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- **Language Code: ENG01, Purpose: publication, Format: 1colA**

Technical Reference—

Using the Milnor Centrifugal Extractor Controller

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

Applicable Milnor® products by model number:

M7V4232C	**M7V4232L**	**M7V4232R**	**M7V4836C**	**M7V4836L**	**M7V4836R**	**M7V4840C**
M9S4232C	**M9S4232L**	**M9S4232R**	**M9V4232C**	**M9V4232L**	**M9V4232R**	**M9V4840C**
M9V4840L	**M9V4840R**	**MMS4232C**	**MMS4232L**	**MMS4232R**	**MMV4232C**	**MMV4232L**
MMV4232R	**MXS4232C**	**MXS4232L**	**MXS4232R**	**MXV4232C**	**MXV4232L**	**MXV4232R**

Preface

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i. About the Centrifugal Extractor Controller Manual

i. 1. Scope

This manual provides commissioning, programming, operating, and troubleshooting instructions for Milnor® centrifugal extractors. Refer to additional documentation provided with the machine for additional information. Replacement documentation is available from the Milnor® parts department.

i. 2. The Normal Display at Start-up

The start-up display sequence for the Milnor® centrifugal extractor controller is described in Section 3.1. “Centrifugal Extractor Automatic Operation”.

i. 3. Simplified English [Document BIUUUD18]

Some of the documents in this manual use the Simplified Technical English (STE) specification as defined in Specification ASD-STE100 Issue 4 (January 2007). The specification describes the preparation of maintenance documentation in a controlled language. STE makes the English text easier to use and simplifies the translation to other languages. STE documents include this notice:

Notice 1: This document uses Simplified Technical English (STE). See [section] Simplified English.

More information about Specification ASD-STE100 is available at `http://www.asd-ste100.org`.

i. 4. How to Identify this Manual and its Included Documents [Document BIUUUD13]

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

Use the specifications on the front cover of this manual to identify this manual or the included documents. This section tells about these specifications.

Published manual number—The primary identification number for the manual.

Specified date—The first assembly date for the machine or change about which this manual gives data.

As-of date—The company makes new manuals about items that are not new. These new manuals will include data started before this date.

Access date—The date Milnor prepared the manual for its publication.

Depth—"Detail" manuals show the maximum available data. "Synopsis" manuals show the minimum necessary data. A manual with more data goes with a synopsis manual.

Custom—A value of "n/a" here shows that this manual applies to all machines identified on the inner front cover of the manual. Other values show the laundry name and a code for the specified machine.

Applicability—Each value here shows the machines or model numbers that this manual applies to. The inner front cover shows the full list of the applicable models. If this value is "not used," this manual has a different function.

Language Code—The value here shows the language and dialect of this manual. "Eng01" shows that the manual uses United States English.

Refer to a **document** in this manual with all of the specifications shown on the front cover. Replace the published manual number with the document number.

i. 5. Trademarks [Document BIUUUD14]

i. 5.1. Trademarks of Pellerin Milnor Corporation—These words are trademarks of Pellerin Milnor Corporation:

Table 1: Trademarks

CBW®	E-P Plus®	Mentor®	MilTouch™	RinSave®
E-P Express®	ExactXtract®	Mildata®	PulseFlow®	Staph Guard®
	GreenTurn™	Milnor®	RecircONE™	

i. 5.2. Trademarks of Other Companies—These words are trademarks of other companies:

Table 2: Trademarks

Acronis®	IBM®	Microsoft Office XP®	Microsoft Access®	Siemens®
Atlas 2000®	Microsoft Windows 2000®	Microsoft Windows NT®	Microsoft Windows XP®	Seagate Crystal Reports®
		Yaskawa®		

— End of BICXUK01 —

BIUUUK06 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

ii. Contacting Milnor®

Your authorized Milnor dealer can assist you with any aspect of your Milnor machine and is familiar with local conditions that may be pertinent to its installation, use, or maintenance. Always contact your dealer first. Should you or your dealer need assistance from the Milnor factory, refer to Table 3 for contact information.

Table 3: Pellerin Milnor Corporation Contact Information

Purpose	Department	Telephone	FAX	E-mail/Website
Order, or enquire about replacement parts	Parts	504-467-2787	504-469-9777	parts@milnor.com
Obtain advice on installing, servicing, or using	Customer Service/ Technical Support	504-464-0163	504-469-9777	service@milnor.com www.milnor.com (Customer Service)
Learn about, request, or enroll in Milnor service seminars	Training	504-712-7725	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

Your first contact with any question should be your authorized Milnor dealer, but problems or special situations encountered in the field may require consultation with the Milnor factory. Written correspondence can be mailed to this address:

Pellerin Milnor Corporation
Post Office Box 400
Kenner, Louisiana 70063-0400
Telephone: 504-467-9591
http://www.milnor.com

— End of BIUUUK06 —

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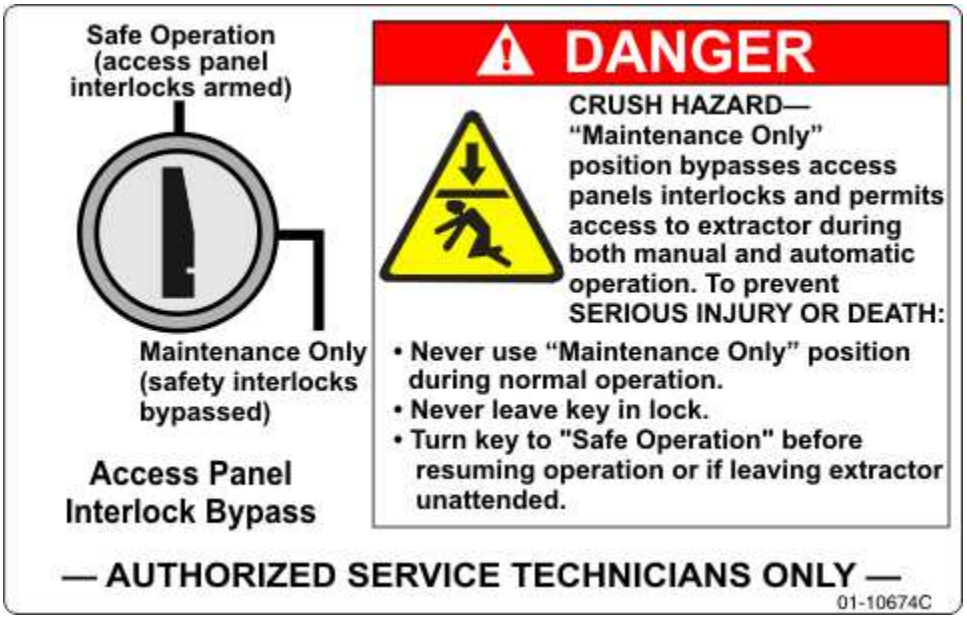
iii. SAFETY ALERT for Owner/Managers and Maintenance Personnel: Using the Access Panel Interlock Bypass Key Switch

The access panels on this machine are equipped with safety lockout switches that disable the machine if a panel is removed. The Access Panel Interlock Bypass key switch permits bypassing this safety feature to allow access to certain moving parts during required maintenance procedures. This key switch, located inside the low voltage control box, is shown in Figure 1.

DANGER 3: Crush Hazard—The "Maintenance Only" position bypasses access panel interlocks and permits access to moving parts during both manual and automatic operation. **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 access panels.
- 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 Access Panel 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.

Figure 1: Access Panel Bypass Key Switch and Safety Placard



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Chapter 1
Commissioning

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1.1. About the Forces Transmitted by Centrifugal Extractors

During extracting, all centrifugal extractors transmit both static and dynamic (cyclic) forces to the floor, foundation, or any other supporting structure. During slow speed operation, the impact of the goods as they drop imparts forces which are quite difficult to quantify. While flexibly-mounted machines such as the Milnor centrifugal extractor transmit only a fraction of the force transmitted by rigid machines, the forces are still considerable. The actual magnitude of these forces vary according to several factors:

- machine size,
- final extraction speed,
- amount, condition, and type of goods being processed,
- chemical conditions in the bath preceding extraction, and
- other miscellaneous factors.

Estimates of the maximum force normally encountered are available for each model and size upon request. Floor or foundation sizes shown on any Milnor® document are only for on-grade situations based only on previous experience without implying any warranty, obligation, or responsibility on our part.

1.1.1. Foundation Considerations

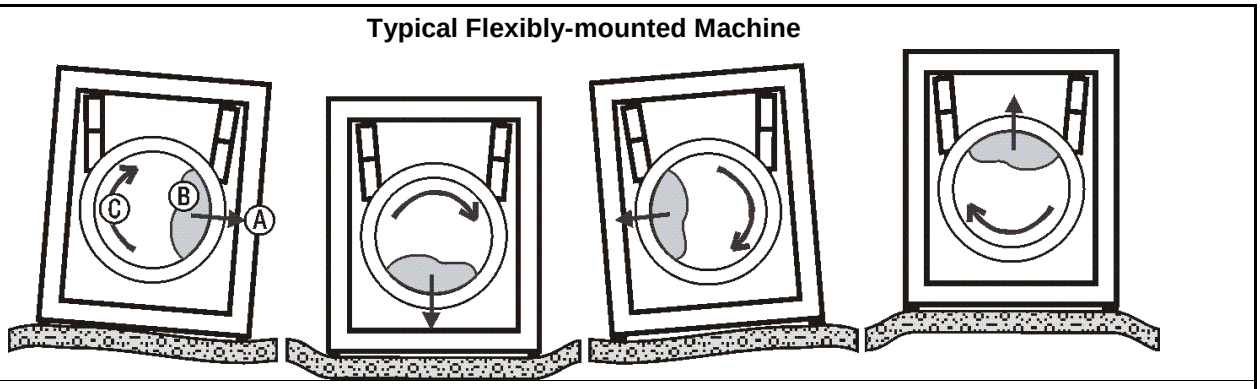
Size for size, flexibly-mounted machines generally do not require as strong a floor, foundation, or other supporting structure as do rigid machines. However, a floor or other supporting structure having sufficient strength and rigidity, as described in Section 1.1.2, is nonetheless vitally important for these models as well.

1.1.2. How Strong and Rigid?

Many building codes in the U.S.A. specify that laundry floors must have a minimum live load capacity of 150 pounds per square foot (732 kilograms per square meter). However, even compliance with this or any other standard does not necessarily guarantee sufficient rigidity. In any event, it is the sole responsibility of the owner/user to assure that the floor and/or any other supporting structure exceeds not only all applicable building codes, but also that the floor and/or any other supporting structure for each extractor or group of extractors actually has sufficient strength and rigidity, plus a reasonable factor of safety for both, to support the weight of all the fully loaded machine(s) including the weight of the water and goods, and including the published 360-degree rotating sinusoidal RMS forces that are transmitted by the machine(s). Moreover, the floor, foundation, or other supporting structure must have sufficient rigidity (i.e., a natural or

resonant frequency many times greater than the machine speed with a reasonable factor of safety); otherwise, the mentioned 360-degree rotating sinusoidal RMS forces can be multiplied and magnified many times. It is especially important to consider all potential vibration problems that might occur due to all possible combinations of forcing frequencies (rotating speeds) of the machine(s) compared to the natural frequencies of the floor and/or any other supporting structure(s). A qualified soil and/or structural engineer must be engaged for this purpose.

Figure 2: How Rotating Forces Act on the Foundation



Legend

A. Direction of force
B. Load
C. Rotation (Frequency = RPM / 60)

The figure(s) above depict(s) both on-grade and above-grade installations as well as models installed directly on a floor slab or on a foundation poured integrally with the slab. Current machine data is available from Milnor® upon request. All data is subject to change without notice and may have changed since last printed. It is the sole responsibility of every potential owner to obtain written confirmation that any data furnished by Milnor® applies for the model(s) and serial number(s) of the specific machines.

— End of BIWUUI02 —

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1.2. Definitions of Terms and Abbreviations

CPU (central processing unit)—integrated circuit component, usually an Intel 8088 and its ancillary devices, that interprets programming instructions and inputs to the microprocessor and provides outputs to other devices

CCW—counterclockwise cylinder rotation, as viewed from the load end; see also CW

centrifugal extractor—extraction device to which tunnel may pass batches; extraction is by spinning goods in a cylinder

checksum—one of several numbers generated by the control that represents the amount of data in a specific memory area; any change in a checksum indicates that data has changed

configure—microprocessor programming for various software and hardware options on the machine

control—an electrical enclosure, usually housing a keypad, at which the user commands actions and programs the machine; also includes all electromechanical devices on the machine involved with its operation; also referred to as “controller”

CPU—central processing unit; the main computer chip in a microprocessor control system that processes data, as well as the board on which the CPU chip is mounted

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

daisy chain—method of linking two or more serial type microprocessor controls with one four-conductor shielded cable. All data passes via this cable, regardless of which machines are communicating.

default password—see **Password, default**

default value—value used by the microprocessor control if no other value has been set by the programmer

DIP switches—dual in-line package switches; a row of (usually six or eight) miniature switches in a single housing used to permanently select or configure certain options on microprocessor boards; on Milnor® microprocessor controls these switches are used most often to specify the communications address for each machine in a system

discretionary data field—any field in the microprocessor control system that can be updated through the keyboard or keypad; also, a machine configuration field, such as temperature units, that is not limited by hardware or equipment in the machine

display—the component by which the machine provides data to the operator; the component may be one of several types, including vacuum fluorescent or liquid crystal (two lines of 20 alpha-numeric characters), color graphic liquid crystal (320 pixels by 240 pixels), or CRT monitor of various resolutions.

door, manual—machine door which is opened and closed by hand, without power assistance

door, power operated—machine door which is normally operated through electro-mechanical controls rather than manually; usually, the machine must be energized for the door to operate

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

EPROM—erasable programmable read-only memory; the portion of some Milnor® microprocessor control systems used to store the fixed instructions (software) that determine how the machine functions

extraction—the removal of excess water from goods discharged from the tunnel washer

extractor, centrifugal—see **Centrifugal extractor**

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

formula code—see **Code, formula**

goods—articles processed or conveyed by a machine

hardware—electronic boards that control the machine

input, direct—signals that enter the processor board directly; direct inputs are provided by switches on the machine, including limit switches, the *Signal Cancel* button, and the *Run/Program* keyswitch

input, standard—signals to the microprocessor controller that certain standard conditions exist; these inputs enter the processor board through the standard input/output board(s); include *Bag Ready*, *Load Conveyor Ready*, and remote customer and goods codes, etc.

jogging—intermittent rotation of the cylinder on certain Milnor® machines can be used to dislodge goods from the cylinder wall after extraction, or to assist in discharging goods from the tilted cylinder, etc.

load—the amount of goods, measured by weight or pieces, that a machine normally handles during a cycle

loading device—in a system, this is the device which loads another device; example: a shuttle may be the loading device for a dryer

loading direction—the direction the goods are loaded into or onto a device

MMQ—minutes, minutes, and quarter minutes (e.g., 043 = 4 minutes and 45 seconds); see also **SS** and **SSS**

model—designation of machine without regard to options; for most devices, the model includes some dimensional representation of the effective machine size

motor contactor box—enclosure containing the high voltage motor contactors

permanent press—a fabric or finish which is heat-set after the article is manufactured to minimize wrinkling and to retain creases

program mode—mode which allows programming of wash formulas, dry cycles, and other discretionary data; see also **Run mode**

run mode—mode of operation that allows devices to run automatically; see also **Program mode**

software—fixed information contained in EPROMs (programming by Milnor®) or on disk files that determines how a machine or computer operates

SS (SSS)—seconds, i.e., "SS" means two digits (usually 00-99 seconds), "SSS" means three digits (usually 000-255 seconds); see also **MMQ**

three-wire circuit—circuit that provides control power for all machine functions; any of several safety devices in the three-wire circuit will open the circuit and stop machine operation if a malfunction is detected; once open, the three wire circuit can only be closed by manual intervention and then only if the condition that opened the circuit is rectified

toggle switch—one of several types of hand-operated switches with a single operating lever that can be moved to two or more positions (e.g., the *Master* switch)

trickle charge—process of slowly and continuously charging a microprocessor backup battery during machine operation to maintain a full charge

— End of BIUUUK05 —

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1.3. Summary of Milnor® Allied Interface Capability, Centrifugal Extractor

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

> **Note 1:** Refer to the document "About Milnor® Allied Interfaces for Automated Laundering System Machines" for a general explanation of allied interfaces. Refer to "Milnor® Allied Interface Specifications and Signals" for technical information needed to implement an allied interface.
>
> **Note 2:** The allied interfaces offered by Milnor are continually evolving and the available signals can vary from one software version (date code) to another. Milnor Tehnical Support can assist in determining data-passing capacities for specific software versions.

