Published Manual Number/ECN: MATCOBUKBE/2018103A

- **Publishing System: TPAS2**
- **Access date: 03/06/2018**
- **Document ECNs: Latest**

Technical Reference

Cobuc/Cobud 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.

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MATCOBUKBE/18103A

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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.

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

How to Get the Necessary Repair Components

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

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

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

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

To write to the Milnor factory:

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

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

— End of BIUUUD19 —

Trademarks

BNUUUU02.R01 0000158093 A.2 7/13/17 1:11 PM Released

These words are trademarks of Pellerin Milnor Corporation and other entities:

Table 1 Trademarks

AutoSpot™	GreenTurn™	Milnor®	PulseFlow®
CBW®	GreenFlex™	MilMetrix®	PurePulse®
Drynet™	Hydro-cushion™	MilTouch™	Ram Command™
E-P Express®	Linear Costa Master™	MilTouch-EX™	RecircONE®
E-P OneTouch®	Linear Costo™	Miltrac™	RinSave®
E-P Plus®	Mentor®	MultiTrac™	SmoothCoil™
Gear Guardian®	Mildata®	PBW™	Staph Guard®

End of document: BNUUUU02

Commissioning 1

Important Owner/User Information—Machines with a Keypad

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

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

1. Ensure Safety of Laundry Personnel

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

2. Protect Against Data Loss

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

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

3. Customize Data

3.1. When to Customize Data

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

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

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

Table 1: Data Type and Accessibility

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

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

— End of BICM3K01 —

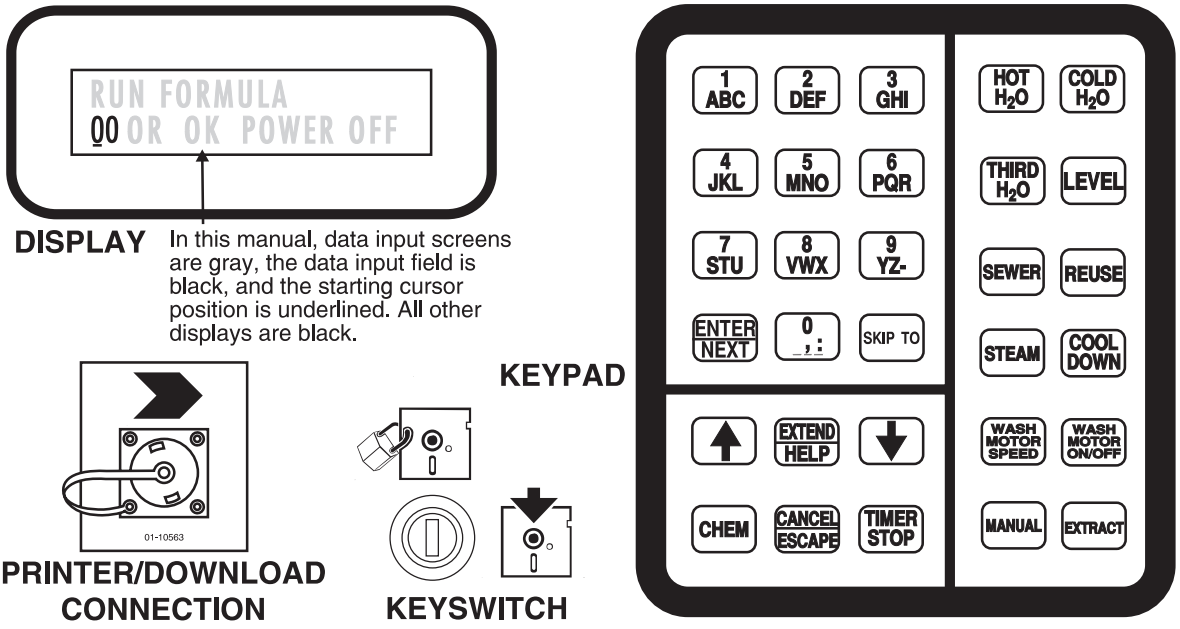
ABOUT THE USER CONTROLS— MACHINES WITH A KEYPAD

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

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

Electro-Mechanical Controls

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



Example Key Symbols Used in the Text

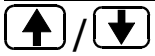
Symbology	What It Means
B 	Turn the *keyswitch* clockwise to *program* (), then press and release the *Enter/Next key*.
	Turn the *keyswitch* counterclockwise to *run* (), then press and release the *Enter/Next key*.
	Press and release the key shown.
	A slash between symbols means use either key shown.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

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

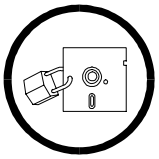
Microprocessor Interface Controls

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

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

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

⚠ CAUTION ⚠



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

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

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

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

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

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

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

BIUUUK05 (Published) Book specs- Dates: 20050112 / 20050112 / 20050117 Lang: ENG01 Applic: CSW

Definitions of Terms and Abbreviations

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

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"

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

cycle—operations undertaken in a specific order to process goods; a cycle normally ends with the device ready to accept another load

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

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.

download—process of transferring data, usually configuration and programming instructions, from a machine to another machine or to a memory storage device

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

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

formula code—see **Code, formula**

goods—articles processed or conveyed by a machine

hardware—electronic boards that control the machine

home—the specific position along the shuttle path to which the shuttle returns upon power up; or after discharge, load, or error correction; belt is at receive level 0

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.

Linear COSTA—Milnor® controller to store and track multiple cakes on a belt conveyor

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

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**

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

VERTSTO—Milnor multi-tiered, non-translating, elevating or non-elevating intermediate conveyor for storing pressed cakes between other cake-moving devices in the CBW® system

— End of BIUUUK05 —

Programming 2

CONFIGURING THE COBUC CONTROLLER

Configure decisions are accessed in the program mode (i.e., *Program/Run keyswitch* is at). These decisions influence how the Cobuc interfaces with the Miltrac "traffic-cop" or with the controller for allied goods-handling devices before and after the Cobuc. Therefore, the values for these decisons must match the presently installed configuration of the entire interconnected laundry system. Because configure decisions are discrete to the specific machine and laundry system, they should only be changed if options are later added or removed. Although the Cobuc is configured at the Milnor® factory, all configure decison values must be checked for accuracy at installation.

Accessing Configure Decisions

With Cobuc power *on*, three-wire enabled, and Cobuc not moving, display=

```
WAITING FOR LOADING
DEVICE TO GET READY
```

⓪ Disables the three-wire circuit. Display=

```
THREE WIRE DISABLED
 PUSH START TO GO
```

Operator alarm will sound. Do not press ① to silence the alarm at this time.

Accesses the *program mode*. Display=

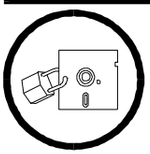
```
      CONFIGURE
```

① **Silences operator alarm.**

Returning to *Run Mode* From *Program Mode*

ENTER NEXT	**Repeatedly until display=**	TURN KEY OFF PRESS NEXT TO EXIT	This display must appear before turning keyswitch to *run*.
, ENTER NEXT	**Prompts**	PUSH STOP TO EXIT CONFIGURE	
0	**Prompts**	THREE WIRE DISABLED PUSH START TO GO	
1	**Accesses *run mode***	WAITING FOR LOADING DEVICE TO GET READY	

⚠ CAUTION ⚠



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

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

NOTE: If the display says *Clear Memory Now*, see "COBUC ERROR MESSAGES."

Entering Data in Configure Decisions

How To Enter Data

When the display= CONFIGURE

ENTER NEXT = NUMBER OF CAKES TO RECEIVE? 1 This is the first configure decision.

<value> **Enters the value for the current decision,** where **<value>** is the one-, two-, or three-digit number for the currently displayed decision. See "The Configure Decisions" in this section.

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

ENTER NEXT, ENTER NEXT, ENTER NEXT, etc. **Advances through each decision, retaining the previously entered value.**

After advancing past the last configure decision, the display returns to the *program menu.*

Why the Sequence of Configure Decisions Will Vary—The following describes *all possible* configure decisions. Many configure decisions only appear if certain values were entered in previous configure decisions.

The Configure Decisions

Code	Data Display	Range	Explanation
A	NUMBER OF CAKES TO RECEIVE? 1	1-4 allowed	Enter the maxium number of loads the Cobuc will accept before declaring itself loaded.
B	NUMBER OF RECEIVE LEVELS ? 1	1-4 levels	Enter the number of different receive levels the Cobuc must receive from.
C	NUMBER OF DISCHARGE LEVELS ? 1	1-4 levels	Enter the number of different discharge levels the Cobuc must discharge to.
D	ELEVATOR INSTALLED ? 0=NO 1=YES 0	0-1	**0=No**, if the Cobuc cannot elevate. **1=Yes**, if the Cobuc can elevate.
Configure decision E only appears if *D=1*.			
E	TIME TO REACH BOTTOM-TOP (S) 50	5-99 seconds	Enter the time in seconds required to *raise* the Cobuc bucket from full down to full up.
F	CHECK FOR PERIPHERAL FAILURE 0=NO 1=YES 0	0-1	**0=No**. *Does not* check for malfunctioning boards. **1=Yes**. Checks for malfunctioning boards. Set value at 1 unless otherwise determined by the Milnor® factory during service procedures.

G

```
ALLIED LOADING ?
0=NO 1=YES          0
```

0-1

0=No. Disables allied loading.
1=Yes. Enables allied loading. See "INTERFACING MILNOR® COBUCS WITH ALLIED (NON-MILNOR®) SYSTEM."

Configure decision H and *I* appear only if *G=1*.

H

```
ALLIED LOADING     SS
COMPLETED DELAY    00
```

00-10 seconds

Enter the time desired (in seconds) to delay the *I have loaded you output* from the Cobuc to the allied device. This decision is dependent on the allied controller and its operational requirements.

I

```
COMPATIBILITY  FDDCG
0=N/A 1=MATCH  01000
```

0-1 (each)

Enter the compatibility code desired for each type of data (0=match not required, 1=match required).
F=Formula
D=Dry Code
D=Destination code
C=Customer code
G=Goods code

Decision I provides for specifying which batch codes (formula, dry code, destination, customer, and goods code), if any, must match the first cake when additional cakes are being loaded. See *decision A* (*Number of Cakes To Receive*).

J

```
ALLIED DISCHARGE ?
0=NO 1=YES          0
```

0-1

This decision only applies to Miltrac-controlled systems.
0=No. Disables allied discharge.
1=Yes. Enables allied discharge. See "INTERFACING MILNOR® COBUCS WITH ALLIED (NON-MILNOR®) SYSTEMS."

Configure decisions K and *L* appear only if *J=0*.

K

```
WAIT FOR START
BEFORE MOVING       0
```

0-1

0=No. Only used for Miltrac systems. Cobuc can start moving when the Miltrac system gives "get ready" command.
1=Yes. Cobuc must wait for the Miltrac "start" command before moving (i.e., the discharging or receiving device is on a second Miltrac system via Linkmaster). Prevents Cobuc from seeking for load or discharge device. The device actually has committed to receive or discharge the load.

L

```
MOVE LEFT/RIGHT
BEFORE UP           1
```

0-1

0=No. There is sufficient clearance for the bucket to move diagonally.
1=Yes. Cobuc is only permitted to traverse at receive level zero (lowest level).

M	GOODS UNIT 0=WEIGHT 1=PIECES 0	0-1	Enter the unit (weight or pieces) Miltrac will track goods by. The value entered here only valid if loading system properly equipped.
N	OUTPUT FLAG WHEN EMPTY 0=NO 1=YES 0	0-1	**0=No**. *I am empty output* not required. **1=Yes**. *I am empty output* required. This output is only used in systems that require the Cobuc to electromechanically signal other devices that it is empty.
O	MILTRAC ADDRESS 000	000-255	Enter the Miltrac address for the Cobuc (may vary at each laundry—see Miltrac manual).
P	MILDATA ADDRESS 000	000-255	Enter the Mildata® address for the Cobuc (may vary at each laundry—see Mildata® manual).
Q	LANGUAGE 0	0-4	**Software version 91200 or later only.** **0**=English **1**=French **2**=Dutch **3**=Spanish **4**=Italian **NOTE:** All languages are available in the same software

B

See “How To Access the Configure Mode, Enter Data, and Exit” in this section for displays when exiting configure.

Cobuc Configure Values

The configure values recorded in the microprocessor correspond to how this sepcific machine was equipped when installed, and how it operates with its interfacing devices. Changes in options on this machine or its interfacing devices may require changing these values. Record the configure values here each time they are changed, and keep this record of values and this manual in a safe place.

