</td>
<td>013 013</td>
<td></td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
<tr>
<td>01</td>
<td>2</td>
<td>251</td>
<td>179</td>
<td>020 020</td>
<td>007</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
<tr>
<td>02</td>
<td>0</td>
<td>118</td>
<td>127</td>
<td>032 032</td>
<td>000</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>OdF</th>
<th>STEP TOTAL</th>
<th>VP</th>
<th>REASON FOR TERMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>3</td>
<td>375</td>
<td>179</td>
<td>022 022</td>
<td>087</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
<tr>
<td>01</td>
<td>2</td>
<td>249</td>
<td>179</td>
<td>020 020</td>
<td>013</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
<tr>
<td>02</td>
<td>0</td>
<td>118</td>
<td>127</td>
<td>032 032</td>
<td>000</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>OdF</th>
<th>STEP TOTAL</th>
<th>VP</th>
<th>REASON FOR TERMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>3</td>
<td>400</td>
<td>224</td>
<td>031 031</td>
<td>123</td>
<td><strong>OUTLET EXCEEDED 220°F (104°C)</strong></td>
</tr>
<tr>
<td>01</td>
<td>2</td>
<td>401</td>
<td>221</td>
<td>000 000</td>
<td>000</td>
<td><strong>OUTLET EXCEEDED 220°F (104°C)</strong></td>
</tr>
<tr>
<td>02</td>
<td>0</td>
<td>092</td>
<td>127</td>
<td>032 032</td>
<td>000</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>OdF</th>
<th>STEP TOTAL</th>
<th>VP</th>
<th>REASON FOR TERMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>3</td>
<td>374</td>
<td>175</td>
<td>031 031</td>
<td>056</td>
<td><strong>STEP CANCELLED MANUALLY</strong></td>
</tr>
<tr>
<td>01</td>
<td>2</td>
<td>251</td>
<td>180</td>
<td>020 020</td>
<td>007</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
<tr>
<td>02</td>
<td>0</td>
<td>112</td>
<td>127</td>
<td>032 032</td>
<td>000</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP</th>
<th>HOW</th>
<th>IdF</th>
<th>OdF</th>
<th>STEP TOTAL</th>
<th>VP</th>
<th>REASON FOR TERMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>3</td>
<td>375</td>
<td>170</td>
<td>150 150</td>
<td>087</td>
<td><strong>MAX TIME REACHED</strong></td>
</tr>
<tr>
<td>01</td>
<td>2</td>
<td>250</td>
<td>181</td>
<td>020 020</td>
<td>013</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
<tr>
<td>02</td>
<td>0</td>
<td>118</td>
<td>127</td>
<td>032 032</td>
<td>000</td>
<td><strong>STEP PARAMETERS SATISFIED</strong></td>
</tr>
</tbody>
</table>
MANUAL MODE MENU FUNCTIONS
ON THE MARK III, IV, AND V DRYER CONTROL

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

- **Scrolls** the available functions.

- **Selects** function xx

For Return to Run Mode From This Menu

- **When the display =**
  - **BLOWER FUNCTIONS**
    **02**
  Selects manual function 00.

  **RETURN TO AUTOMATIC**
  **00**

  **WAITING FOR LOAD
  ******************
  Dryer ready for normal automatic operation.
With manual mode (1-13) selected:

<table>
<thead>
<tr>
<th>BLOWER FUNCTIONS</th>
<th>02</th>
<th>Example: manual mode 2 selected.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>= MAIN BLOWER</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>= STRIPPER</td>
</tr>
</tbody>
</table>

Accesses the selected mode. 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 =

<table>
<thead>
<tr>
<th>BASKET FUNCTIONS</th>
<th>The basket may be manually operated to test the dryer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>CW=clockwise</td>
</tr>
<tr>
<td></td>
<td>CCW=counterclockwise</td>
</tr>
</tbody>
</table>

1 = TURN TWO WAYS
2 = CW
3 = CCW

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.

![Diagram of reversing rotation sequence](attachment:figure1.png)

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 [3DEF].
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.

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.

Turns all outputs off and returns to BASKET FUNCTIONS 01.
02=Blower Functions

When the display = BLOWER FUNCTIONS

<table>
<thead>
<tr>
<th>02</th>
<th>The main blower and/or the main blower stripper air valve may be operated.</th>
</tr>
</thead>
</table>

| 1 = MAIN BLOWER | These functions can be enabled simultaneously. |
| 2 = STRIP |

| ABC | Starts/stops the main blower. |
|-----|

| ABC | Enables/disables the main blower stripper air valve. |
|-----|

| ENTER or CANCEL | Returns to BLOWER FUNCTIONS |

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 | These functions can be enabled simultaneously. |
|------|

| 1 = BURNER BLOWER | |
| 2 = GET HOT |

| ABC | Turns on/off the combustion air blower. |
|-----|

| ABC | Turns on/off the get hot output. |
|-----|

| ENTER or CANCEL | Turns all outputs off and returns to HEATING FUNCTIONS |

For Steam Dryers

| ENTER | These functions can never be enabled simultaneously. |
|------|

| 1 = OPEN COOLDOWN | |
| 2 = CLOSE COOLDOWN |

| ABC | Opens the cooldown damper. |
|-----|

| ABC | Closes the cooldown damper. |
|-----|

| ENTER or CANCEL | Turns all outputs off and returns to HEATING FUNCTIONS |

| ABC | |
|-----|
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.

1 = SHORT STROKE

2 = LONG STROKE

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

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

<table>
<thead>
<tr>
<th>MAIN AIR DAMPER SETTING</th>
<th>SHORT STROKE</th>
<th>LONG STROKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX AIR</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>MAX - 1</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>MAIN + 1</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>*MIN</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

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

**ENTER** or **CANCEL**

Turns all outputs off and returns to **DAMPER FUNCTIONS 04**
05=Door Functions

When the display = 

<table>
<thead>
<tr>
<th>DOOR FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
</tr>
</tbody>
</table>

The load and discharge doors may be opened or closed.