1.3.1. How Batch Data Travels Through a System

The types and ranges of batch codes that the devices within an automated laundering system can handle depend on both the individual device controller and the means of communication used to pass this data from device to device. Generally, allied interfaces provide less capacity then the Miltrac controller because they are much more limited by hardware constraints and are developed on an as-needed basis. You will notice in Table 4 that certain types of codes and code ranges do not carry over from device to device, or even from the loading to the discharge interface within the same device. Keep in mind that both down stream and upstream of a given allied interface, data will most likely be passed not via an allied interface, but rather, by the Miltrac controller or a

similar system controller supplied by another equipment manufacturer. As of this writing, Miltrac is capable of passing the following codes and code ranges throughout the entire system (among all Miltrac devices): 256 formula codes, 16 press/extract codes, 16 dry codes, 256 goods code, 1000 customer codes, 64 destination codes, 1000 weight values, 256 cake numbers, and the following flags: single cake, empty load, low pressure, third pressure, no pressure.

1.3.2. Batch Data Signals

This section summarizes the types and number of batch codes for which, as of this writing, batch data allied interface signals are available. As shown in Table 4, the signals that carry batch data are divided into two general categories, those that pass multi-digit batch codes (e.g., drycode) in binary, and must therefore, function in groups and those that pass a single on/off value (e.g., the "new customer" code).

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

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

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

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

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

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

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

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

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

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

Cake Number—in older Milnor CBW®'s (with Miltron™ controllers), this is an identification number associated with each batch. The Miltron automatically assigns the numbers 000 to 255 in sequence and starts over at 255. As indicated in Table 4, allied signals are not currently available on any machine for passing this code.

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

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

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

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

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

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

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

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

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

Table 4: 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*
Centrifugal Extractor														
Loading		16	16		256	128	16			X	X	X	X	
Discharge	16		16		256	128	16			X	X	X		
* Low, 3rd, and No Pressure are three separate signals.														

1.3.3. Operational Signals

A set of generic functions can be defined that encompasses most operational information that might be needed for any interface. The generic functions are helpful in understanding interfacing in general, even though it is usually possible to successfully interface any two specific machines using only a few of these functions. Table 5 lists the generic functions and which corresponding signals are actually provided on the device(s).

The generic functions only describe the general purpose for a signal. A given signal may have a more specific meaning pecular to the device. The signal names are taken from the schematics (may be abbreviated) and may vary from device to device. As shown in Table 5, the generic

functions can be grouped into three categories: directional functions, transfer functions, and confirmation functions.

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

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

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

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

at left—The shuttle/COBUC must traverse leftward.

at right—The shuttle/COBUC must traverse rightward.

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 5: Operational Functions and Available Signals

Function Type-->	Directional Functions				Transfer Functions						Confirmation Functions			
Function Name--> Type of Interface	2nd level	Oppo-site side	At left	At right	Early call	Dis-charge desired	Load desired	Load-ing mode	Dis-charge al-lowed	Load al-lowed	Trans-fer not com-plete	Error: cancel trans-fer	data valid	trans-fer com-plete
Centrifugal Extractor														
Loading					input: end ex-tract		output: load desired	input: start ex-tractor		output: extr. says load allowed				input: start cycle
Dis-charge						output: dis-charge desired				input: start dis-charge £				input: dis-charge finished
£ 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.														

— End of BICALC13 —

Chapter 2
Programming

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2.1. Programming the Centrifugal Extractor Controller

The *Program* menu of the centrifugal extractor controller comprises seven separate options for creating and managing the machine configuration and the formulas used when the extractor is operating.

0 = OK TURN KEY TO RUN—described in Section 2.1.2 "Safely Exiting the Program Menu", this display appears when it is safe to turn the keyswitch to return to the *Run* mode from the *Program* menu.

1 = ADD/CHANGE FORMULA—described in Section 2.1.3, use this option to create a new extractor formula or to modify an existing formula with different values.

2 = COPY OLD TO NEW—described in Section 2.1.4, this option allows the user to copy an existing extract formula to any formula number that does not contain a formula.

3 = CONFIGURE—described in Section 2.1.5, use this option to change parameters in the controller to match the physical machine and to adjust certain user preferences.

4 = DOWN LOAD—described in Section 2.1.6, this option allows copying the memory contents of one machine and another machine or serial memory storage device back and forth to make the most efficient use of programming time and to protect programmed data from loss.

5 = CLEAR ALL MEMORY—described in Section 2.1.7, use this option to clear the controller memory of all programmed formulas and configuration. Machine **configuration** decisions are reset to the default values.

6 = DEFAULT FORMULAS—described in Section 2.1.8, this option copies the six factory-provided sample extract formulas into extractor memory so they can be executed or modified as desired.

2.1.1. Entering the Program Menu

Display or Action	Explanation
WAITING FOR LOAD	This is the normal display when the extractor is in *Run* mode and sitting idle. The complete display sequence of the *Run* mode is described in Section 3.1. "Centrifugal Extractor Automatic Operation".
	Turn the *Run/Program* keyswitch to the *Program* position () to access the *Program* menu.
PROGRAM 1 MENU ADD/CHANGE FORMULA	From the main Program menu display, select one of the seven available options. Notice that the character at the display cursor is shown in reverse type.
	Use the arrow keys to scroll through the available options, or enter an option number directly from the keypad.
	Selects option *3* of the *Program* menu (*Configure*).
	With any option selected, this key accesses the option. Some options have introductory screens that present additional decisions, while others begin immediately when the option is accessed.
ADD/CHANGE FORMULA 00 FORMULA 00	This is the introductory screen for option *1* (*Add/Change Formula*). See Section 2.1.3 "1 = Add or Change a Formula" for additional information about this option; other options are described elsewhere in this manual as noted near the beginning of this document.

2.1.2. Safely Exiting the Program Menu

Display or Action	Explanation
	selects option *0* from any other *Program* menu option.
PROGRAM 0 MENU OK TURN KEY TO RUN	This is the option *0* screen. This display must be visible before the keyswitch is turned from the *Program* position () to the *Run* position ().
	When option *0* is visible on the display, turn the keyswitch to the *Run* position and verify by pressing  . This action causes the extractor control to prompt for cake data, as described in Section 3.1.4.4.1 "Prompts for Extractor Cake Information".

2.1.3. 1 = Add or Change a Formula [Document BICXUP02]

2.1.3.1. Set the Number of the Formula to Add or Change

Display or Action	Explanation
PROGRAM 1 MENU ADD/CHANGE FORMULA	This is item 1 of the *Program* menu.
NEXT	Go into this item to add or change a formula.
ADD/CHANGE FORMULA 00 FORMULA 00	"ADD" flashes if you will make a new formula at the number. "CHANGE" flashes if you will change the formula.
0 5	Set the control to add or change formula 05. Formula numbers 00 through 15 are correct.
or CANCEL	Go out of this menu item. You will go back to the *Program* menu.
ADD/CHANGE FORMULA 05 FORMULA 05	Formula 05 is the selection. This display shows that you can *CHANGE* the formula. The display will flash *ADD* if there is no formula 05. Push the *NEXT* button to go to the formula name.

2.1.3.2. How to Apply a Name to a Formula

Display or Action	Explanation
F05 FORMULA NAME FORMULA 05	When you make a new formula, the extractor controller gives the formula a name which includes the number of the formula. Push the *NEXT* button to keep this formula name, or change the formula name as shown.
F05 FORMULA NAME COTTULA 05	Push the correct keypad button until the necessary character shows on the display. For the display shown here, push the *1* button three times. When *C* shows on the display, push the *Up Arrow* button to move the cursor to the subsequent character. Push the *5* button three times to see *O*. Push the *Up Arrow* button to move the cursor. Do this for each character in the new formula name.
0	Push this button one time for an empty space in the formula name.
↑ / ↓	These buttons move the cursor forward and rearward.

Tip: The *SKIP TO* button does the same work as the *Up Arrow* button to move the cursor to the subsequent character position.

NEXT	Push this button to accept the name of the formula. You will go to the first display of formula decisions.

2.1.3.3. How to Write an Extract Formula

Supplement 1

How to Move the Cursor When You Write an Extract Formula

Use these four displays to write an extractor formula, as shown in Figure 3:

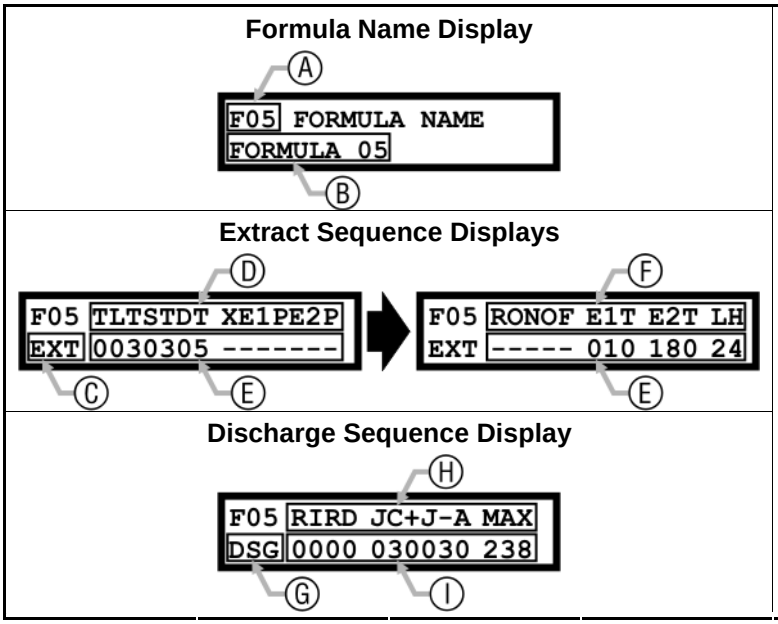
1. the *Formula Name* display
2. the *Loading and Pre-extract Sequence* display
3. the *Final Extract* display, and
4. the *Discharge Sequence* display.

If you see an *Extract Sequence* display or the *Discharge Sequence* display:

(↓) moves the cursor rearward (right to left) through each decision.

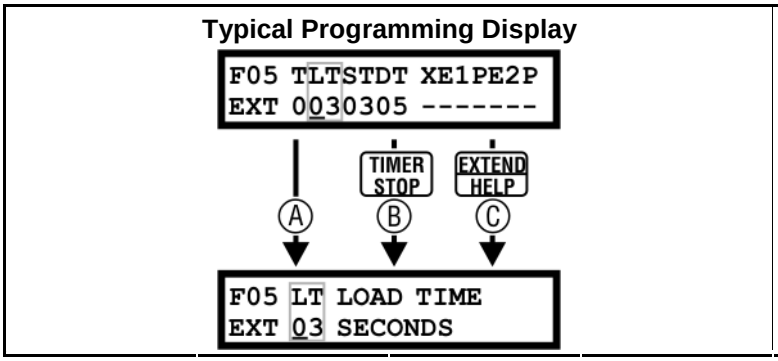
(↑), ENTER moves the cursor forward (left to right) through each decision. If the cursor is at *Decision A* or *Decision X*, it will only advance with ENTER.

Figure 3: Elements of the Programming Displays



2.1.3.3.1. About the Help Displays when Programming—Each decision has a related help display. You will see the *help display* if you do not push a key in eight seconds or less after the cursor stops on the decision. This and other possible selections are given in Figure 4.

Figure 4: Programming Help Display



2.1.3.3.2. Loading and Pre-extract Sequence

Display or Action	Explanation
F05 TLTSTDT XE1PE2P EXT 0181525	**Type of Extract:** This is the first display for programming the loading and pre-extract sequence.
0	**Standard extract**, used for most types of goods.
1	**Pre+Final Extract.** 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 plus high-speed extract) follows the last pre-extract sequence.
2	**Final+Final Extract (Split Extract).** One to three low-speed and high-speed extract sequences, each followed by a stop and a jog to dislodge the cake, then followed by a single final extract (low plus high speeds).
CANCEL	**Prompts to delete the current formula.** At the prompt, either delete the current formula or exit the *Delete Formula* display to continue. Once the cursor advances beyond the first decision (T), pushing CANCEL prompts "Escape? Push Enter Til End of Formula". Push NEXT to advance through each decision to the end of the formula.
F05 TLTSTDT XE1PE2P EXT 0181525	**Loading Time:** the duration in seconds that the extractor runs in loading speed while accepting a load.
03	Minimum programmable time and default value for this decision.
40	Maximum programmable time for this decision.
F05 TLTSTDT XE1PE2P EXT 0181525	**Slow Speed Time:** the duration in seconds that the extractor runs in slow speed before beginning distribution.
00	Causes the extractor to run at distribution speed during loading, never running at slow speed.
03	Minimum programmable time and the default value.
20	Maximum programmable time for this decision.
F05 TLTSTDT XE1PE2P EXT 0181525	**Distribution Time:** the duration in seconds that the extractor runs in distribution speed.
05	Minimum programmable time and the default value.
20	Maximum programmable time for this decision.
F05 TLTSTDT XE1PE2P EXT 2181525 1060120	**Number of Pre-extracts:** the number of times the pre-extract sequence repeats before the final extract sequence begins. The extract will end before this value is satisfied if the time commanded for *MAX* (described in Section 2.1.3.4) expires. Because pre-extract is not used when decision *T=0* (*Standard Extract*), the extractor controller automatically skips this decision.
1	Minimum programmable value and the default value.

Display or Action	Explanation
3	Maximum programmable value for this decision.
F05 TLTSTDT XE1PE2P EXT 2181525 1060120	**E1 Pre-extract Time:** the duration in seconds that the extractor runs in low extract speed during the pre-extract sequence before advancing to the redistribution sequence if *T=1* (*Pre+Final Extract*) or to high extract speed if *T=2* (*Final+Final Extract*). The extractor controller automatically skips this decision if decision *T=0* (*Standard Extract*).
010	Minimum programmable time and the default value.
180	Maximum programmable time.
F05 TLTSTDT XE1PE2P EXT 2181525 1060120	**E2 Pre-extract Time:** the duration in seconds that the extractor runs in high extract speed before advancing to the redistribution sequence if *T=2* (*Final+Final Extract*). The extractor controller automatically skips this decision if decision *T=0* (*Standard Extract*) or *T=1* (*Pre+Final Extract*). The minimum programmable time and default value for this decision is 30 seconds (030); the maximum value is 180 seconds (180).
030	Minimum programmable time and the default value.
180	Maximum programmable time.

2.1.3.3.3. Final Extract Sequence

Display or Action	Explanation
F05 RONOF E1TE2T LH EXT 11010 060120 24	**Reversal sets:** the number of jog reversals after the pre-extract sequence (if *T=1* or *T=2*) for *Pre+Final* or *Final+Final* extract. The extractor controller automatically skips this decision if decision *T=0* (*Standard Extract*).
1	Minimum programmable value and the default value.
9	Maximum programmable value.
F05 RONOF E1TE2T LH EXT 11010 060120 24	**Reversal Slow Speed *On* Time:** the duration in seconds of wash speed in either the clockwise or counter-clockwise direction (if *T=1* or *T=2*) during the jog reversal phase of the redistribution sequence. The extractor controller automatically skips this decision if decision *T=0* (*Standard Extract*).
01 - 99	Valid times for this decision.
F05 RONOF E1TE2T LH EXT 11010 060120 24	**Reversal Slow Speed *Off* Time:** the duration in seconds of dwell between the clockwise and counter-clockwise directions (if *T=1* or *T=2*) during the jog reversal phase of the redistribution sequence. The extractor controller automatically skips this decision if decision *T=0* (*Standard Extract*).
01 - 99	Valid times for this decision.
F05 RONOF E1TE2T LH EXT 11010 060120 24	**Last E1 Time:** the duration in seconds of the last low speed extract before proceeding to the last high speed extract.
010	Minimum and default time.
180	Maximum time.
F05 RONOF E1TE2T LH EXT 11010 060120 24	**Last E2 Time:** the duration in seconds of the last high speed extract before proceeding to the discharge sequence. The minimum and default value for this decision varies according to the programmed type of extract.
0	Minimum and default value **if decision *T = 0* (*Type of Extract = Standard Extract*)**.
30	Minimum value **if decision *T > 0***.
180	Default value **if decision *T > 0***.
600	Maximum value.
F05 RONOF E1TE2T LH EXT 11010 060120 24	**Low Extract Speed:** the desired low extract speed. One row of Table 6 states the four available extract speeds for your machine model. Enter 1, 2, 3, or 4 for the desired speed.
F05 RONOF E1TE2T LH EXT 11010 060120 24	**High Extract Speed:** the desired high extract speed. This value must be equal to or higher than the programmed low extract speed (L). One row of Table 6 states the four available extract speeds for your machine model. Enter 1, 2, 3, or 4 for the desired speed.