A (NUMBER OF CAKES TO RECEIVE)	=_____	I (COMPATIBILITY)	=_____
B (NUMBER OF RECEIVE LEVELS)	=_____	J (ALLIED DISCHARGE)	=_____
C (NUMBER OF DISCHARGE LEVELS)	=_____	K (WAIT FOR START BFR MOVING)	=_____
D (ELEVATOR INSTALLED)	=_____	L (MOVE LEFT/RIGHT BEFORE UP)	=_____
E (TIME TO REACH BOTTOM-TOP)	=_____	M (GOODS UNIT)	=_____
F (CHECK FOR PERIPHERAL FAIL)	=_____	N (OUTPUT FLAG WHEN EMPTY)	=_____
G (ALLIED LOADING)	=_____	O (MILTRAC ADDRESS)	=_____
H (ALLIED LOADING-CMPTD DELAY)	=_____	P (MILDATA ADDRESS)	=_____

Operating 3

RUNNING THE MARK V COBUC IN AUTOMATIC

⚠ DANGER ⚠

CRUSH HAZARD—Moving Cobucs and Cobuc mechanisms will strike or crush anyone in the Cobuc path.

- ☞ **Do not operate the Cobuc without owner/user furnished fencing to enclose Cobuc path per the guidelines posted on the Cobuc.**
- ☞ **Know how to use all factory-supplied Cobuc safety devices including *emergency stop switches,* pull cords, and kickplates.**
- ☞ **Be sure all personnel are clear of the Cobuc path and mechanisms before operating the Cobuc in *manual* or *automatic mode*. Cobuc may move automatically when certain controls are used, such as when ① is pressed, any time cake data is entered, or any time the *Manual/Automatic switch* is set to *automatic*.**

Powering Up the Cobuc

The normal operating mode of Cobucs is fully automatic. Once set to *automatic*, a new load (and its batch codes) passes from the loading device (e.g., the Milnor® CBW®) to the Cobuc each time the loading device discharges, until the Cobuc is declared fully loaded. The loaded Cobuc will then wait to transfer the batch(es) and the associated codes to an extractor or other post-wash devices.

NOTE: Depending on batch codes and Cobuc configuration, the Cobuc may be declared fully loaded before its physical capacity is met (e.g., a Cobuc that can hold four cakes may be fully loaded with one cake).

Power Up Sequence Displays

Master Switch *on* — **Energizes control power, but not Cobuc power.** The operator alarm sounds, and the power up displays appear as shown at right.

```
COPYRIGHT PELLERIN
MILNOR 1990
```
Copyright statement (appears one or more times during sequence)

```
ALL RIGHTS RESERVED
 'COBUC'       91004
```
Number at lower right is software date code.

The display then prompts

```
THREE WIRE DISABLED
 PUSH START TO GO
```

① — Energizes Cobuc power and silences the operator alarm.

```
PRESS NEXT TO LOWER
  BUCKET & RETRACT
```
If already elevated and retracted, goes immediately to "*Does Position 0 Have a Cake?*"

ENTER NEXT — The Cobuc retracts bucket and tests for taut chain and slack chain (if elevator equipped).

```
  RETRACTING BUCKET
```
Appears until bucket fully retracted.

The controller prompts	DOES POSITION 0 HAVE A CAKE? 0=NO 1=YES 0	Default=1(Yes). If yes, see "When Cake Data Must Be Confirmed" in this section. If no, operation continues as shown below.
Bucket should be fully retracted, but the controller may briefly show	RETRACTING BUCKET	Appears until the bucket is fully retracted.

Home is the position along the Cobuc path that the Cobuc seeks after power up, discharging, loading, or recovery from an error condition. At the Home position, the Cobuc reorients itself (verifies its position). Home is usually either directly in front of the primary loading device or at a location central to all loading devices.

When the bucket is fully retracted, but the Cobuc is not at Home position, display=	RETURNING HOME	Appears until the Cobuc finds the Home position.
When Cobuc is home and empty	WAITING FOR LOADING DEVICE TO GET READY	

Automated Cobuc Operation

NOTE: Traversing Cobucs orient themselves using three types of targets on the Cobuc rail: *Home, Oops*, and *Device*. The Cobuc seeks the fixed *Home* target whenever it finishes loading, finishes discharging, or recovers from an error. The Cobuc uses this target to determine which devices are to the right or left of it, so it moves in the correct direction when a device requires service. The *Oops* targets are fixed targets mounted at each end of the rail. These targets indicate that the Cobuc has traversed too far right or left. The *Device* target is a normally retracted target that extends downward on command. The target is controlled by the device requiring service to stop the Cobuc at the appropriate device.

Load Operation

While the Cobuc is idle and waiting to be loaded, display=

WAITING FOR LOADING DEVICE TO GET READY

When the Cobuc is commanded to move to the loading device, display=

FINDING LOAD STATION AND LEVEL	Cobuc searches for load station and load level (the load position is not the Home position).
EXTENDING BUCKET	The Cobuc extends the bucket to load.
WAITING FOR LOAD	The Cobuc has found the load station and receive level, and the bucket is in position to accept goods.
LOADING	The loading device is loading goods onto the Cobuc.
LOADING COMPLETE	Cobuc is loaded.
RETRACTING BUCKET	The Cobuc retracts its bucket.
RETURNING HOME	The Cobuc returns to the Home position to reorient itself along the rail.
WAITING TO DISCHARGE	The Cobuc has declared itself loaded and is waiting to be allowed to discharge.

Discharge Operation

When the Cobuc is commanded to discharge its load.

FINDING DISCHARGE STATION AND LEVEL	The Cobuc is searching for the discharge station and the discharge level.
UNLOADING	The Cobuc is unloading its goods.
UNLOADING COMPLETE	The Cobuc is unloaded.
RETURNING HOME	The Cobuc returns to the Home position to reorient itself along the rail.

When the Cobuc is idle and ready to be loaded again, display=

WAITING FOR LOADING DEVICE TO GET READY

When Cake Data Must Be Confirmed

When normal operation resumes following morning start up, a power loss, any error (see "COBUC ERROR MESSAGES"), or manual intervention, the controller does not know if goods are present in the bucket. Therefore, the controller considers the batch codes unreliable and prompts the user for information explained here.

⚠ DANGER ⚠

CRUSH HAZARD—Moving Cobucs and Cobuc mechanisms will strike or crush anyone in the Cobuc path.

☞ **Be sure all personnel are clear of the Cobuc path and mechanisms before operating the Cobuc in *manual* or *automatic mode*. Cobuc may move automatically when ① is pressed, any time cake data is entered, or any time the *Manual/Automatic switch* is set to *automatic*.**

Responding to Prompts for Cobuc Cake Information

The controller prompts

```
DOES POSITION 0 HAVE
A CAKE? 0=NO 1=YES 1
```

Default=1(Yes).

0, ENTER/NEXT **(No) Tells the controller there are no goods in the Cobuc.**

```
WAITING FOR LOADING
DEVICE TO GET READY
```

If answered *no*, then the Cobuc is ready to be loaded.

or

1, ENTER/NEXT or ENTER/NEXT **(Yes) Tells the controller that goods are still on the Cobuc and prompts**

```
ENTER FORMULA
FOR POSITION 0   XXX
```

Where XXX is the wash formula. Change number if necessary.

ENTER/NEXT **Accepts the displayed formula number**, and the controller prompts for confirmation of additional information: extract code, dry code, destination, customer, goods code, weight (or pieces, as determined by *configure decision N*), and cake number.

NOTE: If the Cobuc is configured to hold two, three, or four loads, the controller will prompt for cake data (as shown above) for each position. However, because all loads will be mixed in one bucket, the Cobuc must choose one set of cake data for all loads. Therefore, the Cobuc will use the last cake data entered for all loads in the bucket.

When all cake data is entered, the normal power up sequence resumes.

Interruptions in Normal Cobuc Operation

Holds Ahead of the Cobuc—Anytime the flow of goods into the Cobuc stops (as might be caused by a hold condition in the tunnel washer), the Cobuc remains at *Waiting For Load*. When the flow of goods resumes, the Cobuc resumes operation without manual intervention.

Holds Behind the Cobuc—Anytime the Cobuc desires to discharge but cannot because the receiving device (e.g., extractor) is not ready, the Cobuc waits at the Home position and displays *Waiting To Discharge.* As soon as the receiving device is available, the transfer occurs and normal operation resumes without manual intervention.

⚠ DANGER ⚠

CRUSH HAZARD—Bucket may slowly descend even with power *off* or three-wire disabled, crushing anyone under it.

Power Loss—If the Cobuc loses power, it stops immediately. The Cobuc resumes operation, as explained in "Power Up Sequence Display" in this section. See **NOTE** below.

Three-Wire Disabled—If the Cobuc loses three-wire, it stops immediately. The Cobuc resumes operation as explained in "When Cake Data Must Be Confirmed." See **NOTE** below.

NOTE: It is not usually necessary to load or unload the Cobuc before returning it on-line with the controller. Upon restoring power, the Cobuc initializes and resumes normal automatic operation. It automatically synchronizes with its interfacing devices (e.g., washer, extractor), providing the Cobuc was not in the middle of loading or receiving goods at power loss which may require manual intervention.

Viewing Data on the Microprocessor Display

Cake data (batch codes), inputs, outputs, and Miltrac commands can be viewed while the Cobuc is operating (i.e., the three wire is enabled). All this data is useful for troubleshooting, but cake information is also useful for determining the status of individual batches.

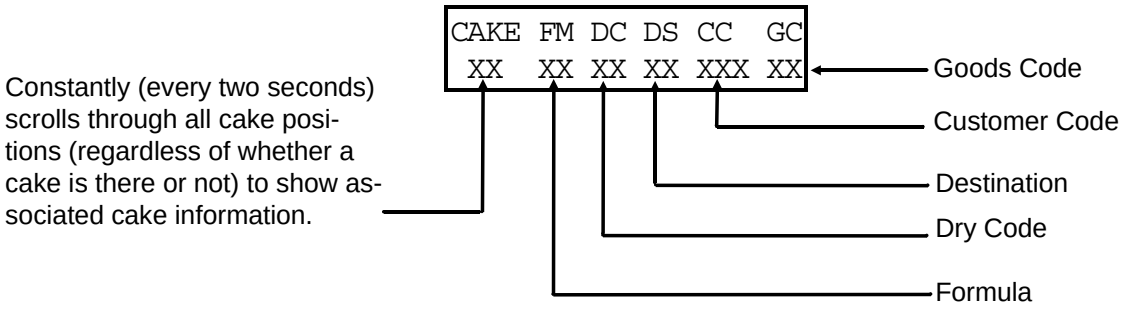
How To Access, Scroll, and Exit the Data Menu

When display= WAITING TO DISCHARGE

2 DEF — Displays one of the four types of data each time it is pressed, or scrolls through all menu choices if held depressed. Pressing 2 DEF, with Miltrac commands displayed, returns to the normal run display.

Viewing Cake Information

Hold 2 DEF until this display appears, then release.



Viewing Inputs

Hold 2 DEF until this display appears, then release.

Displays 1st 16 inputs (1: A-P). Located on first 16/8 board

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

"+" = input energized
"-" = input not energized

SKIP TO **Displays second 16 inputs (2: A-P)**. Located on 2nd 16/8 board.

SKIP TO **Displays third 16 inputs (3: A-P)**. Located on 3rd 16/8 board.

SKIP TO **Displays fourth 16 inputs (4: A-P)**. Located on 4th 16/8 board.

SKIP TO **Displays fifth 16 inputs (5: A-P)**. Located on 5th 16/8 board.

SKIP TO **Displays sixth 16 inputs (6: A-P)**. Located on 6th 16/8 board.

SKIP TO **Displays last 6 inputs (7: A-F)**. Located on processor board.

