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Controller Reference

Milnor® Mark VI Centrifugal Extractor Controller

PELLERIN MILNOR CORPORATION Post Office Box 400, Kenner, Louisiana 70063–0400, U.S.A.

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1 Preface

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1.1 About the Mark VI Centrifugal Extractor Controller

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The Milnor® Mark VI centrifugal extractor controller is comprised of a display screen and a keypad. All the functions and information you need to configure, program, and run the machine appear on this screen.

The Mark VI controller has two modes of operation: *Run* () and *Program* (). Operators will use the *Run* mode to operate the centrifugal extractor. Specialists will use the *Program* mode to configure, program, and troubleshoot the extractor. This manual provides information primarily on the *Program* mode of the extractor. Refer to the operator guide for operating instructions.

1.2 About the Centrifugal Extractor Controller Manual

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1.2.1 Scope

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This manual provides commissioning, programming, and troubleshooting instructions for Milnor® centrifugal extractors with a Mark VI graphical user interface. Refer to additional documentation provided with the machine for more information. Replacement documentation is available from the Milnor® parts department.

1.2.2 Trademarks

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

Table 1. Trademarks

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

1.3 Manufacturer Data for Non-Milnor® Machine Components

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This machine uses some non-Milnor® components that have their own manual, such as the inverter. Although information about such components is not normally needed by the owner/operator of a Milnor® machine, you can usually find information about these components in the manufacturer's manual, which we include with the machine. You can also find related information in the technical knowledge base on the Milnor® website (`milnor.com/technical-knowledge-base/bulletins/maintenance-2/`) and on the manufacturers' websites.

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1.4 How to Contact Milnor®

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Your authorized Milnor® dealer can assist you with your Milnor® machine and knows about the local conditions that may be pertinent to the installation, use, or maintenance of the machine. Contact your dealer first. For assistance from the Milnor® factory, refer to Table 2, page 8 for contact information.

Table 2. Pellerin Milnor® Corporation Contact Information

Purpose	Department	Telephone	FAX	E-mail/Web site
Order or ask about replacement parts	Parts	504–712–7775 or 800–299–1500	504–469–9777	parts@milnor.com
Get advice on installing, servicing, or using	Customer Service/ Technical Support	504–712–7780	504–469–9777	service@milnor.com www.milnor.com (Customer Service)
Learn about, request, or enroll in Milnor® service seminars	Training	504–712–7716	504–469–9777	training@milnor.com
Determine warranty eligibility or claim status	Warranty Administration	504–712–7735	504–469–9777	service@milnor.com (Attention: Warranty)
Ask about, comment on, or report an error in equipment manuals	Technical Publications	504–712–7636	504–469–1849	techpub@milnor.com
European contacts	Milnor® International	+ 32 2 720 5822	—	milnor@milnor.be
Ask about the shipping weight of your machine before it arrives at your facility	Logistics Department	504–712–7686	504–471–0273	—

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

Telephone: 504-467-9591
http://www.milnor.com

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1.5 Safety Alert for Owners/Managers and Maintenance Personnel: Door Interlock Bypass Key Switch

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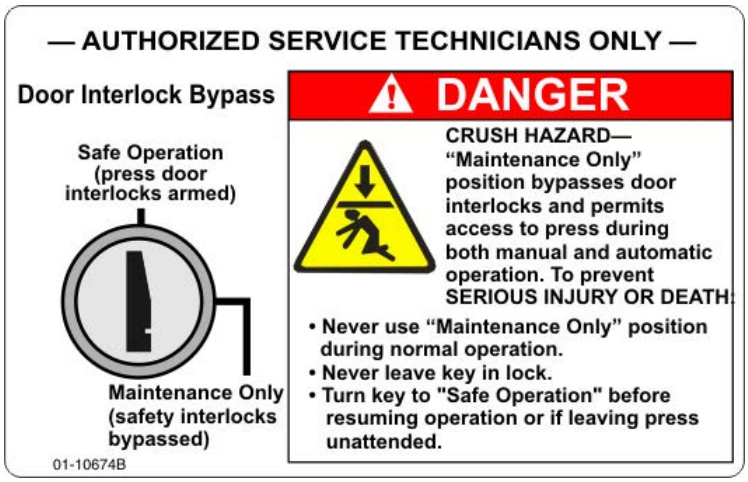
The hand-operated access doors on this machine are equipped with safety lockout switches that disable the machine if a door is opened. The Door Interlock Bypass key switch permits a qualified maintenance technician to bypass this safety feature during both manual and automatic operation. This key switch, located inside the low voltage control box, is shown in the following figure.

Figure 1. Door Interlock Bypass Safety Placard on Presses (Centrifugal Extractors Similar)



Set the Door Interlock Bypass key switch to the "Maintenance Only" position during required maintenance procedures to allow access to certain moving parts.

DANGER: Moving components under power while the Door Interlock Bypass key switch is in the "Maintenance Only" position — can crush or injure you. To prevent serious injury or death, comply with, or ensure compliance with the following:

- Never use the machine for normal operation with this switch in the "Maintenance Only" position.
- Never use this switch to clear faults or for any operational function.

- Use this switch only if you are a trained, authorized service technician, and only when performing maintenance that requires immediate access to moving parts normally shielded by the doors.
- Always turn the switch to the “Safe Operation” position and remove the key before resuming normal operation or stepping away from the machine.
- Keep the Door Interlock Bypass key secured away from machine operators and all other personnel who do not fully understand the results of using it.
- Keep all electrical and control cabinets closed and securely latched. Keep control cabinet keys away from untrained employees.

2 Programming

2.1 About the Run/Program Keyswitch

The **Run/Program** keyswitch is used to alternate between the extractor's two modes: *Run* mode and *Program* mode. Functions are mutually-exclusive between these two modes, and the key-switch must be engaged in either the *Run* or *Program* position to access them.

Figure 2. Run/Program Keyswitch (Run Mode)

The *Run* mode (**Run/Program** keyswitch in the  position) is the extractor's normal mode of operation. Turn the **Run/Program** keyswitch to the  position to enter *Program* mode. To switch from *Run* mode to *Program* mode, the extractor must be idle (the controller displays "Waiting for Load").

The *Run* mode allows users to:

- Run the extractor in automatic mode;
- Monitor the extractor during automatic operation;
- View diagnostics and troubleshoot the extractor.

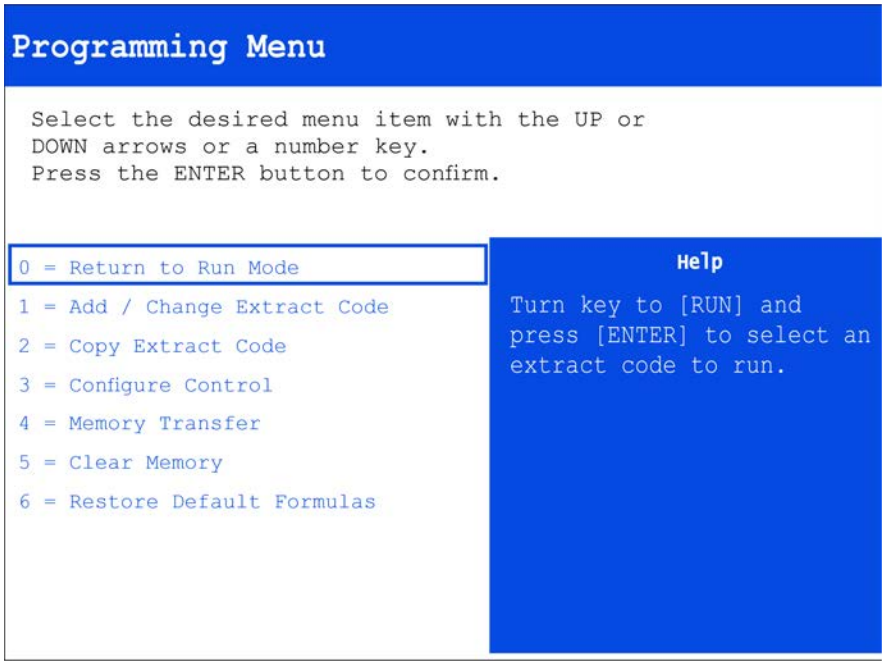
The *Program* mode allows users to:

- Configure the Mark VI controller;
- Program extract codes;
- Manage the controller's memory.

2.2 The Programming Menu

The *Programming* menu is the main menu of the extractor's *Program* mode. It comprises seven separate selections for managing the machine configuration and machine memory, and creating and editing the extract codes used when operating the extractor.

Figure 3. The Programming Menu



0 = Return to Run Mode After you turn the **Run/Program** keyswitch to the *Run* position, select this option to exit the *Programming* menu and return to the *Run* mode. See Section 2.1 : About the Run/Program Keyswitch, page 11 for more information.

1 = Add / Change Extract Code This option allows the user to create a new extract code (also referred to as a "formula"), or to modify an existing extract code with different values. See Section 2.3.1 : Add / Change Extract Code, page 14 for more information.

2 = Copy Extract Code This option allows the user to copy an existing extract code to any unused extract code number. See Section 2.3.2 : Copy Extract Code, page 15 for more information.

3 = Configure Control This option allows the user to change parameters in the controller to match the physical machine and to adjust certain user preferences. See Section 2.4.1 : Configure Control, page 29 for more information.

4 = Memory Transfer This option allows the upload or download of machine memory states. Machine memory contents can be copied to, or received from, another machine, a personal computer running Milnor's programmer software, a personal computer that's part of a Mildata network, or a serial memory storage device. See Section 2.6.1 : Memory Transfer and Back-up, page 42 for more information.

5 = Clear Memory This option allows the user to clear the controller memory of all programmed extract codes and configuration decisions. Machine configuration decisions are reset to their default values. See Section 2.6.2 : Clear Memory, page 58 for more information.

6 = Restore Default Formulas This option replaces all existing extract codes with the six factory-provided sample extract codes so that they can be executed or modified as desired. See Section 2.3.3 : Restore Default Formulas, page 17 for more information.

2.2.1 How to Use the Programming Menu

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Use the following procedure to access the extractor's *Program* mode.

NOTE: The extractor must be idle to access the *Program* mode.

1. If the extractor is displaying an idle *Run* display, turn the **Run/Program** keyswitch to the *Program* position ( ).

   The *Programming* menu, shown in Figure 3: The Programming Menu, page 12 , appears.

2. Use the arrow keys to scroll through the available options, or enter an option number directly from the keypad.

   or 1 ABC, 2 DEF...

3. With any option selected, press the **Enter** key to access the option submenu. Some options have introductory screens that present additional decisions, while others begin immediately when the option is accessed.

   Enter

2.2.2 Safely Exiting the Programming Menu

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Use the following instructions to exit the *Programming* menu when you are ready to return to the extractor's *Run* mode.

1. On the *Programming* menu, highlight option 0, *Return to Run Mode*, on the *Programming* menu by using the **up** and **down** arrow keys, or by pressing the **0** key.

   or 0

2. When option 0 is highlighted on the display, turn the keyswitch from the *Program* position ( ) to the *Run* position ( ) and press the **Enter** key on the keypad.

   Enter

   When the operator returns the extractor to the *Run* mode from the *Program* mode, the controller prompts for cake data.

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2.3 Extract Code Programming

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2.3.1 Add / Change Extract Code

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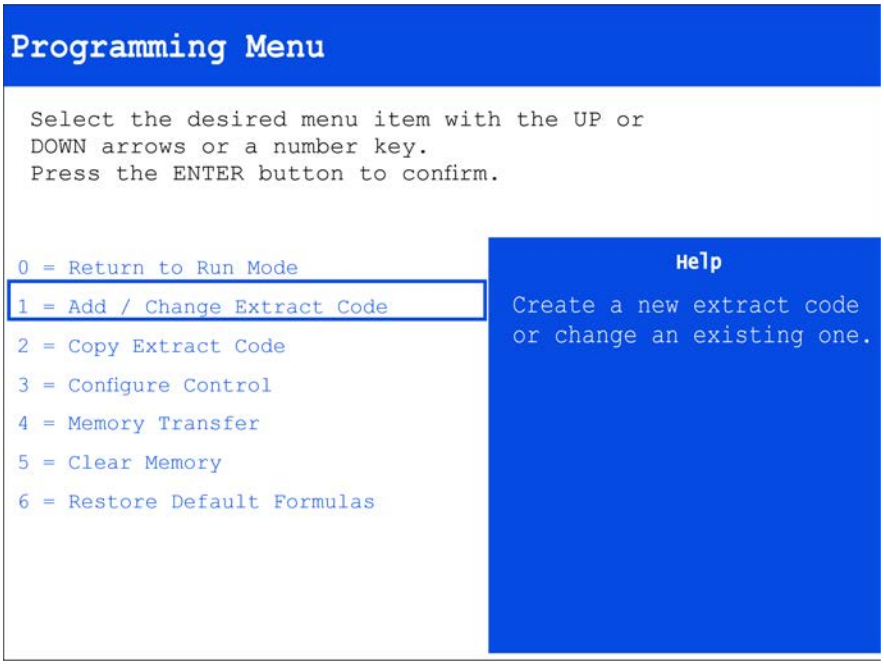
An extract code (sometimes referred to as a “formula”) is a series of programming decisions that determine the actions in an extract sequence, and the subsequent discharge sequence. The *Add / Change Extract Code* submenu allows you create new extract codes and modify existing extract codes. Access the *Add / Change Extract Code* submenu using selection 1 on the *Programming* menu, as shown in the following figure.

Figure 4. Add / Change Extract Code Selection



2.3.1.1 How to Create a New Extract Code

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To create and name a new extract code, highlight an empty extract code position and press the **Enter** key. The default name `FORMULA XX`, where `XX` is an unused two-digit number, is assigned to the new extract code.

2.3.1.2 How to Rename an Extract Code

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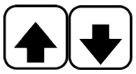
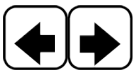
Use the following procedure to change the name of an extract code.

1. Highlight the extract code you'd like to rename by entering the extract code position on the keypad, or by navigating the submenu with the **up** and **down** arrow keys.



2. Press the **Enter** key on the keypad.

3. Use the **left** and **right** arrow keys to shift the cursor over each letter you'd like to change.



4. Use the T9 system to enter a new name with the keypad. Push the correct keypad button until the desired character appears on the display.
5. Push the **0** key for an empty space in the extract code name.

6. Press the **Enter** key to accept the name of the extract code. You will then be redirected to the *Formula* submenu, as shown in Figure 7: Add/Change Extract Code and Formula Submenus, page 19 .

2.3.1.3 How to Delete an Extract Code

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To delete an extract code:

1. Access the *Add / Change Extract Code* submenu.
2. Select the desired extract code and press **F9**.

3. The extractor controller will prompt for confirmation; press the **Enter** key to confirm deletion.

2.3.2 Copy Extract Code

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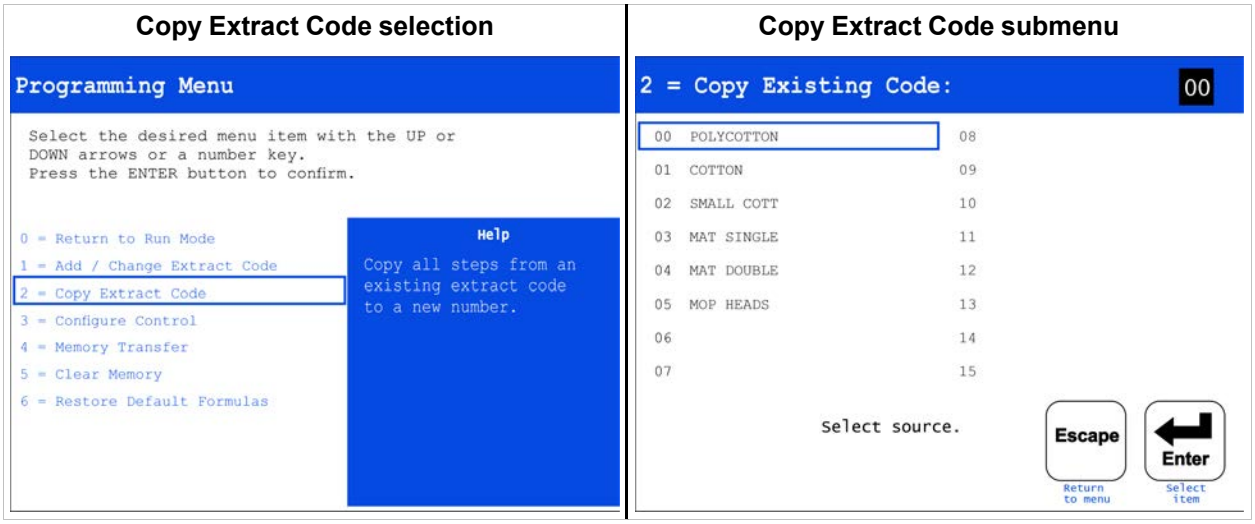
Copying an extract code to a new position allows for the easy modification of few variables. Use this function to experiment with variable changes, or to derive a new extract code from one that

has already been made. Copy an existing extract code using selection 2 on the *Programming* menu, as shown in the following figure.

Figure 5. Copy Extract Code Selection and Submenu (Default Extract Codes Displayed)



2.3.2.1 How to Copy an Extract Code

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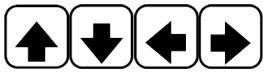
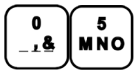
Use the following procedure to copy an extract code from one formula position to another.

At any time during this procedure, press the **Escape** key once to cancel a selection; press the **Escape** key twice to return to the *Programming* menu.

1. Use the arrow keys to navigate to the extract code you want to copy. The cursor can be moved up, down, left, or right between columns.

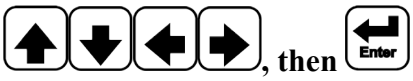
   You can also enter the number of the target extract code on the keypad. For example, press keys **0** and **5** to select extract code 05.

2. After navigating to the target extract code, press the **Enter** key to select it.

3. Navigate to an empty extract code position with the arrow keys, then press the **Enter** key again to copy the selected extract code to the selected empty position.



NOTE: Copied extract codes are automatically given the default name FORMULA XX, where XX is the first available unused two-digit number. To rename a copied extract code, return to the *Programming* menu and enter selection *1: Add / Change Extract Code*. For more information, see Section 2.3.1.2 : How to Rename an Extract Code, page 14.

2.3.3 Restore Default Formulas

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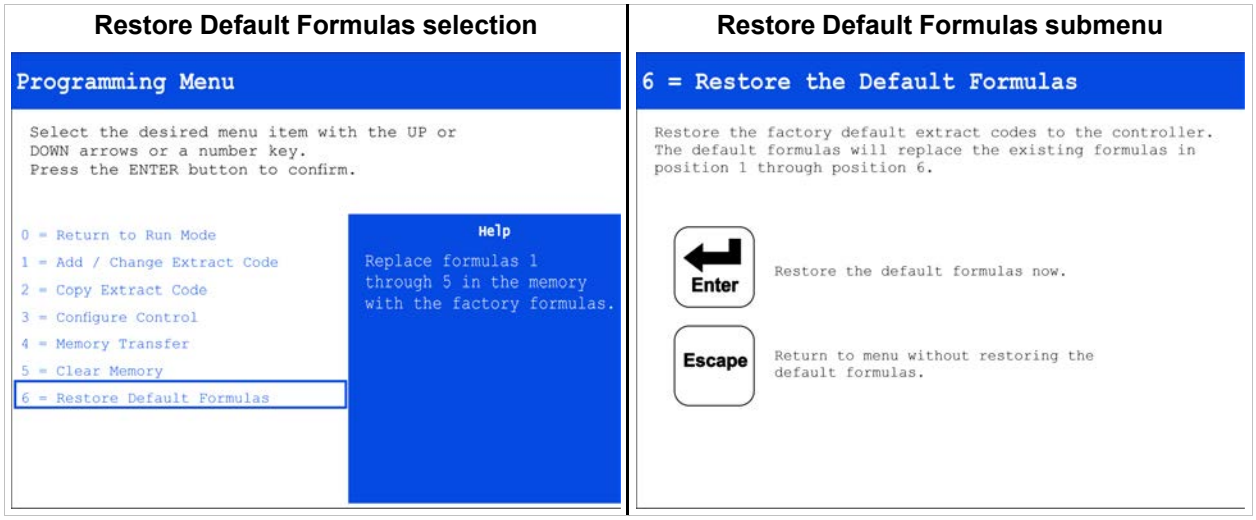
Restore the default extract formulas to **erase all existing formulas**, and replace formulas 00 through 05 with the factory-programmed standard formulas. These six default formulas can be modified to suit the specific needs of your facility, thus preventing the need to completely reprogram all formulas. Restore the default formulas using selection 6 on the *Programming* menu, as shown in the following figure.

Figure 6. Restore Default Formulas Selection and Submenu



Press the **Enter** key to clear all formulas from memory and load the six default formulas.

To exit the submenu without erasing existing formulas, and without generating the six default formulas, press the **Escape** key.

See Table 3, page 18 for more information on the generated default formulas, displayed as formulas **00** through **05**. The extract code variables for these six default formulas are shown in the table below.

Table 3. Standard Default Centrifugal Extractor Formulas

Programming Parameter	00 Poly Cotton	01 Cotton	02 Small Cotton	03 Mat Single	04 Mat Double	05 Mop Heads
Extract Type	0	0	1	0	2	1
Loading (SS)	10	15	10	10	15	10
Slow Speed (SS)	03	03	03	03	03	03
Distribution (SS)	15	15	15	15	15	15
Pre-extracts	-	-	1	-	1	1
E1 Pre-extracts (SSS)	- - -	- - -	045	- - -	015	045
E2 Pre-extracts (SSS)	- - -	- - -	- - -	- - -	090	- - -
Reversals Sets	-	-	1	-	1	1
Slow ON (SS)	- -	- -	02	- -	02	02
Slow OFF (SS)	- -	- -	02	- -	02	02
Final E1 (SSS)	015	015	015	015	015	015
Final E2 (SSS)	090	120	105	090	045	105
Low Extract Speed	2	2	2	2	2	2
High Extract Speed	4	4	4	4	4	4
Rib Inflate (SS)	00	15	15	00	00	15
Rib Deflate (SS)	00	05	15	00	00	15
Jog Reversals	03	05	05	03	03	05
Jog Run (S)	1	1	1	1	1	1
Jog Stop (SS)	01	01	01	01	01	01
Jog Before Tilt	0	0	1	0	0	1
Formula Time (SSS)	155	218	335	155	257	335

2.3.4 How to Modify Extract Codes

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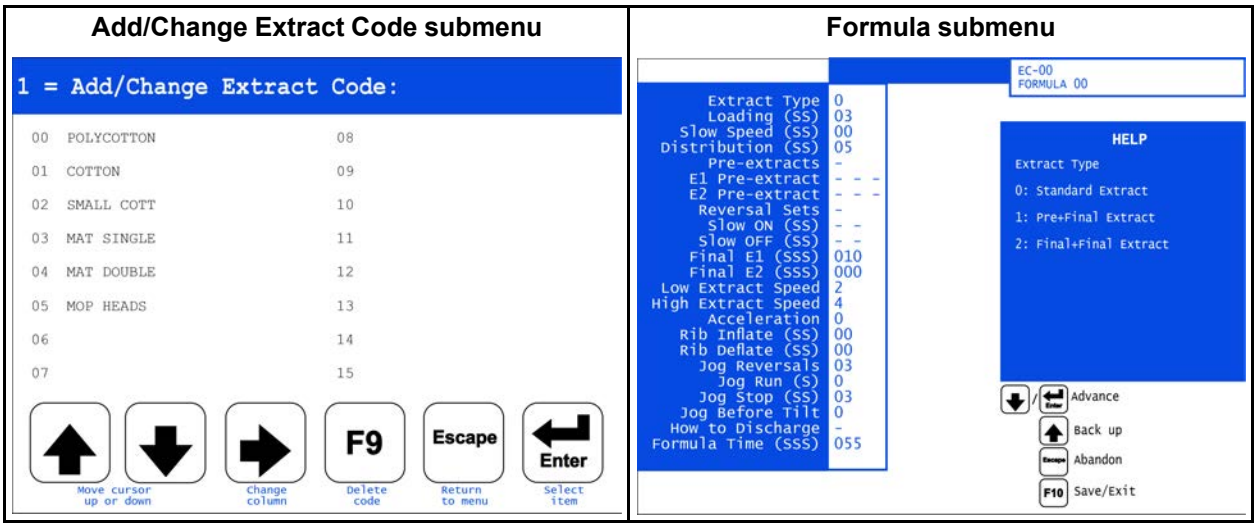
To modify extract codes, navigate to the *Add / Change Extract Code* submenu and highlight the target extract code, or target extract code position.

The formula submenu, shown in : , , contains a list of formula variables that can be edited. Each variable, when selected, displays its valid inputs in the HELP section on the right-hand side of the screen.

Use the following directions to modify variables.

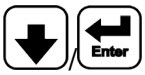
Figure 7. Add/Change Extract Code and Formula Submenus



On the *Add / Change Extract Code* submenu, use the arrow keys to move between extract code positions. The cursor can be moved up, down, left, or right between columns.

You can also enter the number of the target extract code on the keypad. For example, press keys **0** then **5** to select extract code 05. Extract codes 00 through 15 are valid selections.

Highlight a valid extract code and press the **Enter** key twice to edit it. The formula submenu will appear, as shown in : , .



Use the down arrow key, or the **Enter** key, to advance through formula variables on the *Formula* submenu. Formula variables are explained in detail in Section 2.3.4.1 : Extract Code Variables, page 20.

Use the up arrow key to move the cursor to the previous variable.

To edit a variable, review the options in the HELP section and enter your selection on the keypad. Press the down arrow key, or the enter key, after your selection is displayed to continue to the next variable.

When you are ready to save your formula modifications, press the F10 key. Your changes will be applied to the modified formula, and you will be returned to the *Extract Codes* submenu.

To exit the formula without saving any changes made, press the **Escape** key. Your changes will **not** be applied, and you will be returned to the *Extract Codes* menu.

2.3.4.1 Extract Code Variables

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Loading and Pre-extract Sequence Variables

Extract Type — The extraction protocol used for the formula. 0: Standard Extract will be sufficient for most goods, but experimentation with 1: Pre+Final Extract and 2: Final+Final Extract may be required for certain materials.

0: Standard Extract Use this extract type for most types of goods.
One low-then-high speed extract sequence occurs after loading and distribution.

1: Pre+Final Extract Use this extract type to remove water gently from delicate goods, such as small cotton goods and multifilament operating gowns, and from goods that are prone to stick to each other.
One to three low-speed pre-extract sequences, with each sequence followed by a stop and a jog to dislodge the cake. One final extract sequence (low-then-high speed extract) follows the last pre-extract sequence.

2: Final+Final Extract Use this extract type to remove water from difficult-to-handle goods, such as mats and 100% polyester napery.
One to three low-speed and high-speed pre-extract sequences, each followed by a stop and a jog to dislodge the cake, then followed by a single final extract (low-then-high speed extract).

Loading (SS) — The duration in seconds that the extractor runs in loading speed while accepting a load.

03 The minimum programmable time and default value for this decision.
40 The maximum programmable time for this decision.

Slow Speed (SS) — The duration in seconds that the extractor runs in slow speed before beginning distribution.

00 Disable slow speed; the extractor will run at distribution speed during loading, never running at slow speed.
03 The minimum programmable time and the default value.
20 The maximum programmable time for this decision.

Distribution (SS) — The duration in seconds that the extractor runs in distribution speed.

1 The minimum programmable time and the default value.
20 The maximum programmable time for this decision.

Pre-extracts — The number of times the pre-extract sequence repeats before the final extract sequence begins. Because pre-extract is not used when the *Extract Type* decision is set to *0: Standard Extract*, the extractor controller will not accept inputs for this decision if *0: Standard Extract* is used.

1 The minimum programmable time and the default value.
3 The maximum programmable time for this decision.

E1 Pre-extract (SSS) — The duration in seconds that the extractor runs in low extract speed during the pre-extract sequence before advancing to the redistribution sequence if the Extract Type decision is set to *1: Pre+Final Extract* or *2: Final+Final Extract*. The extractor controller will not accept inputs for this decision if *0: Standard Extract* is used.

010 The minimum programmable time and the default value.
180 The maximum programmable time for this decision.

E2 Pre-extract (SSS) — The duration in seconds that the extractor runs in high extract speed during the pre-extract sequence before advancing to the redistribution sequence if the Extract Type decision is set to *2: Final+Final Extract*. The extractor controller will not accept inputs for this decision if *0: Standard Extract* or *1: Pre+Final Extract* is used.