Table 6: 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

2.1.3.4. Programming a Discharge Sequence

Supplement 2

Guidelines for Discharging Various Goods

In general, three different types of discharge sequences will efficiently discharge most goods that are processed in the centrifugal extractor. Goods of polyester/cotton blended fabrics and walk-off mats do not tend to stick to the inside of the extractor excessively, so less time is required to discharge them. The fastest discharge sequence—which is usually sufficient for goods of this type—involves tilting the extractor cylinder up to the unload position and jogging the cylinder to dislodge the goods. The number of jogs required to completely unload the extractor varies according to many factors, but experimentation will help determine the fewest number of jog cycles that will reliably empty the machine.

All-cotton goods tend to stick to the extractor basket, so require more effort to unload. The most common discharge sequence for cotton goods makes use of the optional inflatable ribs. This sequence generally consists of tilting the cylinder to the unload position, then inflating and subsequently deflating the ribs. After the ribs are deflated, the goods are jogged to dump them from the extractor.

For mop heads and other goods that are prone to stick to the inside of the extractor as well as each other, a series of rib inflation and jog cycles before the cylinder tilts up helps to break the slabs into smaller pieces. The general sequence for this goods type is to jog the goods, inflate and deflate the ribs, then jog again. After the second jog series, tilt the cylinder up to the discharge position and jog again to unload the goods.

Display or Action	Explanation
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Rib Inflation Time:** applies only to machines equipped with optional inflatable ribs. This is the number of seconds allowed for the 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 Inflation* decision. Enter *00* if the machine is not equipped with inflatable ribs.
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Rib Deflation Time:** applies only to machines equipped with optional inflatable ribs. This is the number of seconds allowed for the ribs to deflate before jogging begins. If *Jog before Tilting* is *false* (decision *A=0*, described below), then this time begins after the extractor tilts up to discharge. If *Jog before Tilting* is *true* (decision *A=1*), then *RD* begins before the extractor tilts up.
00 - 60	Valid values for the *Rib Deflation* decision. Enter *00* if the machine is not equipped with inflatable ribs. **Provide sufficient time to deflate the ribs.**
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Jog Reversals:** number of *Jog Counts* to occur during discharge. One count (reversal) = clockwise jog run time + jog stop time + counterclockwise jog run time + jog stop time. If *Jog before Tilting* is *false* (decision *A=0*, described below), then jogging occurs after the extractor tilts up to discharge. If *Jog before Tilting* is *true* (decision *A=1*), then jogging occurs both before and after the extractor tilts up.
01 - 20	Valid values for the *Jog Count* variable. The controller will not allow *00.*
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Jog Run Time:** a valid non-zero value entered here determines the number of seconds the motor runs at slow speed during clockwise or counterclockwise rotation. A zero (*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* commanded in decision *J-* are doubled.
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 Count* programmed.
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Jog Stop Time:** a valid non-zero value entered here determines the number of seconds the motor stops when reversing between clockwise and counterclockwise rotation. If the special jogging sequence is enabled in the previous decision (*+ = 0*), then this decision is one half the number of desired jogs in each direction. For example, if the special jogging sequence is enabled and *J-* is programmed to *5*, the basket will jog 10 times in each direction.

Display or Action	Explanation
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 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.
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Jog Before Tilt:** The value entered here determines whether the extractor cylinder jogs before tilting to the unload position.
0	No (default). The extractor tilts to the unload position before beginning the jog sequence.
1	Yes. When the *Rib Inflation* time (*RI*) and *Rib Deflation* time (*RD*) expire, the machine jogs as specified by the *JC*, +, and *J-* 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 Supplement 2 for additional information about discharging goods.
F05 RIRD JC+J-A MAX DSG 1245 033150 600	**Formula Time:** 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 Supplement 3 "Using and Modifying the *Estimated Cycle Time* Values" for more details about this decision.
SKIP TO	Any time during programming, pushing this key displays the current cumulative *estimated cycle time*.

Supplement 3

Using and Modifying the *Estimated Cycle Time* Values

The *MAX* value initially displayed when programming the discharge sequence for an extract formula shows the estimated time required for the formula (**extract cycle**) to run. The extractor controller includes the estimated time required for braking, jogging, and other actions when calculating the initial *MAX* 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 *MAX* value can be increased up to the total time for the extract cycle. If the *MAX* 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 *MAX*.

> **Note 8:** 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.

2.1.3.5. Programming Worksheet and Sample Formula

Table 7: Worksheet for Centrifugal Extractor Formula

#_____		Formula Name:			
Decision	**Value**	**Decision Name**	**Decision**	**Value**	**Decision Name**
T		Type of Extract	L		Low Extract Speed
LT		Loading Time	H		High Extract Speed
ST		Slow Speed Time	RI		Rib Inflation Time
DT		Distribution Time	RD		Rib Deflation Time
X		Number of Pre-extracts	JC		Jog Reversals
E1P		E1 Pre-extract Time	+		Jog Run Time
E2P		E2 Pre-extract Time	J–		Jog Stop Time
R		Reversal Sets	A		Jog Before Tilt
ON		Reversal Slow Speed On Time	MAX		Formula Time
OF		Reversal Slow Speed Off Time			
E1T		Last E1 Time			
E2T		Last E2 Time			

Table 8: Worksheet for Centrifugal Extractor Formula

#_____		Formula Name:			
Decision	**Value**	**Decision Name**	**Decision**	**Value**	**Decision Name**
T		Type of Extract	L		Low Extract Speed
LT		Loading Time	H		High Extract Speed
ST		Slow Speed Time	RI		Rib Inflation Time
DT		Distribution Time	RD		Rib Deflation Time
X		Number of Pre-extracts	JC		Jog Reversals
E1P		E1 Pre-extract Time	+		Jog Run Time
E2P		E2 Pre-extract Time	J–		Jog Stop Time
R		Reversal Sets	A		Jog Before Tilt
ON		Reversal Slow Speed On Time	MAX		Formula Time
OF		Reversal Slow Speed Off Time			
E1T		Last E1 Time			
E2T		Last E2 Time			

Supplement 4

Extracting Walk-off Mats

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 4: 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 6 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 9 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 9: Sample Program--Walk-off Mats

Decision	Value	Decision Name		Decision	Value	Decision Name
T	0	Type of Extract		L	1	Low Extract Speed
LT	5	Loading Time		H	3	High Extract Speed
ST	9	Slow Speed Time		RI	0	Rib Inflation Time
DT	20	Distribution Time		RD	0	Rib Deflation Time
X		Number of Pre-extracts		JC	4	Jog Reversals
E1P		E1 Pre-extract Time		+	2	Jog Run Time
E2P		E2 Pre-extract Time		J–	1	Jog Stop Time
R		Reversal Sets		A	0	Jog Before Tilt
ON		Reversal Slow Speed On Time		MAX	180	Formula Time
OF		Reversal Slow Speed Off Time				
E1T	20	Last E1 Time				
E2T	50	Last E2 Time				

2.1.4. 2 = Copy Old to New [Document BICXUP03]

Display or Action	Explanation
PROGRAM 2 MENU COPY OLD TO NEW	This display indicates the menu selection which allows copying an existing (old) formula to a new formula number.
NEXT	Selects this menu item.
CANCEL	At any time during this procedure, this keystroke exits this menu item and returns the display to the item *0* of the *Program menu*.
COPY SOURCE 00	Prompts for the source program number. This is the number of the program from which the copy will be made.
↑ / ↓	Scrolls all formula numbers.

Tip: Program numbers can also be accessed directly by entering the two-digit number.

COPY SOURCE xx DOES NOT EXIST	Indicates that the selected **source** formula does not exist. Choose another formula number to be copied.
COPY SOURCE 05 SHIRTS	If the chosen source formula exists, the controller displays the formula number and name.
NEXT	Verifies the selected formula as the **source**. This formula will be copied to the target formula number.
COPY DESTINATION 00	This display prompts for the selection of a **target** formula.
↑ / ↓	Scrolls all formula numbers.
COPY DESTINATION 12 ALREADY EXISTS	Indicates that the selected destination formula (Formula 12) already exists, thus this location is not a valid destination for copying. The display remains visible until a number representing an empty formula is entered.
COPY DESTINATION 12 FORMULA 12	Indicates that the selected destination formula number is available.
NEXT	Writes the new copy of the formula to memory and exits the *Copy Old to New* menu selection.
PROGRAM 0 MENU OK TURN KEY TO RUN	The selected existing formula has been copied to the unused location represented by the target formula number, except that **the formula name is not copied**. The new copy of the formula is automatically named the same as the destination formula number. From this display, you can select another programming operation or exit from the *programming* mode to the *run* mode.

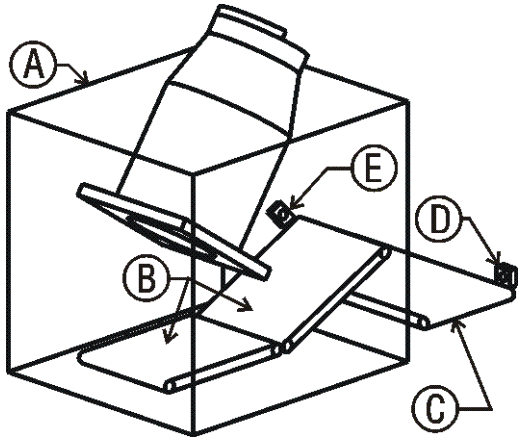
2.1.5. 3 = Configure [Document BICXUP04]

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 eliminates unnecessary programming decisions. Configuration also allows you to select the language used on the display and to adjust certain operating parameters according to the needs of your specific installation.

Display or Action	Explanation
PROGRAM 3 MENU CONFIGURE	This menu selection allows you to configure the controller.
NEXT	Selects this menu item.

2.1.5.1. How Belt A and Belt B Work [Document BICXUO02]—The extractor uses conveyor belts as shown in Figure 5. The two belts under the cylinder are called “Belt A” collectively, and are standard equipment on all centrifugal extractors. According to overall system design, Belt A will discharge to either an optional storage belt (Belt B) or directly to the receiving device (e.g., a Milnor® COLOOS loose goods shuttle).

Figure 5: Extractor with Belt A and Belt B

Illustration	Legend
	**A.** Extractor cylinder **B.** Belt A: both belts run under cylinder **C.** Belt B (optional): detached belt receives goods from Belt A **D.** Photoeye location if Belt B provided **E.** Photoeye location if no Belt B

2.1.5.1.1. 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 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.

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

2.1.5.1.3. Controlling Goods Distribution during Discharge—To control the dispersal of goods on the belts during cylinder discharge, the user can specify one of three actions as described in Table 10:

- no belt motion
- no belt motion, followed by continuous belt motion until the belt photoeye is blocked, or

- no belt motion followed by intermittent belt motion, if Belt B is provided.

Table 10: Extractor Belt Movement Chart

	Belt Delay Time	Belt OFF Time for Belt B	Belt Motion		
			During Jogging		After Jogging
			During Belt Delay Time	After Belt Delay Time	
Belt A only	not 99 (Method 1)	-- n/a --	stationary	continuous	continuous for Belt A Clear time (Notes 4 and 5)
	99 (Method 2)	-- n/a --	stationary		
Belt A when Belt B is present	not 99 (Method 1)	0	continuous		
		>0	stationary	intermittent	
	99 (Method 2)	-- n/a --	stationary		
Belt B, when present	not 99 (Method 1)	0	continuous		continuous until photoeye blocked (Notes 1, 2, and 3)
		>0	stationary	intermittent (Note 1)	
	99 (Method 2)	-- n/a --	stationary		
Notes:	1	Belt B stops when photoeye blocks			
	2	"Photoeye Failed" error occurs if Belt B photoeye is not blocked within Belt B Clear time.			
	3	If the extractor is configured for allied discharge, Belt B stops and starts each time the eye blocks and clears (e.g., goods are manually removed), until it runs for one continuous Belt B Clear time. Then the control declares Belt B empty and prevents it from running until it receives the next batch of goods.			
	4	"Photoeye Failed" error occurs if Belt A photoeye is not blocked and cleared within Belt A Clear time.			
	5	If "Store Load on Belt A" is enabled, Belt A stops when photoeye is blocked. "Photoeye Failed" error occurs if Belt A photoeye is not blocked within Belt A Clear time.			

2.1.5.2. Moving the Cursor in the Configure Menu

Display or Action **Explanation**

(↓) Moves the cursor backward through each configure decision display, retaining each existing value.

Tip: After the *Machine Name* display appears, changes in previous configure decisions require completing the configuration procedure and starting again from the *Languages* decision.

(↑) or NEXT Advances the cursor forward through the decisions, retaining each existing value.

Tip: The control does not advance automatically when an existing value is changed. To advance after changing a value, press NEXT.

2.1.5.3. The Configure Decisions

Display or Action		Explanation
LANGUAGES 0=ENGLISH		**Languages:** This decision allows selection of English or another of the languages supplied in the software.
	0	all prompts appear in English
	1	Spanish (Español)
	2	French (Français)
	3	German (Deutsch)
	4	Dutch (Nederlands)
	5	Italian (Italiano)
	6	Japanese—requires ROM chip in socket *IC8* on processor board
	CANCEL	Any time after the *Languages* configure decision appears on the display, this keystroke prompts, "Escape? Go to end of configuration." Press NEXT for each decision to advance through the configuration menu without changing any values.

The *Delay Starting Belt* decision determines the duration of the pause before belt A (and belt B, if included) starts running. This pause allows goods to bunch together on the belt(s) before the belts start moving. There are two methods of operation for this decision, as described below.

DELAY STARTING BELT 05 SECONDS		**Delay Starting Belt (Method 1):** The *Delay Starting Belt* time begins when the rib deflation time of the discharge sequence ends and the cylinder starts jogging to discharge. Refer to Section 2.1.5.1 "How Belt A and Belt B Work" for an explanation of how this decision influences belt movement. When *Delay Starting Belt* time is configured for a value **other than 99**, the extractor begins the discharge sequence only after transfer is allowed. This is **Method 1**.
	00	0 seconds (minimum and default value)
	98	98 seconds; maximum allowable value for Method 1

Notice 5: A long *Delay Starting Belt* time may exceed the jogging time for formulas with only a few jog counts, truncating the belt delay time.

DELAY STARTING BELT 99 UNTIL AFTER JOGS		**Delay Starting Belt (Method 2):** Belt is stationary during jogging. If belt B is configured and *99* is entered here, the *Belt On Time* and *Belt Off Time* decisions do not appear. When the *Delay Starting Belt* time is configured for a value of **99**, the extractor can begin the discharge sequence before transfer is allowed, allowing goods to discharge onto belt A while the extractor waits for the *OK to Discharge* signal. This is **Method 2**.