Table A: Standard Inputs for Cobucs

Page 1: First 16 Inputs			Page 2: Second 16 Inputs	
Display Code	**Input Name**	**Connector/Pin**	**Input Name**	**Connector/Pin**
A	Chute is Blocked	1MTA4-1	Input Dry Code 0	2MTA4-1
B	Slack Chain	1MTA4-2	Input Dry Code 1	2MTA4-2
C	Not Used	1MTA4-3	Input Dry Code 2	2MTA4-3
D	Left Right Oops	1MTA4-4	Input Dry Code 3	2MTA4-4
E	Bucket Full Up	1MTA4-5	Input Destination Code 0	2MTA4-5
F	Load Station	1MTA4-6	Input Destination Code 1	2MTA4-6
G	Fully Retracted	1MTA4-7	Input Destination Code 2	2MTA4-7
H	Fully Extended	1MTA4-8	Input Destination Code 3	2MTA4-8
I	Not Used	1MTA4-11	Input Customer Code A	2MTA4-11
J	Not Used	1MTA4-12	Input Customer Code B	2MTA4-12
K	Manual Switch	1MTA4-13	Input Customer Code C	2MTA4-13
L	Three-Wire	1MTA4-14	Input Customer Code D	2MTA4-14
M	Miltrac Home position	1MTA4-15	Input Customer Code E	2MTA4-15
N	Transfer Station	1MTA4-16	Input Customer Code F	2MTA4-16
O	Not Used	1MTA4-17	Not Used	2MTA4-17
P	Bucket Full Down	1MTA4-18	Not Used	2MTA4-18

Table A: Standard Inputs for Cobucs (cont'd)

Page 7: Last 6 Inputs		
Display Code	**Input Name**	**Connector/Pin**
A	Not Used	Not Used
B	Program Key	MTA38-03
C	Signal Cancel	MTA38-02
D-H	Not Used	Not Used
I	Go Down Before Discharge	MTA39-01
J-P	Not Used	Not Used

Table B: Optional Inputs for Cobucs

Page 3: Third 16 Inputs			Page 4: Fourth 16 Inputs	
Display Code	**Input Name**	**Connector/Pin**	**Input Name**	**Connector/Pin**
A	Receive Level 0	3MTA4-1	Load Left	4MTA4-1
B	Receive Level 1	3MTA4-2	Load Right	4MTA4-2
C	Discharge Level 0	3MTA4-3	Go Load at Level 1	4MTA4-3
D	Discharge Level 1	3MTA4-4	Desire to Load Bucket	4MTA4-4
E	Discharge Level 2	3MTA4-5	Allied Loading Cancelled	4MTA4-5
F	Not Used	3MTA4-6	Load Semi Automatic	4MTA4-6
G	Not Used	3MTA4-7	Not Used	4MTA4-7
H	Not Used	3MTA4-8	Input Data Valid	4MTA4-8
I	Not Used	3MTA4-11	Single Cake	4MTA4-11
J	Not Used	3MTA4-12	New Customer	4MTA4-12
K	Not Used	3MTA4-13	Loading Complete	4MTA4-13
L	Not Used	3MTA4-14	Input Extract Code 0	4MTA4-14
M	Not Used	3MTA4-15	Not Used	4MTA4-15
N	Not Used	3MTA4-16	Not Used	4MTA4-16
O	Not Used	3MTA4-17	Not Used	4MTA4-17
P	Not Used	3MTA4-18	Not Used	4MTA4-18

Table B: Optional Inputs for Cobucs (cont'd)

Page 5: Fifth 16 Inputs			Page 6: Sixth 16 Inputs	
Display Code	**Input Name**	**Connector/Pin**	**Input Name**	**Connector/Pin**
A	Allied Discharge Desired	5MTA4-1	Not Used	6MTA4-1
B	Allied Discharge Allowed	5MTA4-2	Not Used	6MTA4-2
C	Allied Discharge Cancelled	5MTA4-3	Not Used	6MTA4-3
D	Allied Discharge Completed	5MTA4-4	Not Used	6MTA4-4
E	Discharge Left	5MTA4-5	Not Used	6MTA4-5
F	Discharge Right	5MTA4-6	Not Used	6MTA4-6
G	Discharge Backwards	5MTA4-7	Not Used	6MTA4-7
H	Go Discharge At Level 1	5MTA4-8	Not Used	6MTA4-8
I	Not Used	5MTA4-11	Not Used	6MTA4-11
J	Not Used	5MTA4-12	Not Used	6MTA4-12
K	Not Used	5MTA4-13	Not Used	6MTA4-13
L	Not Used	5MTA4-14	Not Used	6MTA4-14
M	Not Used	5MTA4-15	Not Used	6MTA4-15
N	Not Used	5MTA4-16	Not Used	6MTA4-16
O	Not Used	5MTA4-17	Not Used	6MTA4-17
P	Not Used	5MTA4-18	Not Used	6MTA4-18

4-

Viewing Outputs

Hold 2 DEF until this display appears.

Displays 1st 16 outputs (1: a-p).

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

"+" = input made
"-" = input not made

SKIP TO **Displays 2nd 16 outputs (2: a-p).**

SKIP TO **Displays last 9 outputs (3: a-i).**

Table C: Standard Outputs for Cobucs

Page 1: First 16 Outputs					
Display Code	Output Name	**Connector/Pin**	**Display Code**	Output Name	**Connector/Pin**
a	Move Right	1MTA5-10 1MTA5-19	**i**	Not Used	2MTA5-10 2MTA5-19
b	Extend Load End	1MTA5-9 1MTA5-18	**j**	Signal	2MTA5-9 2MTA5-18
c	Retract Load End	1MTA5-8 1MTA5-17	**k**	Discharge Partial Load	2MTA5-8 2MTA5-17
d	Not used	1MTA5-7 1MTA5-16	**l**	Here Comes a Load	2MTA5-7 2MTA5-16
e	Cobuk Moving	1MTA5-4 1MTA5-14	**m**	I Want to Discharge	2MTA5-4 2MTA5-14
f	Move Left	1MTA5-3 1MTA5-13	**n**	Ready to Unload	2MTA5-3 2MTA5-13
g	Raise Bucket	1MTA5-2 1MTA5-12	**o**	Finished Unloading	2MTA5-2 2MTA5-12
h	Lower Bucket	1MTA5-1 1MTA5-11	**p**	Output Data Valid	2MTA5-1 2MTA5-11

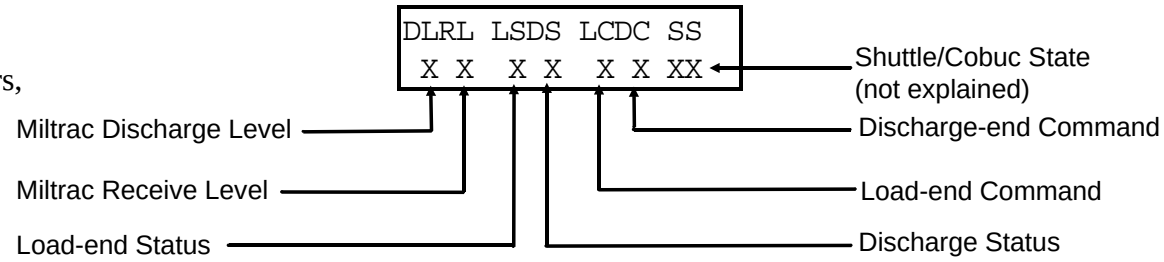
Table D: Optional Outputs for Cobucs

Page 2: Second 16 Outputs			Page 3: Last 9 Outputs		
Display Code	**Output Name**	**Connector/Pin**	**Display Code**	**Output Name**	**Connector/Pin**
a	Move Up	3MTA5-19 3MTA5-10	**a**	Output Dry Code 0	5MTA5-19 5MTA5-10
b	Move Down	3MTA5-18 3MTA5-09	**b**	Output Dry Code 1	5MTA5-18 5MTA5-09
c	Not Used	3MTA5-17 3MTA5-08	**c**	Output Dry Code 2	5MTA5-17 5MTA5-08
d	Not Used	3MTA5-7 3MTA5-16	**d**	Output Dry Code 3	5MTA5-07 5MTA5-16
e	Not Used	3MTA5-14 3MTA5-4	**e**	Output Destination Code 0	5MTA5-14 5MTA5-4
f	Not Used	3MTA5-3 3MTA5-13	**f**	Output Destination Code 1	5MTA5-3 5MTA5-13
g	Not Used	3MTA5-2 3MTA5-12	**g**	Output Destination Code 2	5MTA5-2 5MTA5-12
h	Not Used	3MTA5-1 3MTA5-11	**h**	Output Destination Code 3	5MTA5-1 5MTA5-11
i	Load Desired	4MTA5-19 4MTA5-10	**i**	Not Used	6MTA5-19 6MTA5-10
j	Finished Loading	4MTA5-18 4MTA5-9			
k	Semi Auto Load Desired	4MTA5-17 4MTA5-8			
l	Semi Auto Finished Unload	4MTA5-16 4MTA5-7			
m	Not Used	4MTA5-14 4MTA5-4			
n	Not Used	4MTA5-3 4MTA5-13			
o	Not Used	4MTA5-2 4MTA5-12			
p	Not Used	4MTA5-1 4MTA5-11			

Viewing Miltrac Commands

This screen is used when troubleshooting with factory assistance.

Hold 2 DEF until this display appears, then release.



DL (Miltrac Discharge Level)—where the Miltrac system wants the shuttle to accept discharged goods.

RL (Miltrac Receive Level)—where the Miltrac system wants the shuttle to receive goods.

LS (Load End Status)—what the shuttle is telling the Miltrac system about its load end.

0 Can't Do Anything
1 Want To Receive
2 Ready To Receive
3 I'm Finished Receiving
4 I'm Finished Receiving (Do Not Hold)

DS (Discharge End Status)—what the shuttle is telling the Miltrac system about its discharge end.

0 Can't Do Anything
1 Want To Transfer
2 Ready To Transfer
3 I'm Finished Transferring
4 I'm Finished Transferring (Do Not Hold)

LC (Load End Command)—what the Miltrac system is telling the shuttle to do with respect to its load end.

0 Do Nothing
1 Get Ready To Receive
2 Get Ready To Receive Left
3 Get Ready To Receive Right
4 Start Receiving
5 Finished Receiving
6 You're Finished Receiving (Do Not Hold)

DC (Discharge End Command)—what the Miltrac system is telling the shuttle to do with respect to its discharge end.

0 Do Nothing
1 Get Ready To Transfer
2 Get Ready To Transfer Left
3 Get Ready To Transfer Right
4 Start Transferring
5 You're Finished Transferring
6 You're Finished Receiving (Do Not Hold)

SS (Shuttle/Cobuc State)—not explained (factory troubleshooting only)

MANUALLY OPERATING THE COBUC

The Cobuc can be operated manually from either the manual controls on the Cobuc itself (see the description of controls in the operator manual) or the manual menu accessible at the Cobuc controller. Though the Cobuc can be operated manually from either location, the controls at the Cobuc are better for making subtle movements or for manual goods handling. The Cobuc controller is better for moving the Cobuc longer distances or in situations that do not require manually handling goods. By actuating outputs in manual, most microprocessor outputs can be tested.

While manual modes 00-09 allow actuating outputs for manual operation or output testing, manual mode 10 (Test Inputs) allows microprocessor inputs to be viewed and tested without returning to automatic operation, a function useful for troubleshooting.

The Available Menu Selections

00=Return to Automatic
01=Moving Bucket
02=Extend-Retract
03=Bucket Functions
04=Loading
05=Discharge
06=Data Pass
07=Dry Code
08=Dry Destination
09=Signal
10=Test Inputs

⚠ DANGER ⚠

CRUSH HAZARD—Moving Cobucs and Cobuc mechanisms will strike or crush anyone in the Cobuc path.

☞ **Do not operate the Cobuc without owner/user furnished fencing to enclose Cobuc path per the guidelines posted on the Cobuc.**

☞ **Know how to use all factory-supplied Cobuc safety devices including *emergency stop switches*, pull cords, and kickplates.**

☞ **Always operate the Cobuc carefully in *manual mode*. The operator has total control of Cobuc movement immediately after the *Manual/Automatic switch* is set to *manual*.**

Accessing the Manual Menu

When the display=

```
WAITING FOR LOADING
DEVICE TO GET READY
```

This is the *run mode*. While manual is accessible from other displays, Milnor® recommends entry from this display.

SKIP TO + 1 ABC — **Accesses *manual***

```
**MANUAL OUTPUTS**
00 RETURN TO AUTO
```

0 , 1 ABC — **Selects *Moving Bucket* (example)**

```
**MANUAL OUTPUTS**
01 MOVING BUCKET
```

ENTER NEXT — **Accesses the selected mode (example)**

```
1=RIGHT   2=LEFT
3=UP      4=DOWN
```

This is the moving bucket sub-menu. See "Manual: 01=*Moving Bucket*" in this section.

For Quick Return to Run Mode From Any Manual Menu Selection

ENTER NEXT	**Turns off any output if it is on and returns to *bare manual* menu**	**MANUAL OUTPUTS** 01 MOVING BUCKET	The last-selected mode is displayed.
0, 0	**Selects**	**MANUAL OUTPUTS** 00 RETURN TO AUTO	
ENTER NEXT	**Returns to *run mode***	PRESS NEXT TO LOWER BUCKET AND RETRACT	Cobuc prompts user to press next, then for cake data. Then the cobuc is ready for normal automatic operation.

⚠ CAUTION ⚠

Careless operation of the Cobuc in manual mode can result in extensive damage to equipment and/or goods. In manual mode, the operator is fully responsible for all Cobuc movement.