030 The minimum programmable time and the default value.
180 The maximum programmable time for this decision.

Final Extract Sequence Variables

Reversal Sets — The number of jog reversals that occur after the pre-extract sequence if the Extract Type decision is set to *1: Pre+Final Extract* or *2: Final+Final Extract*. The extractor controller will not accept inputs for this decision if *0: Standard Extract* is used. One reversal = clockwise jog run time + jog stop time + counterclockwise jog run time.

1 The minimum programmable reversal count and the default value.
9 The maximum programmable reversal count for this decision.

Slow ON (SS) — The duration, in seconds, that the extractor rotates in wash speed in either the clockwise or counter-clockwise direction during the jog reversal sets. This variable only applies if the Extract Type decision is set to *1: Pre+Final Extract* or *2: Final+Final Extract*. The extractor controller will not accept inputs for this decision if *0: Standard Extract* is used.

01–99 Valid times for this decision.

Slow OFF (SS) — The duration, in seconds, of dwell between the clockwise or counter-clockwise rotations during the jog reversal sets. This variable only applies if the Extract Type decision is set to *1: Pre+Final Extract* or *2: Final+Final Extract*. The extractor controller will not accept inputs for this decision if *0: Standard Extract* is used.

01–99 Valid times for this decision.

Final E1 (SSS) — The duration in seconds of the last low speed extract before the controller proceeds to the last high speed extract.

010 The minimum programmable time and the default value.

180 The maximum programmable time for this decision.

Final E2 (SSS) — The duration in seconds of the last high speed extract before the controller proceeds to the discharge sequence. The minimum and default value for this decision varies according to the programmed Extract Type.

0 The minimum and default value if *0: Standard Extract* is used.

30 The minimum value if *1: Pre+Final Extract* or *2: Final+Final Extract* is used..

180 The default value if *1: Pre+Final Extract* or *2: Final+Final Extract* is used.

600 The maximum programmable time for this decision.

Low Extract Speed — The desired low extract speed. Choose from the 4 available pre-set speeds. Use Table 4: Available Speeds by Machine Model Number, page 22 to determine the speeds by model.

1, 2, 3, or 4 Valid speed settings.

High Extract Speed — The desired high extract speed. Choose from the 4 available pre-set speeds. Use Table 4: Available Speeds by Machine Model Number, page 22 to determine the speeds by model.

1, 2, 3, or 4 — Valid speed settings.

Table 4. Available Speeds by Machine Model Number

Machine Model	Approximate Speed and G-forces for Speeds 1, 2, 3, and 4							
	1		2		3		4	
	RPMs	G's	RPMs	G's	RPMs	G's	RPMs	G's
M7V4836	57	2.2	488	162	633	273	700	334
M7V4840	57	2.2	488	162	633	223	746	379
M9S4232	187	21	373	83	560	187	910	494
M9V4232	187	21	373	83	560	187	910	494
M9V4840	385	101	545	202	747	380	840	481
MMS4232	187	21	560	187	746	332	1325	1046
MMV4232	187	21	560	187	746	332	1325	1046
MXS4232	187	21	560	187	746	332	1024	625
MXV4232	187	21	560	187	746	332	1024	625

Acceleration — This value determines the time required for the motor to accelerate to full speed.

0 Use the standard acceleration time.
1 Use the alternate acceleration time pre-programmed in the inverter.

Discharge Procedure Variables

Rib Inflate (SS) — **Applies only to machines equipped with optional inflatable ribs.** This feature can be used to more easily discharge all-cotton goods, and other types of goods that tend to stick to the extractor basket. This value is the number of seconds allowed for ribs to inflate. Inflation begins only after the cylinder speed slows enough that the centrifugal force exerted by the goods against the ribs is minimal. Cylinder speed is sensed by a proximity switch on the main drive pulley.

00–40 Valid values for the *Rib Inflate* decision. Enter **00** if the machine is not equipped with inflatable ribs.

Rib Deflate (SS) — **Applies only to machines equipped with optional inflatable ribs.** This feature can be used to more easily discharge all-cotton goods, and other types of goods that tend to stick to the extractor basket. This value is the number of seconds allowed for ribs to deflate before jogging begins. If *Jog Before Tilt* (see below) is set to **0**, then this time begins after the extractor tilts up to discharge. If *Jog Before Tilt* is set to **1**, then *Rib Deflate* begins before the extractor tilts up.

00–40 Valid values for the *Rib Deflate* decision. Enter **00** if the machine is not equipped with inflatable ribs.

Jog Reversals — This value is the number of jog reversals to occur during discharge. If *Jog Before Tilt* is set to **0**, then jogging occurs after the extractor tilts up to discharge. If *Jog Before Tilt* is set to **1**, then jogging occurs both before and after the extractor tilts up. One reversal = clockwise jog run time + jog stop time + counterclockwise jog run time.

01–20 Valid values for the Jog Reversal count variable. The controller will not allow 00.

Jog Run (S) — This value determines the number of seconds the motor runs at slow speed during clockwise or counterclockwise rotation. Entering **0** for this decision commands the special jogging sequence.

0 Enables the special jogging sequence. In this sequence the brake remains activated during jogging, the *Jog Run Time* and *Jog Stop Time* are both set to 1/3 second, and the jog counts are instead determined by the *Jog Stops* decision below, where the actual number of jog counts is double the value set for this decision.

1–9 Valid range of non-zero values (seconds) for the decision. For example, enter **3** here to cause the motor to run for three seconds in each direction for each Jog Reversal count programmed.

Jog Stop (SS) — This value determines the number of seconds the motor stops when reversing between clockwise and counterclockwise rotation sequences. If the special jogging sequence is enabled in the previous decision (*Jog Run* **= 0**), then this value instead determines the number of jogs in each direction, where this value equals one half the number of desired jogs in each direction. For example, if the special jogging sequence is enabled and *Jog Stop* is programmed to 5, the basket will jog 10 times in each direction.

01–99 Valid range of values (in seconds) if the special jog sequence is **not** enabled. The motor will pause for the programmed number of seconds before reversing direction as a part of a normal jog sequence.

03–10 Valid range of values (reversals) if the special jog sequence is enabled. This value will be doubled to determine the actual number of jogs in each direction (6–20 jogs).

Jog Before Tilt — This value determines whether the extractor cylinder jogs before tilting to the unload position.

0–No The default value. The extractor tilts to the unload position before beginning the jog sequence determined by *Jog Reversal*, *Jog Run*, and *Jog Stop*.

1–Yes When the *Rib Inflate* time and *Rib Deflate* time expire, the machine jogs as specified by the *Jog Reversal*, *Jog Run*, and *Jog Stop* decisions. The extractor then tilts up to the unload position and repeats the jog sequence. This selection is most often used if goods (e.g., mop

heads) tend to dislodge in slabs that are too large to discharge reliably through the machine door. See Section 2.3.4.4 : Programming Guidelines for Discharging Various Goods, page 27 for additional information about discharging goods.

How to Discharge — Set the extractor to use standard discharge or fast discharge. When fast discharge is enabled, the discharge jog sequence begins as soon as the "Conveyor Side Is Down" input is made instead of waiting for the "Rear Full Up" input. The machine starts to tilt down as soon as the jog sequence ends, while Belt A is running, instead of waiting for Belt A clear time to expire.

W = Fast Discharge must be enabled in the config decisions for this variable to be accessible in extract code programming.

0–No Standard discharge, the default value.
1–Yes Utilize fast discharge.

Formula Time (SSS) — Initially displays the estimated total cycle time for the programmed formula, calculated as each formula decision is entered, including estimates for braking time, jogging, etc.

The last high speed extract step of the formula **can be extended** by entering a value here that is greater than the estimated total cycle time. See Section 2.3.4.3 : Using and Modifying the *Formula Time* Decision, page 26 for more details about this decision.

2.3.4.2 The Sequence of Actions in a Typical Extract Code

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A typical extract code sequence consists of: a loading sequence; one or more pre-extract sequences, each followed by a stop and a jog to dislodge the cake; one final extract sequence; and a discharge sequence. Extract codes can be customized according to user specifications by editing the extract code's formula variables in the programming screen. See Section 2.3.4.1 : Extract Code Variables, page 20 for more information.

The Loading and Pre-Extract Sequence

1. The extractor receives a load from the loading device.
2. While accepting a load, the extractor runs in loading speed for the duration of time set for *Loading (SS)*.
3. Optionally, the extractor can be programmed to run in slow speed for the duration of time set for *Slow Speed (SS)* after completing the *Loading (SS)* time.
4. The extractor runs at distribution speed for the duration of time set in *Distribution (SS)* to disperse the goods. The extractor will run at distribution speed immediately after it runs at loading speed if slow speed is disabled (*Slow Speed = 0*).
5. If the extract type is set to Pre+Final Extract (*Extract Type = 1*) or Final+Final Extract (*Extract Type = 2*), the extractor performs the pre-extract sequence 1 to 3 times, depending on the value set for *Pre-extracts*. For each repeated pre-extract sequence:

a. If the extract type is set to Pre+Final Extract, the extractor runs in low extract speed for the duration of time set for *E1 Pre-extract (SSS)*, then proceeds immediately from low extract speed into the redistribution jog reversals of the Final Extract Sequence.

b. If the extract type is set to Final+Final Extract, extractor runs in low extract speed for the duration of time set for *E1 Pre-extract (SSS)* and then runs in high extract speed for the duration in seconds set for *E2 Pre-extract (SSS)*.

The Final Extract Sequence

1. If the extract type is set to Pre+Final Extract (*Extract Type = 1*) or Final+Final Extract (*Extract Type = 2*), the controller performs 1 to 9 jog reversals *(Reversal Sets)* to redistribute goods evenly within the extractor. For each jog reversal:
   a. The extractor runs at extract speed in clockwise, then counter-clockwise directions for the duration of time set for *Reversal Slow Speed On Time*.
   b. The extractor pauses between each clockwise or counter-clockwise jog for the duration of time set for *Reversal Slow Speed Off Time*.
2. The controller runs a low-then-high speed final extract, programmable via *Final E1* and *Final E2* for the low-speed and high-speed portions, respectively, before it proceeds to the discharge sequence. The final extract occurs for all extract types.

Figure 8. Extract Sequence Stages and Corresponding Variables

0: Standard Extract	
Sequence Stage:	**Programmable Via:**
Loading speed	Loading (SS)
Slow speed	Slow (SS)
Distribution speed	Distribution (SS)
Low extract speed	Final E1 (SSS)
High extract speed	Final E2 (SSS)

1: Pre+Final Extract	
Sequence Stage:	**Programmable Via:**
Loading speed	Loading (SS)
Slow speed	Slow (SS)
Distribution speed	Distribution (SS)
Low extract speed	E1 Pre-extracts (SSS) x Pre-extracts
Braking	N/A
Slow reverse	Slow ON + Slow OFF x Reversal Sets
Slow speed	Slow (SS)
Distribution speed	Distribution (SS)
Low extract speed	Final E1 (SSS)
High extract speed	Final E2 (SSS)

2: Final+Final Extract	
Sequence Stage:	**Programmable Via:**
Loading speed	Loading (SS)
Slow speed	Slow (SS)
Distribution speed	Distribution (SS)
Low extract speed	E1 Pre-extracts (SSS)
High extract speed	E2 Pre-extracts (SSS) x Pre-extracts
Braking	N/A
Slow reverse	Slow ON + Slow OFF x Reversal Sets
Slow speed	Slow (SS)
Distribution speed	Distribution (SS)
Low extract speed	Final E1 (SSS)
High extract speed	Final E2 (SSS)

The Discharge Sequence

1. If the extractor is equipped with optional inflatable ribs, and if *Rib Inflation Time* and *Rib Deflation Time* are programmed with values greater than 0, the extractor uses the inflatable ribs to dislodge goods.
2. The extractor tilts to the unload position. Note that if *Jog Before Tilt* is enabled (A = 1), the extractor performs the jog reversal sequence before it tilts to the unload position, then repeats the jog reversal sequence after it tilts to the unload position.
3. The extractor runs 1 to 20 jog reversals *(Jog Reversals)* to initiate discharge.
   a. The extractor runs clockwise at slow speed for the duration of time set for *Jog Run Time*.
   b. The motor stops for the duration of time set for *Jog Stop Time*.
   c. The extractor runs counter-clockwise at slow speed for the duration of time set for *Jog Run Time*. This cycle occurs the number of times set in the *Jog Reversals* decision.
   d. If the special jogging sequence is enabled (*Jog Run* = 0), the brake remains activated during jogging, and the jog run time and jog stop time are both set to 1/3 second. The number of jog counts is determined by the *Jog Stops* decision, where the actual number of jog counts is double the value set for this decision. The special jog sequence mimics continuous distribution, and may help dislodge goods that are uniquely difficult to discharge.
4. Belt A carries the goods to either a receiving device or to Belt B, if equipped.
5. The extractor waits for the *Time to Clear Belt A* to expire, to ensure all goods are transferred.
6. The extractor tilts back to the load position and waits to receive the next load. Note that if *Fast Discharge* is enabled, the extractor tilts back to the load position as soon as the jog sequence is complete. See Section 2.5 : Summary of Extractor Belt Movement during Discharge, page 36 for more information.

2.3.4.3 Using and Modifying the *Formula Time* Decision

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The *Maximum Formula Time* value initially displayed when programming the discharge sequence for an extract formula shows the estimated time required for the extract cycle (formula) to run. The extractor controller includes the estimated time required for braking, jogging, and other actions when calculating the initial *Maximum Formula Time* value.

If the total time available for the extract cycle is longer than the calculated estimated cycle time (for example, if the extractor must wait for the shuttle device to return before discharging), the *Maximum Formula Time* value can be increased up to the total time for the extract cycle. If the *Maximum Formula Time* value is longer than the total cycle time, the extractor controller will extend the last high speed extract of the formula up to the value of *Maximum Formula Time*.

NOTE: When a tunnel washer unloads to a single centrifugal extractor, the theoretical maximum time for the extract cycle equals the time between tunnel transfers. If a tunnel washer is serviced by two extractors, the theoretical maximum time is twice the time between tunnel transfers, etc. for additional extractors.

2.3.4.4 Programming Guidelines for Discharging Various Goods

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In general, three different types of discharge sequences will efficiently discharge most goods that are processed in the centrifugal extractor.

- The standard discharge sequence involves tilting the extractor cylinder up to the unload position, and jogging the cylinder to dislodge the goods. The standard discharge sequence is usually sufficient for goods of polyester/cotton blended fabrics and walk-off mats, which do not tend to stick to the inside of the extractor excessively.
- A special discharge sequence that makes use of the optional inflatable ribs can be used, if the extractor is so equipped. This sequence generally consists of tilting the cylinder to the unload position, then inflating and subsequently deflating the ribs (programmable via the *Rib Inflate* and *Rib Deflate* values). After the ribs are deflated, the goods are jogged to dump them from the extractor. This discharge sequence is especially effective for all-cotton goods, which tend to stick to the extractor basket.
- The double jog discharge sequence (*Jog Before Tilt = 1*) involves jogging the goods, tilting to the unload position, then repeating the jog reversal sequence after the extractor tilts to the unload position. If so equipped, the extractor can also inflate and deflate the ribs before tilting to the unload position. When using the optional inflatable ribs, the general sequence is to jog the goods, inflate and deflate the ribs, then jog again. After the second jog series, tilt the cylinder up to the unload position, and jog again to unload the goods. This advanced discharge sequence is especially useful for mop heads and other goods that are prone to stick to the inside of the extractor, as well as each other, to break the slabs into smaller pieces.

The number of jogs required to completely unload the extractor varies according to many factors, but experimentation with the *Jog Reversals* value will help determine the fewest number of jog cycles that will reliably empty the machine.

2.3.5 Programming Logsheet and Sample Formula

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Table 5. Worksheet for Centrifugal Extractor Formula

#_____	Formula Name:			
Decision Name	**Value**		**Decision Name**	**Value**
Extract Type			High Extract Speed	
Loading (SS)			Acceleration	
Slow Speed (SS)			Rib Inflate (SS)	
Distribution			Rib Deflate (SS)	
Pre-extracts			Jog Reversals	
E1 Pre-extract (SSS)			Jog Run	
E2 Pre-extract (SSS)			Jog Stop	
Reversal Sets			Jog Before Tilt	
Slow ON (SS)			How to Discharge	
Slow OFF (SS)			Formula Time	
Final E1 (SSS)				

Table 5 Worksheet for Centrifugal Extractor Formula (cont'd.)

#_____			Formula Name:	
Decision Name	**Value**		**Decision Name**	**Value**
Final E2 (SSS)				
Low Extract Speed				

Table 6. Worksheet for Centrifugal Extractor Formula

#_____			Formula Name:	
Decision Name	**Value**		**Decision Name**	**Value**
Extract Type			High Extract Speed	
Loading (SS)			Acceleration	
Slow Speed (SS)			Rib Inflate (SS)	
Distribution			Rib Deflate (SS)	
Pre-extracts			Jog Reversals	
E1 Pre-extract (SSS)			Jog Run	
E2 Pre-extract (SSS)			Jog Stop	
Reversal Sets			Jog Before Tilt	
Slow ON (SS)			How to Discharge	
Slow OFF (SS)			Formula Time	
Final E1 (SSS)				
Final E2 (SSS)				
Low Extract Speed				

2.3.5.1 Sample Extract Code: Extracting Walk-off Mats

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Walk-off mats for dust control present certain challenges in extraction because the large area of waterproof material forms pockets which hold water. At high G-forces this trapped water may burst the mat.

CAUTION: Avoid Damage and Premature Wear — High G-forces may force water through waterproof materials and damage the material, while extreme vibration may cause premature wear to the extractor.

- **To protect the goods and the extractor from damage, keep the maximum extract force for walk-off mats at 335 G's or less.** See Table 4: Available Speeds by Machine Model Number, page 22 for RPMs and G-forces.

To reduce trapped water pockets and minimize the chance of rupture, one technique is to perform one or more pre-extract sequences. With each pre-extract sequence, the extractor accelerates the load, then slows and performs a redistribution sequence before beginning the final extract sequence. The redistribution sequence changes how the mats are arranged in the extractor, eliminating much of the trapped water. The disadvantage of this technique is that loads of large mats may

not distribute evenly around the cylinder when there is no free water in the extractor. The unbalanced load causes accelerated wear on the centrifugal extractor and restricts the maximum speed available.

Field trials indicate that the extractor formula shown in Table 7: Sample Program—Walk-off Mats, page 29 works well as a base formula for walk-off mats in most situations. Specific conditions (e.g., extractor model, mat material) may suggest minor adjustments to maximize productivity.

Table 7. Sample Program—Walk-off Mats

#_____	Formula Name:			
Decision Name	**Value**		**Decision Name**	**Value**
Extract Type	0		High Extract Speed	3
Loading (SS)	5		Acceleration	
Slow Speed (SS)	9		Rib Inflate (SS)	
Distribution	20		Rib Deflate (SS)	
Pre-extracts			Jog Reversals	4
E1 Pre-extract (SSS)			Jog Run	2
E2 Pre-extract (SSS)			Jog Stop	1
Reversal Sets			Jog Before Tilt	0
Slow ON (SS)			How to Discharge	
Slow OFF (SS)			Formula Time	180
Final E1 (SSS)	20			
Final E2 (SSS)	50			
Low Extract Speed	1			

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2.4 Hardware Configuration

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2.4.1 Configure Control

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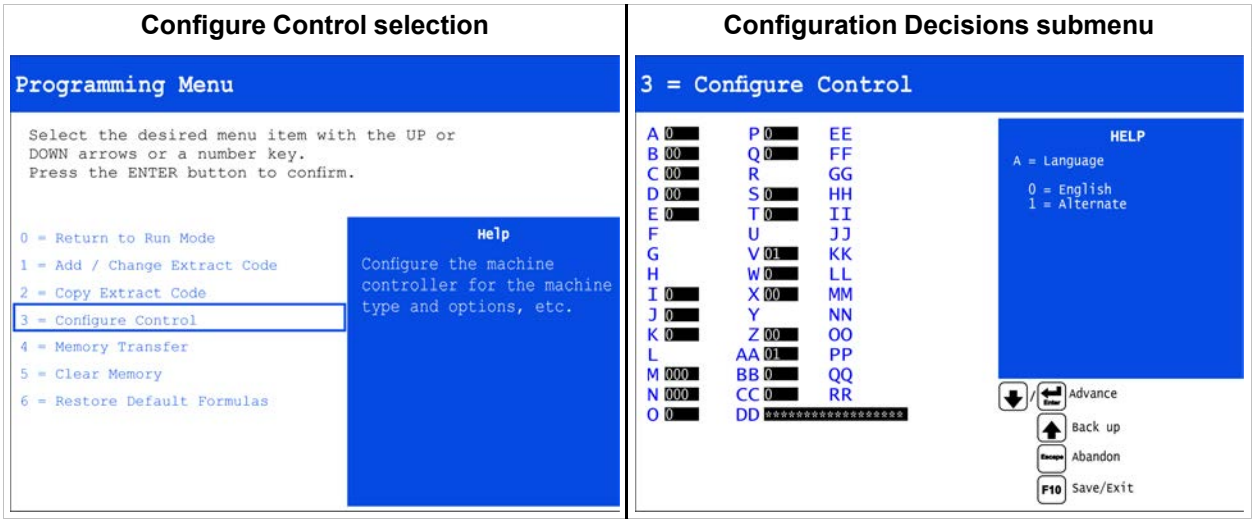
The Milnor® centrifugal extractor controller can control several different models of extractor with numerous options. Configuring the controller for the specific machine allows efficient operation, and allows you to adjust certain parameters according to the needs of your specific installation.

Access the *Configure Control* submenu using selection 3 on the *Programming* menu, as shown in the following figure.

Figure 9. Configure Control Selection and Configuration Decisions Submenu



2.4.1.1 Machine Configuration

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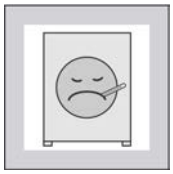
Your machine was configured at the factory with the optimum or required settings for your machine. You can use the following chart to make a copy of your machine configuration settings before you make changes to them.

Configuration Decision				Configuration Decision		
	Setting	Description			Setting	Description
A		Language		Q		Load Eye Check Time
B		When to Start Belts		R		Store a Load on Belt A
C		Time to Clear Belt A		S		Early Call for Load
D		Time to Run Belt A While Tilting		T		Run Belt After Load
E		Belt B Installed		U		— not used —
F		Belt On Time		V		Time Before Brake Pads Check
G		Belt Off Time		W		Fast Discharge
H		Time to Clear Belt B		X		Network String Length
I		Allied Loading		Y		— not used —
J		Allied Discharge		Z		Tilt Error Time
K		Hold Unload Device		AA		Minimum Eye Blocked Time
L		Allied Pass Data		BB		Receive Device Load Direction
M		Miltrac™ Address		CC		Receive Device Load Level
N		Mildata® Address		DD		Machine Name
O		Load Chute Installed		EE		— not used —
P		Load Door Installed		FF		— not used —

Most configuration decisions are hardware-dependent. The only reason to modify hardware-dependent settings is to accommodate modifications to your machine's hardware.



CAUTION: Careless modification of hardware-dependent settings — is likely to degrade machine performance and may cause damage or malfunction.

- Do not make unauthorized changes to hardware-dependent configuration settings.
- Consult Milnor® Technical Support before you change hardware-dependent settings.

2.4.1.2 How to Edit the Configuration Decisions

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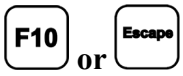
Use the following procedure to navigate between and edit the configuration decisions. Note that certain configuration decisions are cross-dependent on other configuration decisions, and will only display for editing if their enabling conditions are met.

1. Navigate between configuration decisions using the arrow keys. You can also press the **Enter** key to move one decision down.

2. Review the description and valid inputs in the "HELP" section on the righthand side of the display. For more information regarding decisions and values, see Section 2.4.1.3 : The Configuration Decisions, page 31.
3. Use the keypad to enter the desired input, then press the **Enter** key.
4. Confirm or discard your changes:
   - To save your changes and exit to the *Programming* menu, press the **F10** key.
   - To discard any changes made, press the **Escape** key. No changes to your configuration settings will be saved. Press the **Escape** key a second time to return to the *Programming* menu.



2.4.1.3 The Configuration Decisions

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A = Language — This decision allows the selection of English or another software-supported language.

The non-English language available for use is selected by the customer and comes installed as the default alternate language.

0 All prompts appear in English
1 All prompts appear in the designated alternate language

B = When to Start Belts — This decision determines the duration of pause before Belt A (and Belt B, if installed) starts running after the cylinder starts to jog to discharge. This pause allows goods to accumulate on the belt(s) before the belts begin moving. See Section 2.5 : Summary of Extractor Belt Movement during Discharge, page 36 for more information.

0 — 98 Start the belt(s) this many seconds after the cylinder starts to jog to discharge
99 Start the belt(s) when the jog to discharge sequence ends

C = Time to Clear Belt A — After the jog sequence is completed, Belt A runs for this period of time to ensure that all goods are discharged. See Section 2.5 : Summary of Extractor Belt Movement during Discharge, page 36 for more information.

0 — 99 Run Belt A for this many seconds

D = Time to Run Belt A While Tilting — Specifies how long to run Belt A while the extractor is tilting up. Belt A stops when timer expires or when extractor reaches full tilt. Belt does not run if configured for zero.

0 — 99 Run Belt A for this many seconds while tilting up

E = Belt B Installed — Enter *1 = Yes* here if the extractor is equipped with Belt B; otherwise, enter *0 = No*. If this decision indicates that the extractor is not equipped with Belt B, the decisions for *Belt On Time* (F), *Belt Off Time* (G), and *Time to Clear Belt B* (H) will not appear.

0 Belt B not installed
1 Belt B installed

F = Belt On Time — This decision appears only if Belt B is installed (*Belt B Installed* is *1 =Yes*) and if *When to Start Belts* is not set to 99. This value determines how long the belts run each time they start when the cylinder jogs to discharge goods, causing the belts to move intermittently.

0 — 99 Run Belt B for this many seconds while the cylinder jogs to discharge goods.

G = Belt Off Time — This decision appears only if Belt B is installed (*Belt B Installed* is *1 =Yes*) and if *When to Start Belts* is not set to 99. This decision stops the belts for this many seconds each time the cylinder jogs to discharge goods, causing the belts to move intermittently.

0 — 99 Stop Belt B for this many seconds while the cylinder jogs to discharge goods.

H = Time to Clear Belt B — When discharge is allowed, Belt B runs for the duration specified here to ensure that all goods have discharged. This decision appears only if Belt B is installed (*Belt B Installed* is *1 =Yes*).

0 — 99 Belt B runs for this number of seconds when discharge is allowed. This time ensures that all goods are discharged

I = Allied Loading — Sets the system protocol for loading. Miltrac™ loading applies if *Allied Loading* is *0 = No*. For details, see “Special Load Interface Requirements for the Milnor® Centrifugal Extractor” in your schematic manual.

0 Miltrac™ loading

1 Allied loading

J = Allied Discharge — Sets the system protocol for discharging. Miltrac™ discharge applies if *Allied Discharge* is *0 = No*. For details, see "Special Load Interface Requirements for the Milnor® Centrifugal Extractor" in your schematic manual. Selecting *1 = Yes* for this decision allows the use of outputs to supply batch data in binary format and disallows Miltrac™ interfacing with devices on the discharge side of the extractor.

0 Miltrac™ discharge
1 Allied discharge

K = Hold Unload Device — This decision appears only if Miltrac™ discharge is enabled (*Allied Discharge* is *0 = No*). When this decision is enabled (*1 = Yes*), the device that receives goods from the extractor (e.g., a shuttle) waits for more than one load before it moves. Refer to the Miltrac™ reference manual for more information.

0 No; multiple cake discharge is disabled
1 Yes; multiple cake discharge is enabled

L = Allied Pass Data — This decision tells the extractor controller that certain additional boards, required for passing data in binary format, are present. This decision appears only if either the *Allied Loading* or *Allied Discharge* decisions are enabled (*1 = Yes*).

0 Allied data pass is not required
1 Boards at addresses 02H, 03H, and 12H allow allied data pass

M = Miltrac™ Address — If either *Allied Loading* or *Allied Discharging* is answered "*0 = No*," the extractor is a Miltrac™ device requiring an address. This address must be three digits and unique in the Miltrac™ system.

000 — 255 Enter a unique 3–digit address within the listed range for the machine

N = Mildata® Address — If the extractor is connected to a Mildata® system, enter the extractor's system address.

000 — 255 Enter a unique 3–digit address within the listed range for the machine

O = Load Chute Installed — Enter *1 = Yes* here if the extractor is equipped with a load chute; otherwise, enter *0 = No*. If the extractor is not equipped with a load chute, the extractor controller does not check for the "Load Chute Is Not Up" and "Load Chute Is Not Down" error conditions.