Display or Action		Explanation
	99	Belt A (and belt B, if provided) remains stationary until the jogging sequence ends, then runs for the time configured in *Belt Clear time*. Then belt A stops; belt B stops when the photoeye is blocked. If the photoeye is not blocked, an error message appears when *belt B clear time* expires.
BELT A CLEAR TIME 10 SECONDS		**Belt A Clear Time:** After the jog sequence is completed, belt A runs for this period of time to ensure that all goods are discharged.
	00	0 seconds (minimum and default value)
	10	10 seconds (example)
	99	99 seconds (maximum value)
BELT A TILT RUN TIME 10 SECONDS		**Belt A Tilt Run Time:** Specifies how long to run Belt A while the extractor is tilting up. Belt A stops when timer expires or when extractor reaches tilt full up. Belt does not run if configured for zero.
	00	0 seconds (minimum and default value)
	10	10 seconds (example)
	99	99 seconds (maximum value)
BELT B INSTALLED 0=NO [1=YES]		**Belt B Installed:** Enter *1=Yes* here if the extractor is equipped with belt B; otherwise, enter *0=No*. If this decision indicates that belt B is not installed, the decisions for *Belt On time*, *Belt Off time*, and *Belt B Clear time* will not appear.
	0	No; belt B not installed. This is the default value.
	1	Yes; belt B installed.
BELT ON TIME 05 SECONDS		**Belt *On* Time:** Duration of belt motion, after *Belt Delay time*, each time the belts move while the cylinder is jogging to discharge. This decision works with the *Belt Off time* decision, and appears only if belt B is installed and configured, and the *Delay Starting Belt time* is **not** equal to 99. The on and off times should be those times determined by field trials to cause the goods to disperse evenly along the entire length of belt B. Ideally, the first item of goods on the belt will block the discharge end photoeye at about the same time as the last item of goods transfers from belt A to belt B.
	00	0 seconds (minimum and default value)
	05	five seconds (example)
	99	99 seconds (maximum valid value)

Display or Action		Explanation
BELT OFF TIME 02 SECONDS		**Belt *Off* Time:**Duration of belt pause each time the belts stop while the cylinder jogs or discharges. This decision works with the *Belt On time* decision, and appears only if belt B is installed and configured, and the *Delay Starting Belt time* is **not** equal to 99.
	00	0 seconds (minimum and default value)
	02	two seconds (example)
	99	99 seconds (maximum valid value)
BELT B CLEAR TIME 20 SECONDS		**Belt B Clear Time:** 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 Installed* is 1 (Yes).
	00	0 seconds (minimum and default value)
	20	20 seconds (example)
	99	99 seconds (maximum valid value)
ALLIED LOADING 0=NO [1=YES]		**Allied Loading:** Sets the system protocol for loading. Miltrac loading applies if *Allied Loading = No*. For details, refer to the related section in document BICXUI01 elsewhere in this manual.
	0	Miltrac loading. This is the default value.
	1	allied loading
ALLIED DISCHARGE 0=NO [1=YES]		**Allied Discharge:** Sets the system protocol for discharging. Miltrac discharge applies if *Allied Discharge = No*. For details, refer to the related section in document BICXUI01 elsewhere in this 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. This is the default value.
	1	allied discharge
HOLD UNLOAD DEVICE 0=NO [1=YES]		**Hold Unload Device:** This decision applies only if Miltrac discharge is enabled (*Allied Discharge = No*). To determine the correct response to this question, ask “Should the device receiving goods from the extractor (e.g., a shuttle) wait for more than one load before moving?” For example, respond “yes” if the receiving conveyor should wait for two loads before transferring to a multi-cake dryer. Refer to the Miltrac reference manual for more information.
	0	No; multiple cake discharge is disabled.
	1	Yes; multiple cake discharge is enabled.

Display or Action		Explanation
ALLIED PASS DATA 0=NO [1=YES]		**Allied Pass Data:** This decision appears if either the *Allied Loading* or *Allied Discharge* decisions are answered "yes." This decision tells the extractor controller that certain additional boards, required for passing data in binary format, are present. These boards include two additional 16-input/8-output boards at addresses 2H and 3H, and one additional 16-output board at address 12H.
	0	No; allied data pass is not required.
	1	Yes; allied data pass is required and additional boards are present.
MILTRAC ADDRESS 000		**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. Refer to the Miltrac manual for additional details.
	000	lowest available address and default value
	008	address 008 (example)
	255	highest available address
LINK TO MILDATA 0=NO [1=YES]		**Link to Mildata:** Confirm this decision with *1=Yes* if the extractor is connected to as part of a Mildata system. An address on the Mildata system will be required, as prompted in the following display.
	0	No; the extractor will not communicate with a Mildata system.
	1	Yes; a Mildata system is in place, and the extractor should communicate with it.
MILDATA ADDRESS 001		**Mildata Address:** If the previous decision (*Link to Mildata*) was confirmed, this display prompts for an extractor address on the Mildata system.
	000	lowest available address and default value
	025	address 025 (example)
	255	highest available address
LOAD CHUTE INSTALLED 0=NO [1=YES]		**Load Chute Installed:** Is a load chute installed on this extractor? Without a load chute, the extractor controller ignores the *Load Chute not Up* and *Load Chute not Down* inputs and does not check for these error conditions. The controller still, however, uses the *Load Chute Blocked* input to verify that the load chute is clear.
	0	No; a load chute is not present on this extractor.
	1	Yes; this extractor is equipped with a load chute.

Display or Action	Explanation
LOAD DOOR INSTALLED 0=NO [1=YES]	**Load Door Installed:** This decision appears only if the extractor is **not** configured for a load chute. Is a load door installed on this extractor? Without a load door, the extractor controller ignores the *Door Up* and *Door Down* inputs and does not check for these error conditions.
	0 No; a load door is not present on this extractor. This is the default response.
	1 Yes; this extractor is equipped with a load door.
CHECK LOAD-EYE AFTER 1 SECONDS	**Check Load Eye:** The load-end photoeye detects 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. Entering *05* for this decision causes the controller to begin monitoring the load-end photoeye five seconds prior to extract.
	0 don't check the photoeye (default value)
	5 five seconds; recommended value
	9 nine seconds; maximum valid value

CAUTION 6: Avoid crushing the extractor belt—Entering *1=Yes* at the *Store Load on Belt A* decision on a normal (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.

STORE LOAD ON BELT A 0=NO [1=YES]	**Store Load on Belt A:** If the extractor is raised 48 inches above belt A (see caution statement 6 in Section 2.1.5.3), goods may be stored on belt A. This allows a Miltrac controller system, through the multiple cake discharge feature, to accumulate the desired number of extractor loads before allowing belt A to discharge. This decision applies only if the extractor is configured for Miltrac loading **and** Miltrac discharge, **and** *Hold Unload Device = Yes*, **and** belt B is **not** configured.

Note 9: To enable multiple cake discharging, the *Hold Unload Device* decision must be enabled (*1=Yes*).

	0 No (default value); should be used for all extractors except those that are elevated 48 inches above belt A and using belt A for storage.
	1 Yes; use this selection only if the extractor is elevated 48 inches above belt A to allow the extractor cylinder to return to the run/load position without crushing the belt beneath the discharged load.

Note 10: If *Store Load on Belt A = Yes*, then the controller will automatically set *Delay Starting Belt = 99*.

Display or Action	Explanation
EARLY CALL FOR LOAD 1=YES [0=NO] 0	**Early Call for Load:** This decision applies only if the extractor is configured for Miltrac loading. 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 value)
1	Yes
RUN BELT AFTER LOAD 1=YES [0=NO] 0	**Run Belt After Load:** 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 value)
1	Yes
HOLD BELT B TIL A IS FULL 0=NO 1=YES 0	**Hold Belt B Until Belt A is Full:** This decision applies only if the extractor is configured for Miltrac discharge, *Hold Unload Device = Yes*, and belt B is installed and configured.

Note 12: The *Hold Unload Device* decision (described earlier) must be enabled (*1=yes*) to enable multiple cake discharge.

0	No; allow belt B to discharge whenever it is loaded. This is the default value for this decision, and the best value if the device receiving goods from the extractor is capable of handling only single cakes.
1	Yes; prevent belt B from discharging until a load is present on belt A. Use this value to cause two loads to be discharged to the extractor's receiving device with each cycle.
RECHECK BRAKE PAD IN 01 [0 HOUR 15 MIN]	**Recheck Brake Pad:** This decision determines how often the extractor 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.
01	Lowest and default value. At this setting, the controller checks the status of the brake pad input every 15 minutes.
20	Two hours (example)
93	9 hours and 45 minutes (maximum valid value)
MACHINE NAME M7E EXTRACTOR	**Machine Name:** Enter any name for this device up to 20 characters. The name entered here appears on the printouts created when the *Print Data* selection of the *Manual* menu is used.
BYTES IN NETWORK 00,11,24, OR 30 00	**Bytes in Network:** This decision applies only to extractors with Mark III, Mark IV, or Mark V controllers.
00	Select *00* for Miltrac versions from 89100 to 21000.

Display or Action	Explanation
11, 13	Select between *11* and *13* for Milnet versions between 86088 and 86095. If the device does not communicate with the Milnet controller at the first setting chosen, use the other one.
24	Select *24* for Miltrac controllers with version numbers from 86245 to 8624C.
30	Select *30* for Miltrac controllers with version numbers from 89001 to 89018.
97, 98, 99	Select *97*, *98*, or *99* for Milnet or Miltrac systems with version numbers 21000 and later. Selection *97* represents a communication rate of 19.2 kb/s, *98* is 38.4 kb/s, and *99* is 57.6 kb/s.

Tip: Faster communication rates may allow complex systems to communicate on a single Miltrac link, but faster rates are more susceptible to interference from electromagnetic noise in the facility. For best results, choose the fastest communication rate that is reliable in your installation.

```
HOW TO DISCHARGE
0=STD  1=FAST      0
```

How to Discharge: This decision is available in software WUEXTH version 20113 and later.

0 Use the standard discharge sequence and timing.

1 Use fast discharge sequence and timing as described below.

1. If all discharge requirements are satisfied, the discharge jog sequence begins as soon as the *Conveyor Side Is Down* input is present, even if the *Rear Full Up* input is not present.
2. Tilt down begins immediately after the end of the jog sequence, while Belt A is running. This decision prevents waiting for the *Time to Clear Belt A* to expire.

2.1.6. 4 = Memory Transfer [Document BICXUP08]

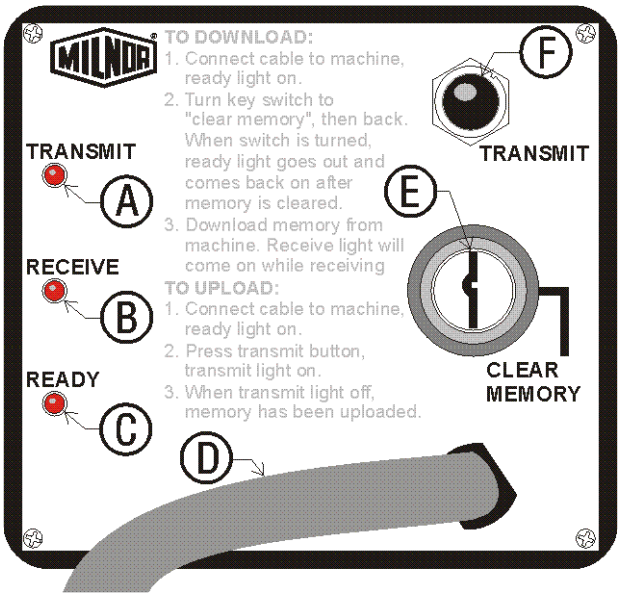
Milnor® centrifugal extractor controllers described in this manual can transfer memory between the machine and a Milnor serial memory storage device (shown in Figure 6) or between two machines. The serial memory storage device includes a cable for temporarily connecting the storage device to a machine.

Memory download and remote formula download is also possible between the machine and a personal computer running Milnor *Mildata* software if the Milnor *Machine Programmer* software is running on the personal computer. See Section 5.3. "Construction of External Serial Link Cables" for inter-machine cable specifications and assembly instructions.

CAUTION 7: Configuration data will be overwritten.—When transferring data from one machine to another, the formulas and configuration data of the *Master* machine will be written to the *Slave* machine. Partial memory transfer is not possible.

- Record all configure data from the *Slave* 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 options.

Figure 6: Controls Identification on Serial Memory Storage Device



2.1.6.1. General Rules for Memory Transfer

1. Valid memory transfer requires that the sending and receiving machines have identical software versions and that the model and options of the receiving machine correspond closely to those of the sending machine. Consider these guidelines:
   - Transferred memory data is fully valid when all involved machines have the same software version, model number, and options. Generally, only minor corrections are required to validate memory data after transfer, so memory transfer is usually beneficial.
   - If all involved machines use the same software version and are the same model number but have different options, modify the configure codes and formulas on the receiving machine to match the options on the receiving machine.
   - If all involved machines use the same software version, but the model numbers and options are different, transferred formulas will usually require substantial modification. Memory transfer is of questionable benefit in this situation.
   - Memory transfer between machines with different software version numbers is of no value, as the resulting data at the receiving machine will be scrambled beyond recovery.
2. Memory transfer sends all formulas and configure codes from one machine (or simulator or personal computer) to another via a serial communication cable, or between a machine and a serial memory storage device. Memory transfer eliminates the need to repeatedly enter the same configuration and programming data; however, selective downloading of only certain formulas is not possible.
3. When transferring memory from one machine to another where a serial link cable is not permanently installed in conduit between the participating machines, assemble and install a temporary cable as described in Section 5.3. “Construction of External Serial Link Cables”.

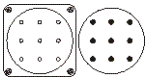
CAUTION 8: Avoid data loss—To prevent accidental loss of data, remove the temporary serial link cable when memory transfer is complete.

4. Do not use the memory transfer procedures described in this document with machines that are part of a Miltrac™ or Mildata® system unless all system devices except those participating in the transfer are turned off.

   Note 13: This restriction does not apply to memory transfer from a Mildata computer. See the Mildata manual for memory transfer procedures involving a Mildata computer.

5. In the memory transfer process, there may be one or more "slave" (receiving) devices and only one "master" (sending) device. **Designate all slave (receiving) devices first.** Data transfer among devices begins immediately when one of the devices is designated as the master.
6. If memory transfer ends before completion for any reason, the data in the receiving devices is **not** valid. **Repeat the memory transfer procedure.**

2.1.6.2. Establishing the Required Connections

Display or Action	Explanation
	Turn off power to the machine before connecting the serial memory storage device or connecting the two machines together.
	Connect the storage device to the machine, or the two machines together, using the 9-pin round connector.
	Apply power to the machine(s). The storage device receives power through the connector from the power supply in the machine.
	Turn the key on the storage device to *Clear Memory*, then return the key to the normal vertical position. This process is handled automatically when transferring from one machine to another.
	The *Ready* light on the storage device will remain off until the clearing process is complete. The clearing process is fully automatic and requires no user action beyond turning the key to *Clear Memory* and returning it to the normal position.
	When the *Ready* light comes on again (after about 45 seconds), the storage device is ready to accept data from the machine controller.

CAUTION 9: Ensure Data Integrity—Clear the memory storage device before saving data to it.

- The memory storage device will hold all programming and configuration data for one machine, and can be re-used many times. However, this device will only accept new data when it's empty.
- Attempts to save data to a storage device that has not been cleared will fail, **even if the procedure appears successful.**

RUN PROGRAM 00 OK TO POWER OFF	When the *Run Program* display appears, switch from *Run* mode to *Program* mode.
	Turn the *Run/Program* keyswitch on the machine controller(s) from the *Run* position to the *Program* position.
PROGRAM 0 MENU OK TURN KEY TO RUN	Controller display when the *Run/Program* keyswitch is set to (*Program* position).
	Scroll down in the *Program* menu to *Down Load*. If two machines are connected together, this is required at both machines.
PROGRAM 4 MENU DOWN LOAD	This is the *Down Load* menu selection used for data transfer. Follow the procedure in Section 2.1.6.3 for making a copy of good data from the machine controller. Refer to Section 2.1.6.4 "Restoring Saved Data to the Machine from the Storage Device or Another Machine" for instructions on restoring previously saved data from the storage device (or another machine) to the machine controller, as might be required after changing the processor board.

2.1.6.3. Saving Data from the Machine to the Storage Device or a Second Machine

Display or Action	Explanation
DOWN LOAD DEVICES 0 MACHINE<==>MACHINE	This is the *Data Download* sub-menu. Select the desired type of data transfer here.
⬇ / ⬆	Scrolls the available types of data transfer. These choices can also be accessed directly by entering the corresponding number from the list below.
0	Allows data transfer between two or more machines, simulators, or serial memory storage devices.
1	Allows data transfer from a cassette tape recorder to one or more machines, or from one machine to a tape recorder. **This method of data storage is considered obsolete because of the significantly greater speed and reliability provided by the serial memory storage device.**
NEXT	Confirms the selected transfer type.
DOWN LOAD STATUS 0 SLAVE	There are two selections available in the *Down Load Status* menu: *0=Slave* and *1=Master*.
⬆	For saving information **to** the data storage device or another machine, select *1=Master* at the machine controller. If two machines are connected, establish the one which will **receive** the data as the slave, and the **sending** machine as the master.
DOWN LOAD STATUS 1 MASTER	The machine controller is set as the *Master* device, making the storage device or the other machine(s) the *slave*.