- ☞ **Do not direct the Cobuc too far left/right or taut/slack.**
- ☞ **Do not tilt goods onto the floor.**
- ☞ **Do not extend the bucket into equipment.**

Manual 01=*Moving Bucket*

When the display=

```
**MANUAL OUTPUTS**
01 MOVING BUCKET
```

ENTER NEXT =

```
1=RIGHT   2=LEFT
3=UP      4=DOWN
```

Controller ignores all inputs. The *oops switch* and associated relays (not controlled by the microprocessor) must prevent the Cobuc from going too far left/right or taut/slack chain. The operator must make sure these circuits are operating to prevent damage to the Cobuc. Outputs can be actuated simultaneously (e.g., *Right* and *Up*); however, the software prevents simultaneously actuating opposing outputs (e.g., *Right* and *Left* or *Up* and *Down*).

NOTE: Once an output is turned on, press the same button to turn it off.

1 ABC / 1 ABC **_Right_ output on/off.**

2 DEF / 2 DEF **_Left_ output on/off.**

3 GHI / 3 GHI **_Up_ output on/off.**

4 JKL / 4 JKL **_Down_ output on/off.**

ENTER NEXT **All outputs off and returns to manual menu 01.**

Manual 02=*Extend-Retract*

0, 2 **Display=**

```
**MANUAL OUTPUTS**
02 EXTEND-RETRACT
```

ENTER/NEXT =

```
LOAD 1-EXTEND
     2=RETRACT
```

Controller ignores all inputs. **It is possible to extend the bucket into equipment**. Outputs can be actuated simultaneously; however, the software prevents simultaneously actuating opposing outputs (e.g., *Extend* and *Retract*).

1 / 1 ***Extend* load end output on/off .**

2 / 2 ***Retract* load end output on/off.**

ENTER/NEXT **All outputs off and returns to manual menu 02.**

Manual 03=*Bucket Functions*

0, 3 **Display=**

```
**MANUAL OUTPUTS**
03 BUCKET FUNCTIONS
```

ENTER/NEXT =

```
1=TILT UP 2=TILT DWN
3=HERE COMES LOAD
```

Controller ignores all inputs. **It is possible to tilt the bucket into equipment.** Outputs can be actuated simultaneously; however, the software prevents simultaneously actuating opposing outputs (e.g., *Tilt Up* and *Tilt Down*).

1 / 1 ***Tilt Up* output on/off.**

2 / 2 ***Tilt Down* output on/off.**

3 / 3 ***Here Comes* A *Load* output on/off (e.g., to interface with extractor.)**

ENTER/NEXT **All outputs off and returns to manual menu 03.**

Manual 04=*Loading*

0, 4 **Display=**

```
**MANUAL OUTPUTS**
04 LOADING
```

ENTER/NEXT =

```
1=DESIRED 2=SM DESRD
3=LOADING 4=FINISHED
```

1 / 1 **Load desired (*Desired*) output on/off.**

2 / 2 **Semi auto load desired (*Sm Desrd*) output on/off.**

3 / 3 **Shuttle is loading (*Loading*) output on/off.**

4 / 4 **Finished loading (*Finished*) output on/off.**

ENTER/NEXT **All outputs off and returns to manual menu 04.**

Manual 05=*Discharge*

0 _ , 5 MNO **Display=**

```
**MANUAL OUTPUTS**
05 DISCHARGE
```

ENTER NEXT =

```
1=DESIRED  2=READY
3=FINISHED 4=SM FINI
```

1 ABC / 1 ABC **I want to discharge (*Desired*) output on/off.**

2 DEF / 2 DEF **Ready to unload (*Ready*) output on/off.**

3 GHI / 3 GHI **Finished unloading (*Finished*) output on/off.**

4 JKL / 4 JKL **Semi auto finished unload (*Sm Fini*) output on/off.**

ENTER NEXT **All outputs off and returns to manual menu 05.**

Manual 06=*Data Pass*

0 _ , 6 PQR **Display=**

```
**MANUAL OUTPUTS**
06 DATA PASS
```

ENTER NEXT =

```
1=PARTIAL LOAD
2=DATA VALID
```

1 ABC / 1 ABC ***Partial Load* output on/off.**

2 DEF / 2 DEF ***Data Valid* output on/off.**

ENTER NEXT **All outputs off and returns to manual menu 06.**

Manual 07=*Dry Code*

0 _ , 7 STU **Display=**

```
**MANUAL OUTPUTS**
07 DRY CODE
```

ENTER NEXT =

```
1=DRY# 0   2=DRY# 1
3=DRY# 2   4=DRY# 3
```

1 ABC / 1 ABC **Dry code bit 0 (*Dry# 0*) output on/off.**

2 DEF / 2 DEF **Dry code bit 1 (*Dry# 1*) output on/off.**

3 GHI / 3 GHI **Dry code bit 2 (*Dry# 2) output on/off.***

4 JKL / 4 JKL **Dry code bit 3 (*Dry# 3) output on/off.***

ENTER NEXT **All outputs off and returns to manual menu 07.**

Manual 08=*Dry Destination*

0, 8 **Display=**

```
**MANUAL OUTPUTS**
08 DRY DESTINATION
```

ENTER/NEXT =

```
1=DEST# 0  2=DEST# 1
3=DEST# 2  4=DEST# 3
```

1 / 1 **Destination bit 0 (*Dest# 0*) output on/off.**

2 / 2 **Destination bit 1 (*Dest# 1*) output on/off.**

3 / 3 **Destination bit 2 (*Dest# 2*) output on/off.**

4 / 4 **Destination bit 3 (*Dest# 3*) output on/off.**

ENTER/NEXT **All outputs off and returns to manual menu 08.**

Manual 09=*Signal*

0, 9 **Display=**

```
**MANUAL OUTPUTS**
09 SIGNAL
```

ENTER/NEXT =

```
1=SIGNAL
```

1 / 1 ***Signal* output on/off.**

ENTER/NEXT **All outputs off and returns to manual menu 09.**

Manual 10=*Test Inputs*

1, 0 **Display=**

```
**MANUAL OUTPUTS**
10 TEST INPUTS
```

See tables of listed inputs in "RUNNING THE COBUC IN AUTOMATIC."

ENTER/NEXT **Displays 1st 16 inputs (1: A-P)**
Located on 2nd 16/8 board

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

"+" = input energized
"-" = input not energized

SKIP TO **2nd 16 inputs (2: A-P).** Located on 2nd 16/8 board.

SKIP TO **3rd 16 inputs (3: A-P).** Located on 3rd 16/8 board.

SKIP TO **4th 16 inputs (4: A-P).** Located on 4th 16/8 board.

SKIP TO **5th 16 inputs (5: A-P).** Located on 5th 16/8 board.

SKIP TO **6th 16 inputs (6: A-P).** Located on 6th 16/8 board.

SKIP TO **Last 6 inputs (7: A-F).** Located on processor board.

ENTER/NEXT **Returns to manual menu 10.**

Troubleshooting 4

COBUC ERROR MESSAGES

The following messages can result from an error condition (e.g., improper procedure, microprocessor component failure, mechanical malfunction) or while correcting an error condition. See "COBUC ALPHANUMERIC LIST OF DISPLAYS" (see Table of Contents) for a complete list of display messages.

Power Up Error Messages

CONFIGURE ERROR TURN PROGRAM KEY ON

Indicates configure data is corrupt (possibly as a result of turning power *off* while in the *program mode*).

RECOVERY:

Reconfigure machine. See "CONFIGURING THE COBUC CONTROLLER."

CONFIGURE

The *Program/Run keyswitch* was incorrectly in the program position at power up, but the control has determined that configure data is good.

RECOVERY:

Turn the keyswitch to *run* and press ENTER/NEXT.

THREE WIRE DISABLED PUSH START TO GO

At power up, this message appears following the power up displays.

RECOVERY:

Press ① to close the three-wire circuit (which provides power to the Cobuc). ① may be pressed at any time during the power up displays, thus silencing the operator alarm and overriding this message. If ① fails to clear this message, see "Operational Error Messages" in this section.

CHECK I/O BOARD *x* PRESS SIGNAL CANCEL

The controller detects a failed or *missing* control circuit board, where *x* is the board number (see schematic manual). A *missing* board can result from configuring for an option not available (e.g., allied loading) or installing a new board or software that was configured for an option not on this machine. The Cobuc uses only I/O boards, which are defined from #1 - #6.

RECOVERY:

Press SIGNAL CANCEL to reset the controller and access the program menu. Review configure decisions to ensure that all configured options are available on that Cobuc and with the microprocessor boards in that Cobuc. If everything is configured correctly, replace the failed board. This permits automatic operation when the problem is resolved.

Operational Error Messages

⚠ DANGER ⚠

SHOCK HAZARD—High voltage electricity is present in electrical devices on this machine whenever external power is supplied, even if all power switches are off. Contact with high voltage electricity will kill or seriously injure you.

- ☞ **Lock *off* and tag out power at wall disconnect before opening any electrical control box or accessing any other electrical component.**
- ☞ **Always employ the services of a licensed, qualified electrician when troubleshooting the electrical system.**

THREE WIRE DISABLED PUSH START TO GO

The three-wire relay, which provides control circuit power to the machine, became de-energized. If the three-wire contact opens, even momentarily (e.g., power goes out or an *emergency stop switch* is pressed), the machine stops and displays *Three Wire Disabled*. This message will remain even if the contact only opened momentarily, and will reappear if the *Master switch* is turned *off* and then *on* again.

RECOVERY:

These messages can only be cleared if the cause of the error is corrected, then the relay is energized by pressing ①. The relay is held energized by its own normally open contacts along with motor overloads, etc.

NOTE: If three wire was disabled because the switch that monitors the chain tension was made (i.e., taut chain error), the *Taut Chain Fault light* illuminates (see the descriptions of controls in the operator manual).

RECOVERY:

1. Turn the keyswitch on the Taut Chain Nameplate to *manual enable*
2. Press *Enable Down button* until the bed is lowered from the taut chain switch
3. Press the *Reset button (Taut Chain Fault light* extinquishes)
4. Ensure operation of level switches
5. Resume normal operation as follows:

① Closes the three-wire circuit and may prompt for cake information.

<responses> Confirms cake data, where <responses> are as explained in "RUNNING THE COBUC IN AUTOMATIC SYSTEMS."

CHECK I/O BOARD *x* PRESS SIGNAL CANCEL

See explanation in "Power Up Error Messages" in this section.

ERROR - CHECK CHAIN PRESS SIGNAL CANCEL

The Cobuc failed to run the hoist to its maximum and minimum heights (to verify they operate) within the configured time. This error condition occurs only when the Cobuc first powers up.

RECOVERY:

Verify that the hoist is free to move up and down and that enough time is entered in *configure decision E. (Time To Reach Top-Bottom).*

ERROR - RAIL LIMIT PRESS SIGNAL CANCEL

The Cobuc moved too far left or right, making the *left/right limit switch* on the traversing rail, and was not able to move away from the switch within five seconds.

RECOVERY:

Verify that switches, targets, and circuits are operational. Manually move the Cobuc off of the *oops switch*:

1. Set the *Manual/Automatic switch* to *manual*, and use manual switches at the Cobuc to move the Cobuc away from the *oops switch.*

2. When the Cobuc is off the *oops switch*, set the *Manual/Automatic switch* to *automatic.*

3. Resume operation at controller by pressing SKIP TO.

ERROR-NOT RETRACTED PRESS SIGNAL CANCEL

The Cobuc bucket is not fully retracted when moving left/right, up/down, or after initialization.

RECOVERY:

Verify operation of the fully retracted switch. Correct error, and press SIGNAL CANCEL.

ERROR - SLACK CHAIN PRESS SIGNAL CANCEL

The Cobuc descended too far while searching for a level, making the slack chain switch.

RECOVERY:

Verify operation of the level switches (load and discharge) and engagement of targets. Correct error, and press SIGNAL CANCEL.

ERROR - TAUT CHAIN PRESS SIGNAL CANCEL

The Cobuc ascended too far searching for a level, making the taut chain switch.

RECOVERY:

Verify operation of the level switches (load and discharge) for operation and engagement of targets. Correct error, and press SIGNAL CANCEL.

ERROR - XFER ABORTED PRESS SIGNAL CANCEL

(For Miltrac system loading and/or discharging only) Indicates the transfer was cancelled.

RECOVERY:

Press SIGNAL CANCEL to clear the error and answer the cake data questions to resume operation.

Supplemental Information 5

Summary of Milnor® Allied Interface Capability, COBUC

A Milnor system machine may need to load from, or discharge to a non-Milnor machine. This document summarizes allied interface capability for the Milnor system machine equipped with Mark 5 microprocessor or later controls, as of this writing (see Note 2).