- **LOAD**: 1=OPEN 2=CLOSE
- **DISCH**: 3=OPEN 4=CLOSE

*Opens the load door.*

*Closes the load door.*

*Opens the discharge door.*

*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* or *Cancel*. The discharge door is forced closed via an output. The load door is closed by gravity.

- **ENT** or **CANC**

  *Turns all outputs off* and returns to 
  
<table>
<thead>
<tr>
<th>DOOR FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
</tr>
</tbody>
</table>

06=Loading Functions

When the display =

<table>
<thead>
<tr>
<th>LOADING FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
</tr>
</tbody>
</table>

- **1=FLAG**
- **2=NODRY FLAG**
- **3=LOAD DESIRED**

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

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

*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.

- **ENT** or **CANC**

  *Turns all outputs off* and returns to 
  
<table>
<thead>
<tr>
<th>LOADING FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
</tr>
</tbody>
</table>
07 = Data Passing

When the display =

<table>
<thead>
<tr>
<th>DATA PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
</tr>
</tbody>
</table>

When =

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

= Turns new customer output on/off.

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

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

These outputs can all be enabled simultaneously.

Table of Destination Codes

<table>
<thead>
<tr>
<th>Destination</th>
<th>Status of DESTINATION 0</th>
<th>Status of DESTINATION 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0=off</td>
<td>0=off</td>
</tr>
<tr>
<td>1</td>
<td>1=on</td>
<td>0=off</td>
</tr>
<tr>
<td>2</td>
<td>0=off</td>
<td>1=on</td>
</tr>
<tr>
<td>3</td>
<td>1=on</td>
<td>1=on</td>
</tr>
</tbody>
</table>

When =

= Turns all outputs off and returns to DATA PASSING

<table>
<thead>
<tr>
<th>DATA PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
</tr>
</tbody>
</table>
08=Filter Functions

When the display =

<table>
<thead>
<tr>
<th>FILTER FUNCTIONS</th>
<th>08</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=AUTOMATIC</td>
<td>2=WINGS</td>
</tr>
<tr>
<td>3=BLOWER</td>
<td>4=STRIPPER</td>
</tr>
</tbody>
</table>

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

Extends/retracts lint filter wings (Wings).

Turns the lint filter blower (Blower) on/off.

Turns the internal lint screen stripper air valve (Stripper) on/off.

Turns all outputs off and returns to FILTER FUNCTIONS 08

How the Autolint®/Autovac® Lint Stripper Cycle Works

When 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 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

1 = MAIN SIGNAL
2 = UNLOAD BEACON

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

Turns the unload beacon output on the dryer on/off.

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.

1 = RELEASE VALVE

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 |

Displays the first 16 inputs (Page 0: A-P)

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

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

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 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)

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=

\[
\begin{array}{c}
\text{DATA ACCUMULATION} \\
13
\end{array}
\]

This is the data accumulator sub-menu.

For Quick Exit From Anywhere in Data Accumulation

Returns to the next higher menu. Repeat until desired menu appears.
Data Accumulation: 0=Display Data

When the display =

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


Displays the data for the last load processed.

Drycode number of last load run
Processing time (Heating and Cooldown) in minutes, minutes, tenths

LAST
RUN
WAIT
01F 000 180

Total ERROR time in hours, hours, tenths; includes ROTATION FAILURE, FIRE EYE TRIPPED, and THREE WIRE DISABLED.

Total WAIT time in minutes, minutes, and tenths; includes “WAITING FOR LOAD” and “WAITING TO DISCHARGE.”

Hold \[\text{up} \] to view the same information for partial loads.

or \[\text{down} \]

Permits displaying a specific drycode.

Drycode
Load size
Number of loads processed with this drycode
RUN time for all loads, this drycode, in hours, hours, hours, tenths

00 LDS RUN WAIT ERR
F 026 0026 0019 000

Scroll the drycodes with \[\text{up} \] or \[\text{down} \].

Total ERROR time for all loads, this drycode, in hours, hours, tenths of hour; includes “ROTATION FAILURE,” “FIRE EYE TRIPPED,” and “THREE WIRE DISABLED.”

WAIT time for all loads, this drycode, in hours, hours, hours, tenths.

Hold \[\text{up} \] to view the same information for partial loads.

or \[\text{down} \]

Displays totals for all formulas.

Total number of loads run
Total RUN time in hours, hours, hours, tenths

LOAD RUN WAIT ERR
0069 00048 00522
000

Total ERROR time in hours, hours, tenths
Total WAIT time in hours, hours, hours, tenths

Hold \[\text{up} \] to view the same information for partial loads.
Data Accumulation: 1=Print

When the display =

<table>
<thead>
<tr>
<th>0</th>
<th>DISPLAY DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PRINT</td>
</tr>
<tr>
<td>2</td>
<td>CLEAR</td>
</tr>
</tbody>
</table>

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).

<table>
<thead>
<tr>
<th>ABC,</th>
<th>ENTER</th>
<th>Enables printing of accumulated data and prompts for the date.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE: DD-MM-YYYY</td>
<td>XX-XX-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>ENTER,</th>
<th>ENTER,</th>
<th>ENTER</th>
<th>Retains the date shown.</th>
</tr>
</thead>
</table>

Or enter a new date as in the following example:

<table>
<thead>
<tr>
<th>ABC,</th>
<th>9 YZC,</th>
<th>ENTER</th>
</tr>
</thead>
</table>

Enters 09 for the day. Cursor advances to month.