Note 14: The *Master* device is always the **sender** and controls when the data transfer starts. The *Slave* device is always the **receiver** and should be established and waiting for data before the *Master* device is confirmed.

Notice 10: Do not send data to the memory storage device until the storage device is cleared and ready to receive. The *Ready* light must be **on** when transfer begins or the stored data will not be valid.

NEXT	Confirms selection of the machine controller as the **Master**. **All receiving (slave) machines must be established before the master machine is designated.**
(M) 9600 BAUD **AC35** TRANSFERRING DATA  	While the data transfer is occurring, the four digits at the top right of the display scroll rapidly as the machine controller sends data. The *Receive* light on the storage device illuminates when the data transfer begins, indicating that it is receiving data. The display on the slave machine scrolls quickly as data is accepted.

Note 15: Transfer times may vary somewhat, but the average is about 75 seconds.

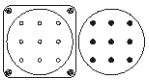
Display or Action	Explanation
PROCESS COMPLETED NEXT TO PROCEED NOT RECEIVING	This display indicates that the master machine controller delivered the data to the slave machine or storage device.
	The *Receive* light on the storage device goes off when the transfer successfully ends. If all three lights on the storage device begin blinking at any time during the transfer, the data being received by the storage device is invalid. Clear the memory in the storage device and perform the transfer again.

CAUTION 11: Data Corruption Hazard—If the machine controller indicates that the data transfer is complete but the *Receive* light on the data storage device is still illuminated, invalid data is stored in the storage device.

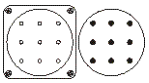
- Do not rely on the data in the storage device unless the machine controller indicated that the transfer completed, **AND** the *Receive* light on the storage device turned off automatically.
- Do not restore data from the storage device to the machine if the data is invalid. Restoring invalid data from the storage device to the machine controller will overwrite any formulas that have been changed or created since the data was last stored. These formulas can not be recovered.

NEXT	Acknowledges that the data transfer is complete and returns to the *Program* menu.
PROGRAM 4 MENU DOWN LOAD	The *Down Load* menu display. Scroll to item *0* of the *Program* menu, then turn the *Run/Program* keyswitch to the *Run* position.
	Scroll the *Program* menu selections.
PROGRAM 0 MENU OK TURN KEY TO RUN	From item *0* of the *Program* menu, return to normal operating mode.
	Return to normal operating mode. Press NEXT if necessary to confirm that the key is at *Run*.
RUN PROGRAM 00 OK TO POWER OFF	The *Run Program* display appears to indicate that it is safe to turn the machine off.
	Turn off power to the machine(s).
	Disconnect the memory storage device, remove the key, and put both in secure locations. For two machines, remove the connecting cable.

2.1.6.4. Restoring Saved Data to the Machine from the Storage Device or Another Machine

Display or Action	Explanation
	Turn off power to the machine(s) before connecting the serial memory storage device.
	Connect the storage device to the machine using the 9-pin round connector. For two machines, use a serial cable constructed as described in Section 5.3. "Construction of External Serial Link Cables".
	Apply power to the machine(s). The storage device receives power through the connector from the power supply in the machine.
`RUN PROGRAM` `00 OK TO POWER OFF`	When the *Run Program* display appears, switch from *Run* mode to *Program* mode.
	Turn the *Run/Program* keyswitch on the machine controller(s) from the *Run* position to the *Program* position.
`PROGRAM 0 MENU` `OK TURN KEY TO RUN`	Controller display when the *Run/Program* keyswitch is set to  (*Program* position).
	Scroll down in the *Program* menu to *Data Transfer*.
`PROGRAM 4 MENU` `DOWN LOAD`	This is the *Down Load* menu selection. Follow the procedure in Section 2.1.6.3 "Saving Data from the Machine to the Storage Device or a Second Machine" for making a copy of good data from the machine controller.
	Confirms selection and advances to the *Down Load* menu.

Display or Action	Explanation
`DOWN LOAD STATUS` `0 SLAVE`	This machine controller is set as the *Slave* device, making the other machine or serial memory storage device the *Master*. The *Master* device always controls when the data transfer starts and **sends** the data to the slave device. If transferring data from one machine to another, **the slave machine will receive the data sent from the master**.
	Confirms the selection of the machine controller as the *Slave* device.
`OK TO RECONFIGURE?` `0 = NO [1 = YES]`	This display appears only on machines set to **receive** data (slave machines). Because configure codes must be correct for the receiving machine, make the selection that is most likely to meet this requirement. In most cases, the desired selection is *0=no*.
	Specifies that the receiving (slave) machine will **ignore** the configure codes from the sending (master) device. The machine configuration currently stored in the receiving machine is unchanged.

Display or Action	Explanation
	Specifies that the receiving (slave) machine will **receive** the configure codes along with the formula data from the sending (master) device. The machine configuration currently stored in the receiving machine is overwritten with the values stored in the sending machine or serial memory storage device.
	Accepts the selected choice for the *Receive Config?* decision.
`(S) 9600 BAUD 0000` `WAITING FOR MASTER`	This display indicates that the receiving (slave) machine is ready to receive data. The *(S)* in the upper left corner of the display signifies that this is a **slave** machine.
`(S) 9600 BAUD 0000` `RECEIVING DATA`	This display indicates that the machine controller is polling the data storage device for incoming data. The characters at the right end of the top line show the memory location currently being written. These characters remain at "0000" until the transfer begins.
	Press the *Transmit* button on the data storage device or confirm the *Master* setting on the sending machine to begin the transfer.
	As soon as the *Transmit* button on the data storage device is pressed (or NEXT on the master machine), the storage device begins sending a continuous data stream to the slave machine controller. The machine display shows the progress of this display in the four characters on the top line.
	The *Transmit* light on the data storage device turns off when the transfer completes.
`PROCESS COMPLETED` `NEXT TO PROCEED`	This display indicates that the data received by the machine controller matches exactly the data sent by the storage device. The data transfer was successful.
	Acknowledge that the data transfer is complete and returns to the *Program* menu.
`PROGRAM 4 MENU` `DOWN LOAD`	*Data Transfer* menu display. Scroll to *Program* menu item *0*, then turn the *Run/Program* keyswitch to the *Run* position.
	Scroll the *Program* menu selections.
`PROGRAM 0 MENU` `OK TURN KEY TO RUN`	From item *0* of the *Program* menu, return to normal operating mode.
	Return to normal operating mode. Press NEXT if necessary to confirm that the key is at *Run*.
`RUN PROGRAM` `00 OK TO POWER OFF`	The *Run Program* display appears to indicate that it is safe to turn the machine off.
	Turn off power to the machine(s).
	Disconnect the memory storage device, remove the key, and put both in secure locations.

2.1.7. 5=Clear Memory [Document BICXUP06]

Use this selection to voluntarily clear all formulas from the machine controller.

Display or Action	Explanation
`PROGRAM 5 MENU` `CLEAR ALL MEMORY`	This is the *Program* menu with the *Clear All Memory* option selected.
NEXT	Accesses the *Clear All Memory* option.
`4+5+6=CLEAR MEMORY` `CANCEL = ESCAPE`	This instruction display does not have a cursor.
CANCEL	Exits this program without clearing memory.
4 + 5 + 6	Clears all formulas and machine configuration from memory. All machine configuration decisions are reset to the default values.

Notice 12: Always configure the controller when commissioning the machine for the first time and whenever the display says "Config Error."

`LANGUAGES` `0 = ENGLISH`	The controller automatically invokes the *Configure* menu after memory is cleared voluntarily. Refer to Section 2.1.5 "3 = Configure" for details on configuring your machine.

2.1.8. 6 = Default Formulas [Document BICXUP07]

Notice 13: Restoring the default extract formulas as described below will erase all existing formulas and replace formulas 00 through 05 with the factory-programmed standard formulas.

Display or Action	Explanation
`PROGRAM 6 MENU` `ADD DEFAULT FORMULAS`	This display indicates the menu selection for restoring the default extract formulas. The six default formulas can be modified to suit the specific needs of your facility, thus preventing the need to completely program all formulas.
NEXT	Selects this menu item.
`ADD DEFAULT FORMULAS` `0 = NO [1 = YES]`	This display prompts the user to acknowledge that the default formulas will replace any existing formulas in memory. Press 0 NEXT or CANCEL to abandon this operation and return to the *Program* menu.
1, NEXT	Copies the six preset formulas into memory. All 16 formulas previously stored in memory are erased, and formulas *00* through *05* replaced with the preset formulas shown in Table 11.

Table 11: Standard Default Centrifugal Extractor Formulas

Programming Parameter	00 PolyCotton	01 Cotton	02 Small Cotton	03 Mat Single	04 Mat Double	05 Mop Heads
T=Type of Extract	0	0	1	0	2	1
LT=Loading Time	10	15	10	10	15	10
ST=Slow Speed Time	03	03	03	03	03	03
DT=Distribution Time	15	15	15	15	15	15
X=Number of Pre-extracts	-	-	1	-	1	1
E1P=E1 Pre-extract Time	---	---	045	---	015	045
E2P=E2 Pre-extract Time	---	---	---	---	090	---
R=Reversals after Pre-extracts	-	-	1	-	1	1
ON=Slow Speed On Time	--	--	02	--	02	02
OF=Slow Speed Off Time	--	--	02	--	02	02
E1T=Final E1 Time	015	015	015	015	015	015
E2T=Final E2 Time	090	120	105	090	045	105
L=Low Extract Speed	2	2	2	2	2	2
H=High Extract Speed	4	4	4	4	4	4
RI=Rib Inflation Time	00	15	15	00	00	15
RD=Rib Deflation Time	00	05	15	00	00	15
JC=Set of Jog Reversals	03	05	05	03	03	05
+=Jog Run Time (0=Special)	1	1	1	1	1	1
J-=Jog Stop Time (Inch if +=0)	01	01	01	01	01	01
A=Tilt After Jog	0	0	1	0	0	1
MAX=Est. Total Cycle Time	155	218	335	155	257	335

— End of BICXUP01 —

Chapter 3
Operating

BICXUO01 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

3.1. Centrifugal Extractor Automatic Operation

CAUTION 14: 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.

3.1.1. Normal Automatic Operation

The Milnor® centrifugal extractor normally operates as a fully automatic device. In a typical installation, the extractor receives goods from a washer (e.g., a Milnor CBW® tunnel washer), processes them as programmed, and discharges the goods to one or more dryers or no-dry stations. Where necessary, shuttles and conveyors transport the goods between adjacent devices. Processing instructions in the form of goods codes are passed from one device to the next simultaneously with the goods.

3.1.1.1. The Power-up Sequence

Display or Action	Explanation
①	The *Master* switch provides power to the extractor controls, but does not provide power to the main mechanical components. The *operator signal* sounds until the *Start* button is depressed, and the power-up displays appear as shown below.
`COPYRIGHT PELLERIN MILNOR 1991 - 2001`	This copyright statement (or one similar to it) appears at least once when power is applied to the controls. This display may appear more than once as the extractor prepares for automatic operation.
`ALL RIGHTS RESERVED 'EXTRACTOR' 20101`	The second copyright screen describes the type of device and the software date code. In this example, the device type is "M7E-Extractor," and the software date code is "20101." The software date code is important whenever you need to communicate with the Milnor® factory or your equipment dealer about operational issues or troubleshooting.
`FORMULA CHECKSUM 3027`	The formula checksum is calculated by the controller and used to ensure that programming data has not changed inadvertently. This number will change after each programming session if any extract formula is changed.

Display or Action	Explanation
`CLEAR MEMORY NOW PRESS 4+5+6`	This display prompts the user to clear memory and appears if the controller detects an error in formula memory.
4 + 5 + 6	Clears formula memory and resets machine configuration to the default values. Turn the *Run/Program* keyswitch (🔑/🔑) to 🔑 before pressing the keys to clear memory.
`LANGUAGES 0 = ENGLISH`	Automatically invokes the *Configure* menu, described in Section 2.1.5.
or	
`CONFIG ERROR TURN KEY TO PROGRAM`	This display appears if the controller detects an error in machine configuration.
🔑	Turning the *Run/Program* keyswitch to the 🔑 position invokes the *Configure* menu.
`LANGUAGES 0 = ENGLISH`	Automatically invokes the *Configure* menu, described in Section 2.1.5.

Display or Action	Explanation
`DOES **EXTRACTOR** HAVE A LOAD 0=NO 1=YES 0`	This display allows the system operator to confirm that the extractor is empty (the default case), or was turned off with goods still in the cylinder or on belt A underneath the extractor cylinder. If the extractor is not empty, refer to Section 3.1.3.
ENTER	Accepts that the extractor is empty, and prompts the user for the load status of belt B.
`DOES **CONVEYOR** HAVE A CAKE 0=NO 1=YES 0`	This display appears only if the extractor is configured for belt B. If belt B is not empty, refer to Section 3.1.3.

Display or Action	Explanation
ENTER	Accepts that extractor belt B is empty.
THREE WIRE DISABLED SEE MANUAL	This display indicates that the three wire circuit is open, preventing operation. The operator signal sounds.
①	Silences the operator signal and energizes the extractor.
WAITING FOR LOAD	Indicates that the extractor is in automatic mode and waiting for a load from its loading device.

3.1.1.2. Normal Operating Displays—When the extractor is operating normally in automatic mode, all timers show data in the format of MM:SS, where MM is a two-digit number representing minutes, and SS represents seconds.

If two or more extractors are loaded by a shuttle loading device (e.g., a Milnor COBUC), flags or targets on the shuttle rail in front of each extractor extend to position the shuttle device at the next extractor to be loaded. For systems controlled by a Miltrac controller, the flag deploys when the Miltrac controller signals the extractor to "get ready to receive." This signal precedes the "start transfer" signal. The flag retracts immediately after the *Cycle Start* input is made and the Miltrac controller signals the extractor to "do nothing," indicating that the transfer sequence is finished. If the extractor is loaded by an allied (non-Milnor) device, the flag deploys when the *Loading Allowed* input is made and retracts 10 seconds after the *Cycle Start* input is made.

Whether or not the Miltrac controller is present, the extractor always uses the *Cycle Start* input to ensure that the cylinder turns at distribution speed while goods enter the cylinder.

3.1.1.2.1. While Extractor is Idle

Display or Action	Explanation
WAITING FOR LOAD	normal display when extractor is idle

3.1.1.2.2. After Extractor Receives Signal to Get Ready

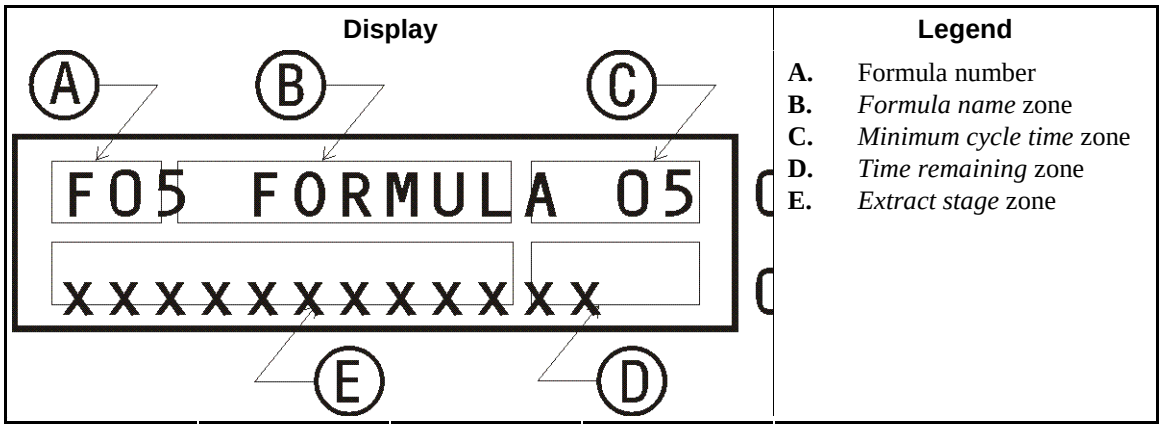
Display or Action	Explanation
ACCESSING MILDATA	If the machine is part of a Mildata network, this display appears while the extractor is receiving a formula from the Mildata computer. The request is terminated if the three-wire input is lost after the formula data is requested.
WAITING TO LOAD GOODS INTO EXTRACTOR	This display appears when the Miltrac controller commands "start transfer," or, for allied loading, when the *load allowed* input is made. The extractor cylinder turns at wash speed while receiving a load.
RECEIVING ERROR PRESS SIGNAL CANCEL	This display appears if the extractor receives an invalid extract code.
BRAKE FAULT, MUST BE CLEARED TO RESTART	The controller monitors the position of the brake, via an input from the brake pressure switch which indicates when the brake is disengaged. This display appears during loading if the controller detects a brake fault.