0 No, a load chute is not present on this extractor
1 Yes, this extractor is equipped with a load chute

P = Load Door Installed — If the extractor is not equipped with a load door, the extractor controller does not check for the "Load Chute Is Not Up" and "Load Chute Is Not Down error conditions. This decision appears only if the extractor is not configured for a load chute (*Load Chute* is *0 = No*).

0 No, a load door is not equipped on this extractor (default)
1 Yes, this extractor is equipped with a load door

Q = Load Eye Check Time — The load-end photoeye checks for goods hanging out of the basket after the extractor receives a load. This decision sets the number of seconds prior to the beginning of extract that the controller should check the photoeye.

0 Zero seconds/don't check the photoeye (default)
5 Five seconds (recommended)
9 Nine seconds (maximum value)

R = Store a Load on Belt A — If the extractor is raised 48 inches above Belt A (see caution statement below), goods may be stored on Belt A. This allows a Miltrac™ controller system, through the multiple cake discharge feature (*Hold Unload Device* is *1 = Yes*), to accumulate the desired number of extractor loads before allowing Belt A to discharge.

This decision appears only if

- the extractor is configured for Miltrac™ loading (*Allied Loading* is *0 = No*) **and** Miltrac™ discharge (*Allied Discharge* is *0 = No*),
- **and** Belt B is **not** configured (*Belt B Installed* is *0 = No*),
- **and** the extractor is configured for multiple cake discharge (*Hold Unload Device* is *1 = Yes*).

> **CAUTION: Enabling this decision on a non-elevated extractor —** causes the extractor to crush Belt A when it returns to the load/run position after discharging.
>
> ▶ Enter *1 = Yes* to the Store Load on Belt A decision **only if** the extractor is elevated 48 inches above Belt A.

0 Do not store a load on Belt A
1 Store a load on Belt A; use this selection only after reviewing the above caution statement and your machine specifications

NOTE: If *Store Load on Belt A = Yes*, then the controller will automatically set *When to Start Belts = 99*.

S = Early Call for Load — This decision appears only if the extractor is configured for Miltrac™ loading (*Allied Loading* is *0 = No*). Enter *1 = Yes* if the extractor should request goods from the loading device after the formula minimum time expires. Enter *0 = No* if the extractor should request goods only after the jog sequence is finished and the basket is beginning to tilt to discharge

0 No (default)
1 Yes

T = Run Belt After Load — Set this decision to *1 = Yes* to run Belt A for 15 seconds when the machine enters distribution speed. This feature clears the belt of any loose items which may have fallen onto the belt during loading. Set this decision to *0 = No* if Belt B is installed or if a load can be stored on Belt A.

0 No (default)

1 Yes, run Belt A for 15 seconds to clear belt of loose items

V = Time Before Brake Pads Check — This decision determines how often the controller should check the wear level of the brake pads. If the pads are worn, the controller will sound an alarm at the interval entered here. Intervals are calculated in whole and quarter-hour increments. The first digit of the two-digit value is the hour count; the second digit is the quarter hour value.

01 0:15 (check every 15 minutes; minimum value)
02 0:30
10 1:00
13 1:45
40 4:00
93 9:45 (check every 9 hours and 45 minutes; maximum value)

W = Fast Discharge — When fast discharge is enabled, the discharge jog sequence begins as soon as the "Conveyor Side Is Down" input is made instead of waiting for the "Rear Full Up" input. The machine starts to tilt down as soon as the jog sequence ends, while Belt A is running, instead of waiting for Belt A clear time to expire.

Enabling this decision makes the *How to Discharge* extract code variable accessible.

0 No, standard discharge only
1 Yes, fast discharge allowed on this machine

X = Network String Length — This decision (also known as Baud Rate, Bytes for Network, and Number for Network) applies only to devices in a Milnet or Miltrac™ network.

NOTE: If you change the network string length (baud rate) on this machine, you must also change the network string length of the Miltrac™ (or Milnet) computer and every machine on the Miltrac™/Milnet link to the same value.

00 The system uses Miltrac™ software version 89100 or later, but before 20004
11 For systems with Milnet versions between 86088 and 86095. If the device does not communicate with the Milnet controller at the first setting chosen, select the other one.
24 The system uses Miltrac™ software version 8624B and earlier
30 Enter this number for systems with Miltrac™ versions 89001 to 89018.
96, 97, 98, 99 Enter 96, 97, 98, or 99 for Milnet or Miltrac™ software version 21000 and later. Differences in baud rate are a trade-off between communication speed, which can affect productivity, and protection against data corruption from electromagnetic interference, common in industrial processing settings. A technician familiar with Miltrac™ device communication may need to experiment with the baud rate setting.

96 = 9.6 kb/s; slowest, but most reliable communication rate

97 = 19.2 kb/s; somewhat favors reliability over speed

98 = 38.4 kb/s; average speed and reliability (recommended starting value)

99 = 57.6 kb/s; somewhat favors speed over reliability

NOTE: If your machine or system performance is poor at all available baud rates, consult your dealer or a Milnor® technician using the information in Section 1.4 : How to Contact Milnor®, page 8.

Z = Tilt Error Time — Enter the number of seconds allowed for this machine to tilt fully up or down. The error "Too Long To Tilt Up" or "Too Long To Tilt Down" occurs when tilting exceeds the specified time. Enter a value of 00 to disable this error.

0 Disabled
1 — 99 Seconds of full tilt permitted

AA = Minimum Eye Blocked Time — Enter the minimum number of seconds required for goods to block the discharge photoeye before the eye blocked condition is triggered. This parameter applies only on an extractor configured for Belt A discharge, and does not apply to an extractor configured for Belt B or for storing a cake on Belt A.

1 — 99 Valid values in seconds

BB = Receive Device Load Direction — Enter the direction from which an elevating device receives loads from the extractor.

0 the receive device runs forward when the single stage press discharges to it. This is the default
1 the receive device runs in reverse when the single stage press discharges to it

CC = Receive Device Load Level — Enter the level at which an elevating device receives loads from the extractor.

0 — 7 Valid level values

DD = Machine Name — Enter any name for this device up to 20 characters. The name entered here appears on machine generated printouts.

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2.5 Summary of Extractor Belt Movement during Discharge

BNEUUP03.C01 0000578906 A.2 A.5 A.17 6/21/23, 8:46 AM Released

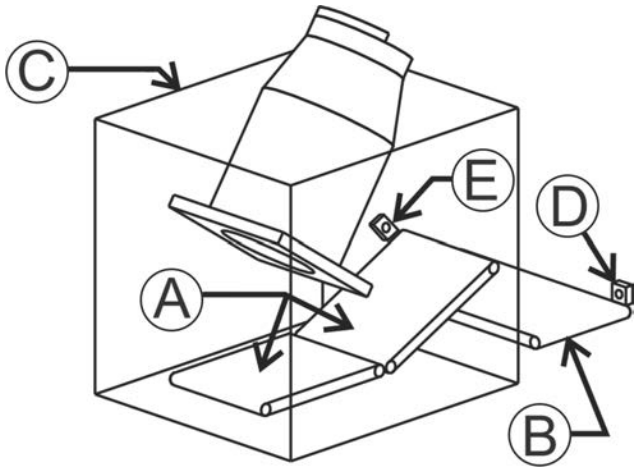
2.5.1 Typical Extractor Layout

BNEUUP03.C02 0000578905 A.5 A.8 A.17 8/12/24, 10:51 AM Released

Centrifugal extractors use conveyor belts to discharge goods. The two belts under the extractor cylinder are referred to collectively as Belt A, and are standard equipment on all extractors. Typically, Belt A discharges to either an optional storage belt (Belt B), or directly to the receiving device (e.g., a Milnor® COLOOS loose goods shuttle).

The following figure shows the typical layout of a centrifugal extractor with Belt B.

Figure 10. Typical Extractor Layout



Legend

A . . . Belt A
B . . . Belt B (optional)
C . . . Extractor
D . . . Photo Eye Belt B
E . . . Photo Eye Belt A

2.5.2 Basic Belt Operation during Discharge

BNEUUP03.R01 0000578903 A.4 A.5 A.17 5/27/24, 11:07 AM Released

Extractor Equipped with Belt A and Belt B — If the extractor is equipped with Belt B (usually designed to store goods), the extractor can discharge any time that Belt B is empty. If Belt B is loaded, the extractor must wait for Belt B to discharge its goods before the extractor cylinder can discharge.

Extractor Equipped with Belt A Only — If the extractor is not equipped with a Belt B, the extractor must wait for the receiving device to be ready for a load before the extractor cylinder can discharge. This is because Belt A is not normally capable of storing processed goods.

NOTE: Belt A can be used as a storage belt on extractors that were optionally built high enough to store a load on Belt A.

There are three phases to each discharge cycle: the belt delay time, the jogging sequence, and the post-jogging sequence.

2.5.3 Configuration

BNEUUP03.R02 0000578902 A.5 A.9 A.17 6/29/23, 9:20 AM Released

The following configuration decisions are used to control belt movement, as explained throughout this document.

During the Jogging Sequence

B = *When to Start the Belts* — Also known as the belt delay time. The belts start this many seconds after the cylinder starts to jog for discharge. The time specified can range from 00 to 99 seconds. If the time is set to 99 seconds, the belt remains stationary for the entire jogging sequence.

NOTE: If Belt B is configured and 99 is entered here, the *Belt ON Time* and the *Belt OFF Time* decisions are not available.

F = *Belt ON Time* — This decision is only available if Belt B is installed. This value determines how long the belts run each time they start while the cylinder jogs to discharge goods, causing the belts to move intermittently. The time specified can range from 00 to 99 seconds.

G = *Belt OFF Time* — This decision is only available if Belt B is installed. When available, it stops the belts for this many seconds when the cylinder jogs, causing the belts to move intermittently. The time specified can range from 00 to 99 seconds.

After the Jogging Sequence

C = *Time to Clear Belt A* — After the jogging sequence ends, this value determines how long Belt A runs continuously to ensure that all goods transfer from Belt A to Belt B. The time specified can range from 0 to 99 seconds.

H = *Time to Clear Belt B* — Belt B runs continuously to transfer all goods to the receiving device and stops when the photo eye is blocked. The "Photo eye Failed" error occurs if the Belt B photo eye is not blocked within the time limit configured here. The time specified can range from 0 to 99 seconds.

2.5.4 About the Belt Delay Time

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The *belt delay time* is an optional delay period between when the extractor starts to jog for discharge, and when the belts begin to move. A temporarily stationary belt can allow goods to bunch together on Belt A before both belts start moving.

All belts remain stationary for the duration of the belt delay time, which is the value set in the *When to Start the Belts* decision (1 to 98 seconds). For example, set the *When to Start the Belts* decision to 5, and the belt(s) remain stationary for 5 seconds after jogging begins.

A belt delay time can be configured to occur before continuous or intermittent belt movement, as described in the subsequent sections. Set the *When to Start the Belts* decision to 0 to disable the belt delay time.

NOTE: If the belt delay time exceeds the jogging time (e.g. the belt delay time is long and the formula has only a few jog counts), the belt delay time ends when the jogging sequence ends.

2.5.5 Controlling Goods Distribution during the Jogging Sequence

BNEUUP03.C03 0000578901 A.4 A.5 A.17 5/21/24, 4:48 PM Released

To control the dispersal of goods on the belts during the jogging sequence, the user can specify one of three types of belt movement:

- Continuous belt movement
- Intermittent belt movement, if Belt B is provided
- Fully stationary belt

2.5.5.1 Continuous Belt Movement

BNEUUP03.C06 0000578898 A.5 A.16 A.17 5/21/24, 4:51 PM Released

Belt A moves continuously during the jogging sequence by default. If the extractor is equipped with Belt A and Belt B, both belts move continuously during the jogging sequence if the *Belt ON Time* and *Belt OFF Time* decisions are configured to 0. Continuous movement of Belt A (and Belt B, if equipped) can occur after the configured belt delay time expires, or immediately when the cylinder starts jogging if the belt delay time is disabled.

This information is summarized in the following table.

Table 8. Continuous Belt Movement

	Belt Movement		Configuration		
	During Belt Delay Time	**After Belt Delay Time**	***When to Start the Belts* (seconds)**	***Belt ON Time***	***Belt OFF Time***
Belt A only	stationary	continuous	1-98	n/a	n/a
	n/a	continuous	0	n/a	n/a
Belt A when Belt B is present	stationary	continuous	1-98	0	0
	n/a	continuous	0	0	0
Belt B, when present	stationary	continuous	1-98	0	0
	n/a	continuous	0	0	0

2.5.5.2 Intermittent Belt Movement

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Intermittent movement of Belt A and Belt B can disperse goods evenly along Belt B. For the belts to move intermittently, you must configure a non-zero value for the *Belt ON Time* and *Belt OFF Time* decisions. The belts run for the number of seconds configured in the *Belt ON Time* decision, then pause for the number of seconds configured for the *Belt OFF Time* decision, repeatedly, until the end of the jogging sequence. For example, if the *Belt ON Time* decision is set to 5 and the *Belt OFF Time* decision is set to 3, the belts run for 5 seconds, then stop for 3 seconds, then run for 5 seconds, etc. until the jogging sequence ends. Belt B stops when the photo eye is blocked.

NOTE: Belt A cannot move intermittently on extractors that are not equipped with a Belt B.

Conduct field trials to determine the values for the *Belt ON Time* and *Belt OFF Time* decisions that disperse the goods evenly along the entire length of Belt B. The goal is for the first item of goods to block the photo eye at the end of Belt B just as the last of the goods are transferred from Belt A to Belt B.

Intermittent movement of Belt A and Belt B can occur after the belt delay time expires, or immediately when the cylinder starts jogging if the belt delay time is disabled.

This information is summarized in the following table.

Table 9. Intermittent Belt Movement

	Belt Movement		Configuration		
	During Belt Delay Time	**After Belt Delay Time**	***When to Start the Belts* (seconds)**	***Belt ON Time***	***Belt OFF Time***
Belt A when Belt B is present	stationary	intermittent	1-98	>0	>0
	n/a	intermittent	0	>0	>0
Belt B, when present	stationary	intermittent	1-98	>0	>0
	n/a	intermittent	0	>0	>0

2.5.5.3 Fully Stationary Belt

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You can configure the belt to remain completely stationary until the jogging sequence ends. This setting allows goods to discharge onto Belt A before the receiving device is ready for a load (while the extractor waits for the "OK to Discharge" signal), also known as "early discharge". Early discharge allows a Miltrac™-controlled extractor to accumulate the desired number of loads before allowing Belt A to discharge.

To keep the belt stationary for the duration of the jogging sequence, set the *When to Start the Belts* decision to 99. If the *When to Start the Belts* decision is configured for 99, the *Belt On Time* and *Belt Off Time* decisions are disabled.

NOTE: To allow Belt A to act as a storage belt, your extractor must be elevated high enough to store processed goods on Belt A, approximately 48 inches above Belt A, and you must set the *Store Load on Belt A* configuration decision to 1 (Yes).

NOTE: If *Store Load on Belt A* = 1 (Yes), the controller automatically sets the *When to Start the Belts* decision to equal 99.

Fully stationary belt configuration is summarized in the following table.

Table 10. Fully Stationary Belt Configuration

	Belt Movement		Configuration		
	During Belt Delay Time	**After Belt Delay Time**	***When to Start the Belts***	***Belt ON Time***	***Belt OFF Time***
Belt A Only	n/a	stationary	99	n/a	n/a

Table 10 Fully Stationary Belt Configuration (cont'd.)

	Belt Movement		Configuration		
	During Belt Delay Time	After Belt Delay Time	*When to Start the Belts*	*Belt ON Time*	*Belt OFF Time*
Belt A when Belt B is Present	n/a	stationary			
Belt B When Present	n/a	stationary			

2.5.6 Belt Movement after the Jogging Sequence

BNEUUP03.C08 0000578919 A.5 A.17 5/21/24, 5:05 PM Released

After the jogging sequence ends, Belt A runs continuously for the amount of time configured in the *Time to Clear Belt A* decision. This is the expected time it takes for all goods to transfer from Belt A to Belt B. The "Photo eye Failed" error occurs if the Belt A photo eye is not blocked within the number of seconds specified in the *Time to Clear Belt A* decision.

NOTE: If the *Store a Load on Belt A* decision is enabled (set to 1), the belt stops when the goods block the Belt A photo eye. If the photo eye is not blocked within the time configured in the *Belt A Clear Time* decision, a “Photo eye Failed” error occurs.

Belt B runs continuously until all goods are discharged to the receiving device, and stops when the photo eye is blocked. The "Photo eye Failed" error occurs if the Belt B photo eye is not blocked within the time established in the *Time to Clear Belt B* decision.

If the extractor is configured for allied discharge, Belt B stops and starts each time the photo eye blocks and clears (e.g., goods are manually removed), until it runs continuously for the time configured in the *Time to Clear Belt B* decision. Then the controller declares Belt B as empty and prevents it from running until it receives the next batch of goods. If the Belt B photo eye is not blocked within the time set in the *Time to Clear Belt B* decision, a “Photo eye Failed” error message appears.

2.5.7 Summary of Belt Movement

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The following table summarizes the different types of belt movement that can occur during discharge (during the belt delay time, the jogging sequence, and the post-jogging sequence), and how to configure each type.

Table 11. Extractor Belt Movement Chart

	Belt Movement			Configuration		
	During Jogging		After Jogging			
	During Belt Delay Time	*After Belt Delay Time*		*When to Start the Belts*	*Belt ON Time*	*Belt OFF Time*
Belt A Only	n/a	continuous	continuous for Belt A Clear Time	0	n/a	n/a
	stationary	continuous		01–98	n/a	n/a

Table 11 Extractor Belt Movement Chart (cont'd.)

	Belt Movement			Configuration		
	During Jogging		After Jogging			
	During Belt Delay Time	*After Belt Delay Time*		*When to Start the Belts*	*Belt ON Time*	*Belt OFF Time*
	stationary			99	n/a	n/a
Belt A when Belt B is Present	n/a	continuous		0	0	0
	n/a	intermittent		0	>0	>0
	stationary	continuous		01–98	0	0
	stationary	intermittent		01–98	>0	>0
	stationary			99	n/a	n/a
Belt B, when Present	n/a	continuous	continuous until Photo Eye Blocked	0	0	0
	n/a	intermittent		0	>0	>0
	stationary	continuous		01–98	0	0
	stationary	intermittent		01–98	>0	>0
	stationary			99	n/a	n/a

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2.6 Memory Management

BNEUUP09.C01 0000602737 A.13 A.2 A.5 1/15/24, 10:13 AM Released

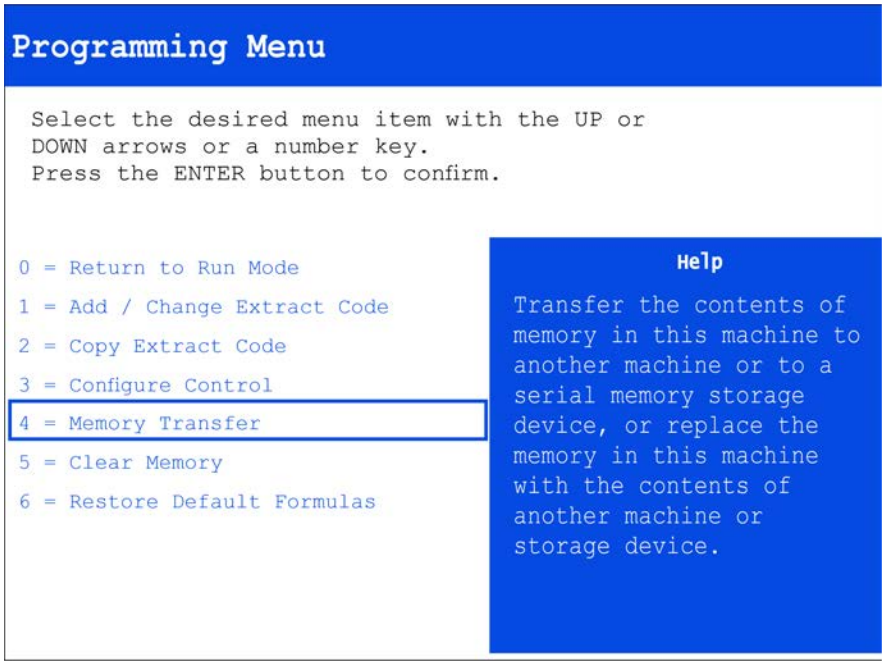
2.6.1 Memory Transfer and Backup

BNEUUP02.T09 0000601628 A.13 A.5 A.28 8/12/24, 10:52 AM Released

Use the *4: Memory Transfer* selection on the *Programming* menu to transfer configuration and extract code data between machines, or to export data to a storage device for backup. Memory transfer processes eliminate the need to repeatedly enter the same configuration and programming data on multiple machines. Maintaining backup files can help you restore data and return your machine to production quickly if data becomes corrupted or lost.

Navigate to the *Memory Transfer* submenu via the *Programming* menu, as shown in the following figure.

Figure 11. Memory Transfer Selection

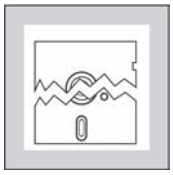


2.6.1.1 Memory Transfer Methods

BNEUUP02.T10 0000601652 A.13 A.5 A.17 5/9/24, 9:38 AM Released

The primary methods used to transfer data to/from the extractor are listed below:

- Transfer data between a machine and a personal computer running the Milnor® Machine Programmer (MMP) software **(primary method)**
- Transfer data between two machines directly communicating via a wired connection
- Send data from the Mildata®/Miltrac™ PC to any machine on the network (one-way transfer, only for machines in a Mildata® network)
- Transfer data between a machine and a serial memory storage device



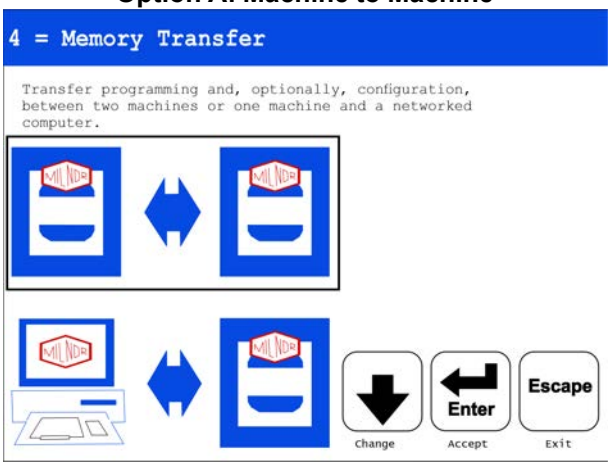
CAUTION: Avoid corrupted data. — The risk of error increases the more machines are involved in a single transfer.

▶ Limit data transfer to one sending (“master”) device and one receiving (“slave”) device at a time.

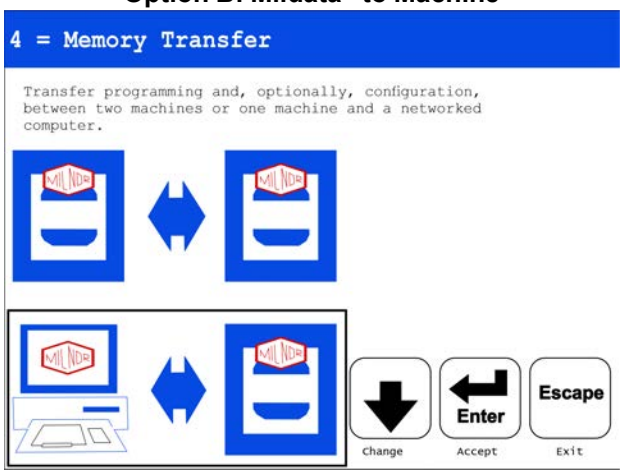
The *Memory Transfer* submenu provides users with two initial options, shown in the figure below.

Figure 12. Memory Transfer Options

Option A: Machine to Machine



Option B: Mildata® to Machine



- Option A, Machine to Machine, applies to data transfers performed between a machine and...
  - a PC running the Milnor® Machine Programmer software,
  - another machine, or
  - a serial memory storage device.
- Option B, Mildata® to Machine, applies to machines receiving data from the Mildata® network.

2.6.1.2 About Machine Compatibility

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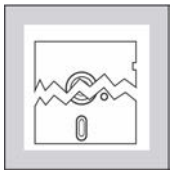
When a machine is designated as a receiving (“slave”) device in a memory transfer, the controller prompts if it should accept or ignore configuration data, making it possible to transfer only extract code data. However, selective downloading of certain extract codes is only possible using the Milnor® Machine Program (MMP) software. All other data transfer methods will send **all** extract codes to the receiving device.

Errors can occur and data can become invalid if the sending and receiving machines do not have identical software versions, or if the model and hardware options of the receiving machine do not correspond closely to those of the sending machine. If you are transferring data from a personal computer running the MMP software or a serial memory storage device, you must consider the software version, model number, and hardware of the extractor that the data on these devices originated from.



CAUTION: Avoid data loss. — The extract codes and, optionally, configuration data of the sending (“master”) machine will overwrite the data on the receiving (“slave”) machine.

▶ Record or backup all extract code and configuration data from the receiving machine before beginning the download.

- For best results, both machines in a machine-to-machine transfer must be identical models with identical controller software and hardware options.

2.6.1.2.1 Principles of Valid Memory Transfer

BNEUUP09.C02 0000615308 A.13 A.3 A.5 5/9/24, 10:19 AM Released

The following principles apply to all "machine-to-machine" transfers, including transfers between two wired machines, transfers between an extractor and a PC running the Milnor® Machine Programmer (MMP) software, and transfers between a machine and serial memory storage device.

- If both involved machines have the same software version, model number, and hardware options, transferred memory data is fully valid. Minor corrections to received data may be required. Validate data on the receiving machine after transfer.
- If both involved machines use the same software version and are the same model number, but have different hardware options, modify the configuration decisions and extract codes on the receiving machine to match the hardware equipped on the sending machine. Transfer of configuration decisions is not recommended.
- If both involved machines use the same software version, but have different model numbers and hardware options, transferred memory data will usually require substantial modification. Validate data on the receiving machine after transfer. Transfer of configuration decisions is not recommended.
- **Do not attempt** memory transfer between machines with different software version numbers. The resulting data on the receiving machine will be invalid.

2.6.1.3 Establish the Required Connections

BNEUUP02.T18 0000602650 A.13 A.5 A.14 5/9/24, 10:59 AM Released

Programmable data can be transferred using **temporary** or **permanent** serial communication cables.

- Machines in a Mildata® or Miltrac™ network typically communicate via **permanent** serial link cables, connected directly to microprocessor boards via MTA connectors. Memory and formula transfer is performed using these permanent cables. However, you must close the Online Communicator software at the Mildata®/Miltrac™ computer to temporarily disable Mildata® communications. This frees the COM port for data transfer.
- If your machine is NOT in a Mildata® or Miltrac™ network, or otherwise not connected via permanent serial link cables, you must use the cabinet-mounted DIN receptacles to **temporarily** attach serial link cables for data transfer. See Section 4.2 : Construction of External Serial Link Cables, page 89 for instructions on establishing temporary serial link cables.

CAUTION: Avoid data loss — To prevent accidental loss of data, remove temporary serial link cables when memory transfer is complete.

2.6.1.4 How to Transfer Data Between a Machine and a PC Using the Milnor® Machine Programmer Software

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Memory transfer is most commonly performed between a personal computer running the Milnor® Machine Programmer (MMP) software and an extractor via serial communication cable. The MMP software can be running on the Mildata®/Miltrac™ computer, or a non-networked personal computer such as a laptop.