DATE: DD-MM-YYYY

09-XX-XXXX

<table>
<thead>
<tr>
<th>ABC,</th>
<th>2 DEF,</th>
<th>ENTER</th>
</tr>
</thead>
</table>

Enters 12 for the month. Cursor advances to year.

DATE: DD-MM-YYYY

09-12-XXXX

<table>
<thead>
<tr>
<th>ABC,</th>
<th>YZC,</th>
<th>YZC,</th>
<th>ABC</th>
</tr>
</thead>
</table>

Enters 1991 for year.

DATE: DD-MM-YYYY

09-12-1991

<table>
<thead>
<tr>
<th>ENTER</th>
</tr>
</thead>
</table>

Accepts year and begins printing.

PRINTING . . .

**PLEASE WAIT**

A sample printout is shown in FIGURE 3.

After printing, display returns to

<table>
<thead>
<tr>
<th>0</th>
<th>DISPLAY DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PRINT</td>
</tr>
<tr>
<td>2</td>
<td>CLEAR</td>
</tr>
</tbody>
</table>

Data Accumulation: 2=Clear

When the display =

<table>
<thead>
<tr>
<th>0</th>
<th>DISPLAY DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PRINT</td>
</tr>
<tr>
<td>2</td>
<td>CLEAR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 DEF,</th>
<th>ENTER</th>
</tr>
</thead>
</table>

Enables clearing of all accumulated data

NEXT TO CLEAR DATA
CANCEL = ESCAPE

Clears all accumulated data from memory. Display returns to the data accumulation menu.

or

<table>
<thead>
<tr>
<th>CANCEL</th>
</tr>
</thead>
</table>

Returns to the data accumulation menu without clearing data.
### Data Accumulation

#### 0 = Last Drycode Run

<table>
<thead>
<tr>
<th>Drycode</th>
<th>Run Time</th>
<th>Wait Time</th>
<th>Error Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>04P</td>
<td>121</td>
<td>002</td>
<td>000</td>
</tr>
</tbody>
</table>

#### 1 = Data Per Drycode

<table>
<thead>
<tr>
<th>Drycode</th>
<th># of Loads</th>
<th>Run Time</th>
<th>Wait Time</th>
<th>Error Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>00F</td>
<td>001</td>
<td>0001</td>
<td>0038</td>
<td>000</td>
</tr>
<tr>
<td>00P</td>
<td>001</td>
<td>0001</td>
<td>0010</td>
<td>000</td>
</tr>
<tr>
<td>01F</td>
<td>001</td>
<td>0001</td>
<td>0005</td>
<td>000</td>
</tr>
<tr>
<td>01P</td>
<td>001</td>
<td>0001</td>
<td>0004</td>
<td>000</td>
</tr>
<tr>
<td>02F</td>
<td>002</td>
<td>0007</td>
<td>0009</td>
<td>000</td>
</tr>
<tr>
<td>03F</td>
<td>002</td>
<td>0005</td>
<td>0010</td>
<td>000</td>
</tr>
<tr>
<td>04F</td>
<td>001</td>
<td>0002</td>
<td>0008</td>
<td>000</td>
</tr>
<tr>
<td>04P</td>
<td>001</td>
<td>0001</td>
<td>0040</td>
<td>000</td>
</tr>
</tbody>
</table>

#### 2 = Total Accumulation Data

<table>
<thead>
<tr>
<th>Total</th>
<th># of Loads</th>
<th>Run Time</th>
<th>Wait Time</th>
<th>Error Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL</td>
<td>0007</td>
<td>00016</td>
<td>00070</td>
<td>000</td>
</tr>
<tr>
<td>PARTIAL</td>
<td>0003</td>
<td>00003</td>
<td>00054</td>
<td>000</td>
</tr>
</tbody>
</table>

### Notes:
- # = Number
- HHT = Hours-Hours-Tenth of hour
- HHHHT = Hours-Hours-Hours-Tenth of hour
- HHHHHT = 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
Troubleshooting
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.

**CLEARING MEMORY**

**PLEASE WAIT**

See “2=Configure, 4=Default Drycodes,” and “1=Modify Drycodes” in “PROGRAMMING THE . . . DRYER CONTROL” (see Table of Contents).

**PROGRAM 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.

**RETURN**

+ **ENTER**

Returns to the run mode. Display = ***************

**THREE WIRE DISABLED**

At power up this message appears following the power up displays until is pressed to close the three-wire circuit and provide 110-120VAC control circuit voltage to the dryer. may be pressed at any time during the power up displays, thus silencing the operator signal and overriding this message. If fails to clear this message, see “Operational Error Messages” in this section.
The control detected invalid accumulator data (usually because of a power surge at power on). “ ” clears all totals. See “13=Data Accumulation” in “MANUAL MENU FUNCTIONS . . .” for consequences.

“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 “ ” to clear. If the message indicates that I/O #1 failed and does not clear after checking the board and pressing “ ”, check all connections in the serial link between the processor board and the peripheral boards.

Configuration/Programming Error Messages

On a machine receiving data during a download operation, this message indicates that downloading was unsuccessful. See “5=Download” (see Table of Contents).

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 cool-down in each drycode.

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.

See explanation in “Power-up Error Messages” in this section.

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 🔄 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.

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 🔄 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 . . .”
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 \textbf{C}. 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 DRYCODE . . .”). 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.”

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 \textbf{C} to clear error lights, then \textbf{C} 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 \textit{Check Error Lights} is displayed. This is part of the safety reset circuit, and will cause the \textit{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 \textbf{C}. Press \textbf{C} to clear display and return to normal operation.
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 . Press 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 . Press 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 . Press 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 . Press 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 and to clear the error and return to normal operation.
If the limits on the standard unload sequence parameters are exceeded, this message is displayed immediately after all goods are discharged. Press \( \text{CLEAR} \) 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.