3.1.1.2.3. While Extractor is Loading and Extracting

—Figure 7 shows a typical display during

extractor operation when the machine is not idle.

Figure 7: Typical Operating Display



Formula number—always displays the extract formula (extract code) in progress or requested by the system controller.

Formula name—normally displays the default name of the formula (same as the formula number) or the name assigned to the formula during programming. During the slow reverse and distribution stages of a pre-extract or final extract sequence, this area displays "PRE + FINAL."

Minimum cycle time—When an extract cycle begins, the extractor controller calculates an estimated *minimum cycle time*. This calculation includes the time required for these functions: loading, distribution, pre-extract, slow speed extract, final extract, and braking. This value counts down to 00:00 as the extract cycle progresses. After the estimated *minimum cycle time* expires, this area displays the additional time between the estimated *minimum cycle time* and the *MAX* value programmed for the current formula. The value for this additional time is fixed on the display.

Time remaining—displays the time remaining in each stage of the extract formula until the estimated *minimum cycle time* (see above) expires. After the *minimum cycle time* expires, the extractor controller uses this area to displays the time elapsed from the end of the *minimum cycle time* until the cycle ends or the additional time equals the programmed *MAX* time.

Extract stage—displays the current stage of the extract cycle. The possible stages of extract cycles are shown in Section 3.1.1.2.3.1 and Section 3.1.1.2.3.2. This area flashes to indicate that the *minimum cycle time* has expired.

3.1.1.2.3.1. Stages of a Standard Extract Sequence

1. Loading speed
2. Slow speed
3. Distribution speed
4. Low extract speed
5. High extract speed

3.1.1.2.3.2. Stages of a Pre-extract or Final Extract Sequence

1. Loading speed
2. Slow speed
3. Distribution speed

4. Low extract speed
5. High extract speed (final/final)
6. Braking
7. Slow reversing
8. Distribution
9. Low extract speed
10. High extract speed

3.1.1.2.4. During Transition to Discharge Sequence

Display or Action	Explanation
`BRAKING` `SPEED SWITCH OPEN`	indicates that the cylinder is slowing, but is still rotating faster than the threshold set by the speed switch.
`F05 FORMULA 05` `RIB INFLATION 00:30`	This display apears when the extractor has slowed sufficiently to close the speed switch input. At this point the air valve turns on to inflate the ribs, if equipped.
`F05 FORMULA 05` `DSG WAIT TIME  00:12`	If *Delay Starting Belt* time is not configured as 99 seconds, this display appears while the extractor waits to discharge.
`TILT UP TO DISCHARGE` `**PLEASE WAIT**`	displays while the extractor cylinder tilts up to the discharge position
`DISCHARGE` `RIB DEFLATION 00:07`	This display appears when the cylinder reaches the full up position and remains visible for the time commanded to deflate the ribs (if equipped with inflatable ribs).

3.1.1.2.5. While Discharging

Display or Action	Explanation
`DISCHARGE JOG #03` `JOG  RUN 00:05`	This display appears while the extractor is jogging to discharge the goods. The number in the upper right corner of this display shows the number of jogs **remaining** in the discharge sequence. On the bottom line "RUN" alternates with "STOP" to indicate whether the cylinder is turning or paused. The time value displayed is the time remaining **for this jog cycle**.
`F05 FORMULA 05` `DSG WAIT TIME  00:12`	If *Delay Starting Belt* time is configured to 99 seconds, this display appears while the extractor waits to discharge.
`CONVEYOR STATUS` `RUN BELT  00:09`	After the cylinder finishes jogging, this display appears as the ribs inflate one final time to release any goods that were caught. The left side of the bottom line indicates whether the belt is running or stopped if the *Delay Starting Belt* configure decision is some value other than 99. The time at the right side of the bottom line is the remaining belt on or off time, depending on whether the belt is running or stopped.
`TILTING DOWN` `**PLEASE WAIT**`	This display appears when the *Belt A Clear Time* expires, while the extractor is tilting down to return to the loading position.

When two or more extractors are served by a shuttle receiving device (e.g., a Milnor® COLOOS loose goods shuttle), discharge end flags (targets) on the shuttle rail behind each extractor

position the receiving device at the next extractor to be discharged. For systems using the Miltrac™ controller, the flag deploys when the Miltrac™ control requests that the extractor get ready to discharge. When discharge is controlled by an allied device, the flag deploys when the *Discharge Allowed* input is grounded. For either type of system controller, the flag retracts at the end of the discharge sequence.

3.1.2. About Early Call

Early call is a software feature which causes the extractor to issue a *desire to load* or *desire to discharge* message before transfer is required. This feature may save significant amounts of processing time, thus increasing efficiency.

3.1.2.1. For Receiving—The extractor signals that it desires a load when the *estimated minimum cycle time* reaches zero and *Early Call for Load=1 (yes)*. If the extractor is told that that a load is committed to transfer to it, the extractor control ends the current extract cycle. Immediately after the extractor finishes discharging the current load and returns to the loading position, it requests completion of the transfer.

In systems where the extractor is loaded directly by a tunnel washer, *early call* requires that the extract cycle end before the next load is committed for transfer. The *End Extract* input to the extractor provides this ability. When the *End Extract* input is made and the *estimated minimum cycle time* for the extract formula in progress counts down to zero, the extractor ends the extract cycle, discharges, and returns to the loading position before it triggers a *no transfer* hold condition in the tunnel washer. The tunnel controller must close the *End Extract* input before the tunnel is committed to transfer.

3.1.2.2. For Discharging—If the commanded *rib inflation* value (RI) for the formula in progress is zero, the extractor desires to discharge when the extract cycle ends and the extractor begins braking. If the commanded *rib inflation* value is not zero, the extractor desires to discharge when the *rib inflation* value counts down to zero. Belt B, if the extractor is equipped with one, is independent of the *rib inflation* value and will try to discharge immediately.

3.1.3. Interruptions in Normal Operation

3.1.3.1. Holds Before the Extractor—The extractor remains at *Waiting for Load* any time the flow of goods into the extractor stops, as would occur if the tunnel washer enters a hold condition. When the flow of goods resumes, processing continues without manual intervention.

3.1.3.2. Holds After the Extractor—When the extractor is prevented from discharging by a device which receives goods from the extractor (e.g., belt B or a shuttle), the extractor takes one of four possible actions. The action taken depends on the *Jog Before Tilt (A)* programming decision and the *Delay Starting Belt Time* configure decision. Refer to Table 12 below for more information.

Table 12: Post-extractor Hold Actions

Jog Before Tilt (A)	Belt Delay Time	Sequence of Actions Taken
0	NOT 99	Tilt up, wait for receiving device, inflate ribs, jog and run belt(s)
0	99	Tilt up, inflate ribs, jog, wait for receiving device, run belt(s)
1	NOT 99	Inflate ribs, jog, tilt up, jog and run belts
1	99	Inflate ribs, jog, tilt up, jog, wait for receiving device, run belt(s)

Note 18: See Section 2.1.5.1 "How Belt A and Belt B Work".

In all four cases described in Table 12, normal processing resumes without manual intervention as soon as a device is available to receive goods from the extractor.

3.1.3.3. Power Loss or Three-wire Disabled Condition—If the extractor loses power or if the three-wire circuit opens momentarily (e.g., a *Stop* switch is pressed), the extractor stops immediately. The extractor can be easily returned to automatic operation regardless of how long it was stopped or what portion of the cycle was in progress.

Notice 15: The extractor does not need to be manually loaded or unloaded to return it to an *on line* state. The extractor will resume normal automatic operation and synchronize with its interfacing devices when one of the power restoration sequences described in this document is completed.

3.1.4. Power Restoration Sequences

The extractor will execute one of three sequences to return *on line*, depending on which of the following conditions caused the machine to go *off line*:

- Power was lost during any portion of the cycle other than extract
- Power was lost during extract
- The three-wire circuit opened without power loss.

3.1.4.1. Power Losses Before or After Extract—If power was lost either before or after the extract stage of a cycle, the power restoration sequence is the same as described in Section 3.1.1.1 "The Power-up Sequence".

3.1.4.2. Power Losses During Extract

Display or Action	Explanation
	Turning on the *Master* switch (or restoring power) energizes control power, but not extractor power. The operator signal sounds until the *Start* button (①) is pressed.
`POWER OFF IN EXTRACT` `20 SECONDS DELAY..##`	## represents the seconds remaining, counting down from 20.
①	Closes the three-wire circuit and silences the operator signal.
`SPEED SWITCH OPEN`	If the cylinder is still rotating, the rotational speed may be great enough to prevent grounding of the *speed switch closed* input. If this display remains visible after the cylinder slows, refer to the troubleshooting sections of this manual.
`FORMULA CHECKSUM` `0051`	The formula checksum value appears when the speed switch closes.
`OPEN THE DOOR?` `0=NO [1=YES]`	If the loading door is installed, the controller asks if the operator wants to open the door.
`DOES EXTRACTOR HAVE` `A CAKE 0=NO 1=YES 0`	If the extractor is loaded (*1=Yes*), cake data may need to be confirmed as described in Section 3.1.4.4. The extractor returns to automatic operation after cake data is verified.
`F05 FORMULA 05 02:06` `xxxxxxxxxxxxx  00:35`	If the cylinder was not commanded to discharge, the extract sequence begins at loading speed. Refer to Section 3.1.1.2.3 for a complete explanation of the extract sequence displays.

Note 19: All displays during the transition to the discharge sequence and during the discharge sequence are the same as if the cycle completed normally. If the extractor was commanded to discharge the load, the cycle skips directly to the *Rib Inflation* stage.

3.1.4.3. Three-wire Disabled without Power Loss

Display or Action	Explanation
①	The *start* button closes the three-wire circuit and silences the operator alarm.
`3-WIRE RECOVERY` `**PLEASE WAIT**`	If the cylinder was rotating, it slows and the clutch engages if the speed switch is closed. If any other display appears, see the troubleshooting sections of this manual.
`SPEED SWITCH OPEN`	If the cylinder is still rotating, the rotational speed may be great enough to prevent grounding of the *speed switch closed* input. If this display remains visible after the cylinder slows, refer to the troubleshooting sections of this manual.
`DOES EXTRACTOR HAVE` `A CAKE 0=NO 1=YES 0`	If the extractor is loaded (*1=Yes*), cake data may need to be confirmed as described in Section 3.1.4.4. The extractor returns to automatic operation after cake data is verified. Responses entered at the subsequent prompts for cake data are explained in Section 3.1.4.4. The extractor returns to automatic operation after cake data is verified.
`F05 RECYCLE 02:06` `xxxxxxxxxxxxx 00:35`	The extract display sequence is described in Section 3.1.1.2.3. "Recycle" in place of the formula name indicates that the cycle re-started.

Note 20: All displays during the transition to the discharge sequence and during the discharge sequence are the same as if the cycle completed normally. If the extractor was commanded to discharge the load, the cycle skips directly to the *Rib Inflation* stage.

Supplement 5

How the Pass Empty Code Affects Operation

Each wash formula programmed for a Milnor® CBW® tunnel washer can be assigned an *extract formula number* to be passed to the extractor when the load transfers out of the tunnel washer. However, in a Miltrac system, any wash formula to which the pass empty attribute is assigned will be ignored by the extractor controller.

Note 21: See the related section in document BICCNP01 in the technical reference manual for the Mentor CBW controller for details of all post-wash codes, including the extract code.

When programming the batch washer in a Miltrac system, assign the *pass-empty* attribute and an unused extract formula number to all empty-pocket wash formulas (e.g., the *pass-empty* formula and the *purge pocket* formula). When empty pockets associated with these formulas arrive at the extractor, the extractor door opens and the extractor runs in slow or distribution speed, according to extractor configuration. While the unloading device—usually the tunnel washer—dumps water into the extractor, the extractor display shows *Receive Empty Load.*

Extractor formula numbers dedicated to either *pass-empty* or *purge pocket* formulas in the tunnel washer will be ignored by the extractor, thus they should not be programmed.

In a non-Miltrac (allied) system, extractors with Allied Data Pass are provided with an *Empty Load* input which, when grounded, emulates a pass-empty formula.

3.1.4.4. Conditions Requiring Confirmation of Cake Data—Following certain conditions, the extractor controller may not be able to determine whether goods are still present in the cylinder or on belt B. For the conditions listed here, the extractor considers the batch codes for these locations unreliable and prompts the user for the necessary information:

- power loss (three-wire disabled)
- receiving error
- transfer error
- limit switch error
- manual intervention

WARNING 16: Crush and Entangle Hazard—Extractor will resume automatic operation immediately after the user enters the required cake information. Ensure that all personnel are clear of extractor mechanisms.

If power is restored to the extractor after a brief shutdown with wet goods in the cylinder, extract these goods by responding *yes* when the extractor control asks “Does Extractor have a Cake?” and *no* to the next prompt, “Discharge Load in Basket?”

If the goods remaining in the extractor do not require further extraction or the extractor lost power with the cylinder in the up position, discharge these goods from the extractor by responding *yes* to “Does Extractor have a Cake?” and *yes* to “Discharge Load in Basket?” **Use these replies even if all the goods have already discharged onto belt A.**

CAUTION 17: Crush and Entangle Hazard—An extractor that is in the up position when power is restored will remain in that position until the user verifies the cake data. Certain responses to cake data prompts may cause the extractor to remain up or to tilt down.

- Ensure that all guards are in place and all personnel are clear of the machine before verifying cake data.

3.1.4.4.1. Prompts for Extractor Cake Information

Display or Action	Explanation
`DOES EXTRACTOR HAVE A CAKE 0=NO 1=YES 0`	This display begins the sequence for verifying the contents of the **extractor**. See Section 3.1.4.4.2 for how to verify **conveyor** contents.

If the extractor cylinder is empty:

0, NEXT	Answering *0=No* tells the extractor control that the extractor is ready to accept a load.
`PRESS NEXT TO BRING MACHINE DOWN`	If the cylinder was in the raised position when power was restored and belt B is not configured, press NEXT to return the cylidner to the full down position.

CAUTION 18: Crush and Entangle Hazard—Pressing NEXT causes the cylinder to tilt down. Ensure that all personnel are clear of the extractor.

`TILTING DOWN **PLEASE WAIT**`	Notifies the user that the extractor cylinder is tilting down to the load position.

If the extractor cylinder contains a load:

1, NEXT	Answering *1=Yes* tells the extractor control that goods are either in the extractor or on belt A.
`ENTER FORMULA FOR EXTRACTOR xx`	First, the extractor controller prompts the user for the **wash formula** associated with the goods in the cylinder or on belt A. The user should change this number if necessary.
NEXT	accepts the displayed formula number and advances the controller to the next prompt.
`ENTER EXTRACT CODE FOR EXTRACTOR xx`	Enter the desired extract code for the goods. This corresponds to the **extract** code.
`ENTER EXTRACT CODExx DOES NOT EXIST`	This display indicates that the extract code entered is not programmed, thus it is invalid.
CANCEL	returns the extractor controller to the first cake data prompt
`DOES EXTRACTOR HAVE A CAKE? 0=NO 1=YES 0`	If an invalid extract code was entered, start again from this display and enter a valid extract code (one that is already programmed).

The extractor controller prompts for verification of each batch code in the order shown below:

1. dry code,
2. destination code,
3. customer code,
4. goods code,
5. soil weight, and
6. cake number (single cake or multiple cake load)

Display or Action	Explanation
DISCHARGE LOAD IN BASKET? 0=NO 1=YES 0	After verifying all cake data, the controller asks whether to discharge this load or process it.