2.6.1.4.1 Set Up the Devices

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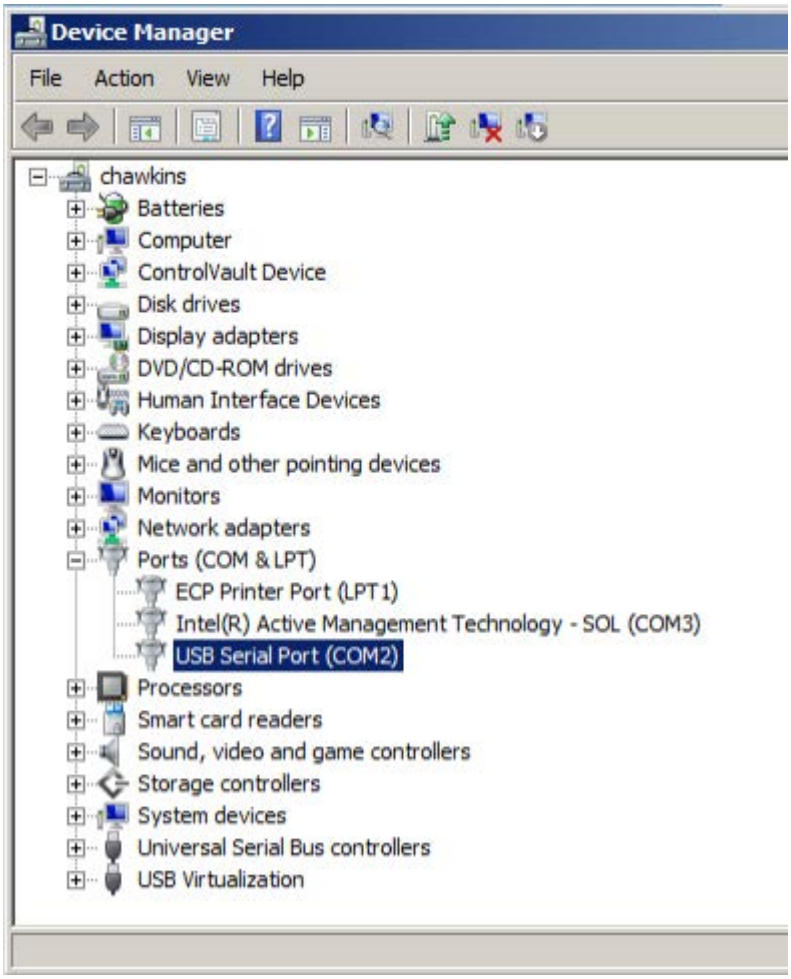
1. Determine whether you will be using **temporary** or **permanent** serial communication cables for this transfer, as explained in Section 2.6.1.3 , page 45, and establish the required connections:
   - If you are using the permanent Mildata® serial cables, close the Online Communicator software at the Mildata®/Miltrac™ computer to temporarily disable Mildata® communications. This frees the COM port for data transfer.
   - If you are using a temporary machine-to-PC data cable (Ex. P/N KXMDSWBRS3), plug the 9-pin DIN connector into the receptacle on the machine, and plug the USB Nano 485 converter into your PC. See Section 4.2.2 : Connecting Milnor® Machine Controllers to a PC, page 89 for more information.
2. Determine the communication port (COM port) used by the extractor (Ex. COM1, COM2, etc.). This value is needed in the subsequent procedures.
   - If you are using the permanent Mildata® serial cables, this will be the Mildata® COM port.
   - If you are using a temporary machine-to-PC data cable, check the COM port that Windows has assigned to the USB Nano 485 Converter, as follows:
     a. Access the system *Control Panel* and navigate to the *Device Manager*.
     b. Expand the *Ports (COM & LPT)* tree by clicking the + sign next to it, and identify the COM port for the “USB Serial Port”, as shown in Figure 13, page 47.

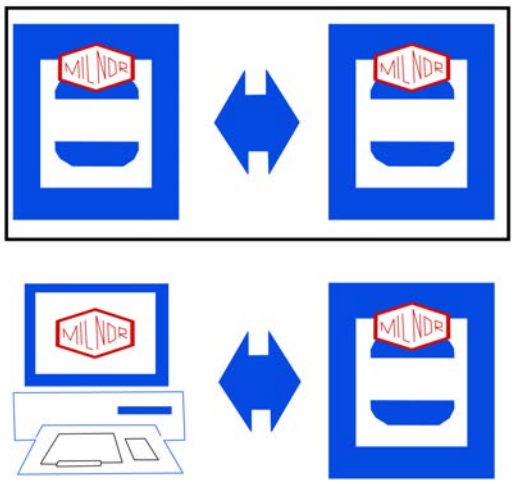
Figure 13. Ports (COM & LPT) on the Device Manager Window (Example)



NOTE: If the assigned COM port is a number other than 1, 2, 3, or 4, you will have to reassign the COM port. Contact the Milnor® Service Department for assistance.

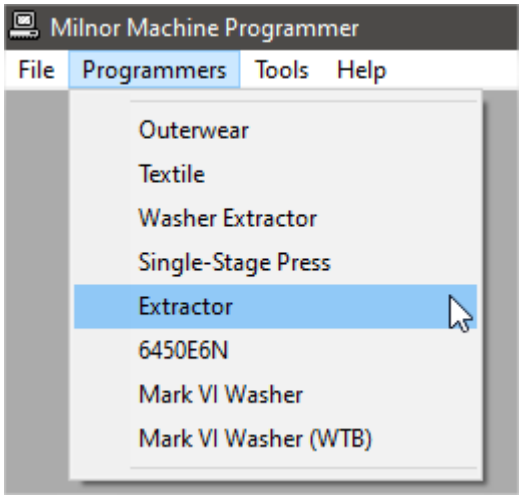
3. At the extractor, access the *Memory Transfer* submenu via the *Programming* menu.
4. On the *Memory Transfer* submenu, select Option A: Machine to Machine, as depicted in the following figure.

Figure 14. Option A: Machine to Machine



5. Open the Milnor® Machine Programmer (MMP) software on your Mildata®/Miltrac™ computer, or other personal computer.
6. On the MMP software taskbar, select **Programmers→Extractor** to launch the centrifugal extractor machine programmer.

Figure 15. Launch the Extractor Programmer from the MMP



7. Continue to Section 2.6.1.4.2 , page 48 if the extractor is receiving data, or Section 2.6.1.4.3 , page 51 if the extractor is sending data.

2.6.1.4.2 How to Send Data from the MMP to an Extractor

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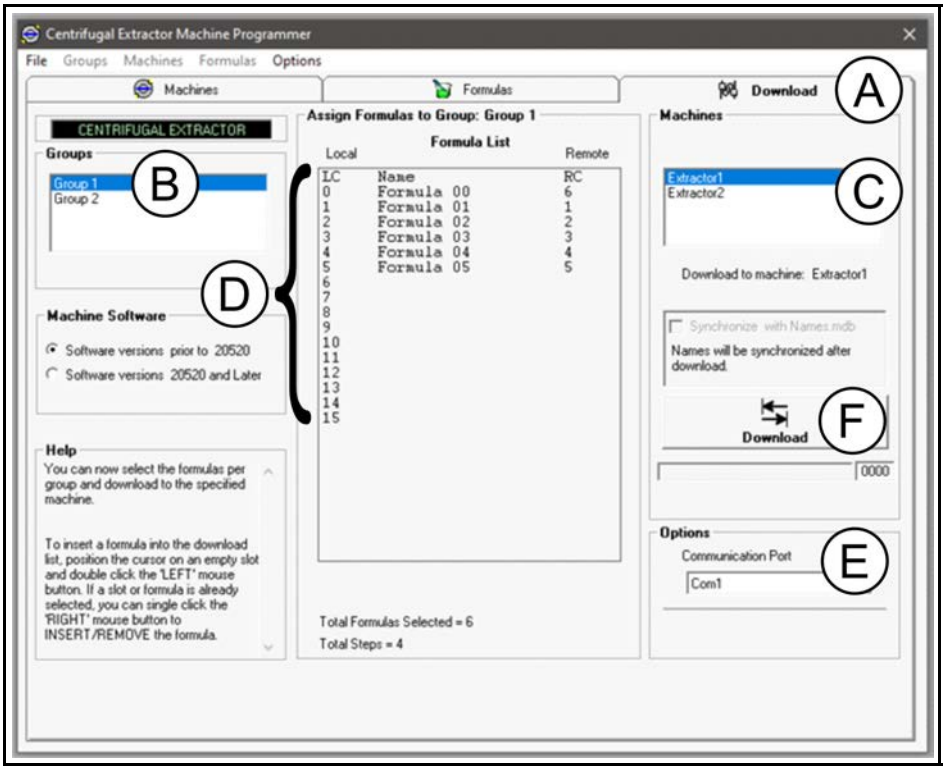
Refer to Figure 16, page 49 below throughout this procedure.

Figure 16. The Download Tab of the Centrifugal Extractor Machine Programmer (MMP)

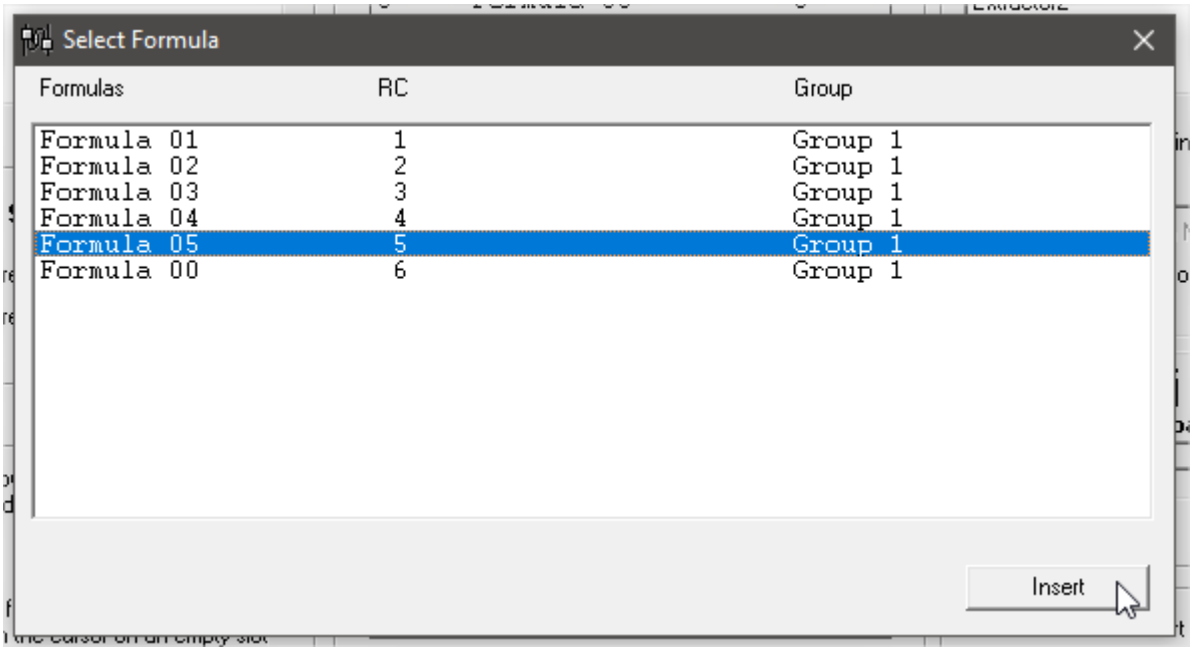


Legend

A . . . Download tab
B . . . Group field
C . . . Machine field
D . . . Empty formula slot
E . . . Communication port
F . . . Download button

1. On your PC, in the MMP window, navigate to the *Download* tab, indicated by item A in the figure.
2. In the *Download* tab, select the extractor that will receive data:
   a. In the *Groups* field (item B), select the desired extractor's Group from the list. The extractors in the selected Group are listed in the *Machines* field.
   b. In the *Machines* field (item C), select the desired extractor.
3. Select the formulas you wish to export by assigning them to the *Formula List* (item D) for the selected Group. You can export up to 16 formulas in a single memory transfer process. To insert a formula into the download list:
   a. Position the cursor on an empty slot and double click the left mouse button. A dialog box appears, which lists all formulas saved in the MMP's memory, as shown in the following figure.
   b. Select a formula from the list and click **Insert** to add it to the *Formula List*.

Figure 17. Formula Insertion



4. Under *Options* (item E), select the communication port used by the extractor from the drop-down list.
   - If your extractor is part of a Mildata® network, this will be the Mildata® com port.
   - If you are using a temporary machine-to-PC data cable, this is the COM port you determined in Section 2.6.1.4.1 : Set Up the Devices, page 46.
5. At the Mark VI extractor controller, on the *Memory Transfer* submenu, designate the extractor as the "slave" device. The controller prompts you to either **Ignore** or **Accept** the configuration data.
   - Select **Ignore** to transfer only the extract codes to the receiving device.
   - Select **Accept** to transfer both the extract codes and the configuration data saved to the MMP's memory for that extractor to the receiving device.
6. Return to the PC running the MMP software, and press the **Download** button (item F). A dialog box prompts you to confirm or cancel the transfer. The transfer begins when you confirm.

   NOTE: If the Online Communicator is running when you attempt to transfer data, the software will issue an error stating the Online Communicator must be closed prior to transferring data, otherwise the data will become corrupted.
7. Upon transfer completion, review and modify imported extract codes and configuration decisions for validity.

CAUTION: Avoid corrupted data. — If memory transfer ends before completion for any reason, the data in the receiving device is **not** valid.

▶ Clear memory and repeat the memory transfer procedure.

8. If you used a temporary serial link cable to connect your machine to a PC, remove the cable. Do not remove permanent serial link cables that were established for machines in a Mildata® network.
9. If your machines are part of a Mildata® network, re-open the Online Communicator software at the Mildata®/Miltrac™ computer to re-enable Mildata® communications when the transfer is finished.

2.6.1.4.3 How to Send Data from an Extractor to the MMP

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1. On your PC, in the MMP window, navigate to the *Machines* tab (the default view after launching the Extractor Programmer).
2. On the *Machines* tab, select **Groups→Upload Data from Machine** on the task bar, as depicted in Figure 18, page 51. The *Upload Data from Machine* window appears, as shown in Figure 19, page 51.

Figure 18. Upload Data from Machine Selection

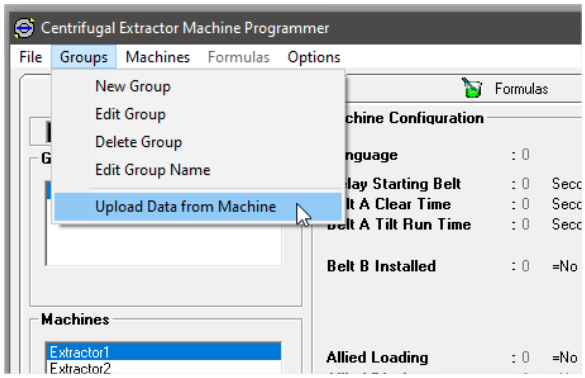
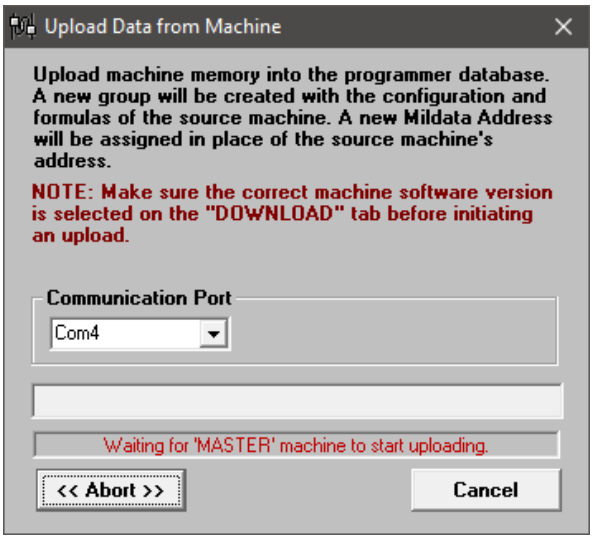


Figure 19. Upload Data from Machine Window



3. In the *Upload Data from Machine* window, select the communication port used by the extractor from the *Communication Port* drop-down menu.
   - If your extractor is part of a Mildata® network, this will be the Mildata® com port.
   - If you are using a temporary machine-to-PC data cable, this is the COM port you determined in Section 2.6.1.4.1 : Set Up the Devices, page 46.
4. Click the **Upload** button to initiate the transfer of data from the extractor to the MMP software.

   The window displays “Waiting for ‘MASTER’ machine to start uploading.”
5. At the Mark VI extractor controller, on the *Memory Transfer* submenu, designate the extractor as the “master” device. **The data transfer begins automatically when you make this selection.**

A new group will be created with the configuration data and formulas of the source machine. A new Mildata® address will be assigned in place of the source machine's address.

6. If you used a temporary serial link cable to connect your machine to a PC, remove the cable. Do not remove permanent serial link cables that were established for machines in a Mildata® network.
7. If your machines are part of a Mildata® network, re-open the Online Communicator software at the Mildata®/Miltrac™ computer to re-enable Mildata® communications when the transfer is finished.

2.6.1.5 How to Transfer Data Between Two Machines

BNEUUP02.T15 0000602398 A.13 A.21 A.5 5/31/24, 2:59 PM Released

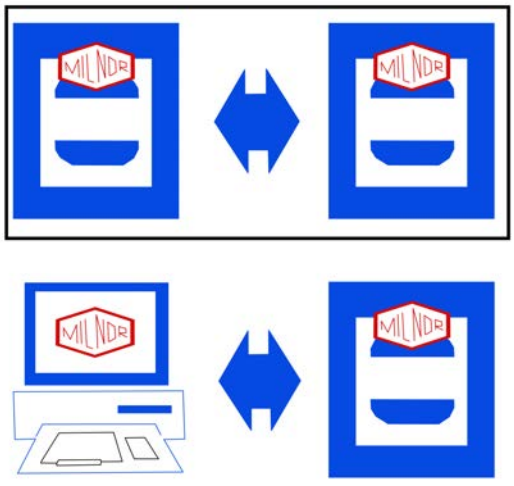
Use the following instructions to transfer memory between two extractors physically wired to one another using permanent or temporary serial communication cables.

1. If you are using the permanent Mildata® serial cables, close the Online Communicator software at the Mildata®/Miltrac™ computer to temporarily disable Mildata® communications. This frees the COM port for data transfer.

   NOTE: If the Online Communicator is running when you attempt to transfer data, the software will issue an error stating the Online Communicator must be closed prior to transferring data, otherwise the data will become corrupted.

2. At the receiving extractor, access the *Memory Transfer* submenu via the *Programming* menu.
3. Select Option A: Machine to Machine, as indicated in the following figure, on the extractor that will receive data.

   Figure 20. Option A: Machine to Machine



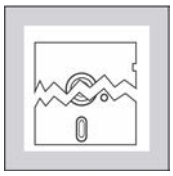
   The controller prompts: "Master or Slave?"

4. At the receiving extractor, select the "slave" designation.

   NOTE: Designate the receiving extractor first. Data transfer begins immediately when the sending extractor is designated as the "master".

5. The controller prompts you to either **Ignore** or **Accept** the sending extractor's configuration decisions.
   - Select **Ignore** to transfer only the extract codes to the receiving extractor. If the extractors involved do NOT share the same hardware options, this is the recommended selection.
   - Select **Accept** to transfer both the extract codes and the configuration data to the receiving extractor.
6. At the sending extractor, access the *Memory Transfer* submenu via the *Programming* menu, and select Option A: Machine to Machine.

   The controller prompts: "Master or Slave?"
7. At the sending extractor, select the "master" designation. **The data transfer begins automatically when you make this selection.**
8. Upon transfer completion, review and modify imported extract codes and configuration decisions for validity.



CAUTION: Avoid corrupted data. — If memory transfer ends before completion for any reason, the data in the receiving device is **not** valid.

▶ Clear memory and repeat the memory transfer procedure.

9. If you used a temporary serial link cable to connect your machines, remove the cable. Do not remove permanent serial link cables that were established for machines in a Mildata® network.
10. If your machines are part of a Mildata® network, re-open the Online Communicator software at the Mildata®/Miltrac™ computer to re-enable Mildata® communications.

2.6.1.6 How to Download Data from a PC via the Mildata® Network

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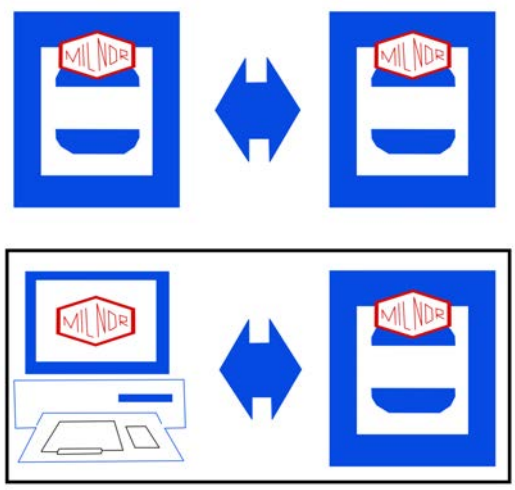
If your machine is part of a Mildata® network, it is possible to download extract code and, optionally, configuration data from the Milnor® Machine Programmer (MMP) software on the Mildata®/Miltrac™ PC directly to a networked extractor. This method bypasses the need to initiate the transfer from the MMP software; however, the extractor can only receive data using this method, not send it.

NOTE: In order to use this data transfer method, you must have the programmer (MMP) path and the download DLL defined in the Mildata® software.

1. At the receiving extractor, access the *Memory Transfer* submenu via the *Programming* menu.
2. On the *Memory Transfer* menu, select Option B: Mildata® to Machine, as depicted in the following figure.

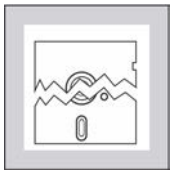
Figure 21. Option B: Mildata® to Machine



The controller prompts: **Mildata® Network** or **Machine Programmer**?

3. Select the **Mildata® Network** option. This automatically designates the extractor as the receiving ("slave") device, and the PC as the sending ("master") device.
4. The controller prompts you to either **Ignore** or **Accept** the master device's configuration decisions.
   - Select **Ignore** to transfer only the extract codes to the receiving device.
   - Select **Accept** to transfer both the extract codes and the configuration data saved to the MMP's memory for that extractor to the receiving device.

   The memory transfer automatically begins when you make a selection.
5. Review and modify imported extract codes and configuration decisions as needed upon transfer completion.



CAUTION: Avoid corrupted data. — If memory transfer ends before completion for any reason, the data in the receiving device(s) is **not** valid. **Clear memory and repeat the memory transfer procedure.**

2.6.1.7 How to Transfer Data between a Machine and a Serial Memory Storage Device

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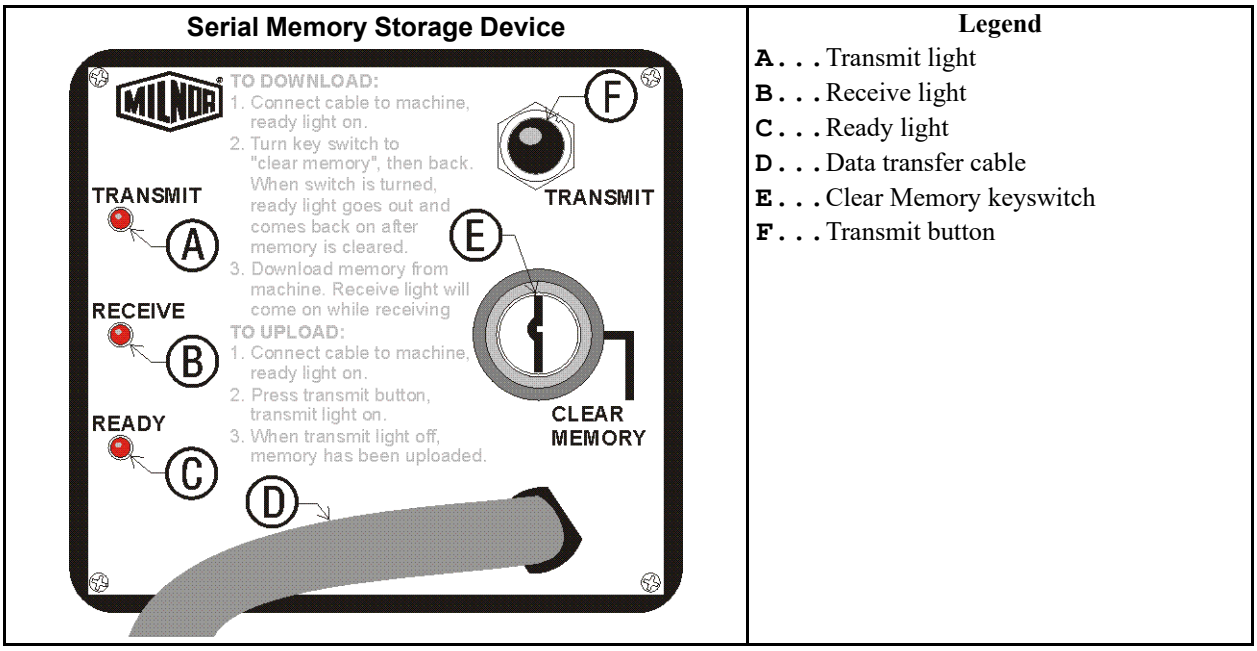
The Milnor® serial memory storage device (also known as a download box, or "black box") contains nonvolatile memory to hold a back-up copy of the programming and configuration data for one machine. The following procedures explain how to upload and download data between an extractor and a serial memory storage device for backup or transfer to another machine. A typical serial memory storage device is depicted in the following figure.

Figure 22. Controls Identification on Serial Memory Storage Device



2.6.1.7.1 How to Send Data from a Machine to a Serial Memory Storage Device

BNEUUP02.T16 0000602397 A.13 A.5 5/31/24, 3:01 PM Released

1. Clear the serial memory storage device's memory so that it can accept new data.
   a. Insert the key into the **Clear Memory** keyswitch on the serial memory storage device.
   b. Turn the key to the horizontal position to clear memory, then return the key to the normal vertical position.
   c. The **Ready** light on the storage device will remain OFF until the clearing process is complete.

      NOTE: The clearing process takes about 45 seconds, and requires no user action beyond turning the key to **Clear Memory** and returning it to the normal position.

   d. When the **Ready** light comes on again, the storage device is ready to accept data from the extractor controller.

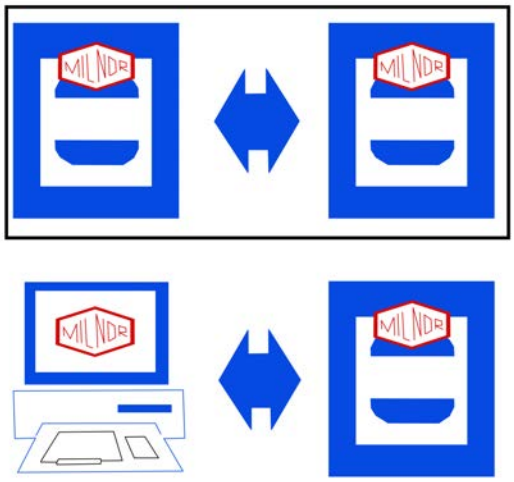
Figure 23. Serial Memory Storage Device—Clear Memory Stages

2. Configure the device's DIP switch settings to accept extractor data. See Section 4.3 : Serial Memory Storage Device Applications, page 94 for more information.
3. Connect the device to the extractor using the 9-pin DIN receptacle on the electric box.

   There is a cable pre-wired to the device for establishing a temporary connection. See Section 4.2 : Construction of External Serial Link Cables, page 89 for information on cable fabrication.

4. With the **Ready** light illuminated on the serial memory storage device, access the *Memory Transfer* submenu via the *Programming* menu on the extractor that will send data.
5. Select Option A: Machine to Machine, as indicated in the following figure.

Figure 24. Option A: Machine to Machine

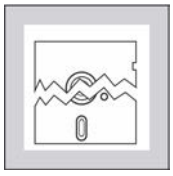


The controller prompts: "Master or Slave?"

6. Select the "master" designation. **The data transfer process will begin immediately.**

   The **Receive** light on the storage device illuminates when the data transfer begins, indicating that it is receiving data, and goes off when the transfer has been successfully completed.

Figure 25. Serial Memory Storage Device—Slave Stages



CAUTION: Avoid corrupted data. — If memory transfer ends before completion for any reason, the data in the receiving device is **not** valid.

- Clear memory and repeat the memory transfer procedure.

7. When the transfer is finished, remove the temporary serial cable connecting the storage device to the machine.
8. If you plan to maintain the data on the serial memory storage device as a backup copy, label the storage device with the date, machine name, and serial number to avoid confusion when the device is needed to restore data to a machine.

2.6.1.7.2 How to Send Data from a Serial Memory Storage Device to a Machine

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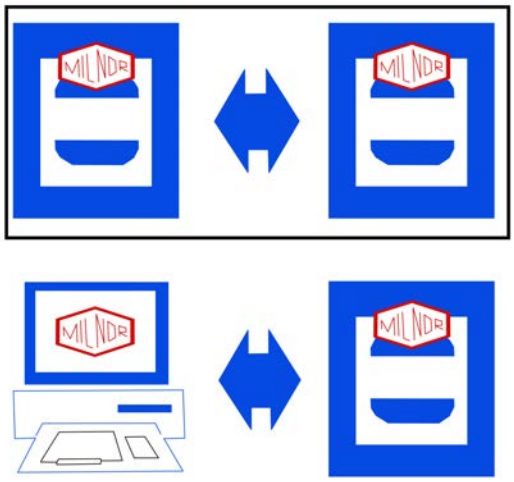
This procedure assumes that the serial memory storage device contains a valid data set for import.

1. Connect the device to the extractor using the 9-pin DIN receptacle on the electric box.

   There is a cable pre-wired to the device for establishing a temporary connection. See Section 4.2 : Construction of External Serial Link Cables, page 89 for information on cable fabrication.