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 \textit{Run/Program keyswitch} must be set to \( \text{ON} \) 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 closed proximity switch is not made. The basket continues to turn, but the \textit{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 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 closed switch is not made. Main air blower and combustion air blower are \textit{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\textsuperscript{®} Report Generator.
- **INVALID GOODS CODE**: Goods code number entered at keypad was not found in the Milnor\textsuperscript{®} Report Generator.
- **INVALID CUST CODE**: Customer code number entered at keypad was not found in the Milnor\textsuperscript{®} Report Generator.
- **INVALID EMPLOYEE #**: Employee identification number entered at keypad was not found in the Milnor\textsuperscript{®} 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

Notice 1: If your sprinkler just actuated (water is pouring from rear of dryer)—go to Section 5 “What to Do If the Sprinkler Actuates”.

This document replaces documents MSTS0105AE “Dryer Temperature Safety Limits” and MSSM0126AE “About the Automatic Water Sprinkler” for dryer models 50040xxx, 58040xxx, 6458xxxx and 7272xxxx.

The fire safety system includes the controls that handle various fire safety functions and the internal sprinkler that can suppress a fire in the basket. The controls automatically invoke actions intended to prevent or suppress fires. The sprinkler will actuate automatically as explained in Section 1 “Controller Fire Safety Functions”. It can also be actuated manually, either by pulling the actuation handle on the sprinkler valve assembly or by actuating it from the control panel, as explained in Section 4 “How to Test the Sprinkler (monthly or every 200 hours)”. Once actuated, the sprinkler will spray water onto the dryer basket and the water will enter the basket through the perforations. The sprinkler assembly must be routinely tested and properly maintained to ensure that it functions effectively, in case it is ever needed to suppress a basket fire.

1. Controller Fire Safety Functions

Fire safety functions and components for 6458xxxx and 7272xxxx dryer models are described in this section. Those for 50040xxx and 58040xxx dryer models vary somewhat, but use the same general concept of operation.

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Temperature switch (closes at preset temperature)</th>
<th>Thermocouple (provides continuous temperature data to controller)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor name</td>
<td>ST225-1 &amp; 2 ST550A &amp; B STBB</td>
<td>T3</td>
</tr>
<tr>
<td>Location</td>
<td>Basket/outlet duct (Figures 1, 3, 4) inlet duct (Figures 1, 2)</td>
<td>Outlet duct (Figure 3)</td>
</tr>
<tr>
<td>Safety limit (temperature or condition that triggers action)</td>
<td>225°F (107°C) 550°F (288°C) 175°F (79°C)</td>
<td>--Three safety limits in software-- Exceeds 220°F (104°C) for 5 seconds** 240°F (116°C)</td>
</tr>
<tr>
<td>Consequence exceeding safety limit</td>
<td>Sprinkler actuates and all dryer functions stop.</td>
<td>Each step prior to cooldown is successively canceled while the condition persists.</td>
</tr>
<tr>
<td>Indication safety limit was exceeded</td>
<td>THREE WIRE DISABLED error and operator alarm</td>
<td>“MINF” appears on operational display and data is saved to dry cycle details</td>
</tr>
<tr>
<td>Corrective action</td>
<td>See Section 5 “What to Do If the Sprinkler Actuates”</td>
<td>See Section 2 “About the “Min Fire” and Outlet Temperature Exceeded 220°F”</td>
</tr>
</tbody>
</table>

* Not applicable to steam dryers
** Not applicable to non-modulating steam dryers.

*Not applicable to steam dryers
**Not applicable to non-modulating steam dryers.
Figure 1: Fire Safety System Component Locations

Dryer Left-, Front-, and Right-side Views (model 6458TG1L shown)

Legend

ST550A. Inlet temperature switch location. Actuates at 550°F (288°C).
ST550B. Secondary inlet temperature switch location. Actuates at 550°F (288°C).
STBB. Burner housing temperature switch location. Actuates at 175°F (79°C).
T2. Inlet temperature thermocouple location. Not used in fire safety system.
T3. Outlet temperature thermocouple location. Provides temperature data to the controller.

1. Sprinkler valve assembly
2. Reset handle
3. Actuation 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

These faults, described below, are preemptive; neither results in an error that requires the operator to take immediate action. However, data about the fault is recorded in the dry cycle details memory (see "Drycode Reports" elsewhere). These faults interfere with the intended processing and often indicate that the goods are being overheated. Overheated goods discharged from the dryer may have a burned smell even though they did not catch fire. If you notice such a smell, review the dry cycle details for these loads. If the data indicates that the cycle ended with a min fire or outlet temperature exceeded 220° fault, investigate and correct the cause, as follows:

2.1. Min Fire (MINF)—This condition applies only to gas- and propane-fired dryers and refers to the valve position of the modulating gas valve when the controller commands it to go to position 000. When properly set, the gas valve remains open slightly at this commanded position. A min fire fault occurs when the controller detects that the outlet temperature continues to rise during min fire. This condition usually indicates that the goods overheated and are at risk of catching fire. As soon as the fault occurs, the controller immediately attempts to counteract it by advancing the drycode to the cooldown step. Some causes of min fire faults include:

- **plastering**—If the basket speed called for by the drycode is too high, the goods can adhere to the basket (plaster), rather than tumble as they lose moisture and become lighter. Once this occurs, the goods will tend to overheat on the surface that is against the basket.

- **gas train malfunction**—If, for example, a modulating gas valve is damaged such that it cannot throttle down completely, it may be unable to lower the flame to the min fire position.