Note 1: Refer to the document "About Milnor® Allied Interfaces for Automated Laundering System Machines" for a general explanation of allied interfaces. Refer to "Milnor® Allied Interface Specifications and Signals" for technical information needed to implement an allied interface.

Note 2: The allied interfaces offered by Milnor are continually evolving and the available signals can vary from one software version (date code) to another. Milnor Tehnical Support can assist in determining data-passing capacities for specific software versions.

1. How Batch Data Travels Through a System

The types and ranges of batch codes that the devices within an automated laundering system can handle depend on both the individual device controller and the means of communication used to pass this data from device to device. Generally, allied interfaces provide less capacity then the Miltrac controller because they are much more limited by hardware constraints and are developed on an as-needed basis. You will notice in Table 1 that certain types of codes and code ranges do not carry over from device to device, or even from the loading to the discharge interface within the same device. Keep in mind that both down stream and upstream of a given allied interface, data will most likely be passed not via an allied interface, but rather, by the Miltrac controller or a similar system controller supplied by another equipment manufacturer. As of this writing, Miltrac is capable of passing the following codes and code ranges throughout the entire system (among all Miltrac devices): 256 formula codes, 16 press/extract codes, 16 dry codes, 256 goods code, 1000 customer codes, 64 destination codes, 1000 weight values, 256 cake numbers, and the following flags: single cake, empty load, low pressure, third pressure, no pressure.

2. Batch Data Signals

This section summarizes the types and number of batch codes for which, as of this writing, batch data allied interface signals are available. As shown in Table 1, the signals that carry batch data are divided into two general categories, those that pass multi-digit batch codes (e.g., drycode) in binary, and must therefore, function in groups and those that pass a single on/off value (e.g., the "new customer" code).

Both the need for, and the specific use that any type of batch code serves can vary significantly from one installation to another. Signals traditionally used for certain batch codes can sometimes be adapted to new types of batch data. The following are the batch codes traditionally associated with allied interfaces and their traditional definitions.

Formula code—identifies the wash formula used in the tunnel. Although in some systems, the wash formula may affect post-wash processing, formula codes are passed to post-wash devices primarily for accounting and record-keeping purposes (see Note 3).

Extract code—Sometimes called press code, this identifies the extract formula, if a Milnor centrifugal extractor is used, or the press formula, if a Milnor single stage press is used (see Note 3). Extract codes do not apply to the Milnor two-stage press which does not have formulas as such, but can be made to vary the pressure of the main bell via the Low, 3rd, and No Pressure (on/off) signals.

Note 3: Although formula code and extract code are technically different things, they can be thought of as the same by programming the Milnor centrifugal extractor or single stage press so that the proper extract formula is invoked by a formula code of the same number. For example, program extract code 05 so that it is the proper extraction process for batches processed with formula code 05. Then simply pass the formula code to the extractor or single stage press as the extract code.

Dry code—identifies the drying formula to be used in the drying or conditioning equipment.

Cooldown code—identifies the cooldown procedure to be used in the dryer.

Customer code—identifies the customer (commercial laundry) or department (institutional laundry) the batch belongs to.

Goods code—in older Milnor CBW®'s (with Miltron™ controllers), identifies a subset of a general class of goods. All batches conforming to the general class are processed using the same wash formula. But each specific goods code within that class causes variations in processing, essentially extending the range of available wash formulas. Although in some systems, the goods code may affect post-wash processing, goods codes are passed to post-wash devices primarily for accounting and record-keeping purposes.

Destination code—identifies a storage location within the laundry to send the load.

Weight—the dry, soiled weight of a batch, as measured by a weighing device, such as a weighing type load conveyor, upstream of the tunnel. Although in some systems, weight may affect post-wash processing, weights are passed to post-wash devices primarily for accounting and record-keeping purposes.

Cake Number—in older Milnor CBW®'s (with Miltron™ controllers), this is an identification number associated with each batch. The Miltron automatically assigns the numbers 000 to 255 in sequence and starts over at 255. As indicated in Table 1, allied signals are not currently available on any machine for passing this code.

New formula—indicates that the batch being transferred was processed using a different formula than the previous batch (see Note 4).

New customer—indicates that the batch being transferred belongs to a different customer than the previous batch (see Note 4).

> **Note 4:** The intent of both of these signals is to provide a means of segregating batches with different formula, goods, and/or customer codes, in post-dry. They are typically used in systems that are not capable of passing (or do not need to pass) formula, goods, or customer codes. Depending on the specific situation, the signal would be actuated by the washer whenever the formula, goods, and/or customer code changes. In the Milnor dryer controller, the "new customer" signal causes the customer code to increment by one (e.g., from 07 to 08). In such a system, the value of the customer code is irrelevant, but changing it signals downstream devices not to combine these loads.

Single cake—also called "small load" or "little load", this signal tells a shuttle to deliver, and a multi-cake dryer to accept this cake (load) by itself. This is usually done when the cake that follows belongs to a different customer and the goods should not be intermingled.

Empty load—also called "empty pocket" or "pass-empty", this signal tells the receiving device that it will not receive any goods with the batch data it is receiving. Empty pockets are sometimes used in the tunnel to perform a cleaning process or to segregate goods from incompatible baths.

Low (main) pressure—tells the Milnor two-stage press to use the lowest main bell pressure (see Note 5).

3rd (main) pressure—tells the Milnor two-stage press to use a lower than normal main bell pressure (see Note 5).

No (main) pressure—tells the Milnor two-stage press to use no main bell pressure (see Note 5).

> **Note 5:** If the Low, 3rd, and No pressure signals are all off, the press will use standard (high) main bell pressure.

Table 1: Batch Data-passing Capacity for Milnor® Allied Interfaces

Data Format-->	Numeric: Groups of signals pass multi-digit batch codes in binary (number of available batch codes shown)									Non-Numeric: One signal passes a single on/off value (X indicates signal is available)				
Code Name--> Type of Interface	Form-ula code	Press/ Ex-tract code	Dry code	Cool-down code	Cust-omer code	Goods code	destin-ation code	weight (tenths of units)	Cake num-ber	New form-ula	New cust-omer	Single cake	Empty load	Low, 3rd, No press-ure*
COBUC														
Loading			16		64		16				X	X		
Discharge			16		64		16»					X		
* Low, 3rd, and No Pressure are three separate signals.														

3. Operational Signals

A set of generic functions can be defined that encompasses most operational information that might be needed for any interface. The generic functions are helpful in understanding interfacing in general, even though it is usually possible to successfully interface any two specific machines using only a few of these functions. Table 2 lists the generic functions and which corresponding signals are actually provided on the device(s).

The generic functions only describe the general purpose for a signal. A given signal may have a more specific meaning pecular to the device. The signal names are taken from the schematics (may be abbreviated) and may vary from device to device. As shown in Table 2, the generic functions can be grouped into three categories: directional functions, transfer functions, and confirmation functions.

Directional functions apply specifically to communication with the shuttle or COBUC and tell the shuttle / COBUC where it must travel to align with the device it will receive from or discharge to. These are all inputs to the shuttle / COBUC and include the following:

2nd level—The shuttle/COBUC must elevate to the higher of two possible levels. 2nd level is usually referred to in the documentation as "level 1" (the first level is level 0).

opposite side—The shuttle must run its belt(s) backwards because the device it is receiving from or discharging to is on the opposite side of the rail from normal. See Note 6.

> **Note 6:** Although the Mark 5 COBUC controls provide a signal for this function, it is not needed because the COBUC can only receive and discharge forward.

at left—The shuttle/COBUC must traverse leftward.

at right—The shuttle/COBUC must traverse rightward.

Transfer functions either declare that the device is now in a certain state with respect to transfer, or request that the other device achieve a certain state. The transfer functions include:

early call—applies only to communication between the tunnel and a Milnor centrifugal extractor. This function tells the extractor to end the current cycle in preparation for transfer if minimum extract time has elapsed. The Milnor extractor input is called end extract.

discharge desired—There are actually two possible functions: 1) Allied discharge desired (loading interface input) which tells the Milnor device that the allied loading device is or soon will be ready to send a batch to it, and 2) Milnor discharge desired (discharge interface output) which tells the allied discharge device that the Milnor device is or soon will be ready to send a batch to it.

load desired—There are actually two possible functions: 1) Milnor load desired (loading interface output), which tells the allied loading device that the Milnor device is or soon will be ready to receive a batch from it, and 2) allied load desired (discharge interface input), which tells the Milnor device that the allied discharge device is or soon will be ready to receive a batch from it.

loading mode—tells the receiving device to perform the actions that facilitate receiving. In the centrifugal extractor, the input is called start extractor and causes the load door to open or the load chute to lower, and the cylinder to turn. In the dryer, the input is called dryer is loading and causes the load door to open and the cylinder to turn.

discharge allowed—There are actually two possible functions: 1) allied discharge allowed (loading interface input), which tells the Milnor device that the allied loading device can now send, and 2) Milnor discharge allowed (discharging interface output), which tells the allied discharge device that the Milnor device can now send.

load allowed—There are actually two possible functions: 1) Milnor load allowed (loading interface output), which tells the allied loading device to begin sending, and 2) allied load allowed (discharge interface input), which tells the Milnor device to begin sending.

Confirmation functions provide information on the completion status of transfer and include the following:

transfer not completed—not an error condition (see below) but simply the inverse of transfer completed.

error: cancel transfer—says that an illegal condition was detected when transfer was attempted and to stop the transfer. Currently, this function is only provided as an allied output/Milnor input signal.

data valid—tells the Milnor device (in a loading interface) or the allied discharge device (in a discharge interface) that batch data are set and should now be read. See Note 7.

transfer completed—says that all goods have been transferred. The signal usually passes from discharging device to receiving device. Hence, this is usually an input signal in a loading interface and an output signal in a discharging interface. However, the Milnor shuttle is also capable, via the belt photoeyes, of detecting when it has received a complete load. So if needed, it can communicate this information (in the opposite direction) to the loading device. The signal name varies, depending on the device and type of interface. See Note 7.

Note 7: In most cases, an explicit data valid signal is not needed because another operational signal serves this purpose. Where the data valid signal is not provided, the various tables of non-numeric signals in the document "Milnor® Allied Interface Specifications and Signals" indicate which signal should be used for this purpose.

Table 2: Operational Functions and Available Signals

Function Type-->	Directional Functions				Transfer Functions						Confirmation Functions			
Function Name--> Type of Interface	2nd level	Oppo-site side	At left	At right	Early call	Dis-charge desired	Load desired	Load-ing mode	Dis-charge al-lowed	Load al-lowed	Trans-fer not com-plete	Error: cancel trans-fer	data valid	trans-fer com-plete
COBUC														
Loading	input: go 2nd load posn.	‡	input: left of home	input: right of home		input: Cobuc desires load				output: desires to load		input: load-ing cancel - led	input: data valid	‡‡
Dis-charge	input: dis-charge at 2nd level	‡	input: dis-charge left	input: dis-charge right		output: desires to dis-charge	input: allied dis-charge desired		output: ready to unload	input: dis-charge allowed		input: dis-charge cancel - led	output: data valid	‡‡‡

‡ Although the Mark 5 COBUC control provides a "discharge backwards" signal for this function, it is not needed because the COBUC can only receive and discharge forward.

‡‡ The COBUC provides a "finished loading" output. It also expects a "loading complete" input.

‡‡‡ The COBUC provides a shuttle "finished unloading" output (for allied devices) and a "finished unloading to Milnor" output (specifically for the Milnor centrifugal extractor). It also expects an "allied discharge complete" input.

— End of BICALC13 —

NOTICE

As this manual was being printed, Pellerin Milnor Corporation began a manufacturing change which may affect how this manual applies to your machine. The six-position DIP switch on each printed circuit board is being replaced with two sixteen-position rotary switches. The switches (DIP and rotary) are used to set the logical address for each board that communicates with the microprocessor in the machine, or with a higher-level control system (e.g., a Mildata network).

Because the change to rotary switches corresponds so closely to the release of this manual, we are supplying you with documentation on how to set both types of switches.

If your machine uses printed circuit boards containing one DIP switch, refer to MSFDA401**D**E to set the address on replacement boards. If your machine uses printed circuit boards containing rotary switches, refer to MSFDA401**E**E.

BMP970004/97071

Hardware Components of Serial Microprocessor Controllers

1. General

Milnor® serial microprocessor controls are designed specifically for Milnor® machines and systems. Along with certain external electromechanical relay logic and sensing devices, they control all machine and system functions. **Not every microprocessor controller includes all the components described in this section.**

2. Microprocessor Components

Note 1: This is a list of all components for Milnor® microprocessor controllers. Not every Milnor® microprocessor controller includes all of the following components.