2. Access the *Memory Transfer* submenu via the *Programming* menu on the extractor that will receive data.
3. Select Option A: Machine to Machine, as indicated in the following figure.

Figure 26. Option A: Machine to Machine

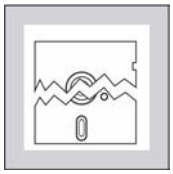


The controller prompts: “Master or Slave?”

4. Select the “slave” designation.
5. The controller prompts you to either **Ignore** or **Accept** the configuration data saved to the serial memory storage device.
   - Select **Ignore** to transfer only the extract codes to the receiving extractor.
   - Select **Accept** to transfer both the extract codes and the configuration data to the receiving extractor.
6. Press the **Transmit** button on the serial memory storage device to initiate the transfer. The button light will illuminate while the data transfer is active, and will turn off once the transfer is complete.

Figure 27. Serial Memory Storage Device—Master Stages

7. Upon transfer completion, review and modify imported extract codes and configuration decisions for validity.



CAUTION: Avoid corrupted data. — If memory transfer ends before completion for any reason, the data in the receiving device is **not** valid.

- Clear memory and repeat the memory transfer procedure.

8. Remove the temporary serial cable connecting the storage device to the machine.

2.6.2 Clear Memory

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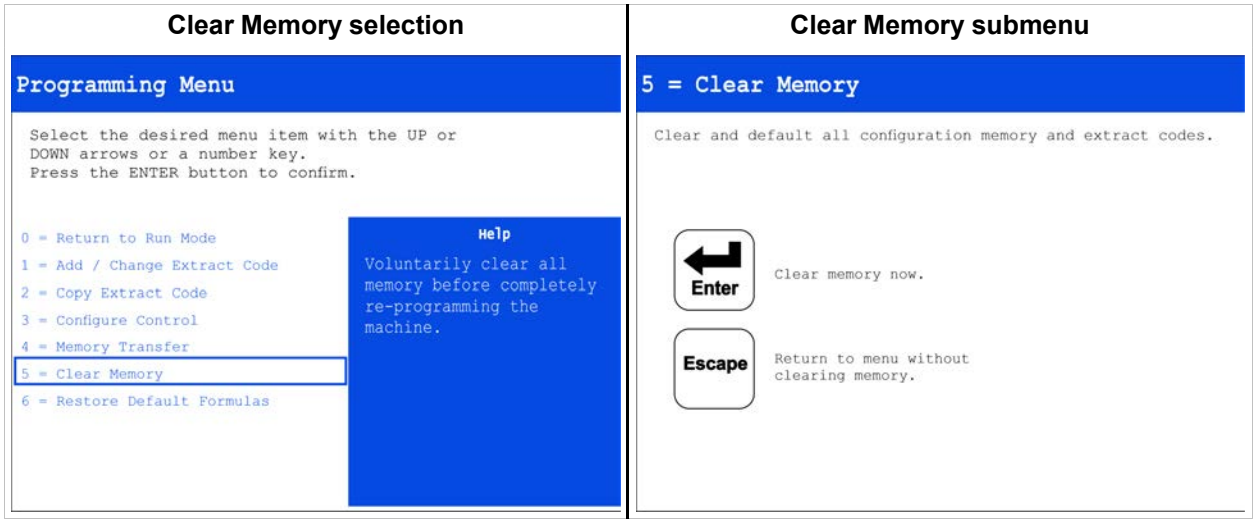
Use this selection to voluntarily clear all extract code and configuration data from the machine controller.

Figure 28. Clear Memory Selection and Submenu



1. Navigate to the *Clear Memory* submenu via the *Programming* menu, as shown in Figure 28, page 58.
2. On the *Clear Memory* submenu, press the **Enter** key to clear all formulas and machine configuration from memory.

All machine configuration decisions will be reset to their default values. After a successful “clear memory” operation, the controller will display the cleared *Configuration* submenu, to prompt for new values.

3 Troubleshooting

3.1 Correcting Errors

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The error messages that appear on the display may require action by the operator, management personnel, or an authorized service representative.

WARNING: Shock Hazard — Electrified parts inside can shock or electrocute you.

- When troubleshooting any electrical fault, lock **off** and tag out power at the external disconnect switch before accessing any electric box or electrical component.

WARNING: Crushing and Entanglement Hazards — The extractor will resume operation immediately upon fault correction, as explained in this section.

- When troubleshooting any mechanical fault, lock **off** and tag out power at the external disconnect switch before accessing any extractor mechanism. Extractor will resume operation immediately upon fault correction as explained in this section. Make sure all personnel are clear of extractor mechanisms.

3.1.1 Interruptions Repairable by the Operator

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These errors can usually be corrected at the operator controls. Review the hazard statements above, in your safety manual, and posted on the machine before attempting any error resolution.

Error Message	Explanation + Recovery
`THREE WIRE DISABLED any message`	The three-wire relay supplying control circuit power to the machine was de-energized, or power was restored to the machine after a shutdown or power loss. **Recovery**: Press **Start** to close the three-wire circuit. If the three-wire circuit remains disabled or another message appears on the display, request authorized service.
`Photoeye Blocked`	The photoeye on the discharge conveyor was blocked when the belt should be empty. **Recovery**: Clear the photoeye and cancel the operator signal to resume.

Error Message	Explanation + Recovery
`Accumulator Data Error / Press ENTER to Clear Data`	Accumulator data was determined to be invalid (usually because of a power surge at power ON). **Recovery**: Clear the accumulator data and resume operation.
`Receive Fault`	The unloading device cancelled the transfer, or the formula code received was not programmed in the extractor control, causing a malfunction during transfer. **Recovery**: Cancel the operator signal and enter cake data to resume operation.
`Transfer Fault`	The receiving device malfunctioned as the extractor attempted discharge. **Recovery**: Cancel the operator signal and enter cake data to resume operation.
`Load Eye was Blocked`	The load end photo-eye detected goods or was blocked three times during the last "Check Load Eye Time" of distribution. **Recovery**: Cancel the operator signal and enter cake data to resume operation.
`Load Chute Blocked`	The load chute photo-eye was blocked (or its connection to the microprocessor broken) during the last five seconds of the distribution phase of the cycle. **Recovery**: Clear the load chute photoeye and cancel the operator signal to resume.
`Redistribution Fault`	There have been three unsuccessful attempts to redistribute the load after an out-of-balance condition during extract tripped the excursion switch. **Recovery**: Allow the extractor to operate at a lower speed, which will result in wetter goods that require longer drying times. If the extractor is consistently generating this error, troubleshoot the speed-limiting system. See your service manual for more information.
`Failed to Block Photoeye`	The photoeye on the conveyor failed to detect a load during discharge. **Recovery**: Check the load on the discharge conveyor and cancel the operator signal to resume.
`Failed to Clear Photoeye`	The load on the conveyor failed to unblock the photoeye within the programmed time limit during discharge. **Recovery**: Check the load on the discharge conveyor and cancel the operator signal to resume.

3.1.2 Interruptions Requiring Management Assistance

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These errors usually require accessing the *Programming* menu on the Mark VI extractor controller, or the program data on the Mildata® computer.

Error Message	Explanation + Recovery
`Invalid Work Order`	The extract formula requested from Mildata® contains an invalid work order number. **Recovery**: Check the Mildata® extract formula and cancel the operator signal to resume.
`Invalid Goods Code`	The extract formula requested from Mildata® contains an invalid goods code. **Recovery**: Check the Mildata® extract formula and cancel the operator signal to resume.
`Invalid Customer Code`	The extract formula requested from Mildata® contains an invalid customer code. **Recovery**: Check the Mildata® extract formula and cancel the operator signal to resume.
`Invalid Employee Number`	The extract formula requested from Mildata® contains an invalid employee number. **Recovery**: Check the Mildata® extract formula and cancel the operator signal to resume.
`Invalid Extract Code`	The extract formula requested from Mildata® contains an invalid extract code. **Recovery**: Check the Mildata® extract formula and cancel the operator signal to resume.
`Data Not Found`	The extract formula requested from the Mildata® system is invalid. **Recovery**: Check the Mildata® extract formula and cancel the operator signal to resume.
`Source Is Empty`	An empty extract code position was selected for copying in the *Copy Extract Code* submenu. **Recovery**: Select an occupied extract code position to copy.
`Target Not Empty`	An occupied extract code position was selected for depositing a copied extract code in the *Copy Extract Code* submenu. **Recovery**: Select an unoccupied extract code position for depositing the copied extract code.
`Formula [XX] incomplete: turn key to program`	The controller detected an incomplete or invalid formula that must be deleted from memory, where [XX] is the number of the offending formula; usually caused by turning the keyswitch to  without ending the formula.

Error Message	Explanation + Recovery
	Recovery: Delete the formula via the *Add / Change Extract Code* submenu.
`Error in Check Sum` `Next to Proceed`	On a machine receiving data during a download operation, this message indicates that downloading was unsuccessful. **Recovery**: Repeat the memory transfer process with the same machines, ensuring that power remains consistent throughout the download operation.
`Config Error` `Turn Key to Program`	Indicates the configure data is corrupt (possibly as a result of turning power off while in the *Program* mode) on power-up. **Recovery**: The machine must be reconfigured. Turn the *Run/Program* ( / ) keyswitch to  to re-configure the machine.
`Clear Memory Now` `Turn Key to Program`	The controller detected an error in configuration or program memory. This usually occurs after power loss, or if the **Master Switch** was turned off while the keyswitch was in the  *Program* position. **Recovery**: Turn the *Run/Program* ( / ) keyswitch to  and press the

3.1.3 Interruptions Requiring Authorized Service

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These errors usually require accessing mechanical or electrical components. Request authorized service in accordance with published safety information. See the safety manual.

WARNING: Entangle and Crush Hazards — Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.

Error Message	Explanation + Recovery
`Peripheral Board Failure [Board XX]`	The named circuit board has lost communication with the processor board. Request authorized service. **Recovery**: Cancel the operator signal to reset the control and access the *Programming* menu. If the error is corrected, a formula can be run in either automatic or manual mode.
`Limit Switch Failed`	The down and up limit switches are made simultaneously. **Recovery**: Request authorized service. Cancel the operator signal to resume operation after the error is corrected.
`Brake Fault Clear Fault to Restart`	The brake pressure switch detected insufficient air pressure in the brake release air cylinder to guarantee brake has released. **Recovery**: Request authorized service. The message clears when the switch detects adequate pressure.
`Load Chute Is Not Down`	The load chute did not descend to the loading position within 10 seconds after the loading sequence started. **Recovery**: Request authorized service. The message clears when the load chute descends fully.
`Load Door Is Not Up`	The load door did not rise to the full up position within 10 seconds after the loading sequence or the discharge sequence started. **Recovery**: Request authorized service. The message clears when the load door raises fully.
`Load Door Is Not Down`	The load door did not descend to the full down position within 10 seconds after the loading sequence or the discharge sequence started. **Recovery**: Request authorized service. The message clears when the load door descends fully.
`Load Chute Is Not Up`	The load chute did not rise to the full up position before the last five seconds of the distribution phase of the cycle. **Recovery**: Request authorized service. Press **Signal Cancel** to restart the cycle after the error is corrected.
`Conveyor Door is Not Down`	The conveyor door did not move down to permit clearance to the extractor drain within five seconds after the extractor tilted up to discharge. A malfunction in the door mechanism or the down proximity switch causes this error. **Recovery**: Request authorized service. The message clears when the door is down.
`Conveyor Door is`	The conveyor door did not move up within the time limit after the controller called to close the extractor drain. A

Error Message	Explanation + Recovery
`Not Up`	malfunction in the door mechanism or the up proximity switch causes this error. **Recovery**: The error clears automatically when the **Conveyor Door Down** input is made.
`*--Keypad Error--*` `[key name]`	A keypad key was stuck or shorted. **Recovery**: Request authorized service.
`Speed Switch is Open`	The speed switch circuit is open. **Recovery**: If the cylinder is stationary, request authorized service. The message clears when the circuit closes.
`Check Brake Shoes`	The machine controller checks the brake pad input when power is applied to the machine or after the configured time after power-up expires. Request authorized service. **Recovery**: Press **Signal Cancel** to clear the error. The error will appear again until the required service is completed.
`Inverter Fault`	The machine controller detected an inverter fault condition. **Recovery**: Authorized service is required to resume operation.
`Data Request Error` `Check MILDATA Link`	The machine control did not receive a valid response from the Mildata® system. **Recovery**: Request authorized maintenance.
`Too Long to Tilt Up`	The extractor did not tilt to the full up position for loading in the allowed time. **Recovery**: Request authorized service on the tilt system or the full up proximity switch.
`Too Long to Tilt Down`	The extractor did not tilt to the full down position for discharging in the allowed time. **Recovery**: Request authorized service on the tilt system or the full up proximity switch.
`Cylinder Not Fully Down`	The machine control does not see the input from the full down tilt switch. **Recovery**: Request authorized service on the full down switch or the tilt system.
`Speed Switch Fault`	The speed switch is closed when the machine controller expects it to be open. Either the basket is not rotating or the speed switch circuit malfunctioned. **Recovery**: Request authorized service.

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3.2 The Manual Menu

BNEUUP06.C04 0000602209 A.5 A.7 A.14 8/12/24, 11:07 AM Released

The *Manual* menu of the centrifugal extractor allows users to manually operate the machine, and provides tools for troubleshooting inputs and outputs and generating reports. Press the Manual (

) button on the keypad when the machine is idle in the *Run* mode to access the *Manual* menu. The menu provides six selections:

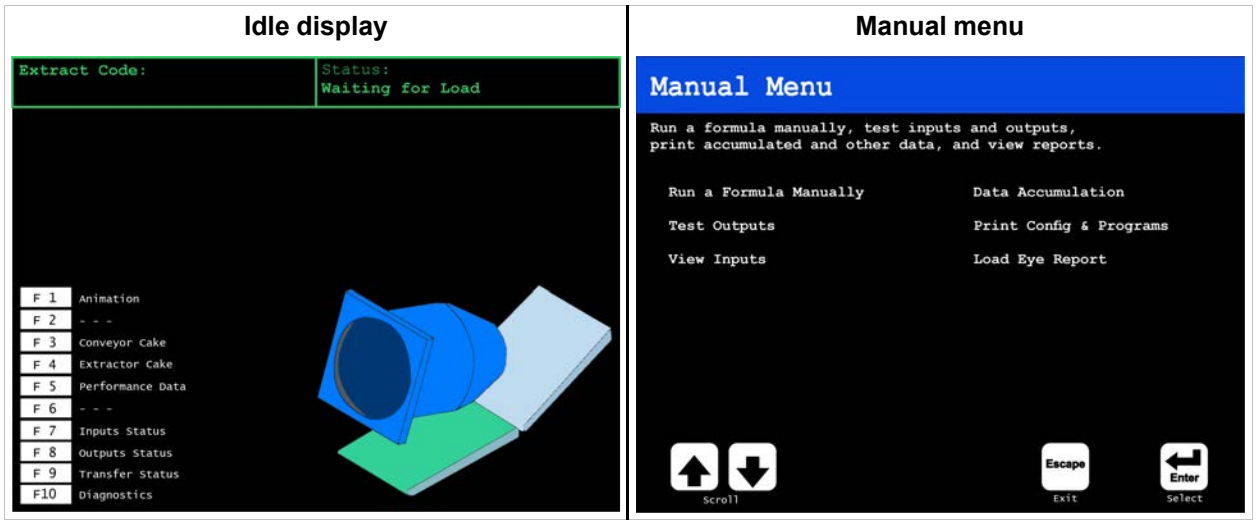
- **Run a Formula Manually** allows you to initiate a programmed extract code manually. See Section 3.2.2 : Run a Formula Manually, page 66 for more information.
- **Test Outputs** allows you to activate any individual output for testing when the extractor is idle. See Section 3.2.3 : Test Outputs, page 67 for more information.
- **View Inputs** displays the status of inputs while the extractor is idle. See Section 3.2.4 : View Inputs, page 71 for more information.
- **Data Accumulation** allows you to display, print, and/or clear accumulated extract code data. See Section 3.2.5 : Data Accumulation, page 75 for more information.
- **Print Config & Program** allows you to print extract codes and configuration decisions for future reference. See Section 3.2.6 : Print Config & Program, page 77 for more information.
- **Load Eye Report** allows you to print a report of all load-eye errors. See Section 3.2.7 : Load Eye Report, page 79 for more information.

3.2.1 How to Use the Manual Menu

BNEUUP06.T01 0000602269 A.5 A.7 A.14 8/12/24, 1:04 PM Released

The *Manual* menu can only be accessed when the extractor is idle (displays “Waiting for Load”), as shown in Figure 29: Idle Extractor + Manual Menu, page 65 below.

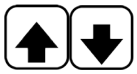
Figure 29. Idle Extractor + Manual Menu



To use the *Manual* menu:

1. Press the **Manual** button on the keypad when the extractor is idle.

2. Use the arrow keys to scroll through the available options.



3. Press the **Enter** key to access the selected *Manual* menu option.

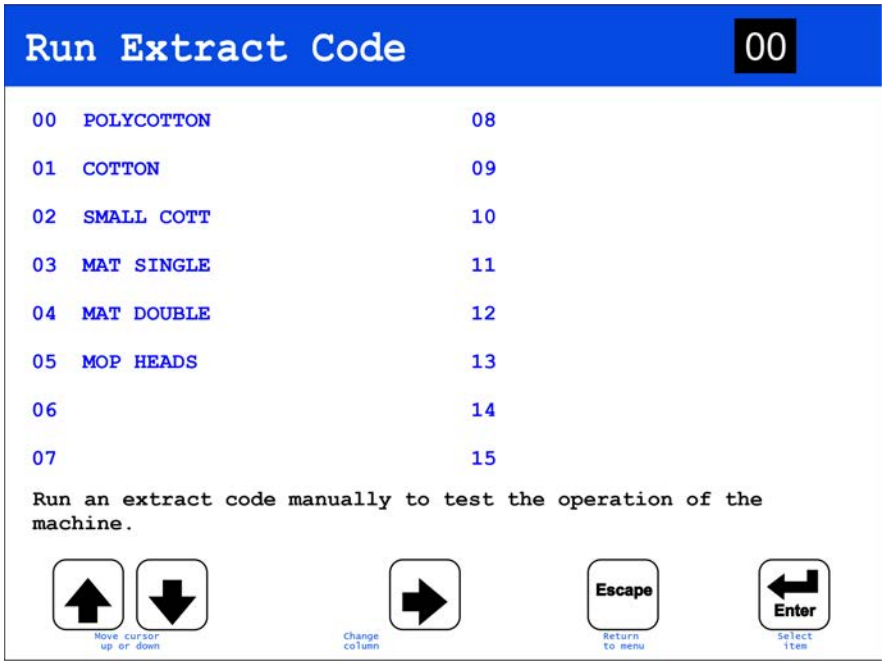
4. Press the **Escape** key to exit the *Manual* menu. The extractor will prompt for cake and load data.

3.2.2 Run a Formula Manually

BNEUUP06.T02 0000602268 A.4 A.5 A.14 8/12/24, 1:07 PM Released

From the *Manual* menu, select **Run a Formula Manually** to manually initiate an extract code. Running an extract code manually can help service technicians test the operation of the machine, and determine the cause of certain fault conditions. Extract codes are selected from the *Run Extract Code* submenu shown in the figure below.

Figure 30. Run Extract Code Submenu



To use the *Run Extract Code* submenu:

Navigate between extract codes with the arrow keys, or by entering the two-digit number of the desired extract code on the keypad.

Press the **Enter** key to initiate extract code operation.

Press the **Escape** key to return to the *Manual* menu without initiating an extract code.

3.2.3 Test Outputs

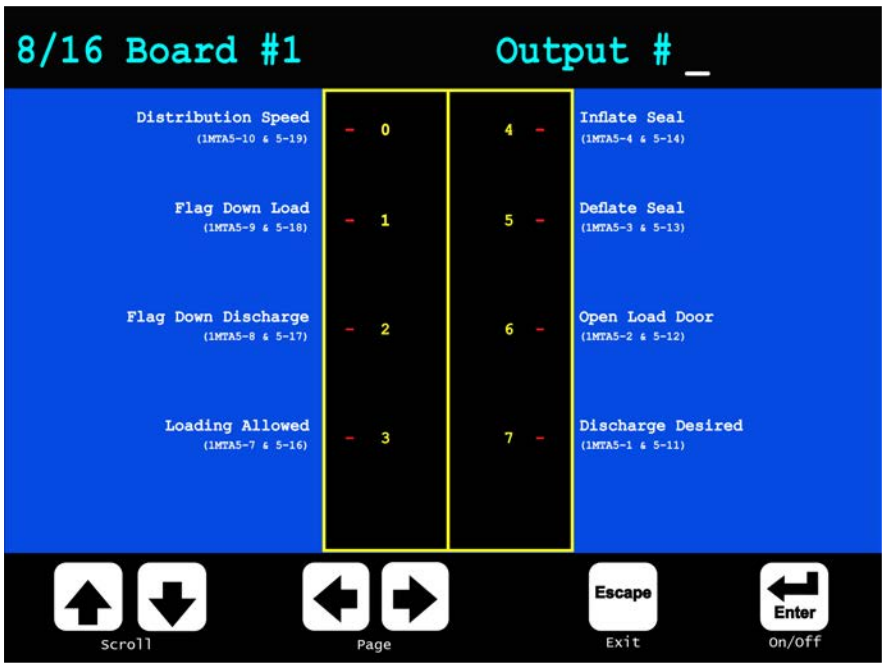
BNEUUP06.T03 0000602311 A.5 A.7 A.14 8/12/24, 1:22 PM Released

From the *Manual* menu, select **Test Outputs** to manually actuate certain outputs while the machine is idle. Turn on individual outputs to troubleshoot them, or test certain machine functions. The minus sign "-" indicates the output is NOT made. The plus sign "+" indicates the output is made.

If the machine is operating, you can view the status of outputs with the **F8** key (

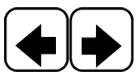
), but you cannot actuate them. See your operator guide for more information.

Figure 31. Test Outputs Submenu (8/16 Board #1)



To use the *Test Outputs* submenu:

Use the **up** and **down** arrow keys to navigate between outputs on a page, or enter the corresponding keypad entry on the keypad.



Use the **left** and **right** arrow keys to navigate between boards.

Press the **Enter** key to actuate an output.

Press the **Escape** key to return to the *Manual* menu.

3.2.3.1 List of Standard Outputs

BNEUUP06.C12 0000602312 A.13 A.5 A.14 8/1/24, 11:42 AM Released

The following tables list the standard outputs, along with descriptions of their functions and their assigned pin(s) on the I/O boards.

Table 15, page 69 lists the special functions, which allow you to activate the different mechanical functions of the extractor from one screen.

Table 12. 8/16 Board #1

Keypad Entry	Output Name	Pin	Function
0	Distribution Speed	1MTA5-10 & 5-19	Turns the cylinder at distribution speed.
1	Flag Down Load	1MTA5-9 & 5-18	If the extractor is loaded by a traversing COBUC (wet goods shutle), this output signals the COBUC to stop aligned with the extractor.
2	Flag Down Discharge	1MTA5-8 & 5-17	If the extractor discharges to a shuttle, this output signals the shuttle to stop aligned with the extractor.
3	Loading Allowed	1MTA5-7 & 5-16	If the extractor is loaded by an allied (non-Miltrac™) loading device, this output signals the loading device that the extractor can receive a load.
4	Inflate Seal	1MTA5-4 & 5-14	Inflates the inflatable basket ribs.
5	Deflate Seal	1MTA5-3 & 5-13	Deflates the inflatable basket ribs.
6	Open Load Door	1MTA5-2 & 5-12	If the extractor is equipped with a load door, this output opens the load door.
7	Discharge Desired	1MTA5-1 & 5-11	If the extractor discharges to an allied (non-Miltrac™) receiving device, this output signals the receiving device that the extractor is ready to discharge.

Table 13. 24–Out Board #1

Keypad Entry	Output Name	Pin	Function
00	E1/E2 Speed	1MTA13-1 & 13-11	This output closes when the cylinder turns at the configured “Low Extract Speed” and “High Extract Speed”.
01	VFD Jog Speed	1MTA13-2 & 13-12	This output closes when the cylinder is jogging to unload.
02	E3/E4 Speed	1MTA13-3 & 13-13	— reserved —
03	CW Slow Speed	1MTA13-4 & 1MTA13-14	The cylinder turns clockwise at slow speed.
04	CCW Slow Speed	1MTA13-5 &13-15	The cylinder turns counter-clockwise at slow speed.
05	Load Desired	1MTA13-6 & 13-16	If the extractor receives from allied (non-Miltrac™) loading device, this output signals the loading device that the extractor is ready to receive a load.
06	Signal	1MTA13-7 & 13-17	Actuates the operator light/buzzer.
07	Discharge Finished	1MTA13-8 & 13-18	If the extractor discharges to an allied (non-Miltrac™) receiving device, this output signals the receiving device that the extractor is finished discharging.

Table 13 24–Out Board #1 (cont'd.)

Keypad Entry	Output Name	Pin	Function
08	Brake Release	1MTA13-9 & 13-19	This output closes when the microprocessor desires to release the brake.
09	Run Belt A	1MTA13-10 & 14-1	The belt under the basket (Belt A) runs.
10	Run Belt B	1MTA14-2 & 14-11	If equipped, the external storage belt (Belt B) runs.
11	VFD Ramp Hold	1MTA14-3 & 1MTA14-12	This output closes to limit extract speed when the out-of-balance detection system is triggered.
12	Lower Load Chute	1MTA14-4 & 1MTA14-13	If the extractor is equipped with a load chute, this output lowers the load chute.
13	Close Load Door	1MTA14-4 & 14-14	If the extractor is equipped with a load door, this output closes the load door.
14 — 23	— not used —	—	—

Table 14. 8/16 Board #4

Keypad Entry	Output Name	Pin	Function
0	VFD Alternate Acceleration	4MTA5-10 & 5-19	This output closes to use the alternate acceleration time preprogrammed in the inverter (if configured).
1	Tilt Down Auxiliary	4MTA5-9 & 5-18	Tilts the cylinder down when made in conjunction with the “Tilt Down” output (4MTA5-1 & 5-11). Both outputs must be made at the same time.
2	Tilt Up Auxiliary	4MTA5-8 & 5-17	Tilts the cylinder up when made in conjunction with the “Tilt Up” output (4MTA5-4 & 5-14). Both outputs must be made at the same time.
3	— not used —	4MTA5-7 & 5-16	—
4	Tilt Up	4MTA5-4 & 5-14	Tilts the cylinder up when made in conjunction with the “Tilt Up Auxiliary” output (4MTA5-8 & 5-17). Both outputs must be made at the same time.
5	— not used —	4MTA5-3 & 5-13	—
6	— not used —	4MTA5-2 & 5-12	—
7	Tilt Down	4MTA5-1 & 5-11	Tilts the cylinder down when made in conjunction with the “Tilt Down Auxiliary” output (4MTA5-9 & 5-18). Both outputs must be made at the same time.

Table 15. Special Functions

Keypad Entry	Output Name	Function
00	Clockwise slow *	The cylinder turns clockwise at slow speed.
01	Counter-clockwise slow *	The cylinder turns counter-clockwise at slow speed.
02	Distribution speed *	The cylinder turns at distribution speed.
03	1st extract speed	The cylinder turns at first extract speed, as determined by factory-set inverter constants.
04	2nd extract speed	The cylinder turns at second extract speed, as determined by factory-set inverter constants.
05	3rd extract speed	The cylinder turns at third extract speed as, determined by factory-set inverter constants.
06	4th extract speed	The cylinder turns at fourth extract speed, as determined by factory-set inverter constants.

Table 15 Special Functions (cont'd.)

Keypad Entry	Output Name	Function
07	Open Load Door	The load door (if equipped) opens.
08	Close Load Door	The load door (if equipped) closes.
09	Inflate Ribs	The inflatable basket ribs (if equipped) inflate.
10	Deflate ribs	The inflatable basket ribs (if equipped) deflate.
11	Tilt machine up **	The extractor tilts up.
12	Tilt machine down	The extractor tilts down.
13	Lower Load Chute	The load chute (if equipped) lowers.
14	Run Belt A	The belt under the basket (Belt A) runs.
15	Run Belt B	If equipped, the external storage belt (Belt B) runs.
16 — 23	— not used —	—
*	When output is on, clutch engages, brake releases, and motor turns. Motor stops and brake is applied when output is off.	
**	When proximity switches are made and machine is on safety stands, extractor tilts full up for two seconds to remove stands.	

3.2.3.2 Optional Allied Data Pass Outputs

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If allied data pass option is provided, actuating any of the outputs shown in the following table closes one microprocessor relay. The closed relays are used in combination to pass codes in binary format to an allied receiving device. Up to three additional 8-output/16-input boards, and one additional 24-output board can be required for allied data pass.