- **min fire set too high**—The min fire position is adjustable and must be set in accordance with the gas and air setting instructions in the service manual. This setting can also change as a result of damage to components.

2.2. Outlet Temperature Exceeded 220° (>220)—This fault applies to all except dryers with non-modulating steam valves. 220° F (104° C) is 5°F (3° C) below the set point of the outlet temperature switches (Fenwals) that actuate the sprinkler. It is intended to preempt sprinkler actuation, if possible, by successively canceling each remaining heating step in the drycode if outlet temperature remains above 220° F (104° C) for at least five seconds at the start of the step. As with a min fire fault, this condition may be the result of plastering or a gas train malfunction. If the goods are not yet on fire, this function can avoid an unnecessary sprinkler actuation. But if a fire has already started, the temperature switches should quickly actuate the sprinkler.

3. Resolving No-fire Sprinkler Actuations

If a dryer experiences sprinkler actuations when there is no fire, this typically indicates one of two problems:

- **A temperature switch is damaged.** This is the most likely cause. Typically, the ST225-2 temperature switch is at fault. The switch probe can bend if a piece of goods gets past the basket seals, through the blower, and into the outlet duct where it hits the probe. Replace a damaged switch and refer to “Felt Seal Inspection and Maintenance” in the service manual for information on avoiding this type of damage.

- **Drying temperatures are not within the normal range.** The causes described in Section 2.1, above, if severe enough, can result in sprinkler actuation.

Resolve no-fire sprinkler actuations by correcting the cause. **Never disable the sprinkler.** If a fire should occur, the sprinkler is your first line of defense, and your best defense against a potentially uncontrollable situation.
4. How to Test the Sprinkler (monthly or every 200 hours)

A1: Permit dryer to empty
- Allow dryer to complete any drycode in progress and discharge load.

A2: Shut off sprinkler water
- Close the manual water valve to prevent flooding. This hand-operated valve is located on the sprinkler assembly which is normally mounted to the side of the dryer discharge shroud.

A3: Perform the Sprinkler Test (tests automatic operation)
- If the dryer has a dedicated controller, see “Manual Mode Menu Functions” in the reference manual. Otherwise, at the Dryer/Shuttle controller:
  1. Select Admin Logon and log in.
  2. Click once on the device display for the dryer you want to test.
  3. Click Manual mode.
  4. Go to “Sprinkler functions” on right side of screen and click Sprinkler [Off] to release the sprinkler valve.

A4: Inspect automatic sprinkler valve
- CAUTION 2: Risk of sprinkler failure—Sprinkler water flow may not suppress fire if sprinkler assembly components have dirt, lint, or corrosion buildup.
  - Clean or repair mechanism as needed to ensure that all parts move freely.

A5: Briefly test sprinkler water flow
- Open the manual water valve on the sprinkler assembly briefly and make sure water flows out the rear of the dryer. Close the valve for the next part of the test.

A6: Reset the sprinkler
- Pull the sprinkler reset handle down fully, so that it latches.

A7: Start a drycode manually (tests manual operation)
- The manual water valve must be closed to prevent flooding during this test.

A8: Trip the sprinkler manually
- When the dryer begins heating, pull down the sprinkler actuation handle (see Figure 1).

A9: Verify shutdown
- 1. The sprinkler automatic valve releases (the reset handle pops up).
   2. The three wire circuit opens (THREE WIRE DISABLED).
   3. The operator alarm sounds.
   4. All dryer functions cease.

A10: Terminate the drycode

A11: Reset the sprinkler
- Pull the sprinkler reset handle down fully, so that it latches.

A12: Open the manual valve
- CAUTION 3: Risk of sprinkler failure—The sprinkler manual water valve must be open for the sprinkler to function.

Return the dryer to service
5. What to Do If the Sprinkler Actuates

The sprinkler can actuate as a result of a fire in the basket or for other reasons. Temperature switches (Fenwals) in the outlet duct actuate the sprinkler at a temperature of 225°F (107°C). If, for any reason, this system fails, the dryer software turns on the sprinkler at an outlet temperature of 240°F (116°C).

A1: Assess the situation
If there is a fire, the sprinkler should remain on until the fire is extinguished. Closer inspection, such as looking through the door glass, may be needed to determine if the basket contents are on fire. Proceed cautiously.

A2: Reset the sprinkler as soon as it's safe
This is important, both to minimize water damage and to restore the manual controls, which may be needed for further assessment and cleanup. Turn off the sprinkler as follows:
1. Turn the Master switch off (M), then back on (M). If the sprinkler was triggered by software, this is the only way to de-actuate the "Desires Sprinkler" output relay.
2. Pull the sprinkler reset handle down fully, as shown at left, so that it latches.

A3: Did a fire occur?

YES

Return the dryer to service

A4: Test basket rotation

1. Set the Load Allowed/Not Allowed switch to Not Allowed (g) to disable automatic loading.
2. Press Start (1). The operator signal ceases and "WAITING FOR LOAD. LOADING NOT ALLOWED" appears on the display.
4. Hold the Jog Direction switch (J/j) in either direction no longer than necessary to verify the basket rotates.

A5: Did the basket rotate?

NO

STOP and repair by a qualified technician

A6: Carefully remove goods

WARNING [4]: Fire Hazard—Overheated goods can catch fire spontaneously in the machine or after discharge.
- Stand clear and be prepared with suitable fire equipment.
Use the manual controls, as above, to discharge the goods.

A7: Lockout/tagout power and inspect for damage

Lockout/tagout power and inspect the entire machine for damage, especially the T-seal, support rollers, main blower, and electric cables on top of the machine. Also check for wet or damp electrical components.

A8: Restore power and test dryer functions

Use manual mode to operate all controls (modulating gas valve, lint stripper, etc.). See "Viewing Inputs and Outputs During Operation" in the reference manual for more information.