To process the load in the extractor cylinder:

0, NEXT	Answer *0=No* to the "Discharge Load?" question to cause the extractor to process the goods in the cylinder according to the extract code previously entered.
PRESS NEXT TO BRING MACHINE DOWN	Appears if the extractor lost power while it was tilted up, and belt B is not configured.

CAUTION 19: Crush and Entangle Hazard—Pressing NEXT causes the cylinder to tilt down. Ensure that all personnel are clear of the extractor.

TILTING DOWN **PLEASE WAIT**	Notifies the user that the extractor cylinder is tilting down to the run position.

To discharge the load in the extractor cylinder:

1, NEXT	Answering *1=Yes* tells the extractor control to discharge the goods currently in the cylinder.
F05 FORMULA 05 WAIT TIME 00:30	The extract cycle holds at the *Inflate Ribs* stage. See the full description of the extract cycle displays in Section 3.1.1.2.

3.1.4.4.2. Prompts for Conveyor Cake Information

Display or Action	Explanation
`DOES CONVEYOR HAVE A CAKE? 0=NO 1=YES 0`	If the extractor is configured for belt B, this display prompts the user for the necessary information.
0, NEXT	Answering *0=No* tells the extractor control that the conveyor (belt B) is empty.
1, NEXT	Answering *1=Yes* tells the extractor control that there are goods on belt B.
`ENTER FORMULA FOR CONVEYOR xx`	The extractor controller prompts the user for the **wash** formula associated with the goods on the conveyor. Press NEXT to accept this value, or enter the current formula number.

The extractor controller prompts for verification of each batch code in the order shown below:

1. extract code,
2. dry code,
3. destination code,
4. customer code,
5. goods code,
6. soil weight, and
7. cake number (single cake or multiple cake load)

`INITIALIZING BELTS **PLEASE WAIT**`	Belt A runs only if the extractor is tilted completely to the up position. If belt B contains a load but the photoeye is not blocked, belt B runs until either the photoeye is blocked or the belt B clear time expires.
`PRESS NEXT TO BRING MACHINE DOWN`	If the extractor cylinder was tilted up when power was restored, this display prompts the user to press NEXT to tilt the machine down.

CAUTION 20: Crush and Entangle Hazard—Pressing NEXT causes the cylinder to tilt down. Ensure that all personnel are clear of the extractor.

`TILTING DOWN **PLEASE WAIT**`	indicates that the extractor cylinder is tilting down to the load and run position.

3.1.5. Viewing Inputs and Outputs during Normal Operation [Document BICXUT01]

The status of microprocessor inputs and outputs can be displayed while the machine is running by holding one or more specific keys depressed, as described below.

Refer to Section 4.2. “Manual Menu” for details regarding extractor manual operation, and manual actuation of outputs and viewing of inputs.

3.1.5.1. Microprocessor Inputs

Display or Action	Explanation
`F05 FORMULA 05 02:06` `xxxxxxxxxxxx 00:35`	This is a typical extractor operating display. Use the procedures described below to view microprocessor inputs from any similar display while the extractor is operating automatically. The function of each input is described in Table 13 through Table 17, below.
7	displays the first 16 inputs (Page 0, items A through P) while the button is held depressed. Inputs A through P appear along the top line of the display. For each input, a "+" underneath indicates that the input is grounded (made), while a "-" underneath indicates that the input is not grounded (not made).
`(0) ABCDEFGHIJKLMNOP` `------+-+-------`	This is a typical display of the first 16 inputs. The page number (Page 0 in this example) appears on the left end of the top row of the display, followed by the inputs. The status of each input is indicated on the second display row. In this example, inputs G and I are grounded; all other inputs are not grounded.
7 + 1	displays the second 16 inputs (Page 1, items A-P) while the buttons are held depressed.
7 + 2	displays the third 16 inputs (Page 2, items A-P) while the buttons are held depressed.
7 + 3	displays the fourth 16 inputs (Page 3, items A-P) while the buttons are held depressed.
7 + 4	displays the fifth 16 inputs (Page 4, items A-P) while the buttons are held depressed.

Table 13: First 16 Standard Inputs (Page 0)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	--not used--	1MTA38-3	I	Load Chute Up	1MTA39-3
B	Program Key	1MTA38-2	J	Begin Discharging	1MTA39-8
C	Signal Cancel	1MTA38-1	K	Load Door Down	1MTA39-7
D	End Extract	1MTA38-4	L	Load Door Up	1MTA39-6
E	Excursion	1MTA38-5	M	--not used--	
F	--not used--	1MTA38-6	N	--not used--	
G	Brake Pads Worn	1MTA39-5	O	--not used--	
H	Load Chute Down	1MTA39-4	P	--not used--	

Table 14: Second 16 Standard Inputs (Page 1)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Load Level	1MTA4-01	I	Speed Switch	1MTA4-11
B	Discharge Level	1MTA4-02	J	Load Chute Blocked	1MTA4-12
C	Three Wire	1MTA4-03	K	Loading Allowed	1MTA4-13
D	Inverter Fault	1MTA4-04	L	Cycle Start	1MTA4-14
E	--not used--	1MTA4-05	M	Belt A or B Photo-eye	1MTA4-15
F	--not used--	1MTA4-06	N	Conveyor Door Down	1MTA4-16
G	--not used--	1MTA4-07	O	Conveyor Door Up	1MTA4-17
H	Brake Pressure	1MTA4-08	P	Discharge Allowed	1MTA4-18

Table 15: First 16 Optional Allied Data Pass Inputs (Page 2)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Extract Code A	2MTA4-01	I	Single cake	2MTA4-11
B	Extract Code B	2MTA4-02	J	Customer Code A	2MTA4-12
C	Extract Code C	2MTA4-03	K	Customer Code B	2MTA4-13
D	Extract Code D	2MTA4-04	L	Customer Code C	2MTA4-14
E	Dry Code A	2MTA4-05	M	Customer Code D	2MTA4-15
F	Dry Code B	2MTA4-06	N	Customer Code E	2MTA4-16
G	Dry Code C	2MTA4-07	O	Customer Code F	2MTA4-17
H	Dry Code D	2MTA4-08	P	Customer Code G	2MTA4-18

Table 16: Second 16 Optional Allied Data Pass Inputs (Page 3)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Customer code H	3MTA4-01	I	Destination code A	3MTA4-11
B	Goods code A	3MTA4-02	J	Destination code B	3MTA4-12
C	Goods code B	3MTA4-03	K	Destination code C	3MTA4-13
D	Goods code C	3MTA4-04	L	Destination code D	3MTA4-14
E	Goods code D	3MTA4-05	M	New formula	3MTA4-15
F	Goods code E	3MTA4-06	N	New customer	3MTA4-16
G	Goods code F	3MTA4-07	O	Empty load	3MTA4-17
H	Goods code G	3MTA4-08	P	--not used--	3MTA4-18

Table 17: First 16 Additional Inputs (Page 4)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Load Chute Photo-eye input	4MTA4-01	I	--not used--	4MTA4-11
B	--not used--	4MTA4-02	J	--not used--	4MTA4-12
C	--not used--	4MTA4-03	K	--not used--	4MTA4-13
D	--not used--	4MTA4-04	L	--not used--	4MTA4-14
E	--not used--	4MTA4-05	M	--not used--	4MTA4-15
F	--not used--	4MTA4-06	N	--not used--	4MTA4-16
G	--not used--	4MTA4-07	O	--not used--	4MTA4-17
H	--not used--	4MTA4-08	P	--not used--	4MTA4-18

3.1.5.2. Microprocessor Outputs

Display or Action	Explanation
`F05 FORMULA 05 02:06` `xxxxxxxxxxxx 00:35`	This is a typical extractor operating display. Use the procedures described below to view microprocessor outputs from any similar display while the extractor is operating automatically. The function of each output is described in Table 18 through Table 22, below.
8	displays the first 16 outputs (Page 0, items “a” through “p”) while the button is held depressed. Outputs “a” through “p” appear along the top line of the display. For each output, a “+” underneath indicates that the output is turned on (enabled), while a “-” underneath indicates that the output is turned off (disabled).
`(0) abcdefghijklmnop` `+----+----------`	This is a typical display of the first 16 outputs. The page number (Page 0 in this example) appears on the left end of the top row of the display, followed by the outputs. The status of each output is indicated on the second display row. In this example, outputs “a” and “f” are enabled; all other outputs are disabled.
8 + 1	displays the second 16 outputs (Page 1, items “a” through “p”) while the buttons are held depressed.
8 + 2	displays the third 16 outputs (Page 2, items “a” through “p”) while the buttons are held depressed.
8 + 3	displays the fourth 16 outputs (Page 3, items “a” through “p”) while the buttons are held depressed.
8 + 4	displays the fifth 16 outputs (Page 4, items “a” through “p”) while the buttons are held depressed.

Table 18: First 16 Outputs (Page 0)

Display Code	Output Name	Connector and Pin	Display Code	Output Name	Connector and Pin
a	Distribution speed	1MTA5-19	i	E1/E2 speed	1MTA13-01
b	Flag down load	1MTA5-18	j	--not used--	1MTA13-02
c	Flag down discharge	1MTA5-17	k	E3/E4 speed	1MTA13-03
d	Loading allowed	1MTA5-07	l	Clockwise slow	1MTA13-04
e	Inflate seal	1MTA5-14	m	Counter-clockwise slow	1MTA13-05
f	Deflate seal	1MTA5-03	n	Load desired	1MTA13-16
g	Open load door	1MTA5-12	o	Operator signal	1MTA13-07
h	Discharge desired	1MTA5-11	p	Discharge finished	1MTA13-18

Table 19: Second 16 Outputs (Page 1)

Display Code	Output Name	Connector and Pin	Display Code	Output Name	Connector and Pin
a	Brake Release	1MTA13-19	i	--not used--	1MTA14-06
b	Run Belt A	1MTA13-10	j	--not used--	1MTA14-16
c	Run Belt B	1MTA14-11	k	--not used--	1MTA14-07
d	Ramp Hold	1MTA14-12	l	--not used--	1MTA14-17
e	Lower load chute	1MTA14-13	m	--not used--	1MTA14-08
f	Close load door	1MTA14-14	n	--not used--	1MTA14-18
g	--not used--	1MTA14-05	o	--not used--	1MTA14-09
h	--not used--	1MTA14-15	p	--not used--	1MTA14-19

Table 20: Third 16 Outputs (Page 2)

Display Code	Output Name	Connector and Pin	Display Code	Output Name	Connector and Pin
a	Dry code A	2MTA5-19	i	Customer A	3MTA5-19
b	Dry code B	2MTA5-18	j	Customer B	3MTA5-18
c	Dry code C	2MTA5-17	k	Customer C	3MTA5-17
d	Dry code D	2MTA5-16	l	Customer D	3MTA5-16
e	Formula A	2MTA5-04	m	Customer E	3MTA5-04
f	Formula B	2MTA5-03	n	Customer F	3MTA5-03
g	Formula C	2MTA5-12	o	Customer G	3MTA5-12
h	Formula D	2MTA5-11	p	Customer H	3MTA5-11

Table 21: Fourth 16 Outputs (Page 3)

Display Code	Output Name	Connector and Pin	Display Code	Output Name	Connector and Pin
a	Single cake	2MTA13-01	i	Goods code G	2MTA13-09
b	New formula	2MTA13-02	j	New customer	2MTA13-10
c	Goods code A	2MTA13-03	k	Destination A	2MTA14-11
d	Goods code B	2MTA13-04	l	Destination B	2MTA14-12
e	Goods code C	2MTA13-05	m	Destination C	2MTA14-13
f	Goods code D	2MTA13-06	n	Destination D	2MTA14-14
g	Goods code E	2MTA13-07	o	--not used--	2MTA14-05
h	Goods code F	2MTA13-08	p	--not used--	2MTA14-15

Table 22: Fifth 16 Outputs (Page 4)

Display Code	Output Name	Connector and Pin	Display Code	Output Name	Connector and Pin
a	--not used--	2MTA14-06	i	Tilt down not	4MTA5-19
b	--not used--	2MTA14-16	j	Tilt down auxiliary	4MTA5-18
c	--not used--	2MTA14-07	k	Tilt up auxiliary	4MTA5-17
d	--not used--	2MTA14-17	l	Conveyor door is up	4MTA5-16
e	--not used--	2MTA14-08	m	Tilt up	4MTA5-04
f	--not used--	2MTA14-18	n	--not used--	4MTA5-13
g	--not used--	2MTA14-09	o	--not used--	4MTA5-12
h	--not used--	2MTA14-19	p	Tilt down	4MTA5-11

3.1.5.3. Viewing and Clearing the Load Eye Error Counter

Display or Action	Explanation
SKIP TO	during normal operation, displays the *Load Eye Error* counter.
EXTRACTOR DETECTED LOAD-EYE ERROR=0928	typical *Load Eye Error* counter display. Release SKIP TO to return to the normal operating display.
SKIP TO + ↓	clears the counter.

— End of BICXUO01 —

Chapter 4
Troubleshooting

BIPEUT01 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

4.1. Centrifugal Extractor Error Messages

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

4.1.1. Power Up Error Messages

Display or Action	Explanation
`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). Machine must be reconfigured. Turn the *Run/Program* (🔑 / 🔑) keyswitch to 🔑 to re-configure the machine. See Section 2.1.5 "3 = Configure" for more information.
`CLEAR MEMORY NOW` `PRESS 4 + 5 + 6`	Control detected an error in configuration or program memory (usually because power was lost or **Master switch** was turned off while keyswitch was at 🔑), and the CPU could not be certain that memory was not corrupted upon power-up.
🔑	Enables clearing formula memory.
4 + 5 + 6	Clears entire formula memory. All formulas revert to their default values.
`CLEARING MEMORY` `** PLEASE WAIT **`	This message appears briefly while the control clears memory. See Section 2.1.3 "1 = Add or Change a Formula" for information on programming an extract formula, or see Section 2.1.6 "4 = Memory Transfer" for restoring data from another machine or a serial memory storage device.
`PROGRAM 0 MENU` `OK TURN KEY TO RUN`	Keyswitch was incorrectly set at **Program** at power up, but the control has determined that formula and configure data is reliable.
🔑	Returns to **run mode**.
`THREE WIRE DISABLED` `SEE MANUAL`	At power up, this message appears following the power up displays until ① is pressed to close the three-wire circuit (which provides power to the extractor). ① may be pressed at any time during the power up display, thus silencing the operator alarm and overriding this message. If ① fails to clear this message, see Section 4.1.3 "Operational Error Messages".
`board name` `FAILED` `CHECK THIS BOARD`	Where **board name** is "8/16 IO #1", "8/16 IO #2", "8/16 IO #3", "8/16 IO #4" or "24 OUT #1", "24 OUT #2". The named control circuit board failed or is **missing**. If future machine options require boards, this message will result if such an option is configured, but the requisite board is not installed.
CANCEL	Resets the control. This permits access to the **Program Menu** whether or not the condition is corrected and permits running a formula in "automatic" or "manual" if the condition is corrected.
`*---KEYPAD ERROR---*` **`key name`**	Keypad key shorted or stuck depressed where **key name** is the name of the offending key. This condition must be corrected before operation can resume.
`ACCUM. DATA ERROR` `NEXT TO CLEAR DATA`	The control detected invalid accumulator data (usually because of a power surge at power ON). ENTER clears all totals. See Section 4.2.6 "4 = Data Accumulation" for an explanation of accumulated data.

4.1.2. Configuration/Programming Error Messages

Display or Action	Explanation
`FORMULA xx INCOMP.` `TURN KEY TO PROGRAM`	Control 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.
⚿	Deletes this formula only and displays:
`DELETING FORMULA #xx` `** PLEASE WAIT **`	Where *xx* is the number of the formula being deleted.
`PROGRAM 0 MENU` `OK TURN KEY TO RUN`	The display then returns to *Program* menu.
`COPY SOURCE` `xx DOES NOT EXIST`	*Copy Old To New* (see Section 2.1.4 "2 = Copy Old to New") was attempted with nonexistent source formula *xx*. This message remains on the display, permitting entry of another formula number.
`COPY DESTINATION` `xx ALREADY EXISTS`	*Copy Old to New* (see Section 2.1.4 "2 = Copy Old to New") was attempted to a destination containing a formula where *xx* is the number of the existing formula. This message remains on the display, permitting entry of another formula number.
`ERROR IN CHECK SUM` `NEXT TO PROCEED`	On a machine receiving data during a download operation, this machine indicates that downloading was unsuccessful. See Section 2.1.6 "4 = Memory Transfer".