Table 16. Optional Allied Data Pass Outputs

Display Code	I/O Board #2		I/O Board #3		24–Out Board #2	
	Output Name	Connector & Pin	Output Name	Connector & Pin	Output Name	Connector & Pin
0	Dry Code Bit 0	2MTA5-10 & 5-19	Customer Code Bit 0	3MTA5-10 & 5-19	Single Cake	2MTA13-1 & 13-11
1	Dry Code Bit 1	2MTA5-9 & 5-18	Customer Code Bit 1	3MTA5-9 & 5-18	New Formula	2MTA13-2 & 13-12
2	Dry Code Bit 2	2MTA5-8 & 5-17	Customer Code Bit 2	3MTA5-8 & 5-17	Goods Code Bit 0	2MTA13-3 & 13-13
3	Dry Code Bit 3	2MTA5-7 & 5-16	Customer Code Bit 3	3MTA5-7 & 5-16	Goods Code Bit 1	2MTA13-4 & 13-14
4	Formula Code Bit 0	2MTA5-4 & 5-14	Customer Code Bit 4	3MTA5-4 & 5-14	Goods Code Bit 2	2MTA13-5 & 13-15
5	Formula Code Bit 1	2MTA5-3 & 5-13	Customer Code Bit 5	3MTA5-3 & 5-13	Goods Code Bit 3	2MTA13-6 & 13-16
6	Formula Code Bit 2	2MTA5-2 & 5-12	Customer Code Bit 6	3MTA5-2 & 5-12	Goods Code Bit 4	2MTA13-7 & 13-17
7	Formula Code Bit 3	2MTA5-1 & 5-11	Customer Code Bit 7	3MTA5-1 & 5-11	Goods Code Bit 5	2MTA13-8 & 13-18
8					Goods Code Bit 6	2MTA13-9 & 13-19
9					New Customer	2MTA13-10 & 14-1

Table 16 Optional Allied Data Pass Outputs (cont'd.)

Display Code	I/O Board #2		I/O Board #3		24–Out Board #2	
	Output Name	Connector & Pin	Output Name	Connector & Pin	Output Name	Connector & Pin
10					Destination Bit 0	2MTA14-2 & 14-11
11					Destination Bit 1	2MTA14-3 & 14-12
12					Destination Bit 2	2MTA14-4 & 14-13
13					Destination Bit 3	2MTA14-4 & 14-14
14–23					— not used —	—

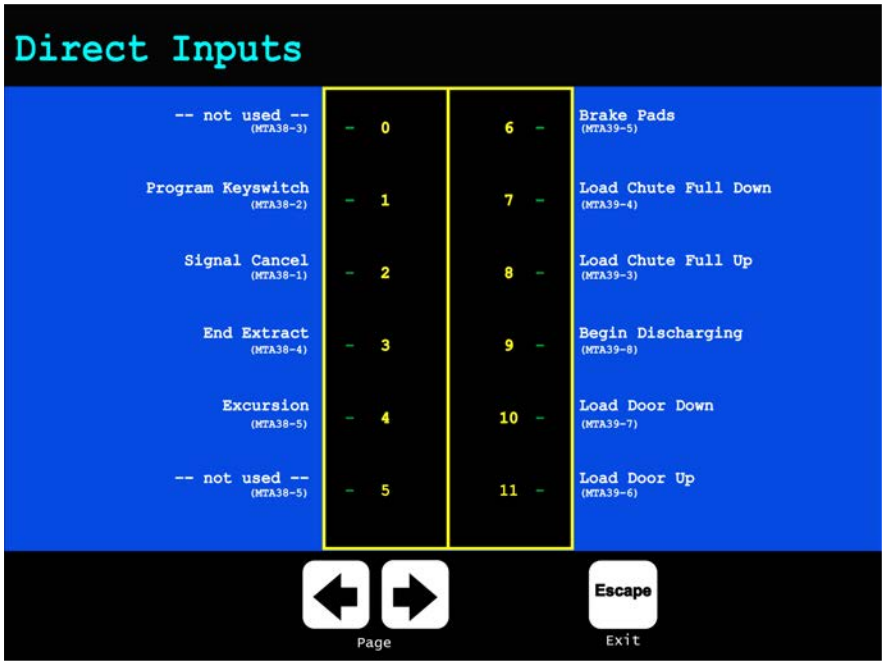
3.2.4 View Inputs

BNEUUP06.C08 0000602274 A.10 A.5 A.14 8/12/24, 1:21 PM Released

From the *Manual* menu, select **View Inputs** to view the on/off state of each microprocessor input. For example, you can use this display to verify that the proper switches are actuated when the machine is in the idle position. The minus sign "-" indicates the input is NOT made. The plus sign "+" indicates the input is made.

Inputs can be monitored from this screen when the machine is idle. Inputs can also be monitored during operation with the **F7** key (F7); see your operator guide for more information.

Figure 32. View Inputs Submenu (Direct Inputs)



Use the left and right arrow keys to navigate between boards.

3.2.4.1 List of Standard Inputs

BNEUUP06.C13 0000602310 A.12 A.5 A.14 8/1/24, 11:45 AM Released

The standard inputs and their corresponding pins are listed in the following table, along with descriptions of their functions.

Table 17. Direct Inputs

Display Code	Input Name	Connector & Pin	Function
0	— not used —	1MTA38–3	—
1	Program Keyswitch	1MTA38–2	This input is made when the **Run/Program** keyswitch has been turned, to access the extractor's *Program* mode.
2	Signal Cancel	1MTA38–1	This input is made when the **Signal Cancel** button is pushed, to silence the operator signal/light.
3	End Extract	1MTA38–4	This input tells the extractor to end the current cycle in preparation for transfer (early call) if the minimum extract time has elapsed.
4	Excursion	1MTA38–5	This input is made when an out-of-balance condition trips the excursion switch.
5	— not used —	1MTA38–6	—
6	Brake Pads	1MTA39–5	This input closes when the brake pads are worn, to trigger the "CHECK BRAKE SHOES" error (42xx models only).
7	Load Chute Full Down	1MTA39–4	This input closes when the load chute (if equipped) reaches the full down position.
8	Load Chute Full Up	1MTA39–3	This input closes when the load chute (if equipped) reaches the full up position.
9	Begin Discharging	1MTA39–8	This input closes when the extractor receives the signal from the allied receiving device that indicates it is ready for the extractor to discharge.
10	Load Door Down	1MTA39–7	This input closes when the load door (if equipped) reaches the full down position.
11	Load Door Up	1MTA39–6	This input closes when the load door (if equipped) reaches the full up position.
	— not used —		—
	— not used —		—
	— not used —		—
	— not used —		—

Table 18. I/O Board #1

Display Code	Input Name	Connector & Pin	Function
0	Load Level	1MTA4–1	This input closes when the rear is full down for loading.
1	Discharge Level	1MTA4–2	This input closes when the rear is full up for discharge.
2	Three Wire Circuit	1MTA4–3	This input is closed when the 3–wire circuit (safety circuit) is energized, to enable critical machine functions (machine turning, tilting, etc.). When the 3–wire circuit is de-energized, this input opens, and the controller disables critical machine functions and issues the “THREE WIRE DISABLED” error message.
3	Inverter Fault	1MTA4–4	This input closes when an inverter fault occurs. The controller turns off all outputs and cancels the extract code.
4	— not used —	1MTA4–5	—
5	— not used —	1MTA4–6	—
6	— not used —	1MTA4–7	—
7	Brake Pressure	1MTA4–8	The controller uses this input to monitor the brake pressure switch on machines with dynamic breaking, to indicate when the brake is disengaged (released).
8	Speed Switch	1MTA4–11	This input is made when the speed switch is closed. The speed switch is closed when the extractor is stopped or rotating slowly; the speed switch is open when the basket is rotating quickly.
9	Load Chute Blocked	1MTA4–12	This input closes when the load chute photo-eye is blocked.
10	Loading Allowed	1MTA4–13	This input closes to indicate to the allied loading device that the extractor is ready to receive a load.
11	Cycle Start	1MTA4–14	This input closes when the extractor receives the allied “transfer complete” signal from the loading device. This input, when made, indicates the extractor is ready to raise the load scoop, or lower the door to start the extract cycle.
12	Belt A or Belt B Photo-eye	1MTA4–15	This input closes when the Belt B photo eye is blocked, to indicate the belt is loaded. If the extractor is not equipped with a Belt B, then this input instead closes when the Belt A photo eye is blocked.
13	Conveyor Door Down	1MTA4–16	This input closes when the conveyor side door is down.

Table 18 I/O Board #1 (cont'd.)

Display Code	Input Name	Connector & Pin	Function
14	Conveyor Door Up	1MTA4–17	This input closes when the conveyor side door is up.
15	Discharge Allowed	1MTA4–18	This input enables/disables discharging via a manually operated switch.

3.2.4.2 Optional Allied Data Pass Inputs

BNEUUP06.C14 0000602309 A.5 A.8 A.14 8/5/24, 3:56 PM Released

The following table lists the optional data pass inputs used to communicate with non-Milnor® equipment. Up to three additional 8-output/16-input boards, and one additional 24-output board can be required for allied data pass.

NOTE: The extractor controller may display allied data pass inputs, even if the machine is not equipped for allied data pass. If the machine does not use allied data pass, these inputs will always appear off ("-") on the display.

Table 19. Optional Allied Data Pass Inputs

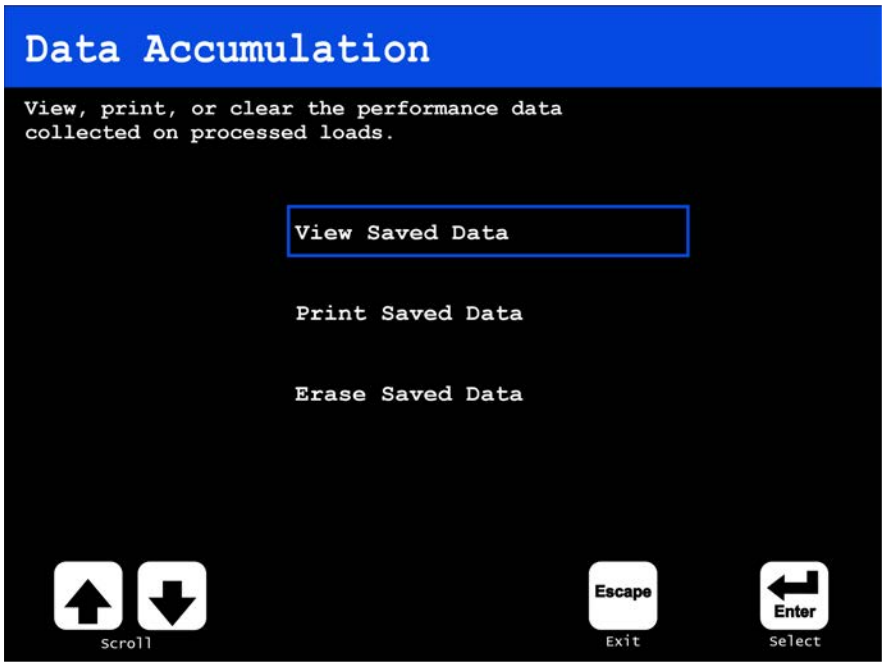
Display Code	I/O Board #2		I/O Board #3		I/O Board #4	
	Input Name	Connector & Pin	Input Name	Connector & Pin	Input Name	Connector & Pin
0	Extract Code Bit A	2MTA4-1	Customer Code Bit H	3MTA4-1	Photoeye Input	4MTA4-1
1	Extract Code Bit B	2MTA4-2	Goods Code Bit A	3MTA4-2	— not used —	4MTA4-2
2	Extract Code Bit C	2MTA4-3	Goods Code Bit B	3MTA4-3	— not used —	4MTA4-3
3	Extract Code Bit D	2MTA4-4	Goods Code Bit C	3MTA4-4	— not used —	4MTA4-4
4	Dry Code Bit A	2MTA4-5	Goods Code Bit D	3MTA4-5	— not used —	4MTA4-5
5	Dry Code Bit B	2MTA4-6	Goods Code Bit E	3MTA4-6	— not used —	4MTA4-6
6	Dry Code Bit C	2MTA4-7	Goods Code Bit F	3MTA4-7	— not used —	4MTA4-7
7	Dry Code Bit D	2MTA4-8	Goods Code Bit G	3MTA4-8	— not used —	4MTA4-8
8	Single Cake	2MTA4-11	Destination Code Bit A	3MTA4-11	— not used —	4MTA4-11
9	Customer Code Bit A	2MTA4-12	Destination Code Bit B	3MTA4-12	— not used —	4MTA4-12
10	Customer Code Bit B	2MTA4-13	Destination Code Bit C	3MTA4-13	— not used —	4MTA4-13
11	Customer Code Bit C	2MTA4-14	Destination Code Bit D	3MTA4-14	— not used —	4MTA4-14
12	Customer Code Bit D	2MTA4-15	New Formula	3MTA4-15	— not used —	4MTA4-15
13	Customer Code Bit E	2MTA4-16	New Customer	3MTA4-16	— not used —	4MTA4-16
14	Customer Code Bit F	2MTA4-17	Empty Load	3MTA4-17	— not used —	4MTA4-17
15	Customer Code Bit G	2MTA4-18	— not used —	3MTA4-18	— not used —	4MTA4-18

3.2.5 Data Accumulation

BNEUUP06.C09 0000602273 A.5 A.6 A.14 8/12/24, 1:24 PM Released

During normal operation, the extractor controller stores data collected on processed loads. This data can be used in accounting, and for generating productivity reports. From the *Manual* menu, select **Data Accumulation** to view, print, or clear the extractor's performance data.

Figure 33. Data Accumulation Submenu



The following three options are available from the Data Accumulation submenu, and described in the following sections:

- View Saved Data;
- Print Saved Data;
- Erase Saved Data.

3.2.5.1 View Saved Data

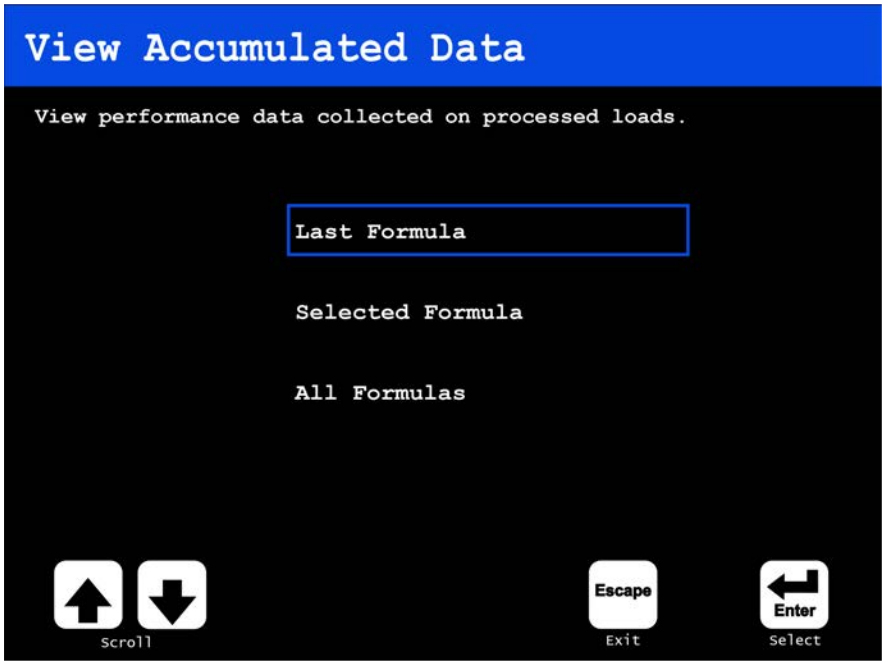
BNEUUP06.C15 0000602352 A.4 A.5 A.14 8/12/24, 2:04 PM Released

From this screen, you can view:

- The data for the last formula (load) processed,
- The data for a specific formula, or
- The data for all formulas (all loads) processed since the last time the machine's memory was cleared.

These selections are shown in the following figure.

Figure 34. Data Accumulation Formula Selections



Each accumulated data report lists the following information:

- Formula Number—if applicable. Does not display if All Formulas is selected.
- Load Count—the number of loads processed, if applicable. Does not display if Last Formula is selected.
- Run Time—total time taken to process a load from start to end of cycle, including error and wait time, with the exception of Time Waiting For Load/Discharge.
- Time Waiting For Load—the time the extractor was idle and waiting for a load to be initiated.
- Time Waiting For Discharge—the time the extractor was waiting to discharge while the receiving device (i.e. the device to which the extractor sends its goods) was unavailable.
- Error Time—the time during which normal operation is suspended due to an error condition. This time is included in the Run Time value.

3.2.5.2 Print Saved Data

BNEUUP06.C16 0000602351 A.5 A.6 A.14 8/12/24, 2:06 PM Released

Printing the saved data will require the user to enter the date in MM/DD/YYYY format. The date you enter is printed at the top of the report. Use the keypad to enter the appropriate values.

NOTE: The date entered here does not limit the report to the data accumulated on the specified date.

The following figure shows a sample accumulated data report.

Figure 35. Accumulated Data Report (Sample)

PELLERIN MILNOR CORPORATION

M7E: M7E42ALR 59436-95 **VERSION:** 9200CS **DATE:** 04/28/2002 **PAGE:** 01

D A T A A C C U M U L A T I O N

0 = LAST FORMULA RUN

FORMULA #	RUN TIME MMT	WAIT TIME #1 MMT	WAIT TIME #2 MMT	ERROR TIME MMT
03	054	001	000	000

1 = DATA PER FORMULA

FORMULA #	# OF LOADS #	RUN TIME HHT	WAIT TIME #1 HHT	WAIT TIME #2 HHT	ERROR TIME T
00	044	021	006	001	2
03	013	007	003	000	0
12	006	004	000	000	0

2 = TOTAL ACCUMULATION DATA

TOTAL	# OF LOADS #	RUN TIME HHHT	WAIT TIME #1 HHHT	WAIT TIME #2 HHHT	ERROR TIME HT
	063	0032	0010	0001	02

NOTES:

#	= Number
T	= Tenth of hour
WAIT TIME #1	= Load Wait Time
WAIT TIME #2	= Discharge Wait Time
HHT	= Hours-Hours-Tenth of hour
HHHT	= Hours-Hours-Hours-Tenth of hour
MMT	= Minutes-Minutes-Tenth of minute
*****	= Data has reached maximum stored value

3.2.5.3 Erase Saved Data

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Attempting to erase the saved data will prompt the user to confirm their deletion request. Press the **Enter** key to proceed with deletion, or the **Escape** key to cancel. It can be necessary to clear the accumulator data if the microprocessor detects that it is corrupt.

Note that this process only clears the machine's production data, and that formulas or configuration decisions are unaffected.

3.2.6 Print Config & Program

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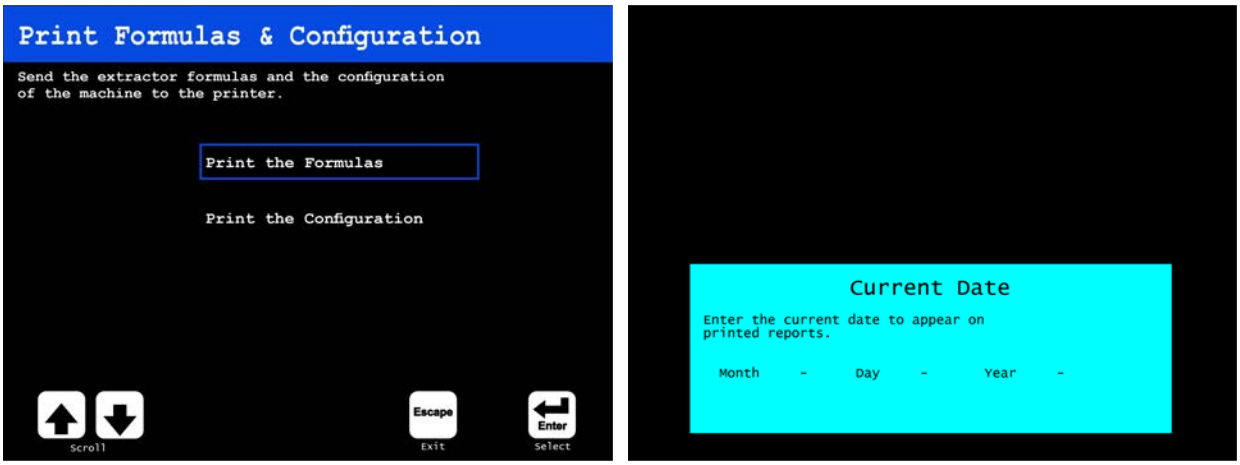
The extractor controller is capable of printing the formulas and configuration codes to a serial printer connected to the extractor.

Figure 36. Print Config & Program Submenu and Print/Date Submission Submenu



Selecting either option—Print the Formulas or Print the Configuration—will prompt the user for the date in MM/DD/YYYY. Use the keypad to enter the appropriate values. The date will appear on the printed report.

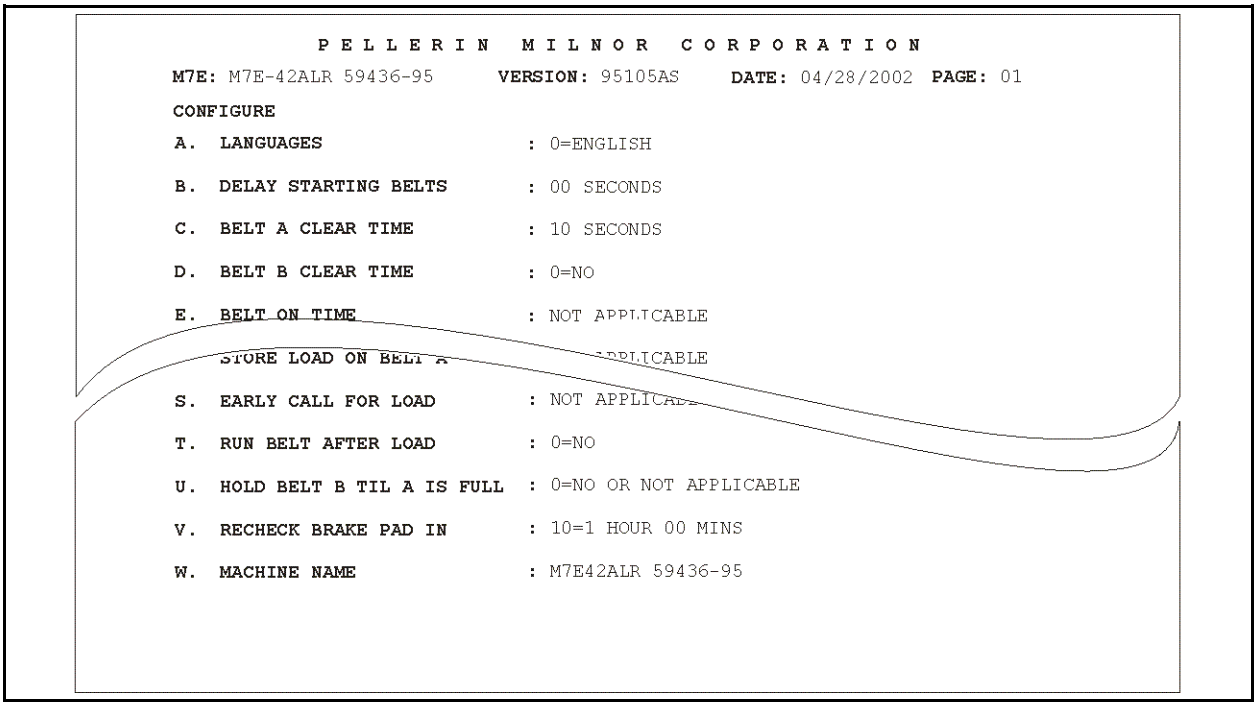
Sample formula and configuration reports are shown in Figure 37: Typical Formula Report, page 78 and Figure 38: Typical Configuration Report, page 79 , respectively.

NOTE: The printer socket is located on the outside of the extractor control box. See Section 4.4 : Printer Requirements and Settings, page 97 for printer specifications and complete instructions on wiring the necessary printer cable.

Figure 37. Typical Formula Report

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

M7E: M7E-42ALR 59436-95      VERSION: 95105AS     DATE: 04/28/2002  PAGE: 01

                                FORMULAS

     T  =TYPE OF EXTRACT                  RI =RIB INFLATION TIME
     LT =LOADING TIME                     RD =RIB DEFLATION TIME
     ST =SLOW SPEED TIME
     DT =DISTRIBUTION TIME
     X  =NUMBER OF PRE-EXTRACT            JC =SET OF JOG REVERSALS
     E1P=E1 PRE-EXTRACT TIME              +  =JOG RUN TIME
     E2P=E2 PRE-EXTRACT TIME                  (SPECIAL JOGS WHEN +=0)
     R  =REVERSALS AFTER PRE-EXTS.        J- =JOG STOP TIME
                                              (INCH COUNTS WHEN +=0)
                                          A  =TILT AFTER JOG
EXT T=********     0 03 00 05 -                 ESTIMATED TOTAL CYCLE TIME
                                                 RECEIVE+DISCHARGE TIMES)
F08 FORMULA 08     T LT ST DT X E1P E2P R ON OF E1T                SECONDS
EXT T=********     0 03 00 05 - --- --- - -- -- 010 000 24

F09 FORMULA 09     T LT ST DT X E1P E2P R ON OF E1T E2T LH RI RD JC + J- A MAX
EXT T=********     0 03 00 05 - --- --- - -- -- 010 000 24 00 00 03 0 03 1 055

F10 FORMULA 10     T LT ST DT X E1P E2P R ON OF E1T E2T LH RI RD JC + J- A MAX
EXT T=********     0 03 00 05 - --- --- - -- -- 010 000 24 00 00 03 0 03 1 055

F11 FORMULA 11     T LT ST DT X E1P E2P R ON OF E1T E2T LH RI RD JC + J- A MAX
EXT T=********     0 03 00 05 - --- --- - -- -- 010 000 24 00 00 03 0 03 1 055
```

Figure 38. Typical Configuration Report