A9: Damage?

YES

STOP and repair by a qualified technician

NO

RETURN the dryer to service

Remember to return all manual controls to the automatic operation position (B).

— End of BIPDUM01 —
Supplemental Information
HOW THE MILNOR® DRYER WORKS

Mode 3 Drying Sequence—Modulating Dryers
(Step 00: H=3, Step 01: H=2)

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.

---

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

---

**Figure 1**

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 2nd inlet temperature 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 cooldown temperature 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.

---

### Programming Parameter Table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Heat Time</td>
<td>MHT</td>
</tr>
<tr>
<td>Commanded Outlet Temp</td>
<td>OdF/OdC</td>
</tr>
<tr>
<td>Commanded Delta</td>
<td>DdF/DdC</td>
</tr>
<tr>
<td>Commanded Cooldown Temp</td>
<td>CdF/CdC</td>
</tr>
<tr>
<td>Maximum Cooldown Time</td>
<td>MCT</td>
</tr>
</tbody>
</table>

---

**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.

**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 equals 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 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.

<table>
<thead>
<tr>
<th>Graph Reference</th>
<th>Programming Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Heat Time</td>
<td>MHT</td>
</tr>
<tr>
<td>Commanded Outlet Temp</td>
<td>CdF/CdC</td>
</tr>
<tr>
<td>Maximum Inlet Temp</td>
<td>IdF/IdC</td>
</tr>
<tr>
<td>Commanded Cooldown Temp</td>
<td>CdF/CdC</td>
</tr>
<tr>
<td>Maximum Cooldown Time</td>
<td>MCT</td>
</tr>
</tbody>
</table>

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.

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 cool 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 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.
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 MSFDA401DE to set the address on replacement boards. If your machine uses printed circuit boards containing rotary switches, refer to MSFDA401EE.
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**: 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)

<table>
<thead>
<tr>
<th>Board Name</th>
<th>Weight Scale Interface</th>
<th>Rotation Safety</th>
<th>Chemical Flow Meter</th>
<th>Thermocouple Signal Conditioner</th>
<th>Steam Valve (4-20mA)</th>
<th>Gas Valve Resistor</th>
<th>Temperature Sensing Resistor</th>
<th>Opto-isolator</th>
<th>CRT</th>
<th>Digital to Analog</th>
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<th>Output</th>
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**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>
<thead>
<tr>
<th>Board Name</th>
<th>Weight Scale Interface</th>
<th>Rotation Safety</th>
<th>Chemical Flow Meter</th>
<th>Thermocouple Signal Conditioner</th>
<th>Steam Valve (4-20mA)</th>
<th>Gas Valve Resistor</th>
<th>Temperature Sensing Resistor</th>
<th>Opto-isolator</th>
<th>CRT</th>
<th>Digital to Analog</th>
<th>Analog to Digital</th>
<th>Output</th>
<th>Input/Output</th>
<th>CPU</th>
<th>Note(s)</th>
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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

<table>
<thead>
<tr>
<th>Devices</th>
<th>COSHA</th>
<th>COBUC</th>
<th>Device Master</th>
<th>Dryer</th>
<th>Textile</th>
<th>Linear COSTO</th>
<th>One-Stage Press</th>
<th>Two-Stage Press</th>
<th>Extractor</th>
<th>VERTSTO</th>
<th>Washer-Extractor</th>
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**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 Technical 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 than 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 downstream 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

<table>
<thead>
<tr>
<th>Data Format—►</th>
<th>Numeric: Groups of signals pass multi-digit batch codes in binary (number of available batch codes shown)</th>
<th>Non-Numeric: One signal passes a single on/off value (X indicates signal is available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code Name—►</td>
<td>Formula code</td>
<td>Press/Extract code</td>
</tr>
<tr>
<td>Type of Interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loading</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Discharge</td>
<td>16</td>
<td>X</td>
</tr>
</tbody>
</table>

» 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 peculiar 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

<table>
<thead>
<tr>
<th>Function Name—→</th>
<th>Directional Functions</th>
<th>Transfer Functions</th>
<th>Confirmation Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2nd level</td>
<td>Opposite side</td>
<td>At left</td>
</tr>
<tr>
<td>Loading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

» The dryer expects a "dryer is loaded" input. It also provides a "load door closed" output.

— End of BICALC13 —
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.
How to Upgrade Microprocessor EPROM Chips

Figure 1: EPROM Chip Identification and Installation

<table>
<thead>
<tr>
<th>EPROM Chip and Socket</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Label</td>
<td></td>
</tr>
<tr>
<td>2. EPROM chip</td>
<td></td>
</tr>
<tr>
<td>3. Key notch</td>
<td></td>
</tr>
<tr>
<td>4. EPROM socket</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Processor Part Number</th>
<th>Typical Machine Applications</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>08BN785A_</td>
<td>30-inch E-P Plus</td>
<td></td>
</tr>
<tr>
<td>08BN788A_</td>
<td>---see above---</td>
<td></td>
</tr>
<tr>
<td>08BH18EP_</td>
<td>36- and 42-inch E-P Plus</td>
<td>20 MHz; brown output and chemical connectors</td>
</tr>
<tr>
<td>08BH18EPA_</td>
<td>---see above---</td>
<td>15 MHz; brown output and chemical connectors</td>
</tr>
<tr>
<td>08BH18EPB_</td>
<td>---see above---</td>
<td>15 MHz; white output and chemical connectors</td>
</tr>
<tr>
<td>08BH18EPC_</td>
<td>---see above---</td>
<td>11 MHz</td>
</tr>
<tr>
<td>08BH18EPD_</td>
<td></td>
<td>20 MHz; white output and chemical connectors</td>
</tr>
<tr>
<td>08BH18EPC_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08BSP___</td>
<td>Mark 2 washer-extractors, etc.</td>
<td>8085 non-serial</td>
</tr>
<tr>
<td>08BSPA___</td>
<td></td>
<td>8085 serial with 4 EPROMs</td>
</tr>
<tr>
<td>08BSPAA_</td>
<td></td>
<td>8085 serial with 2 EPROMs</td>
</tr>
<tr>
<td>08BSPE_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08BSPE1_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08BSPE2_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08BT168A_</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
How to Upgrade Microprocessor EPROM Chips