2.1. Keypad or Keyboard—Depending upon the model and type of machine, the keypad may have 12, 30, or 58 buttons. The different keypads are not interchangeable.

2.2. Keyswitch—Selects run/program modes. The key may be removed only when the switch is set to the *Run* position.

CAUTION 1: Prevent Unauthorized Programming—To prevent unauthorized programming, store the programming key so that it is not available to unauthorized personnel. Improper programming can damage equipment and goods.

2.3. Display—Depending upon the type and model of machine, the display may be either liquid crystal, vacuum fluorescent, or cathode ray tube (CRT), which is a typical computer monitor. Different types of displays are not interchangeable.

Liquid crystal graphic display—This display is identified by colored characters and graphics, usually on a black or white background. It's currently used only on certain washer-extractor models with the Milnor Mark VI control system.

Liquid crystal text display—This type of display is identified by dark gray characters on a lighter gray background, or by green characters on a dark gray background.

Vacuum fluorescent display—The bright green characters on a black background make this display highly visible. This is the most common display for Milnor® washer-extractors, textile machines, and dryers.

Cathode ray tube (CRT)—The CRT display resembles a television screen in appearance and function. This type of display is most commonly used in Miltrac™ and Mildata® systems, which require the display of graphics such as boxes and lines. It is also used on Milnor CBW® tunnel washers.

2.4. Power Supply—The power supply converts the alternating current at the control circuit voltage to direct current voltages of 12 volts positive and negative, and 5 volts positive. One or more of these values are adjustable, depending on the specific power supply used in each application.

The Milnor™ CBW® system employs two different power supplies to convert alternating current from the control circuit to direct current for the microprocessor and peripheral boards.

2.4.1. Control Console Power Supply—The power supply referenced as ESPS in the schematic

diagrams is a 40-watt power supply located in the Miltron™ or Mentor™ cabinet. It powers the peripheral boards located within this cabinet, including the optional load cell interface board and the analog to digital board for a weighing conveyor, as well as the microprocessor board and the memory expansion board.

Tip: For maximum reliability and to minimize the chances of the processor board resetting due to low voltage, adjust the power supply voltage for 80186 processors to 5.10 VDC at the processor board.

In systems operated via the Miltron™ controller, this power supply also provides electricity to the monitor interface board. In Mentor™-controlled tunnel systems, the monitor interface board is contained within the Mentor™ computer enclosure and powered by the computer power supply.

2.4.2. Tunnel Power Supply—The power supply referenced as PSO in the schematic diagrams is a 120-watt unit which powers the peripheral boards located on the tunnel washer. All three voltages output by this device are adjustable.

If adjustment is necessary, set the 5 volts output to provide at least positive 4.8VDC at the electric box on the module farthest from the power supply. This measurement must be made with an accurate digital voltmeter. Verify that the positive and negative 12 volts outputs are set at positive and negative 12.00VDC, respectively.

If the 5 volts reading at the peripheral board nearest the PSO power supply is at least positive 5.25VDC, and the voltage at the peripheral board farthest from PSO is positive 4.8VDC or less, suspect one or more loose connections or inadequate wiring somewhere between the two peripheral boards.

2.5. Power Supply —The power supply converts the alternating current at the control circuit voltage to direct current voltages of 12 volts positive and negative, and 5 volts positive. One or more of these values are adjustable, depending on the specific power supply used in each application.

- The 12 volts positive is used to power all boards other than the microprocessor board. This value is not adjustable.
- The 12 volts negative is used by the analog to digital (A/D) board. This value is not adjustable.
- The 5 volts output powers the microprocessor. This value is adjustable and very sensitive. For devices using microprocessors other than the 80186, the power supply must be adjusted to provide actual voltage of 4.95VDC to 5.10VDC at the microprocessor board. Use an accurate digital voltmeter to measure this value. For devices with 80186 microprocessors, the power supply voltage should be 5.10VDC at the processor board.

A wire of at least 14AWG (2.5 sq mm) must be connected between the ground points on the microprocessor and the peripheral boards. This ground wire is installed at the factory if both enclosures are mounted on the same machine (e.g., washer-extractors). The ground wire must be provided during installation if the microprocessor enclosure and its associated peripheral board enclosures are remote from one another (e.g., dryers).

Some machines, including Milnor® dryers, employ a second identical power supply to provide power for the peripheral boards, which are mounted in an enclosure separate from the microprocessor enclosure.

2.6. Central Processing Unit (CPU) Board—Also referred to as the microprocessor, the central processing unit processes data received from the various inputs, stores information, and responds to each keypad entry with the appropriate action. It may be mounted in an enclosure separate from its peripheral boards. The CPU board contains EPROMs programmed by the Milnor® factory with fixed instructions (software) that determine how the machine functions. Depending upon machine model/type, the processor chip may one of three Intel models: the 8085, the 8088, or the 80186.

Although the EPROMs do not require battery backup, the CPU board utilizes a battery which normally provides power to retain the user-programmable memory for two to three months without external power.

2.7. Memory Expansion Board—Increases memory space available to the processor. This board is used with 8088 CPU boards in some applications.

2.8. Battery—Provides memory retention backup when power is off. The battery is mounted directly on 8085 CPU boards, and mounted separately for 8088 and 80186 CPU boards. A capacitor on the 8088 and 80186 CPU boards provides enough power to retain memory for several hours after the battery has been disconnected. Once fully charged, the battery backup is reliable for two to three months with no power applied.

2.9. Opto-Isolator Board—Optically isolates inputs to the microprocessor for electronic noise immunity. Opto-isolators are incorporated into the 8088 and 80186 CPU board; thus this separate board is only required for machines employing Intel 8085 CPUs.

2.10. Input/Output Board—The 16/8 input-output board contains 16 solid-state signal input devices and eight output relays. The input devices are capable of faithfully conducting a low VA 12VDC ground signal to the microprocessor. The output relays are socket-mounted SPDT, 12VDC electromechanical relays with contacts capable of faithfully conducting a maximum of 25VA at 110/120VAC (0.2 ampere or 200 milliamperes at 110/120VAC) or 12.5 VA at 24VAC (0.5 ampere or 500 milliamperes at 24VAC). The output will be either 24VAC or 110/120VAC, depending on the machine model/type.

These outputs and their power source are intended only to drive another relay with higher contact ratings, that in turn may drive a pump, valve, solenoid, etc., from a separate power source. Never use these outputs to directly drive a pump, valve, or solenoid unless the maximum current required never exceeds the above values. Higher ampere or VA loads will burn out traces on the printed circuit board or possibly overload and damage the control circuit transformer.

This board has 25 status lights. The amber light flashes when the board is communicating. Each of the 24 remaining lights represent an input (green lights) or output (red lights) on that board, and illuminates when the corresponding input or output is made. This board has two rotary dials which must be adjusted to set the board's address (see Section 4 “Assigning Board Addresses” in this document). This board also has convenient test points that can be used to test voltage to the board.

Standard input/output board—used in all devices requiring input/output boards, except those listed below.

High-speed input/output board—used only in the following devices and configurations: E6N, J6N, and T6N washer-extractors equipped with and configured for both variable basket speed and electronic balancing; Milrail configured for high-speed boards, and all configurations of the M7E centrifugal extractor.

2.11. Output Board—A 24-output board contains 24 output relays identical to those described in Section 2.10 "Input/Output Board".

2.12. Analog to Digital Convertor Board—Converts analog voltage signals, such as temperature, to a digital signal that can be utilized by the CPU. Up to a maximum of eight channels may be provided on a single board. Although seemingly identical, the analog to digital boards used to sense air temperature in the dryer, water temperature in washer-extractors and textile machines, water temperature in the tunnel, and weight for a weighing conveyor are all different. The different types are clearly marked with different part numbers, which are mentioned in the wiring diagram set and are not interchangeable.

All analog to digital boards have one status light which flashes when the board is communicating. The board has two rotary dials which must be adjusted to set the board's address (see Section 4 "Assigning Board Addresses"). This board also has convenient test points that can be used to test voltage to the board.

2.13. Digital to Analog Convertor Board—Converts digital signals from the processor to analog signals with voltages between 0 and 5VDC (e.g., provides the analog signal to the dryer gas valve position actuator and dye machine steam position actuator).

This board has one status light which flashes when the board is communicating. The two rotary dials must be adjusted to set the board's address (see Section 4). This board also has convenient test points that can be used to test voltage to the board.

2.14. CRT (Video Display) Board—Receives display instructions from the processor and generates the signals to the video monitor to create the desired displays; used in controllers such as the Miltron™ and Miltrac™ controllers and Device Master™ systems.

CAUTION 2: Avoid Component Damage—The CRT board can be installed backwards, even though the cabinet and bracketry makes this difficult, and labelling on the parent board states the proper orientation. Use care to orient the board correctly, otherwise microprocessor components may be damaged.

CBW® systems with the Mentor™ controller use a standard computer video display adapter, housed within the Mentor™ computer, to transmit signals from the Mentor™ computer to the video monitor. Thus, Mentor™ systems do not have a separate video display board as described here.

2.15. Resistor Boards—Although visually similar, resistor boards vary according to the application. The different types are clearly marked with part numbers, which are mentioned in the electrical schematic diagrams and are not interchangeable.

For temperature-sensing systems—used with analog to digital boards in washer-extractors and dye-extractors as part of temperature-sensing system; not required on tunnel systems because the necessary circuitry is included on other standard CBW® circuit boards.

For modulating gas valves—used with digital to analog boards in the temperature control circuit of gas dryers; converts 0-5VDC to 4-20 milliamperes for controlling the modulating gas valve.

For modulating steam valves—used with digital to analog boards in temperature control circuit of older steam dryers; converts 0-5VDC to 4-20 milliamperes for modulating steam valve. See Section 2.20 "4-20mA Output Board" in this document.

2.16. Signal Conditioner for Thermocouple—Amplifies and filters the output from a thermocouple so an analog to digital board can convert the signal to digital values for the microprocessor.

2.17. Rotation Safety Board—Used in dryers. Reads rotational safety proximity switch to confirm that the basket is turning.

2.18. Temperature Probe—Two types of temperature probes are used, depending on equipment type:

Thermistor temperature probe—a temperature-sensitive resistor whose resistance value changes with respect to temperature; uses include washer-extractors, textile machines, and tunnel systems.

Thermocouple temperature probe—a closed loop of two dissimilar metals which produces a voltage with respect to the change in temperature between the two junctions. Thermocouples are used in dryers.

2.19. Weigh Scale Interface Board—In the electrical circuit, this device is between the weighing conveyor (CONWA) load cell and the weighing conveyor analog to digital board. It filters and interprets the signals from the conveyor load cell to the analog to digital board.

2.20. 4-20mA Output Board—Used on newer textile machines and steam dryers with temperature control. See Section 2.15 "Resistor Boards" in this document.

2.21. 8 Output/16 Input Chemical Flow Meter Board—This board is used with the metered chemical injection option on textile machines. Eight outputs and eight counters respectively are assigned to chemical valves and chemical flow meters. Two of the counters are non-isolated direct inputs to the microprocessor on this board and are capable of counting pulses of 0 to 5VDC at a frequency of up to 10kHz. The remaining six counters are optically isolated from the peripheral board microprocessor and are capable of counting pulses from 0 to 12VDC at a frequency up to 150 Hz.

3. Serial Communications Port

All Milnor® serial microprocessors have a serial port with a nine-pin receptacle and plug to communicate with other devices via one of several special serial cables. If supported by the software, downloading and printing of data is accomplished through this port. These actions are described in the programming section of this manual.

For more information on the various separate serial cables required for these functions, see the related section in document BICWUC01, if applicable.