```
                P E L L E R I N   M I L N O R   C O R P O R A T I O N
M7E: M7E-42ALR 59436-95      VERSION: 95105AS     DATE: 04/28/2002  PAGE: 01
CONFIGURE
A.  LANGUAGES                  : 0=ENGLISH
B.  DELAY STARTING BELTS       : 00 SECONDS
C.  BELT A CLEAR TIME          : 10 SECONDS
D.  BELT B CLEAR TIME          : 0=NO
E.  BELT ON TIME               : NOT APPLICABLE
    STORE LOAD ON BELT A       : NOT APPLICABLE
S.  EARLY CALL FOR LOAD        : NOT APPLICABLE
T.  RUN BELT AFTER LOAD        : 0=NO
U.  HOLD BELT B TIL A IS FULL  : 0=NO OR NOT APPLICABLE
V.  RECHECK BRAKE PAD IN       : 10=1 HOUR 00 MINS
W.  MACHINE NAME               : M7E42ALR 59436-95
```

3.2.7 Load Eye Report

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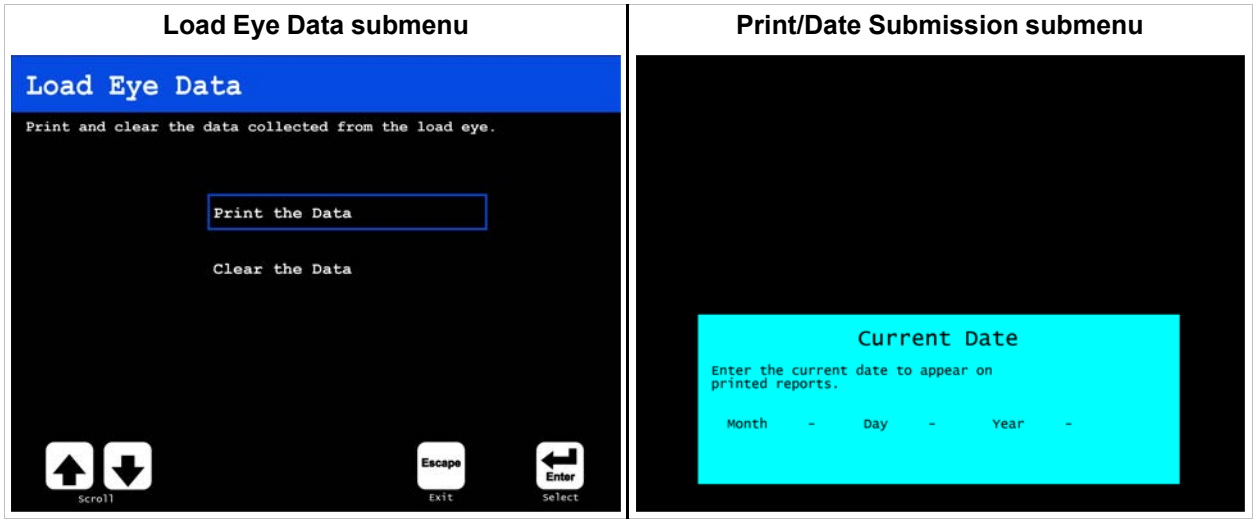
During operation, the extractor controller stores data associated with photoeye errors. You can print a report of this data to troubleshoot persistent receiving and discharging problems. From this menu selection, the user can choose to print the error report or clear the accumulated data.

Printing the saved data will require the user to enter the date in MM/DD/YYYY format. Use the keypad to enter the appropriate values.

Figure 39. Load Eye Report Submenu and Print/Date Submission Submenu



In addition to the date, machine name, and software version, printed reports detail the data categories listed below:

- Load Number—the number of loads processed using the formula indicated in the *Formula Number* column;
- Load Weight—the total weight of the loads processed using the formula indicated in the *Formula Number* column;
- Goods Code—the types of goods processed;
- Formula Number—the formula number used in processing;
- Begin—the number of errors detected in the first distribution (loading) sequence;
- Redis—the number of errors detected in the redistribution phrase of pre-extract;
- Total—the total number of errors detected for the processed formula.

4 Supplemental Information

4.1 Summary of Milnor® Allied Interface Capability

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.

NOTE: Refer to the allied interfaces reference manual for more information on allied interfaces, as well as technical information needed to implement an allied interface.

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

4.1.1 How Batch Data Travels Through a System

The types and ranges of batch codes that 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. Data is most commonly passed, not via an allied interface, but rather by the Miltrac™ controller, or a similar system controller supplied by another equipment manufacturer.

The Miltrac™ controller can pass 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

The Miltrac™ controller can also pass the following flags:

- single cake
- empty load

- low pressure
- third pressure
- no pressure

Generally, allied interfaces provide less capacity than the Miltrac™ controller, because they are much more limited by hardware constraints, and are developed on an as-needed basis. As illustrated in Table 20: Batch Data-passing Capacity for Milnor® Allied Interfaces, page 84 , 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.

4.1.2 Batch Data Signals

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This section summarizes the types and number of batch codes for which batch data allied interface signals are available. As shown in Table 20: Batch Data-passing Capacity for Milnor® Allied Interfaces, page 84 , 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).

The following are the batch codes traditionally associated with allied interfaces and their traditional definitions.

NOTE: The specific use of a type of batch code can vary from one installation to another. Signals traditionally used for certain batch codes can sometimes be adapted to new types of batch data.

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 below note).

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 below note). Extract codes do not apply to the Milnor® two-stage press, which does not have formulas, but can be made to vary the pressure of the ram via the Low, 3rd, and No Pressure (on/off) signals.

TIP: Formula code and extract code 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® tunnels (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 goods code within that class can vary how the goods are

processed, essentially extending the range of available wash formulas. Goods codes are passed to post-wash devices primarily for accounting and record-keeping purposes, but can affect post-wash processing in some systems.

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 tunnel load conveyor. Weights are passed to post-wash devices primarily for accounting and record-keeping purposes, but can affect post-wash processing in some systems.

Cake Number in older Milnor® CBW® tunnels (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 20: Batch Data-passing Capacity for Milnor® Allied Interfaces, page 84 , 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 below note).

New customer indicates that the batch being transferred belongs to a different customer than the previous batch (see below note).

NOTE: 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), to signal 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 ram pressure (see below note).

3rd (main) pressure tells the Milnor® two-stage press to use a lower than normal ram pressure (see below note).

No (main) pressure tells the Milnor® two-stage press to use no ram pressure (see below note).

NOTE: If the Low, 3rd, and No pressure signals are all off, the press will use standard (high) ram pressure.

Table 20. Batch Data-passing Capacity for Milnor® Allied Interfaces

Data Format–>	Numeric: Groups of signals pass multi-digit batch codes in binary (number of available batch codes shown)									Non-Numeric: One signal passes a single on/off value (X indicates signal is available)				
Code Name–> Type of Interface	Formula code	Press/ Extract code	Dry code	Cool down code	Customer code	Goods code	destination code	weight (tenths of units)	Cake number	New formula	New customer	Single cake	Empty load	Low, 3rd, No pressure
CBW® (Tunnel)														
Loading	256**				1000	256**		409.5*						
Discharge 7632CB-W®		16	16	4	1000		8			X	X	X		X
Discharge G3 CBW®	1000 **†	16***	16***	4	256 or 1000 †	1000 **†	8	409.5 *†		X	X	X		X
Centrifugal Extractor														
Loading		16	16		256	128	16			X	X	X	X	
Discharge	16		16		256	128	16			X	X	X		
Single Stage Press														
Loading		16	16		256	64	16				X	X	X	
Discharge			16		256	256	16				X			
2–Stage Press														
Loading	16		16		256	64	16	409.5*			X	X	X	X
Discharge	16		16		256	256	256				X			
Shuttle														
Loading			16		64		16				X	X		
Discharge			16				16					X		
COBUC														
Loading			16		64		16				X	X		
Discharge			16		64		16*					X		
Dryer														
Loading			16								X	X		
Discharge							16				X			

* Passes 4096 weight values (0 to 409.5 in tenths)

** Formula codes or Goods codes, but not both.

*** 16 Drycodes or 16 Extract codes, but not both.

† Requires optional extra data-pass board.

* Reads 4096 weight values (0 to 409.5 in tenths).

* Destination codes only available if optional I/O board #3 supplied.

NOTE: Low, 3rd, and No Pressure are three separate signals.

4.1.3 Operational Signals

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A set of generic functions can be defined to pass most of the needed information between devices in your laundry system. It is usually possible to interface two machines using only a few of these functions. The table below 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 be repurposed, or have a more specific meaning particular to a device. The signal names are taken from the schematics (may be abbreviated) and may vary from device to device. As shown in the table and explained below, the generic functions can be grouped into three categories:

- directional functions
- transfer functions
- confirmation functions

Directional Functions — Directional functions are inputs that tell the shuttle or COBUC where it must travel to align with the device from which it will receive, or to which it will discharge. The directional functions include:

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.

NOTE: 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 — Transfer functions either describe the device’s transfer state, or request that the other device achieve a certain transfer 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 two *discharge desired* functions:

Allied discharge desired (loading interface input) — tells the Milnor® device that the allied loading device is, or soon will be, ready to send a batch to it,

Milnor discharge desired (discharge interface output) — 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 two *load desired* functions:

Milnor load desired (loading interface output) — tells the allied loading device that the Milnor® device is, or soon will be, ready to receive a batch from it.

Allied load desired (discharge interface input) — 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. There are two *loading mode* functions:

start extractor — In the centrifugal extractor, causes the load door to open or the load chute to lower, and the cylinder to turn.

dryer is loading — In the dryer, causes the load door to open and the cylinder to turn.

discharge allowed — There are two *discharge allowed* functions:

allied discharge allowed (loading interface input) — tells the Milnor® device that the allied loading device can now send.

Milnor discharge allowed (discharging interface output) — tells the allied discharge device that the Milnor® device can now send.

load allowed — There are two *load allowed* functions:

Milnor load allowed (loading interface output) — tells the allied loading device to begin sending.

allied load allowed (discharge interface input) — tells the Milnor® device to begin sending.

Confirmation Functions — Confirmation functions provide information on the completion status of transfer. The confirmation functions include:

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 is ready. See the note below.

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. 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 the note below.

NOTE: 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 21. Operational Functions and Available Signals

Function Type–>	Directional Functions				Transfer Functions						Confirmation Functions			
Function Name–> Type of Interface	2nd level	Opposite side	At left	At right	Early call	Discharge desired	Load desired	Loading mode	Discharge allowed	Load allowed	Transfer not complete	Error: cancel transfer	data valid	transfer complete
CBW® (Tunnel)														
Loading									input: bag ready	output: start cvr. or release bag				
Discharge					output: early call*					input: press free**				***
Centrifugal Extractor														
Loading					input: end extract		output: load desired	input: start extractor		output: extr. says load allowed				input: start cycle
Discharge						output: discharge desired				input: start discharge *				input: discharge finished
Single Stage Press														
Loading										output: press free				input: press loaded
Discharge						output: desires to unload				input: start discharge		input: don't discharge		
2–Stage Press														
Loading										output: press free				input: press loaded
Discharge						output: desires to unload				input: allied can receive load				output: discharge complete
Shuttle														
Loading	input: go 2nd load posn.	input: load reverse dir.	input: left of home	input: right of home		input: desires to load shuttle	output: shuttle is empty			output: desires to receive load	output: shuttle loading	input: cancel transfer	input: data valid	*
Discharge	input: go 2nd unload posn.	input: load reverse dir.	input: left of home	input: right of home		output: desires to unload	input: desires load from shuttle		output: ready to unload	input: allowed to receive load	output: not finished unload	input: cancel transfer	output: data valid	**
COBUC														

Table 21 Operational Functions and Available Signals (cont'd.)

Function Type–>	Directional Functions				Transfer Functions						Confirmation Functions			
Function Name–> Type of Interface	**2nd level**	**Opposite side**	**At left**	**At right**	**Early call**	**Discharge desired**	**Load desired**	**Loading mode**	**Discharge allowed**	**Load allowed**	**Transfer not complete**	**Error: cancel transfer**	**data valid**	**transfer complete**
Loading	input: go 2nd load posn.	*	input: left of home	input: right of home		input: COBUC desires load				output: desires to load		input: loading cancelled	invalid: data valid	**
Discharge	input: discharge at 2nd level	*	input: discharge left	input: discharge right		output: desires to discharge	input: allied discharge desired		output: ready to unload	input: discharge allowed		input: discharge cancelled	output: data valid	***
Dryer														
Loading							output: load desired	input: dryer loading		output: load door open				*
Discharge						output: discharge desired			input: discharge allowed					output: discharge door closed

* The CBW® "early call" output, which is used when the CBW® is interfaced with a Milnor® centrifugal extractor via an allied interface, must be user-defined (as explained in the document "Signals—CBW®'s (Tunnels) with Mark 8 and Mark 9 Controls". It is not explicitly provided.

** On the G3 CBW®, the "press free" input must be user-defined as eplained in the document "Signals—CBW®'s (Tunnels) with Mark 8 and Mark 9 Controls".

*** For most situations, the CBW® provides a "start press" output. When the CBW® is interfaced with a Milnor® centrifugal extractor, a special "start extract cycle" output must be user defined, as explained in the document "Signals—CBW®'s (Tunnels) with Mark 8 and Mark 9 Controls".

* There is also a "discharge allowed" input. But in this case, the function of this input is to enable/disable discharging via a manually operated switch.

* All shuttles except the COSLIDE provide a "shuttle is loaded" output. The COSLIDE expects a "belt is loaded" input.

** The shuttle provides a shuttle "finished unloading" output. It also expects an "allied discharge complete" input.

* 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.

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

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4.2 Construction of External Serial Link Cables

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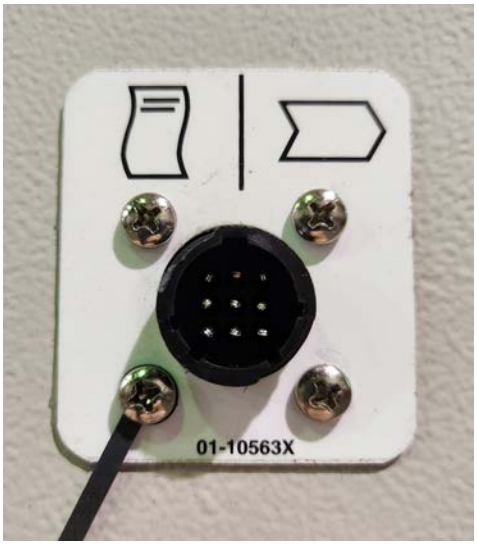
Programmable data can be transferred between a machine and PC, between a machine and a Milnor® serial memory storage device, or between two (or more) compatible machines using serial communication cables. These cable(s) connect to the cabinet-mounted 9-pin DIN type receptacle shown in Figure 40, page 89. Machines typically ship with this receptacle pre-installed and wired.

This document provides information for on-site fabrication and connection of serial communication cables via the 9-pin DIN receptacle. Cables installed via DIN receptacles may be installed temporarily or permanently, but are typically meant to serve as temporary connections. Temporary cables should be removed when transfer is complete.

Figure 40. Cabinet-mounted 9-pin Round Receptacle



4.2.1 Connecting Machines in a Mildata®, Drynet™, or Miltrac™ Network

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Machines in a Mildata®, Drynet™ (dryer/shuttle controller), or Miltrac™ network typically communicate via permanent serial link cables connected directly to microprocessor boards via MTA connectors on the board.

- If you machine is in a Mildata®, Drynet™, or Miltrac™ network, and connected via permanent serial link cables, memory and formula transfer (machine-to-machine or machine-to-PC) is performed using these permanent cables, **not those installed via cabinet-mounted DIN receptacles provided for customer use.**
- If you machine is NOT in a Mildata®, Drynet™, or Miltrac™ network, or otherwise not connected via permanent serial link cables, you can use the cabinet-mounted DIN receptacles to attach serial link cables for data transfer (machine-to-machine or machine-to-PC).

See document BICCUC01 – “On-Site Installation and Troubleshooting of Permanent Serial Communication Cables” for more information on establishing the permanent cables needed to communicate across a Mildata®, Drynet™, or Miltrac™ network.

4.2.2 Connecting Milnor® Machine Controllers to a PC

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Most Milnor® machine controllers can communicate with a PC. The PC can be used to:

- Create and modify configuration settings and formulas, and export that data to the machine.

- Act as a backup device for Milnor® machines.

In order to transfer data between a Milnor® machine and a PC, you will need:

- A download cable with 485/232 data converter and a round 9-pin plug.
- Specialized software on the PC that supports the machine controller.

4.2.2.1 Connecting the USB Nano 485 Converter

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Data cable KXMDSWBRS3 (Figure 41, page 90), which uses a USB/RS485 convertor straight to a round 9-pin plug, is available through the Milnor® parts department for machine-to-PC data transfers.

You may need to download the driver for the USB Nano 485 converter prior to data transfer. The driver can be found on the CD that came with the cable assembly. An updated driver can be found at `www.cti-shop.com`. The device is USB-Nano-485/OP. Plug in the USB Nano 485 converter when indicated by the driver installation program/wizard. Contact Milnor® Technical Support at service@milnor.com for assistance, or visit the Technical Knowledge Base at `www.milnor.com`.

Figure 41. Data Cable KXMDSWBRS3

4.2.2.2 Download the Supporting “Machine Programmer” Software

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The following “machine programmer” software programs support the different machine controllers, and make data transfer with a PC possible:

- E-P Plus® machine programmer
- E-P Express® machine programmer
- The Milnor® Machine Programmer (MMP) for Mark series Milnor® machines (Mark II to Mark VI washers, the single stage press, and the centrifugal extractor)

If you need to download the MMP for a Mark series Milnor® machine, please contact Milnor® Technical Support at service@milnor.com, and provide your software version and machine model(s). The service technicians will help you download the right version of the MMP for your machine. The E-P Plus® and E-P Express® machine programmers are available to download at `www.milnor.com`. See the following articles on the Technical Knowledge Base (**Milnor Homepage→Support and Safety→Technical Knowledge Base**) for the E-P Plus® and E-P Express® machine programmer download links, as well as instructions on how to initiate data transfer sequences between a Milnor® machine controller and a PC.

- Article #000001583 “How do I backup an E-P Plus® or E-P Express® Washer Extractor to a PC?”
- Article #000001433 “How do I backup a Mark Series Milnor Machine to a PC?”

4.2.3 How to Wire Download Cables

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Typically, download cables from the Milnor® parts department, such as P/N KXMDSWBRS3 used for machine-to-PC transfer, come pre-wired with the plug attached to the cable. However, the plug may be provided separately in a bag inside the electric box. Refer to the following information if you need to wire download cables in the field.

Because the DIN receptacle is wired to support different functions, and because the data transferred across these cables can be corrupted by electrical noise, follow these instructions carefully.

4.2.3.1 Pin Identification

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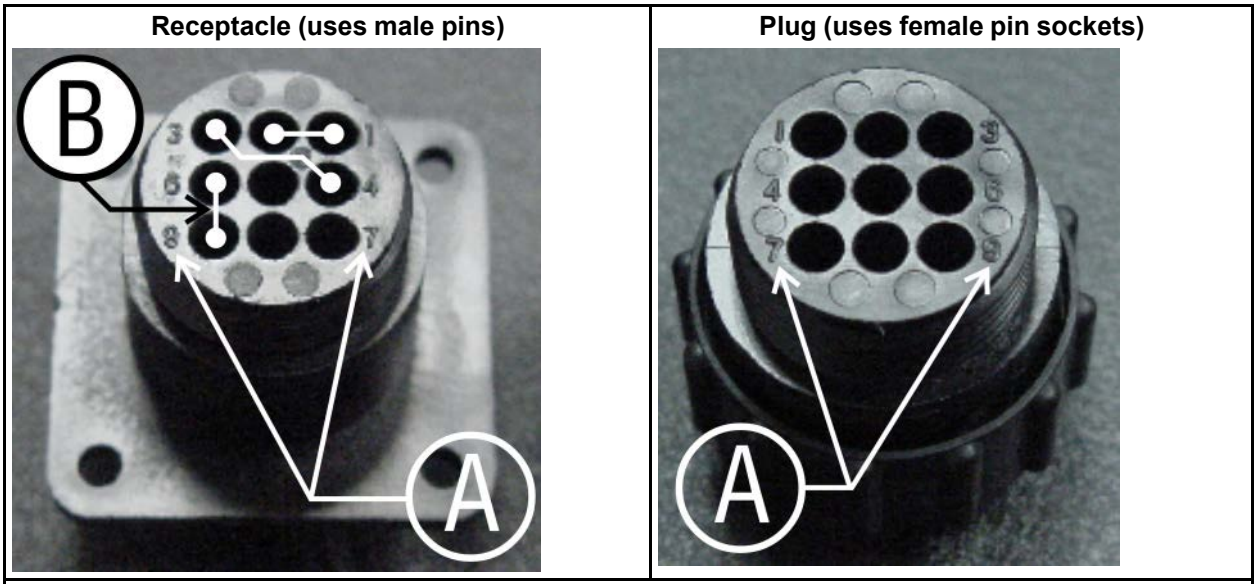
Figure 42, page 91 below illustrates the DIN receptacle (which uses male pins) and the mating plug (which uses female pin sockets), each viewed from the **wire entry** side. Table 22: External Serial Link Pin Assignments, page 91 shows the function of each pin.

Figure 42. 9-Pin DIN Connector Pin Identification (from wire entry side of connectors)



Legend

A . . . Pin numbers molded into parts

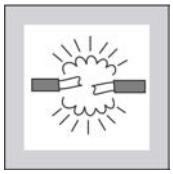
B . . . White dotted lines indicate pins normally connected together at the **Milnor®** factory

Table 22. External Serial Link Pin Assignments

Pin Number	Function	Receptacle Wiring (inside electrical enclosure)	
		Wire Number	Color Code
1	Serial low	DLL	Blue and black
2			
3	Serial high	DLH	Blue and red
4			
5	Clear to send (used for printing only*)	CTS	Blue and orange
6	Electronic ground	2G	Blue and white

Table 22 External Serial Link Pin Assignments (cont'd.)

Pin Number	Function	Receptacle Wiring (inside electrical enclosure)	
		Wire Number	Color Code
9			
7	Transmit data (used for printing only*)	TXD	Blue and orange