Figure 2: Replacement Processor Board

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

Legend
1. Ground (Earth)
2. Negative 12VDC
3. Positive 12VDC
4. Positive 5VDC
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.
## Table 2: EPROM Locations for 8088 Processor Applications

<table>
<thead>
<tr>
<th>EPROMS in Set</th>
<th>A</th>
<th>B</th>
<th>IC-1</th>
<th>IC-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 chips</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3 chips</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>2 chips</td>
<td>2</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1 chip</td>
<td>1</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

## 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

Legend

1. Chassis ground
2. Capacitor
3. 80186 microprocessor chip
4. EPROM in socket IC-2
5. ROM socket (empty except in Japan)
How to Upgrade Microprocessor EPROM Chips

**Figure 8: 80186 Processor Board**

| 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**

| A. Jumper for selecting display type |

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Memory Download Box Applications

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

Legend

1. Download box with Transmit button
2. Download box without Transmit button
3. Transmit button
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>
<thead>
<tr>
<th>Processor Board</th>
<th>Software Version</th>
<th>DIP Switch Setting</th>
<th>Processor Board</th>
<th>Software Version</th>
<th>DIP Switch Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uses Memory Download Box WITH Transmit Button</strong></td>
<td></td>
<td></td>
<td><strong>Uses Memory Download Box WITHOUT Transmit Button</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Washer-extractor Models</strong></td>
<td></td>
<td></td>
<td><strong>Miltron Controller for CBW System</strong></td>
<td></td>
</tr>
<tr>
<td>8088</td>
<td>All</td>
<td>C</td>
<td>8088</td>
<td>All</td>
<td>A</td>
</tr>
<tr>
<td>8088</td>
<td>C</td>
<td></td>
<td>80186</td>
<td>All</td>
<td>B</td>
</tr>
<tr>
<td>80186</td>
<td>98000-98003</td>
<td>C</td>
<td></td>
<td>Miltrac</td>
<td></td>
</tr>
<tr>
<td>80186</td>
<td>98004-99004</td>
<td>not supported</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80186</td>
<td>99005-9900B</td>
<td>D</td>
<td></td>
<td>8088</td>
<td>A</td>
</tr>
<tr>
<td>80186</td>
<td>20000-20003</td>
<td>D</td>
<td></td>
<td>80186</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td><strong>FxW, FxP, and FxS Washer-extractor models</strong></td>
<td></td>
<td></td>
<td><strong>Milrail Rail Controller</strong></td>
<td></td>
</tr>
<tr>
<td>8088</td>
<td>All</td>
<td>C</td>
<td>8088</td>
<td>All</td>
<td>A</td>
</tr>
<tr>
<td>8088</td>
<td>C</td>
<td></td>
<td>80186</td>
<td>All</td>
<td>B</td>
</tr>
<tr>
<td>80186</td>
<td>98000-98003</td>
<td>C</td>
<td></td>
<td><strong>Device Master</strong></td>
<td></td>
</tr>
<tr>
<td>80186</td>
<td>98004-98009</td>
<td>not supported</td>
<td></td>
<td>8085</td>
<td>All</td>
</tr>
<tr>
<td>80186</td>
<td>9800A-9800H</td>
<td>D</td>
<td></td>
<td>8088</td>
<td>All</td>
</tr>
<tr>
<td>80186</td>
<td>20000-2000B</td>
<td>D</td>
<td></td>
<td>94000-94005</td>
<td>not supported</td>
</tr>
<tr>
<td></td>
<td><strong>Textile and Dye Machine Models</strong></td>
<td></td>
<td></td>
<td><strong>Linear Costo Master</strong></td>
<td></td>
</tr>
<tr>
<td>8088</td>
<td>All</td>
<td>C</td>
<td>8088</td>
<td>All</td>
<td>not supported</td>
</tr>
<tr>
<td>8088</td>
<td>C</td>
<td></td>
<td>80186</td>
<td>All</td>
<td>not supported</td>
</tr>
<tr>
<td>80186</td>
<td>95000-95305M</td>
<td>C</td>
<td></td>
<td>94000-94005</td>
<td>not supported</td>
</tr>
<tr>
<td>80186</td>
<td>95305N-95306</td>
<td>D</td>
<td></td>
<td>20000-present</td>
<td>B</td>
</tr>
<tr>
<td>80186</td>
<td>20000-20004</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Dryer Models</strong></td>
<td></td>
<td></td>
<td><strong>Linear Costo Master</strong></td>
<td></td>
</tr>
<tr>
<td>8088</td>
<td>All</td>
<td>C</td>
<td>8088</td>
<td>All</td>
<td>not supported</td>
</tr>
<tr>
<td>80186</td>
<td>All</td>
<td>C</td>
<td>80186</td>
<td>All</td>
<td>not supported</td>
</tr>
<tr>
<td></td>
<td><strong>Centrifugal Extractor Models</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8088</td>
<td>All</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80186</td>
<td>All</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Single-station Press Models</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8088</td>
<td>All</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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
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