Table 1: Board Application by Device (Part A)

Device		Board Name													
		CPU	Input/Output	Output	Analog to Digital	Digital to Analog	CRT	Opto-isolator	Temperature Sensing Resistor	Gas Valve Resistor	Steam Valve (4-20mA)	Thermocouple Signal Conditioner	Chemical Flow Meter	Rotation Safety	Weight Scale Interface
CBW System*	Number	1	2		1		1								1
	Note(s)		+	1	9										5
Device Master*	Number	1	2				1								
	Note(s)		1	1											
Miltrac*	Number	1					1								
	Note(s)														
VERTSTO	Number	1	2				1								
	Note(s)														
Linear COSTA	Number	1	1												
	Note(s)		1												
Link Master	Number	1													
	Note(s)														
Textile*	Number	1	1	2	1	1			1		1				
	Note(s)				4								1		

Notes:

*	Intel 80186 central processing unit
1	Boards can be added for options
2	Used on steam dryers with temperature control, and all gas dryers
3	Used on washer-extractors with temperature option
4	Analog to digital boards vary according to application. See the descriptions of these boards elsewhere in this section.
5	Required for weighing conveyors on tunnel washing systems
6	Required for reuse/cooldown and/or overhead fill tanks on tunnel washing systems
7	Mark I washer-extractor control used Intel 8085 central processing unit
8	Notes 3 and 4 apply
9	One board required per each 8 modules (see also Notes 1, 4, 5, and 6)
10	Two boards required, plus one additional board per module

Table 2: Board Application by Device (Part B)

Device		Board Name													
		CPU •	Input/Output •	Output •	Analog to Digital •	Digital to Analog •	CRT •	Opto-isolator •	Temperature Sensing Resistor •	Gas Valve Resistor •	Steam Valve (4-20mA) •	Thermocouple Signal Conditioner •	Chemical Flow Meter •	Rotation Safety •	Weight Scale Interface •
COBUC	Number	1	2												
	Note(s)		1	1											
COSHA	Number	1	2												
	Note(s)		1												
Dryer	Number	1	2	1	1	1				1		1		1	
	Note(s)				4	2				2	2				
Extractor	Number	1	2	1											
	Note(s)		1	1											
Press	Number	1	2	1	1										
	Note(s)		1	1											
W/E (Mark I)	Number	1	1	1	1			1	1						
	Note(s)	7	1	1	8	1									
W/E (Mark II-VI)	Number	1	1	1	1	1								1	
	Note(s)		1	1	8	1			1						

Notes:

*	Intel 80186 central processing unit
1	Boards can be added for options
2	Used on steam dryers with temperature control, and all gas dryers
3	Used on washer-extractors with temperature option
4	Analog to digital boards vary according to application. See the descriptions of these boards elsewhere in this section.
5	Required for weighing conveyors on tunnel washing systems
6	Required for reuse/cooldown and/or overhead fill tanks on tunnel washing systems
7	Mark I washer-extractor control used Intel 8085 central processing unit
8	Notes 3 and 4 apply
9	One board required per each 8 modules (see also Notes 1, 4, 5, and 6)
10	Two boards required, plus one additional board per module

4. Assigning Board Addresses

The input/output board, output board, analog to digital board, and digital to analog board each have two rotary switches which establish the address for each board. This allows each board to communicate serially with the microprocessor in its device while sending and receiving its own messages. In a battery of machines, the rotary switches are identical for each identical peripheral board in each identical machine (e.g., the first input/output board (I/O-1) in each washer-extractor has identical rotary switch settings). When a microprocessor must communicate with a higher level control (e.g., when all dryers communicate with the MilData® system), the higher level control must know the address of each microprocessor. For 8088 microprocessors, the high level control knows the address of each device because that information was established during configuration (e.g., see *Miltrac Address* configure decision in the programming manual for any device that communicates with Miltrac).

Table 3: Rotary Switch Settings

Board		Washer-Extractor	VERTSTO	Extractor	Two-Stage Press	One-Stage Press	Linear COSTO	Textile	Dryer	Device Master	COBUC	COSHA
Analog to Digital	SW2	2*			2	2		2	2			
	SW1	1*			1	1		1	1			
Digital to Analog	SW2	3*				3		3	3			
	SW1	1*				1		1	1			
Input/Output #1	SW2	0	0	0	0	0	0	0	0	0		
	SW1	1	1	1	1	1	1	1	1	1		
Input/Output #2	SW2	0*	0	0*	0	0	0*	0*	0	0	0	0
	SW1	2*	2	2*	2	2	2*	2*	2	2	2	2
Input/Output #3	SW2			0*	0*	0*				0*	0*	0*
	SW1			3*	3*	3*				3*	3*	3*
Input/Output #4	SW2			0	0*					0*	0*	0*
	SW1			4	4*					4*	4*	4*
Output #1	SW2	1		1	1	1		1	1	1*		
	SW1	1		1	1	1		1	1	1*		
Output #2	SW2	1*		1*	1*			1		1*		
	SW1	2*		2*	2*			2		2*		
Output #3	SW2	1						1*		1*		
	SW1	3						3*		3*		

Notes:

* Optional boards

1 See schematics for rotary switch positions on tunnel washer system devices.

— End of BICMDF01 —

BICMUM01 (Published) Book specs- Dates: 20040817 / 20040817 / 20040817 Lang: ENG01 Applic: CSW

How to Upgrade Microprocessor EPROM Chips

Milnor® microprocessor software is continually upgraded to improve performance and maximize efficiency. Depending on the software change, the new software EPROM (Erasable, Programmable Read-Only Memory) chips may be offered for sale or for no charge to the customer. When a set of these chips is changed in the field, ensure that the software version being installed matches the machine hardware, and that the chips are installed in the proper socket positions and orientation.

1. How to Change EPROMs

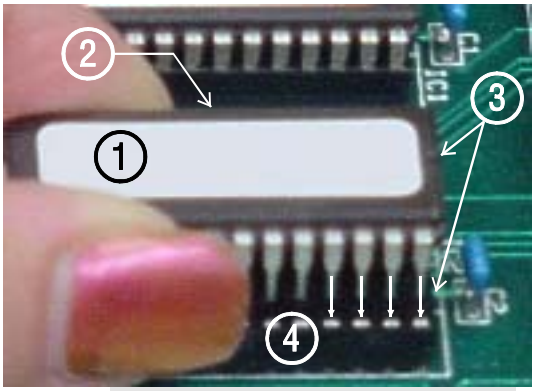
WARNING 1: Electrocution and Electrical Burn Hazards—Contact with high voltage will electrocute or burn you. Power switches on the machine and the control box do not eliminate these hazards. High voltage is present at the machine unless the main machine power disconnect is off.

- Do not attempt unauthorized servicing, repairs, or modification.
- Lock out and tag out power at the main machine disconnect before servicing, or in accordance with factory service procedures.

1.1. Remove and Replace EPROM Chips

1. Make sure all power to the machine is off.
2. Locate the chips as described in Section 2 "Location of EPROM Chips". Note the orientation of the chips as shown in the figure(s) below.
3. Use a chip removal tool or another small flat tool to carefully remove each EPROM chip from its base. Be sure to note the numerical order of each chip and the orientation to the key notch on the socket.
4. Install new chips, making sure the key notch on each chip is properly oriented and that all pins enter the proper holes in the socket, as shown in Figure 1. If necessary, slightly bend the pins on the EPROM chip to align the pins with the holes in the socket. After inserting each chip, verify that all pins are seated in the socket.

Figure 1: EPROM Chip Identification and Installation

EPROM Chip and Socket	Legend
	**1.** Label **2.** EPROM chip **3.** Key notch **4.** EPROM socket

CAUTION 2: Machine Damage Hazards—Incorrectly installing any EPROM chip may destroy or damage the chip or cause the machine or the display to operate erratically.

- Match each chip with its corresponding socket. Each EPROM chip will operate in only one socket, although it may physically fit into others.
- Align each chip so every pin mates with the correct hole in the socket.

1.2. **Verify Proper EPROM Chip Installation**—After installing new EPROM chips, apply power to the machine and turn the machine on. If the chips are properly installed, the display will continue with the normal display sequence when powering up. If the display is blank or appears unusual, turn the machine off at once and verify that the chips are correctly oriented in the sockets.

2. Location of EPROM Chips

Depending on machine model and type, the microprocessor may be an Intel 8085, Intel 8088, or Intel 80186. Each microprocessor board requires at least one EPROM chip for proper operation, but these chips may be located differently on each type of processor board. The following information describes the location and arrangement of the EPROM chips on each type of board, as well as the favored location for checking the voltages required by each type of board.

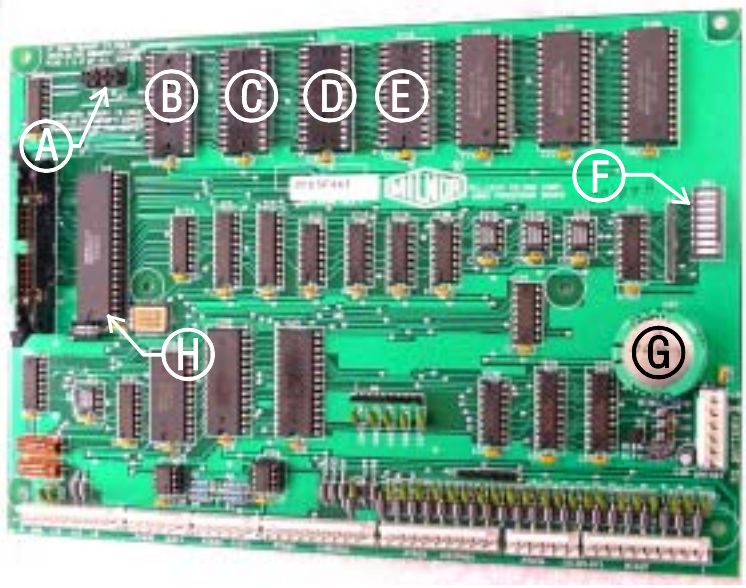
Table 1: Processor Boards and Applications

Processor Part Number	Typical Machine Applications	Comments
08BNCMPAD_	System 7 (e.g., 30015M5G)	
08BN785A_	30-inch E-P Plus	
08BN788A_	---see above---	
08BH18EP_	36- and 42-inch E-P Plus	20 MHz; brown output and chemical connectors
08BH18EPA_	---see above---	15 MHz; brown output and chemical connectors
08BH18EPB_	---see above---	15 MHz; white output and chemical connectors
08BH18EPC_	---see above---	11 MHz
08BH18EPD_		20 MHz; white output and chemical connectors
		8085 non-serial
08BSP___	Mark 2 washer-extractors, etc.	8085 serial with 4 EPROMs
08BSPA___	Mark 2 textile machines	8085 serial with 2 EPROMs
08BSPAA_	replacement for 08BSP_ and 08BSPA_	uses jumpers on processor board to match EPROM type
08BSPC_		Revisions A through D use same software; revision E software is different
08BSPD_	tunnel washers (with expanded memory board)	8088 serial with 2 EPROMs; same as Rev. E of 08BSPC_
08BSPDA_		8088 serial with 4 EPROMs; expanded memory added to processor board
08BSPE_		80186 serial with 1 EPROM and 4 UART chips
08BSPE1_		80186 serial with 1 EPROM and 1 quad-UART chip
08BSPE2_	Mark 6 devices (with graphic display)	
08BT168A_	E-P OneTouch (e.g., 30015T5E)	

2.1. **8085 Processor Boards (except Coin Machines)**—See Figure 4. Install EPROM #1 at the end of the row nearest the corner of the board, then #2, #3, and #4. Chip #4 goes next to the two chips soldered to the board. See Figure 3 for where to check for proper voltages.

Figure 2: Replacement Processor Board

08BSPAA_

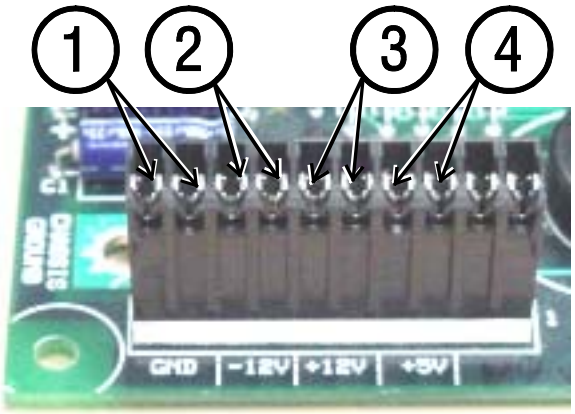


Legend

A. Jumpers for setting EPROM capacity
B. EPROM socket 1
C. EPROM socket 2
D. EPROM socket 3
E. EPROM socket 4
F. DIP switch
G. Capacitor
H. Microprocessor