8	+5 volts DC (used for serial memory storage device only)	V1	Blue
* Print functions are only available on Mark Series machines that use a 8088 or 186 processor board. The 188 processor boards used on E-P Plus® and E-P Express® machines do not support print functions.			



CAUTION: Risk of damage to electronic components — Pin 8 is only used to supply +5VDC power to the download box and will damage components in both devices if not properly connected.

- Never connect pin 8 to any other pin in the connector, a printer, or another machine.

4.2.3.2 Cable Specifications

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A multi-conductor shielded cable that meets the following minimum requirements must be used in the applications covered herein:

- Jacket: 600VAC insulation
- Shielding: braided, tinned copper, minimum 85 percent coverage
- Four conductors with these specifications:
  - Conductive material: Tinned copper, 20 AWG
  - Insulation: 300VAC, color coded
  - Preferred colors: red, black, green and white

A conforming cable may be purchased from the Milnor® parts department (P/N 09V300A04S), or another source.

4.2.3.3 Wiring a Download Cable for a Serial Memory Storage Device

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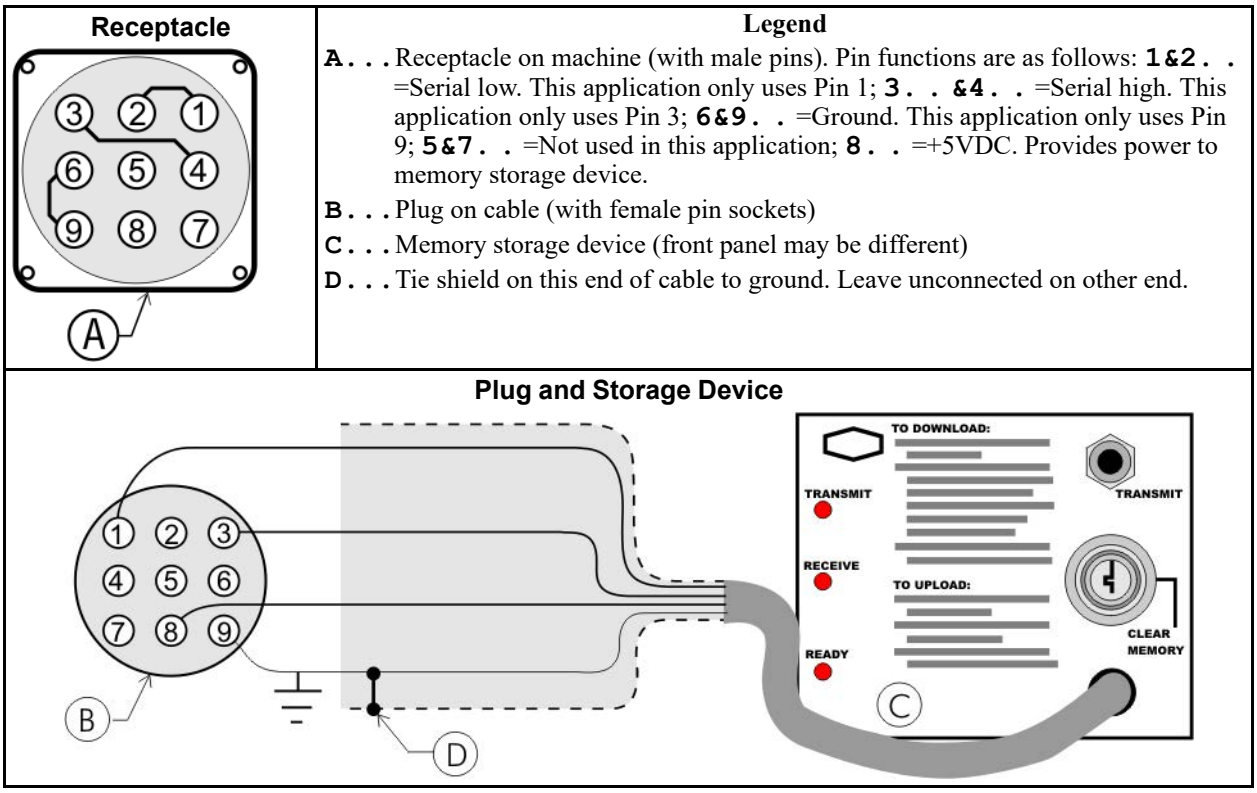
The Milnor® serial memory storage device (also known as a download box, or “black box”) contains nonvolatile memory to hold a back-up copy of the programming and configuration data for **one machine**. This data is transferred between the machine and the memory storage device via the DIN receptacle on the machine. The pre-wired cable and DIN plug are permanently attached to the storage device.

Cable fabrication, as shown in the following figure, is not required except for replacing a damaged cable. The memory storage device is the only application in which the power conductor (Pin 8) is used.

Figure 43. Wiring Diagram for Cable to Connect a Machine to a Serial Memory Storage Device



4.2.3.4 Wiring Two or More Machines Together for Machine-to-machine Transfer

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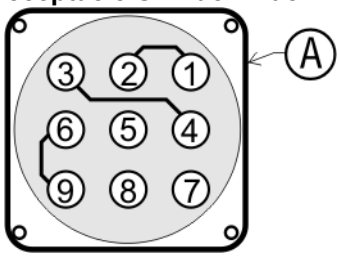
The following figure shows how to wire a cable to connect a bank of identical machines (the example shows connections for four machines), so that data programmed on one machine in the group can be downloaded to all other machines simultaneously. This cable is referred to as a daisy chain because it runs in segments from machine to machine, connecting all machines in the group.

CAUTION: The risk of error increases the more machines are involved in a single transfer. Though it is possible, it is not recommended to transfer data between more than two machines at a time, even if those machines have identical model numbers, software versions, and hardware.

Figure 44. Wiring Diagram for Cable to Connect Two or More Machines

Receptacle On Each Machine



Legend

A . . . Receptacle on machine (with male pins). Pin functions are as follows: **1&2. .** =Serial low; **3&4. .** =Serial high; **6&9. .** =Ground; **5&7. .** =Not used in this application; **8. .** =Not used in this application. See previous, related caution statement.

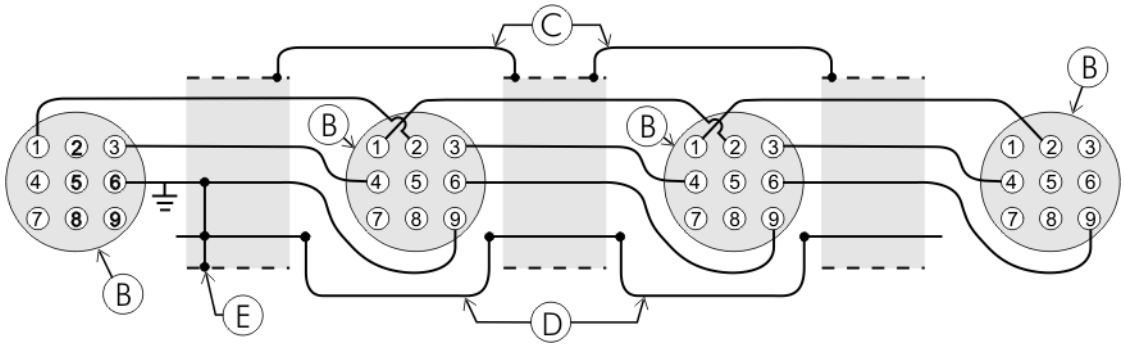
B . . . Plug on cable (with female pin sockets)

C . . . Connect together each segment of shield so that it has continuity across entire daisy chain.

D . . . Connect together each segment of an unused conductor so that it has continuity across entire daisy chain.

E . . . Tie shield and spare conductor(s) on one end of daisy chain to ground. Leave unconnected on other end of daisy chain.

Cable Wiring



The internal connections on each receptacle (machine) between pins 1 and 2, 3 and 4, and 6 and 9 make it easier to wire the cable because it is not necessary to jumper these pins together on the cable. However, this also means that every plug on the daisy chain must be plugged into a receptacle. Otherwise, the serial low, serial high, and ground conductors will not have continuity across the entire daisy chain and some machines will not receive data.

Rules and details about downloading among machines are fully described in the Data Transfer section of this manual.

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4.3 Serial Memory Storage Device Applications

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A serial memory storage device, similar to the one shown below, can be used to store machine configuration and formula data for most current models of Milnor® machines. The serial memory storage device is compatible with several machine types, but can only hold data for one machine at a time.

NOTE: Two storage device models are currently available from the Milnor® parts department: KXMIC00507 and KXMIC00508. Consult the Milnor® Service department to determine the correct device for a particular application.

DIP switches inside the storage device allow you to configure the device to accept data from different machine types and software versions. Use this document to determine the proper DIP switch setting for your machine. After verifying the switch settings, label the storage device with the date, machine name, and serial number to avoid confusion when the device is needed to restore data to a machine.

Figure 45. Serial Memory Storage Device

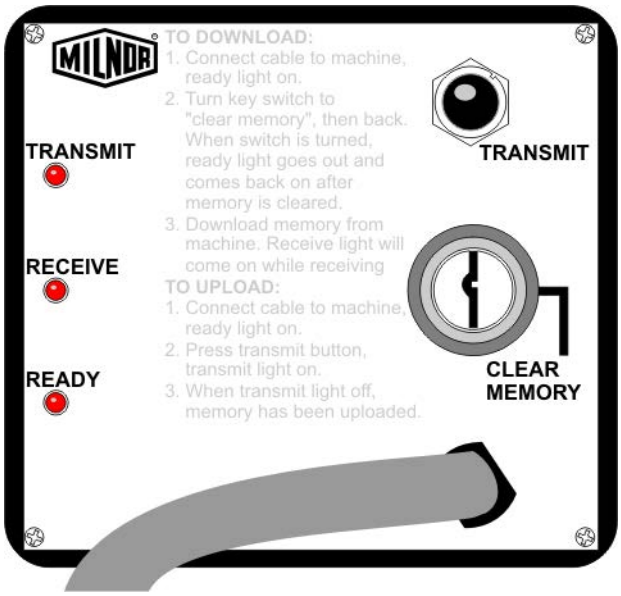


Figure 46. Rear View of Circuit Board

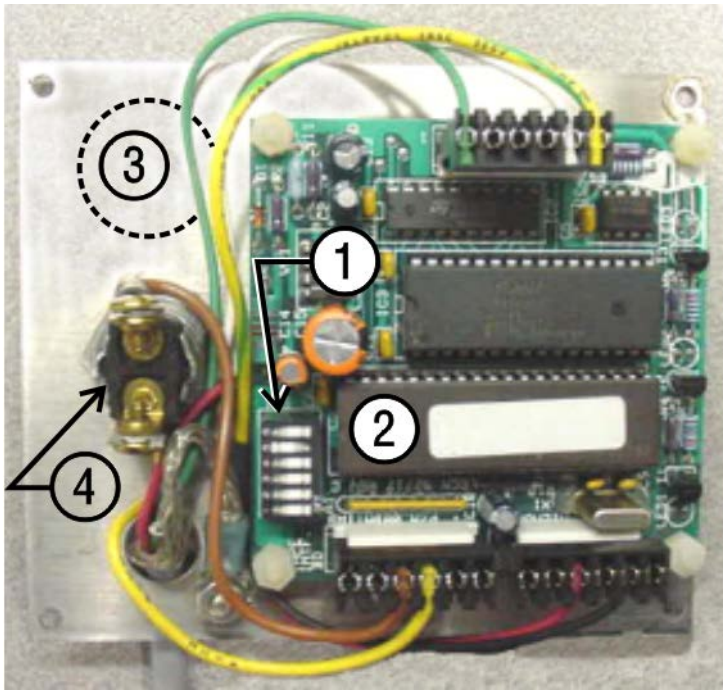
View	Legend
	1. DIP switch 2. Software chip 3. Location of **Transmit button**, if equipped 4. Key switch

Table 23. DIP Switch Positions for Machines Requiring an External Transmit Button

Processor Board	Machine Software Versions	DIP Switch Setting
Washer-extractor Models other than Fxx		
8088	All	C
80186	98000-98003	C
	98004-99004	not supported
	99005-9900B	D
	20000-20003	D
FxW, FxP, FxN, FxS, and FxR Washer-extractor models		
8088	All	C
80186	98000-98003	C
	98004-98009	not supported
	9800A-9800H	D
	20000-2000B	D
	2100F and later	D
Textile and Dye Machine Models		
8088	All	C
80186	95000-95305M	C
	95305N-95306	D
	20000-20004	D
Dryer Models		
8088	All	C
80186	All	C
Centrifugal Extractor Models		
8088	All	C
80186	All	C
Single-station Press Models		
8088	All	C
80186	All	C

Key:

A	All switch positions OFF
B	Position 4 ON; all others OFF
C	Position 5 ON; all others OFF
D	Positions 1 and 5 ON; all others OFF
E	Positions 4 and 5 ON; all others OFF

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4.4 Printer Requirements and Settings

BNCUUI01.C01 0000196632 B.3 A.5 A.6 1/2/20, 1:30 PM Released

NOTICE: Because of the many differences among printer makes and models, Milnor® cannot ensure suitability or troubleshoot printers other than those described in this document (or certain older approved models), with the required interface cable.

4.4.1 Connecting a Machine to a Printer for "Print Data"

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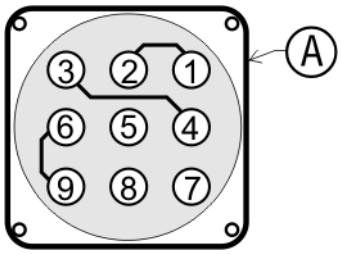
Many Milnor® microprocessor-controlled machines allow permanent or temporary connection of a serial printer for generating printed copies of formulas or status reports during operation. Figure 47: Wiring Diagram for Cable to Connect a Machine to a Printer, page 97 shows how to wire the machine-to-printer cable. Milnor® has tested and approved certain printers for this application (see previous note).

Figure 47. Wiring Diagram for Cable to Connect a Machine to a Printer

Receptacle



Legend

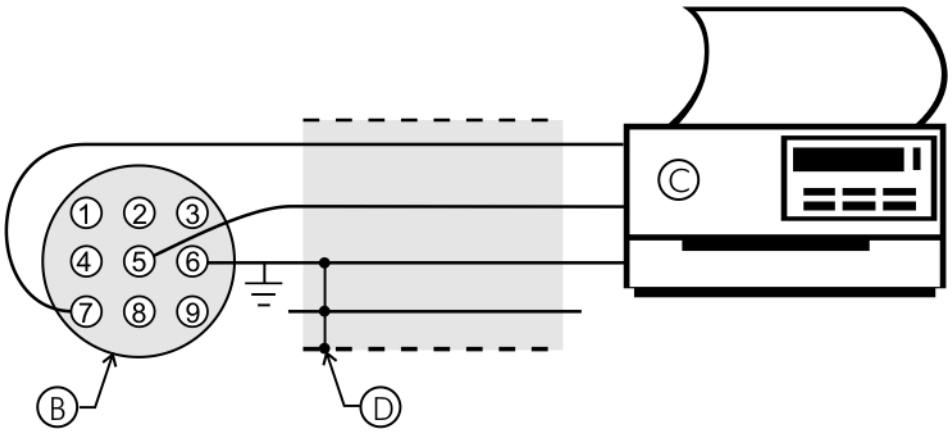
A . . . Receptacle (with male pins). Pin functions are as follows: **5 . . = . .** Clear to send (CTS); **7 . .** =Transmit data (TXD); **6&9 . .** =Ground. This application only uses Pin 6; **1&2 . .** =Not used in this application; **3&4 . .** =Not used in this application; **8 . .** =Not used in this application. See previous, related caution statement.

B . . . Plug (with female pin sockets)

C . . . Approved serial printer (see previous note)

D . . . Tie shield and spare conductor(s) on this end of cable to ground. Leave unconnected on other end.

Cable Wiring



4.4.2 Cable Requirements

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The printer must be connected to the printer port on the machine using the appropriate one of the following Milnor interface cables:

Table 24. Milnor Printer Cables

Printer Cable Part Number	Description
10YMK2PNTR	100-formula washer-extractor, dryer, extractor, and Miltron (CBW®) controllers
10YCBWPNTR	Non-serial Miltron (CBW) controller
08MPSERCBL	Mentor® (CBW) and Mildata® controllers

4.4.3 Configuring the Citizen GSX-190 Printer

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Table 25: Required Settings for Citizen GSX-190 Printer, page 98 lists the required settings for this printer model to work properly with Milnor equipment. To print the current settings stored in your printer, move the **Menu** slide switch on the printer to the **VuePrint** position, then hold the **Print** button for three seconds. Hold the **Menu** button for three seconds to enter the **VuePrint** menu system to make changes.

Table 25. Required Settings for Citizen GSX-190 Printer

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

4.4.4 Configuring the Epson LX300 Printer

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The Epson model LX300 printer was supplied by Milnor prior to March 2001 to print data from microprocessor controllers with printing functions. When shipped from Milnor, this printer was configured to operate correctly with Milnor equipment. If the printer is replaced or must be reconfigured for any reason, refer to the user's guide and the following table.

Table 26. Required Settings for Epson LX300 Printer

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

4.4.5 Previous Printer Models

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The Epson LX300 printer replaced the Epson LX-810, which replaced the Epson LX-800. For information on these older printer models, request document MSSM0251AE from the Milnor factory.

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4.5 How to Upgrade Microprocessor EPROM Chips

BNCUUM01.C01 0000220311 A.3 A.5 A.7 1/2/20, 1:30 PM Released

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.

4.5.1 How to Change EPROMs

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WARNING: Electrocution and Electrical Burn Hazards — Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not attempt unauthorized servicing, repairs, or modification.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard

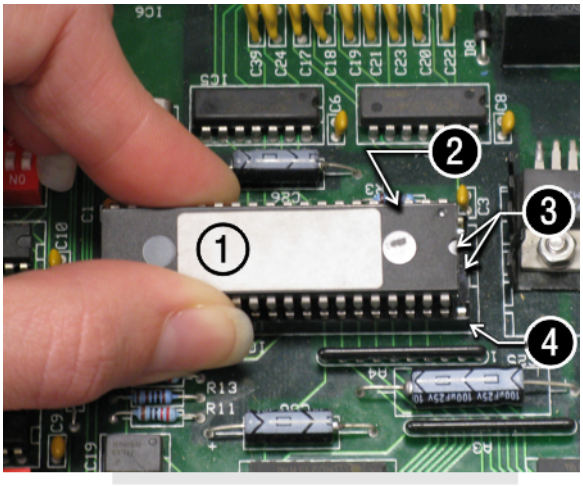
4.5.1.1 Remove and Replace EPROM Chips

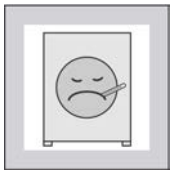
BNCUUM01.T01 0000220383 B.2 A.5 A.7 6/27/23, 4:44 PM Released

1. Make sure all power to the machine is off.

2. Locate the chips as described in Section 4.5.2 : Location of EPROM Chips, page 101. 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 48, page 100. 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 48. EPROM Chip Identification and Installation

EPROM Chip and Socket	Legend
	1. Label—shows the software version and date code 2. EPROM chip 3. Key notch 4. EPROM socket



CAUTION: 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.

4.5.1.2 Verify Proper EPROM Chip Installation

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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, **immediately** turn the machine off and verify that the chips are correctly oriented in the sockets.

4.5.2 Location of EPROM Chips

BNCUUM01.C05 0000220354 A.4 A.5 A.7 1/2/20, 1:30 PM Released

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 27. 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)	

4.5.2.1 8085 Processor Boards (except Coin Machines)

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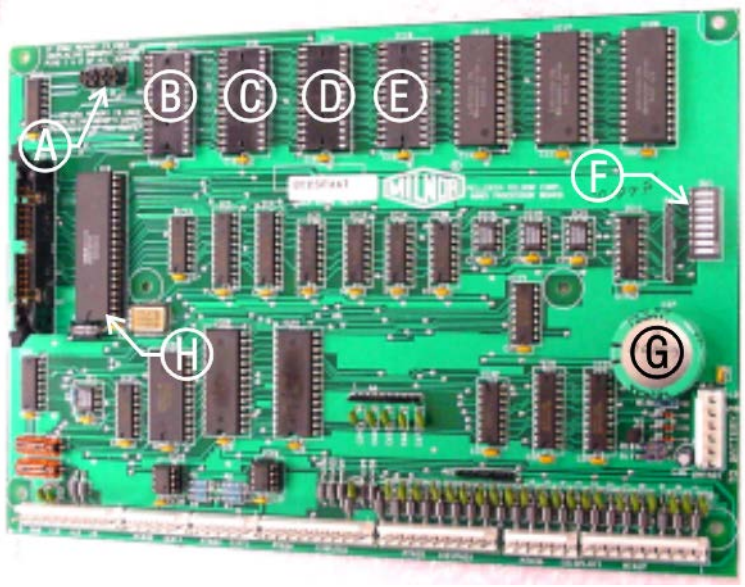
See Figure 51: 8085 Processor Boards (Except Coin Machine), page 103 . Install EPROM #1 at the end of the row nearest the corner of the board, then #2, #3, and #4. Chip #4 goes next to the two chips soldered to the board. See Figure 50: Where to Check Processor Board Voltages, page 102 for where to check for proper voltages.

Figure 49. Replacement Processor Board

08BSPAA_

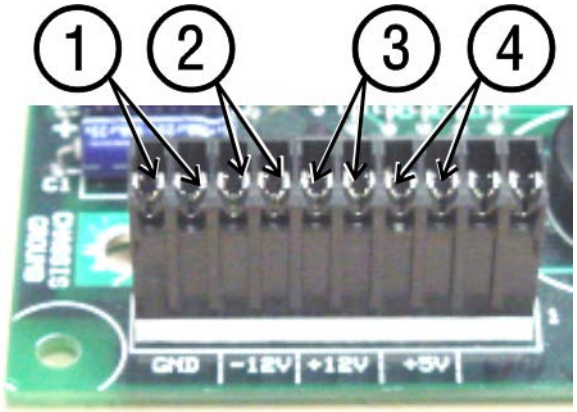


Legend

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 50. Where to Check Processor Board Voltages

Typical MTA-31

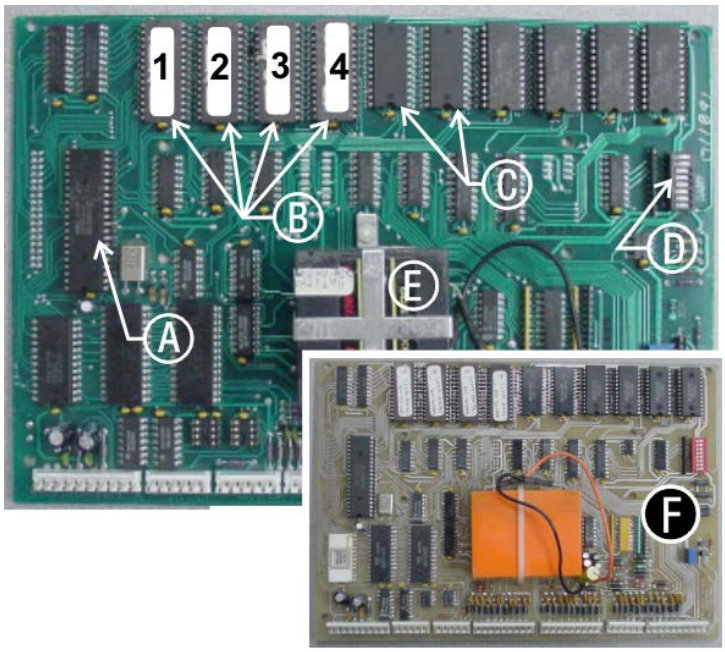


Legend

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

Figure 51. 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

4.5.2.2 8088 Processor Boards without Memory Expansion Board

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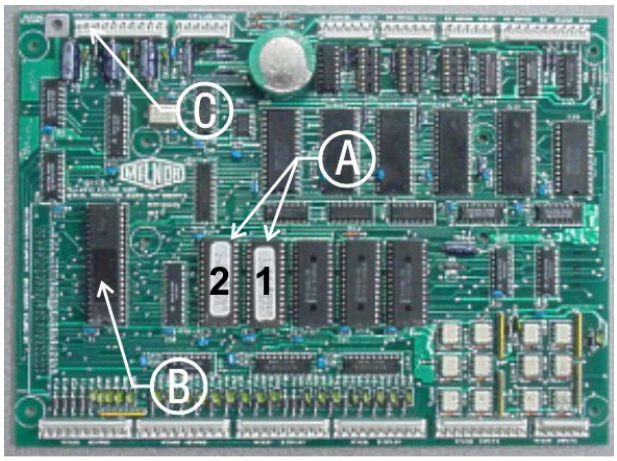
See Table 28: EPROM Locations for 8088 Processor Applications, page 104 and Figure 53: 8088 Processor Board and Optional Memory Expansion Board, page 104 . If the set consists of only one EPROM, install it in socket A of Figure 53, page 104. If two EPROMs comprise the set, install EPROM #2 in socket 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 52. Typical 8088 Processor Board without Memory Expansion Board

08BSPC_ Processor Board



Legend

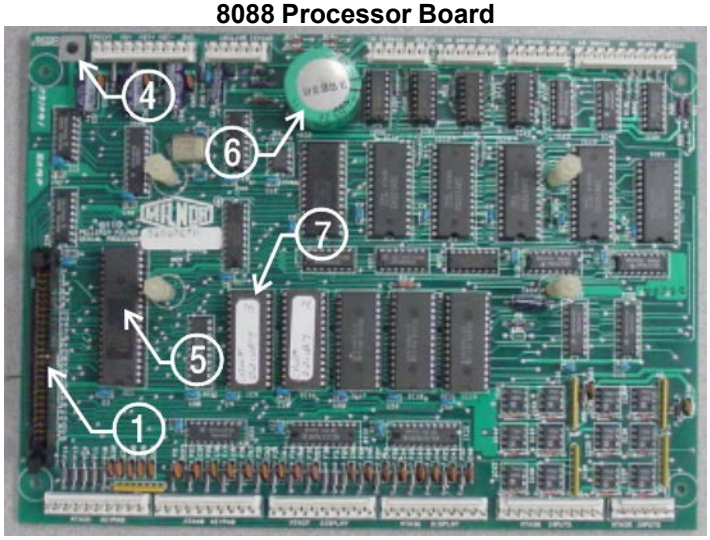
A . . . EPROMs
B . . . 8088 processor chip
C . . . MTA31 for voltage verification

Table 28. EPROM Locations for 8088 Processor Applications

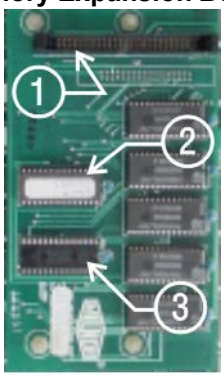
	EPROM Location by Socket			
EPROMS in Set	**A**	**B**	**IC-1**	**IC-2**
4 chips	4	3	2	1
3 chips	3	2	1	—
2 chips	2	1	—	—
1 chip	1	—	—	—

Figure 53. 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

4.5.2.3 8088 Processor Boards with Memory Expansion Board

BNCUUM01.C08 0000220390 A.3 A.5 A.7 1/2/20, 1:30 PM Released

See Table 28: EPROM Locations for 8088 Processor Applications, page 104 and Figure 53: 8088 Processor Board and Optional Memory Expansion Board, page 104 . 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.

4.5.2.4 80186 Processor Boards

BNCUUM01.C09 0000220389 A.3 A.5 A.7 1/2/20, 1:30 PM Released

This processor board (see Figure 54: 08BSPET 80186 Processor Board, page 105) 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.

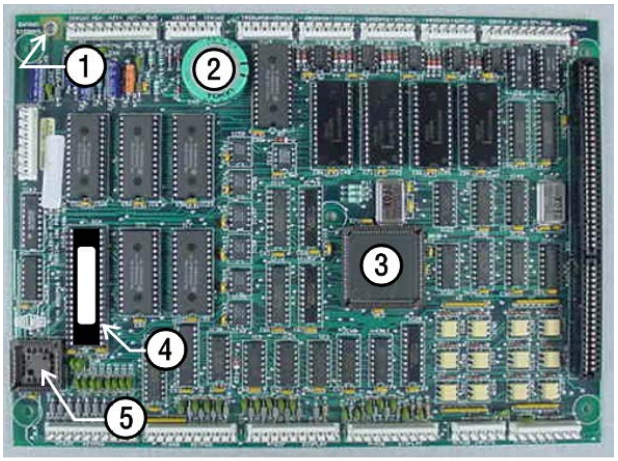
TIP: For maximum reliability and to minimize the chances of the processor board resetting due to low voltage, adjust the power supply voltage for 80186 processors to 5.10 VDC at the processor board.

There are three major revisions of this board, all of which have Milnor® part numbers starting with "08BSPE". If the seventh character is a "1" (one), the board is a later version with a single four-channel communications chip. If the seventh character of the part number is any 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 (shown in Figure 56: 08BSPE2T 80186 Processor Board, page 106) 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.

Figure 54. 08BSPET 80186 Processor Board

Overview

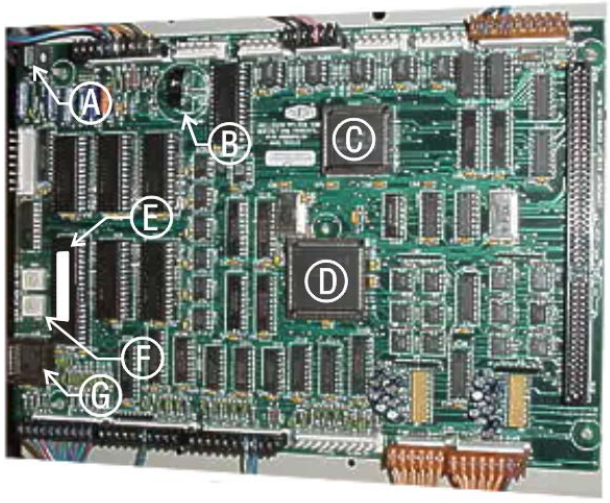


Legend

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

Figure 55. 08BSPE1T 80186 Processor Board

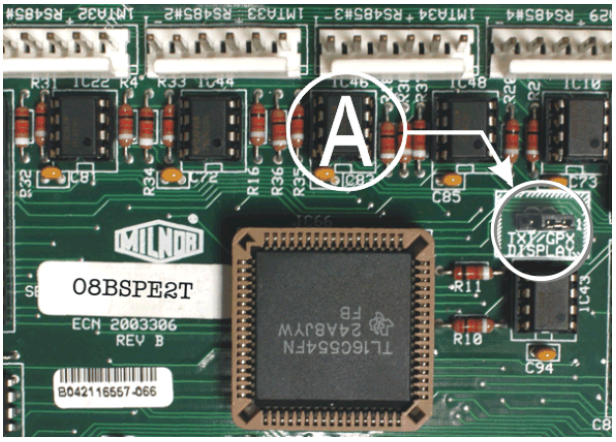
Overview



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 56. 08BSPE2T 80186 Processor Board

Detail	Legend
	**A . . .** Jumper for selecting display type

4.6 Hardware Components of Serial Microprocessor Controllers

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4.6.1 General

BNCEUF01.C02 0000217705 A.3 A.5 A.8 1/2/20, 1:12 PM Released

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.**

4.6.2 Microprocessor Components

BNCEUF01.C03 0000217704 A.3 A.5 A.8 1/2/20, 1:12 PM Released

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

4.6.2.1 Keypad or Keyboard

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

4.6.2.2 Keyswitch

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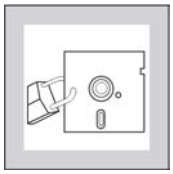
Selects run/program modes. The key may be removed only when the switch is set to the **Run** position.



CAUTION: 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.

4.6.2.3 Display

BNCEUF01.C06 0000217701 A.4 A.5 A.8 1/2/20, 1:12 PM Released

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 Display This type of display is identified by dark green characters on a lighter 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.

4.6.2.4 Power Supply

BNCEUF01.C07 0000217700 A.5 A.8 1/2/20, 1:12 PM Released

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.

4.6.2.5 Central Processing Unit (CPU) Board

BNCEUF01.C08 0000217699 A.5 A.8 1/2/20, 1:12 PM Released

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 be 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.

4.6.2.6 Memory Expansion Board

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Increases memory space available to the processor. This board is used with 8088 CPU boards in some applications.

4.6.2.7 Battery

BNCEUF01.C10 0000217743 A.3 A.5 A.8 1/2/20, 1:12 PM Released

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.

4.6.2.8 Opto-Isolator Board

BNCEUF01.C11 0000217742 A.3 A.5 A.8 1/2/20, 1:12 PM Released

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.

4.6.2.9 Input/Output Board

BNCEUF01.C12 0000217741 A.4 A.5 A.8 1/2/20, 1:12 PM Released

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 4.6.4 : Assigning Board Addresses, page 114 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.

4.6.2.10 Output Board

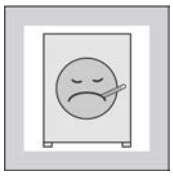
BNCEUF01.C13 0000217740 A.3 A.5 A.8 1/2/20, 1:12 PM Released

A 24-output board contains 24 output relays identical to those described in Section 4.6.2.9 : Input/Output Board, page 108.

4.6.2.11 CRT (Video Display) Board

BNCEUF01.C14 0000217739 A.5 A.8 8/28/22, 2:34 PM Released

Receives display instructions from the processor and generates the signals to the video monitor to create the desired displays; used in controllers such as the Miltron and Miltrac™ controllers and Device Master systems.



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

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

4.6.2.12 Resistor Boards

BNCEUF01.C15 0000217738 A.3 A.5 A.8 1/2/20, 1:12 PM Released

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.

4.6.2.13 Temperature Probe

BNCEUF01.C16 0000217737 A.4 A.5 A.8 1/2/20, 1:12 PM Released

Thermistor temperature probes are temperature-sensitive resistors through which the resistance value changes with respect to the temperature of the surrounding medium (usually bath liquor). This type of device is used in washer-extractors, textile machines, and tunnel washers.

4.6.2.14 8 Output/16 Input Chemical Flow Meter Board

BNCEUF01.C17 0000217736 A.3 A.5 A.8 1/2/20, 1:12 PM Released

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.

4.6.3 Serial Communications Port

BNCEUF01.C18 0000217735 A.5 A.8 1/2/20, 1:12 PM Released

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 Section 4.2 : Construction of External Serial Link Cables, page 89, if applicable.

Table 29. 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

Table 29 Board Application by Device (Part A) (cont'd.)

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
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

Table 29 Board Application by Device (Part A) (cont'd.)

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		

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 30. 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					1	
	Note(s)		1	1	8	1									

Notes:

* Intel 80186 central processing unit

1 Boards can be added for options

Table 30 Board Application by Device (Part B) (cont'd.)

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
2														
3														
4														
5														
6														
7														
8														
9														
10														

Used on steam dryers with temperature control, and all gas dryers

Used on washer-extractors with temperature option

Analog to digital boards vary according to application. See the descriptions of these boards elsewhere in this section

Required for weighing conveyors on tunnel washing systems

Required for reuse/cooldown and/or overhead fill tanks on tunnel washing systems

Mark I washer-extractor control used Intel 8085 central processing unit

Notes 3 and 4 apply

One board required per each 8 modules (see also Notes 1, 4, 5, and 6)

Two boards required, plus one additional board per module

4.6.4 Assigning Board Addresses

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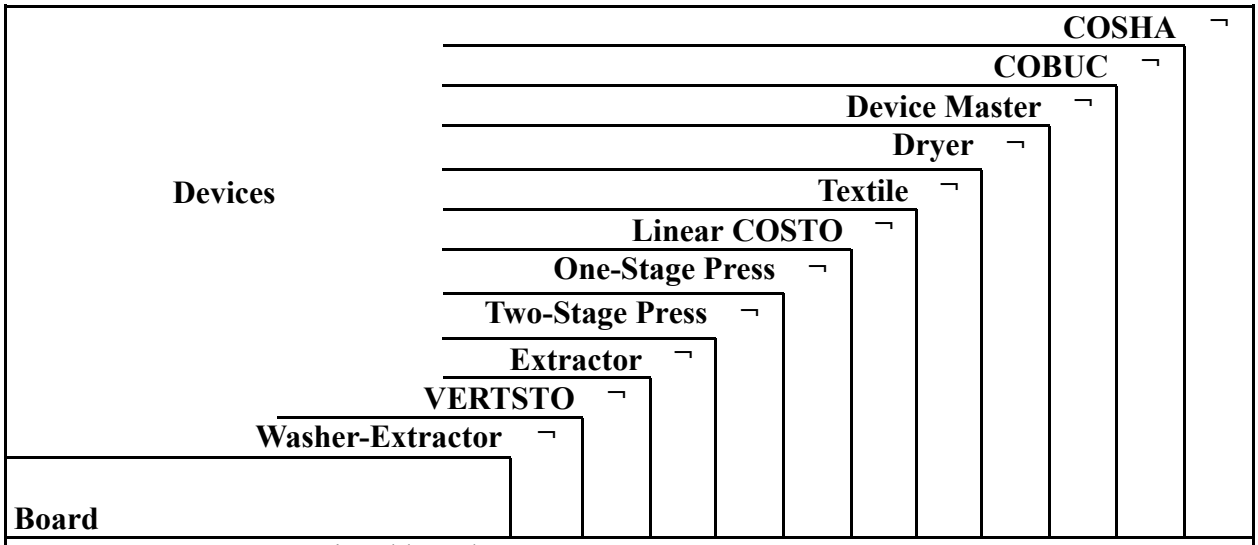
The input/output board, output board, analog to digital board, and digital to analog board each have two rotary switches which establish the address for each board. This allows each board to communicate serially with the microprocessor in its device while sending and receiving its own

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 31. Rotary Switch Settings

Board		Devices: 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:												

Table 31 Rotary Switch Settings (cont'd.)



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