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Function</th>
<th>Receptacle Wiring (inside electrical enclosure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Serial low</td>
<td>DLL Blue and black</td>
</tr>
<tr>
<td>2</td>
<td>Serial high</td>
<td>DLH Blue and red</td>
</tr>
<tr>
<td>3</td>
<td>Clear to send (used for printing only)</td>
<td>CTS Blue and orange</td>
</tr>
<tr>
<td>4</td>
<td>Electronic ground</td>
<td>2G Blue and white</td>
</tr>
<tr>
<td>5</td>
<td>Transmit data (used for printing only)</td>
<td>TXD Blue and orange</td>
</tr>
<tr>
<td>6</td>
<td>+5 volts DC (used for serial memory storage device only)</td>
<td>V1 Blue</td>
</tr>
</tbody>
</table>

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](image)

**Legend**

<table>
<thead>
<tr>
<th>Receptacle</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Receptacle (with male pins). Pin functions are as follows:</td>
</tr>
<tr>
<td>5.</td>
<td>Clear to send (CTS).</td>
</tr>
<tr>
<td>7.</td>
<td>Transmit data (TXD)</td>
</tr>
<tr>
<td>6&amp;9.</td>
<td>Ground. This application only uses Pin 6.</td>
</tr>
<tr>
<td>1&amp;2.</td>
<td>Not used in this application</td>
</tr>
<tr>
<td>3&amp;4.</td>
<td>Not used in this application</td>
</tr>
<tr>
<td>8.</td>
<td>Not used in this application. See caution statement 1.</td>
</tr>
<tr>
<td>B.</td>
<td>Plug (with female pin sockets)</td>
</tr>
<tr>
<td>C.</td>
<td>Approved serial printer (see Note 1)</td>
</tr>
<tr>
<td>D.</td>
<td>Tie shield and spare conductor(s) on this end of cable to ground. Leave unconnected on other end.</td>
</tr>
</tbody>
</table>
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](image)

**Receptacle On Each Machine**

<table>
<thead>
<tr>
<th>Legend</th>
<th>A. Receptacle on machine (with male pins). Pin functions are as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1&amp;2. Serial low</td>
</tr>
<tr>
<td></td>
<td>3&amp;4. Serial high</td>
</tr>
<tr>
<td></td>
<td>6&amp;9. Ground</td>
</tr>
<tr>
<td></td>
<td>5&amp;7. Not used in this application. See caution statement 1.</td>
</tr>
<tr>
<td></td>
<td>8. Not used in this application. See caution statement 1.</td>
</tr>
</tbody>
</table>

**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.**

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**

- 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.

**Legend**

- 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.

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Printer Requirements and Settings

**Notice**: 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**
<table>
<thead>
<tr>
<th>Printer Cable Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10YMK2PNTR</td>
<td>100-formula washer-extractor, dryer, extractor, and Miltron (CBW) controllers</td>
</tr>
<tr>
<td>10YCBWPNTR</td>
<td>Non-serial Miltron (CBW) controller</td>
</tr>
<tr>
<td>08MPSERCBL</td>
<td>Mentor (CBW) and Mildata controllers</td>
</tr>
</tbody>
</table>

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**
<table>
<thead>
<tr>
<th>Menu</th>
<th>Data Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install 1</td>
<td>Ribbon</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>A.S.F.</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Emulation</td>
<td>Epson</td>
</tr>
<tr>
<td>Print Style</td>
<td>Font</td>
<td>Draft</td>
</tr>
<tr>
<td></td>
<td>Emphasized</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Pitch</td>
<td>10 characters per inch</td>
</tr>
<tr>
<td></td>
<td>Font lock</td>
<td>Off</td>
</tr>
<tr>
<td>Page Layout</td>
<td>Line spacing</td>
<td>6 lines per inch</td>
</tr>
<tr>
<td></td>
<td>Form length</td>
<td>Letter</td>
</tr>
<tr>
<td></td>
<td>Page skip</td>
<td>Off</td>
</tr>
<tr>
<td>Print Mode</td>
<td>NLQ Dir</td>
<td>Uni-directional</td>
</tr>
<tr>
<td></td>
<td>Graphic Dir</td>
<td>Uni-directional</td>
</tr>
<tr>
<td></td>
<td>Character</td>
<td>Slash zero: Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Character set: Graphics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intl character set: U.S.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Code page: U.S.A.</td>
</tr>
<tr>
<td>Install 2</td>
<td>Tear off</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Paper out</td>
<td>Enable</td>
</tr>
<tr>
<td></td>
<td>Auto linefeed</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Copy mode</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Envelope</td>
<td>Off</td>
</tr>
<tr>
<td>Serial I/F</td>
<td>Baud rate</td>
<td>9600</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
<td>Even</td>
</tr>
<tr>
<td></td>
<td>Data bits</td>
<td>8 bits</td>
</tr>
<tr>
<td></td>
<td>Stop bits</td>
<td>1 bit</td>
</tr>
<tr>
<td></td>
<td>Protocol</td>
<td>DTR</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Value</th>
<th>Data Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character spacing</td>
<td>10 characters per inch</td>
<td>Tractor</td>
<td>Single</td>
</tr>
<tr>
<td>Shape of zero</td>
<td>0</td>
<td>Interface</td>
<td>Serial</td>
</tr>
<tr>
<td>Skip over perforation</td>
<td>Off</td>
<td>Bit rate</td>
<td>9600 bps</td>
</tr>
<tr>
<td>Character table</td>
<td>PC 437</td>
<td>Parity</td>
<td>Even</td>
</tr>
<tr>
<td>Auto line feed</td>
<td>Off</td>
<td>Data length</td>
<td>8 bits</td>
</tr>
<tr>
<td>Page length</td>
<td>11 inches</td>
<td>ETX/ACT</td>
<td>On</td>
</tr>
<tr>
<td>Auto tear off</td>
<td>Off</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 —