Figure 3: Where to Check Processor Board Voltages

Typical MTA-31

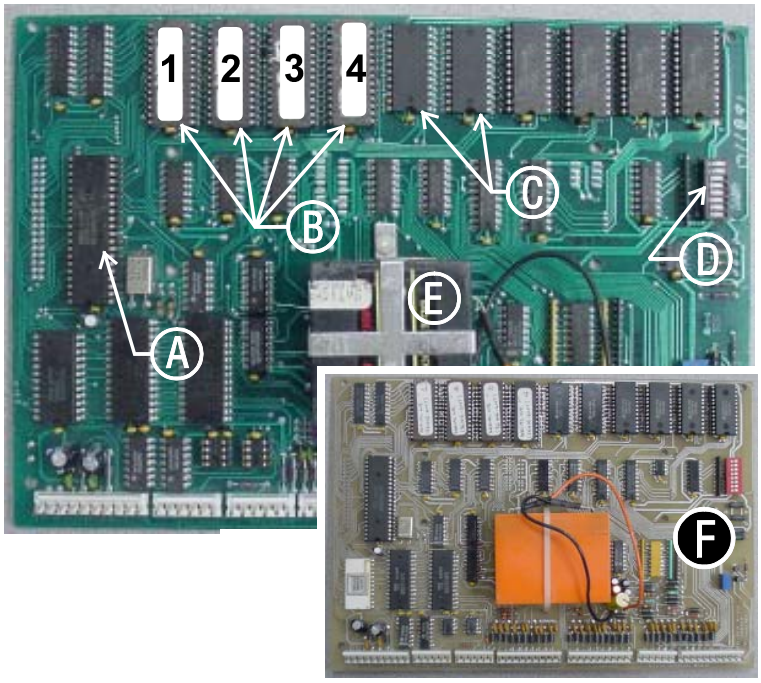


Legend

1. Ground (Earth)
2. Negative 12VDC
3. Positive 12VDC
4. Positive 5VDC

Figure 4: 8085 Processor Boards (Except Coin Machine)

Typical 08BSP_ and 08BSPx_ Processor Boards



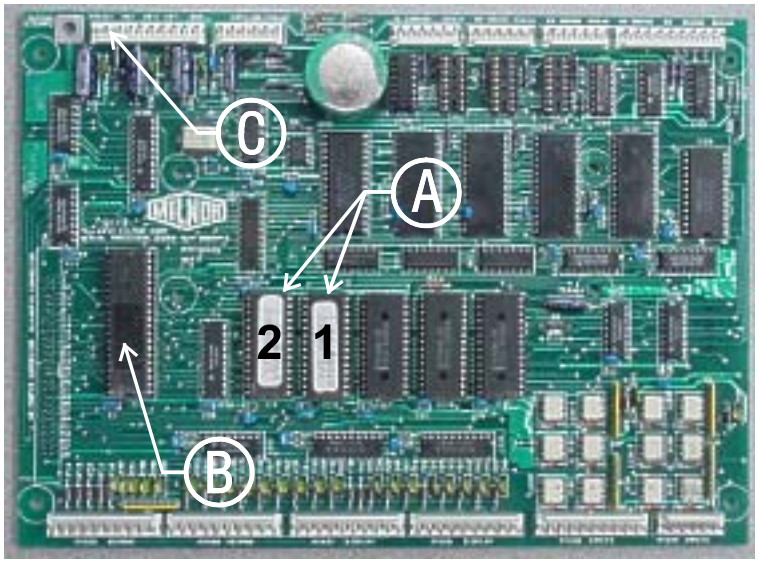
Legend

A. 8085 microprocessor chip
B. EPROMs
C. Soldered chips
D. DIP switch
E. Battery
F. 08BSPB_ processor board

2.2. 8088 Processor Boards without Memory Expansion Board—See Table 2 "EPROM Locations for 8088 Processor Applications" and Figure 6. If the set consists of only one EPROM, install it in socket A of Figure 6 . If two EPROMs comprise the set, install EPROM #2 in socket A and EPROM #1 in socket B. Always install the highest numbered EPROM in socket A. If the set consists of more than two EPROMs, a memory expansion board must be present in the machine along with the processor board.

Figure 5: Typical 8088 Processor Board without Memory Expansion Board

08BSPC_ Processor Board



Legend

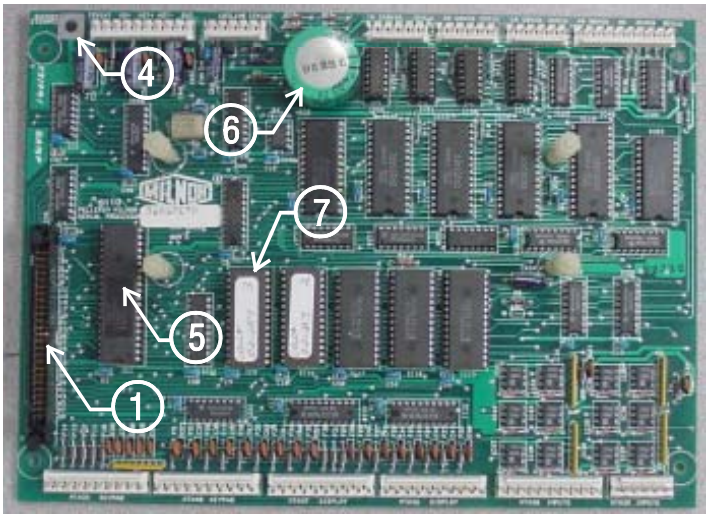
A. EPROMs
B. 8088 processor chip
C. MTA31 for voltage verification

Table 2: EPROM Locations for 8088 Processor Applications

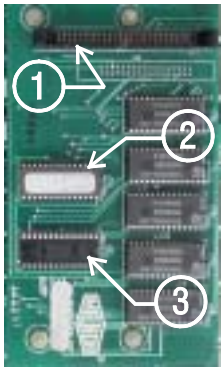
	EPROM Location by Socket			
EPROMS in Set	**A**	**B**	**IC-1**	**IC-2**
4 chips	4	3	2	1
3 chips	3	2	1	—
2 chips	2	1	—	—
1 chip	1	—	—	—

Figure 6: 8088 Processor Board and Optional Memory Expansion Board

8088 Processor Board



Memory Expansion Board



Legend

1. Connector, memory board to processor board
2. Socket IC1
3. Socket IC2
4. Chassis ground
5. 8088 microprocessor chip
6. Capacitor
7. Highest numbered EPROM

2.3. 8088 Processor Boards with Memory Expansion Board—See Table 2 and Figure 6. If the EPROM set consists of three or more EPROMs, install the two highest numbered EPROMs (e.g., #3 and #4 of a four-chip set) on the processor board, with the highest numbered EPROM (EPROM #4 of a four-chip set) in socket A, and the EPROM with the second highest number (EPROM #3 of a four-chip set) in socket B. Install the remaining EPROM(s) on the memory expansion board with the highest numbered of the remaining EPROMs (e.g., EPROM #2 of a four-chip set) in socket IC-1 on the memory expansion board and EPROM #1 in socket IC-2.

2.4. 80186 Processor Boards—This processor board (see Figure 7) is used on all Milnor® system controllers (Miltron™, Mildata®, etc.) equipped with a color monitor. It is also used on fully-programmable washer-extractors, textile processing machines with software version 95000 and later, and other models. The single EPROM on this board is located in socket IC-2.

Tip: For maximum reliability and to minimize the chances of the processor board resetting due to low voltage, adjust the power supply voltage for 80186 processors to 5.10 VDC at the processor

board.

There are three major revisions of this board, both of which have Milnor part numbers starting with “08BSPE”. If the seventh character is a number “1,” the board is a later version with a single four-channel communications chip. If the seventh character of the part number is a letter, the board is an earlier version with four one-channel communications chips.

The third version of 80186 processor board—with part number “08BSPE2_”—can be configured via a jumper on the board to operate either a vacuum fluorescent **text** display, or a flat panel **color graphic** LCD display. The jumper controls the serial communications port on MTA30.

Supplement 1

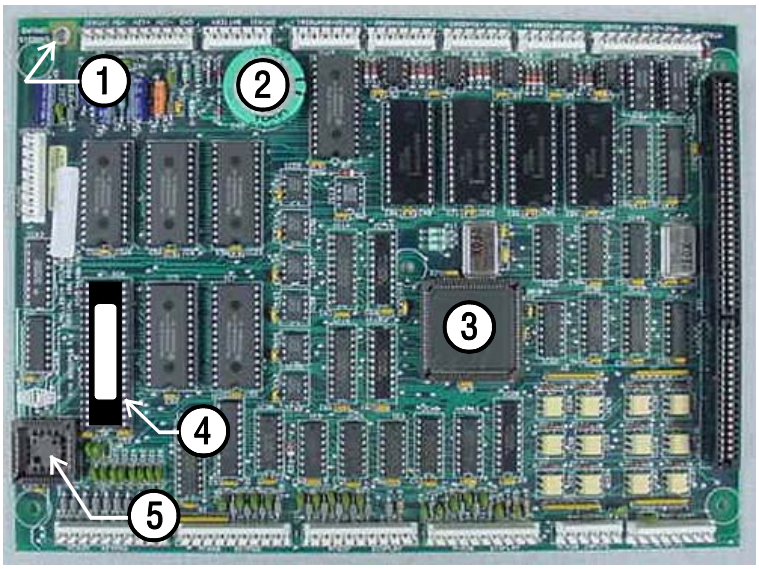
Rules for Replacing 80186 Processor Boards

Processor board “08BSPET” is obsolete. Depending on machine model and build date, this board can be replaced by either “08BSPE1T” or “08BSPE2T”, but new software is required. Contact Milnor's service engineering department to determine the appropriate replacement board and software.

Processor board “08BSPE1T” has been superseded by board “08BSPE2T”(see Figure 9). If your machine uses a two-line or four-line vacuum fluorescent text display, either “...E1T” or “...E2T” will work with your existing software. The most important difference between these two boards is jumper *J1* on the “...E2T” board for selecting the flat panel **color graphic** LCD display. This jumper must be set to the *TXT* or *NO* position for machines with a vacuum fluorescent display, or in the *GPX* (graphics) position for machines with a color LCD display.

Figure 7: Obsolete 80186 Processor Board

08BSPE_ Processor Board

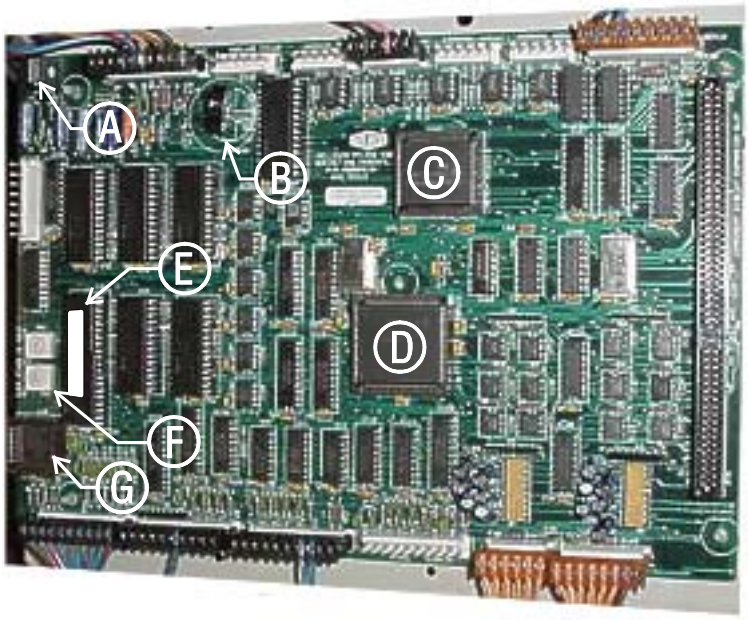


Legend

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

Figure 8: 80186 Processor Board

08BSPE1_ Processor Board

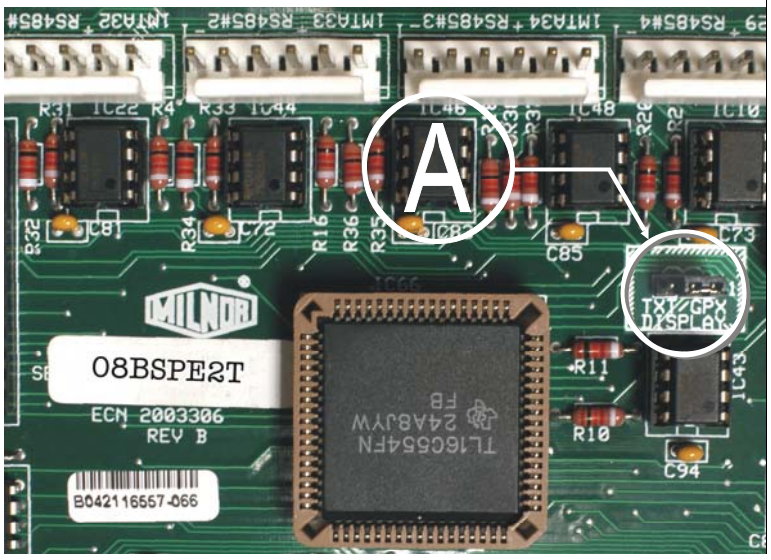


Legend

A. Chassis ground
B. Capacitor
C. Quad-UART chip
D. 80186 microprocessor
E. EPROM
F. Rotary DIP switches for keypad
G. ROM socket (empty except in Japan)

Figure 9: 08BSPE2_ 80186 Processor Board

Detail



Legend

A. Jumper for selecting display type

— End of BICMUM01 —