4.1.3. Operational Error Messages

WARNING 21: Shock Hazard—When troubleshooting any electrical fault, lock **off** and tag out power at the external disconnect switch before accessing any electric box or electrical component.

WARNING 22: Crushing and Entaglement Hazards—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.

Display or Action	Explanation
board name FAILED CHECK THIS BOARD	See explanation in Section 4.1.1 "Power Up Error Messages".
THREE WIRE DISABLED SEE MANUAL	The three-wire relay became de-energized. This is usually the result of pressing the *Stop* button or pulling an **Emergency Stop** switch. See Section 3.1.4.3 "Three-wire Disabled without Power Loss".
①	Closes the three-wire circuit and prompts for cake information. The proper responses must be provided to tell the control if the extractor (and Belt B, if one is provided) has goods and if it does, what the batch codes are.
<responses>	Confirms cake data, where <responses> are as explained in Section 3.1.4.4 "Conditions Requiring Confirmation of Cake Data".
PRESS START THREE WIRE DISABLED	A formula was selected to run manually (manual mode), but the three-wire relay became de-energized. ① closes the three-wire circuit, permitting the formula to run.
DATA UNLOCATABLE PRESS SIGNAL CANCEL	The extractor received a signal from the Mildata computer that the requested extract formula could not be found. This condition must be corrected before operation can resume. ⌿ resumes operation if the cause of the error is corrected.
SPEED SWITCH OPEN	Control sees that the *speed switch* is open, indicating that 1) the basket is rotating at speed which keeps the speed switch open, or 2) a malfunction in the speed switch circuitry occurred (if the basket is stopped). When the speed switch input is made, operation resumes.
BRAKE FAULT, MUST BE CLEARED TO RESTART	*Brake pressure switch* saw insufficient air pressure in the brake release air cylinder to guarantee that the brake has released. Possible causes include 1) low air pressure (frequently caused by too small an air supply pipe to the machine), 2) leaking quick release valve, pilot air valve, or piston cup in air cylinder, or 3) pinched or leaking brake air lines. Operation resumes after the cause of the error is corrected.
CONVEYOR DOOR IS NOT DOWN	The conveyor door is the moving panel that permits clearance for the extractor drain. It is normally commanded to move down when the extractor is at the intermediate point and must move **down** fully within five seconds after the extractor has tilted up fully to discharge, otherwise this error occurs. Any malfunction of the door mechanism or **down** proximity switch must be corrected before normal operation can resume. The error clears automatically when the *Conveyor Door Down* input is made.
CONVEYOR DOOR IS NOT UP	Normally the conveyor door is commanded to move up when the extractor desires to tilt down and must move to the fully up position within ten seconds after the extractor desires to tilt down or this error will occur. Any malfunction of the door mechanism or **up** proximity switch must be corrected before normal operation can resume. The error clears automatically when the *Conveyor Door Up* input is made.

DANGER 23: Entaglement Hazard—The linen inside or hanging partially outside a turning cylinder can suddenly wrap around your hand, arm or body and twist off/sever it. Lock **off** and tag out power at external disconnect before clearing the load chute.

Display or Action	Explanation
LOAD CHUTE IS NOT DOWN	The load chute is commanded down when the machine starts the loading sequence, but if the load chute is not down ten seconds after the loading sequence starts, this error message is displayed and the cylinder stops. returns to the start of the loading sequence once the cause of the error is corrected. The machine must be configured for this option or the error is ignored.
LOAD CHUTE IS NOT UP	The load chute is commanded up when DT (distribution) starts. However, if the load chute is not up during the last five seconds of distribution, this error message is displayed and the cylinder stops. restarts the cycle once the cause of the error is corrected. The machine must be configured for this option or the error is ignored.
LOAD DOOR IS NOT UP	The door is commanded up at the start of the loading or discharge sequence. Once the door is commanded up, it must move up fully within ten seconds or this error occurs. returns to the start of the loading or discharge sequence once the cause of this error is corrected. The machine must be configured for this option or the error is ignored.
LOAD DOOR IS NOT DOWN	The door is commanded down after the extractor receives or discharges a load. Once the door is commanded down, it must move down fully within ten seconds or this error occurs. starts the cycle after the cause of the error is corrected. The machine must be configured for this option or the error is ignored.
LOAD CHUTE BLOCKED PRESS SIGNAL CANCEL	The load chute photo-eye was blocked (or its connection to the microprocessor broken) during the last five seconds of *Distribution Time* (DT). This also stops the cylinder. restarts the cycle after the cause of the error is corrected.
PHOTO-EYE FAILED PRESS SIGNAL CANCEL	If Belt B is not provided, the photo-eye failed to make, then break, during discharge to assure goods have passed it. The Belt B photo-eye is made when the control knows the belt should be empty or the input is not made when the control knows the belt should contain goods. This condition must be corrected before operation can resume. resumes operation after the cause of the error is corrected.
LIMIT SWITCH ERROR PRESS SIGNAL CANCEL	A malfunction caused the *down limit switch* and *up limit switch* to both be made simultaneously. This condition must be corrected before operation can resume.
	Clears the error message if the malfunction was corrected and causes the control to prompt for cake information (e.g., **Does Extractor Have A Cake?**). The correct responses must be provided to tell the control if the extractor (and Belt B, if one is provided) has goods and if so, the batch codes for the batches in those locations.
<responses>	Confirms cake data, where <responses> are as explained in Section 3.1.4.4 "Conditions Requiring Confirmation of Cake Data".

Display or Action	Explanation
`RECEIVING ERROR,` `PRESS SIGNAL CANCEL`	The extractor received a formula code that is not currently programmed in the extractor control or for Miltrac systems only, or a malfunction during transfer occurred in the device from which the extractor is receiving its goods.
	Cancels the *Receiving* mode and causes the control to prompt for cake information (e.g., **Does Extractor Have A Cake?**). The correct responses must be provided to tell the control whether or not transfer occurred and if so, the batch codes for the goods that just entered the extractor.
<responses>	Confirms cake data, where <responses> are as explained in Section 3.1.4.4 "Conditions Requiring Confirmation of Cake Data".
`TRANSFER ERROR,` `PRESS SIGNAL CANCEL`	Applies to Miltrac systems only. A malfunction during transfer occurred in the device to which the extractor is sending its goods.
	Cancels the transfer and causes the control to prompt for cake information in the extractor (or on Belt B, if one is provided). The correct responses must be provided to tell the control whether or not transfer occurred. If no transfer occurred, the batch codes for goods about to leave the extractor (or Belt B) must be provided, too.
<responses>	Confirms cake data, where <responses> are as explained in Section 3.1.4.4 "Conditions Requiring Confirmation of Cake Data".
`*---KEYPAD ERROR---*` **`key name`**	See explanation in Section 4.1.1 "Power Up Error Messages" in this section.
`LOAD-EYE WAS BLOCKED` `PRESS SIGNAL CANCEL`	The controller detects that the load eye was blocked three times during the distribution speed of the loading sequence or redistribution of the pre-extract sequence.  restarts the cycle at wash speed if the condition is corrected.
`CHECK BRAKE SHOES` `PRESS SIGNAL CANCEL`	The controller sees the brake pad input each time power is applied to the machine or each time the configured **Check Brake Pad Time** time expires after power is applied.  clears the error message. The message will recur every time the configured **Check Brake Pad Time** expires or power is applied to the machine until the controller no longer detects a defective brake pad.
`INVERTER FAULT` `PRESS SIGNAL CANCEL`	Control detects an inverter fault condition. Refer to the inverter manual provided to diagnose and correct the problem. This condition must be corrected before operation can resume.
`REDISTRIBUTION FAULT` `PRESS SIGNAL CANCEL`	Indicates that the extractor has unsuccessfully attempted to distribute the load three times. When the excursion switch trips the fourth time, this error appears. This condition must be corrected before operation can resume.

Display or Action	Explanation
SPEED SWITCH FAULT PRESS SIGNAL CANCEL	Controls sees speed switch closed, following final extract, when a speed switch open condition was expected. This indicates that 1) the basket was not rotating, or 2) the speed switch circuit malfunctioned. This condition must be corrected before operation can resume.

— End of BIPEUT01 —

BICXUT02 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

4.2. Manual Menu

The *Manual menu* of the Milnor® centrifugal extractor controller provides six selections:

1. **Run Formula**—invokes any formula manually; described in Section 4.2.3
2. **Test Outputs**—actuates any individual output for testing when the extractor is **not** running a formula; described in Section 4.2.4
3. **Test Inputs**—displays the status of any individual input when the extractor is **not** running a formula; described in Section 4.2.5
4. **Data Accumulation**—displays, prints, and clears accumulated formula data; described in Section 4.2.6
5. **Print Data**—prints formulas and configure codes for future reference; described in Section 4.2.7
6. **Load Eye Report**—prints a report of all load-eye errors; described in Section 4.2.8

4.2.1. How to Access the Manual Mode

Display or Action	Explanation
WAITING FOR LOAD	This is the normal *run mode* display when the extractor is idle.
MANUAL	If the extractor is idle (not running a formula), this button accesses the *Manual menu*.
MANUAL MENU 1 RUN FORMULA	This is the *Manual menu* with the *Run Formula* option selected. If desired, select another option from this screen, or return to the *run mode* as described in Section 4.2.2.
↑ or ↓	Scrolls the available *Manual menu* choices. Any option can also be selected directly by entering the corresponding number.
MANUAL MENU 4 DATA ACCUMULATION	As an example, this screen appears after pressing the ↓ three times **or** pressing the 4 key.
NEXT	Accesses the selected *Manual menu* item. Each item is detailed elsewhere in this document.

4.2.2. How to Exit the Manual Mode

Display or Action	Explanation
CANCEL	From the *Manual menu*, this keystroke causes the control to back up one screen and eventually to ask for the cake information detailed in Section 3.1.4.4. Provide the correct responses for proper post-wash processing and accounting.
`DOES EXTRACTOR HAVE A CAKE 0=NO 1=YES 0`	This is the first display in the sequence used to verify cake information. When all prompts have been verified, the controller returns to the *Run* mode.
`WAITING FOR LOAD`	This is the normal *run mode* display when the extractor is idle.

4.2.3. 1 = Run Formula [Document BICXUT03]

Any programmed formula can be started manually to verify operation of the centrifugal extractor.

WARNING 24: Crushing and Entanglement Hazards—When the machine described in this document operates as intended by the manufacturer, parts of the machine may tilt up and down, drive motors may start and stop, conveyors may run and stop, and other devices may move automatically and without warning. Red *emergency stop buttons* on the extractor and *emergency pull cords* on conveyors will stop the machine.

- Verify that all machine guards are in place.
- Verify that personnel cannot enter or reach into the machine.

Display or Action	Explanation
MANUAL MENU 1 RUN FORMULA	This is the *Manual menu* display with the *Run Formula* option selected.
NEXT	Accesses the *Run Formula* option.
RUN FORMULA MANUAL 00 FORMULA 00	Formulas *00* through *15* are available to run manually. Press CANCEL to return to the *Manual menu*.
0 3	Selects formula *03*. If a formula is selected which has not been programmed, the display shows, “Does Not Exist.”
or ↑ / ↓	scrolls the available program choices.
NEXT	If the three-wire circuit is open, the display indicates that the extractor is either ready to accept a load, or must tilt down to the loading position before the formula can run.
PRESS START	display when the three-wire circuit is open and the extractor is tilted to the loading position
PRESS NEXT TO TILT MACHINE DOWN	display when the three-wire circuit is open and the extractor is **not** tilted to the loading position
①	Starts the extractor in slow speed for loading when the machine is tilted to the loading position.
WAITING TO LOAD GOODS INTO EXTRACTOR	Indicates that the extractor is turning slowly in the loading position.
NEXT	Signals the extractor that it contains a load. The selected formula starts, and the display appears as described in Section 3.1. “Centrifugal Extractor Automatic Operation”.
RUN FORMULA MANUAL 00 FORMULA 00	This display appears when the commanded formula ends. Press CANCEL to return to the *Manual menu*, or select another formula to run.

4.2.4. 2 = Test Outputs [Document BICXUT04]

The *Manual menu* allows testing of any machine function by turning on individual outputs. Outputs can also be viewed—but not actuated—while the machine is operating, as described in Section 3.1.5.2 “Microprocessor Outputs”.

Display or Action	Explanation
MANUAL MENU 2 TEST OUTPUTS	This is the *Manual menu* with the *Test Outputs* option selected.
NEXT	Accesses the *Test Outputs* option and selects the first output.
CLOCKWISE SLOW 01 OFF	All outputs shown in Table 23 are available for actuation. Press 0 0 NEXT to return to the *Manual menu*.
↑ or ↓	Scrolls the available outputs. Any output may be selected directly by entering the corresponding number.
NEXT	turns the selected output **on**
CANCEL	turns the selected output **off**

Table 23: Outputs for Standard Functions in Manual Mode

Keypad Entry	Output Name	Results of Actuation
00	abort Outputs test	returns to Manual menu
01	clockwise slow *	turns clockwise at slow speed
02	counter-clockwise slow *	turns counter-clockwise at slow speed
03	distribution speed *	turns at distribution speed
04	1st extract speed	turns at first extract speed as determined by factory-set inverter constants
05	2nd extract speed	turns at second extract speed as determined by factory-set inverter constants
06	3rd extract speed	turns at third extract speed as determined by factory-set inverter constants
07	4th extract speed	turns at fourth extract speed as determined by factory-set inverter constants
08	brake release	brake releases when output is on
09	operator signal	operator signal sounds when output is on
10	open load door	extractor door (if equipped) opens
11	close load door	extractor door (if equipped) closes
12	inflate seal	inflatable basket ribs inflate
13	deflate seal	inflatable basket ribs deflate
14	tilt machine up **	cylinder tilts up
15	tilt machine down	cylinder tilts down
16	lower load chute	load chute lowers when output is on
17	run belt A	belt under basket runs
18	run belt B	external discharge belt (if equipped) runs
19	flag down load	load-end shuttle target extends
20	flag down discharge	discharge-end shuttle target extends
21	loading allowed	signals allied loading device that the extractor can receive a load
22	discharge desired	signals allied non-Miltrac receiving device that the extractor is ready to discharge
23	discharge finished	signals allied receiving device that the extractor desired to discharge
24	load desired	signals allied non-Miltrac loading device that extractor desires a load
*	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.	

If the allied data pass option is provided, actuating any of the outputs shown in Table 24 closes one microprocessor relay. The closed relays are used in combination to pass codes in binary format to an allied receiving device.

Table 24: Outputs for Optional Allied Data Pass in Manual Mode

Keypad Entry	Output Name	Keypad Entry	Output Name	Keypad Entry	Output Name	Keypad Entry	Output Name
16 Dry Codes		256 Customer Codes		New Formula or Same		New Customer or Same	
25	Dry Code A	33	Customer A	42	New Formula	50	New Customer
26	Dry Code B	34	Customer B	128 Customer Codes		16 Destinations	
27	Dry Code C	35	Customer C	43	Goods A	51	Destination A
28	Dry Code D	36	Customer D	44	Goods B	52	Destination B
16 Formula Codes		37	Customer E	45	Goods C	53	Destination C
29	Formula A	38	Customer F	46	Goods D	54	Destination D
30	Formula B	39	Customer G	47	Goods E		
31	Formula C	40	Customer H	48	Goods F		
32	Formula D	One Cake or Two		49	Goods G		
		41	Single Cake				

Note 23: The centrifugal extractor controller permits accessing and actuating allied data pass outputs even if allied data pass is not provided, but no output relays are energized in this case.

4.2.5. 3 = Test Inputs [Document BICXUT05]

The *on/off* state of each microprocessor input can be displayed from the *Manual menu* if the extractor is not running. Inputs can also be monitored during operation as described in Section 3.1.5.1 "Microprocessor Inputs".

4.2.5.1. Viewing the Standard Inputs

Display or Action	Explanation
`MANUAL MENU` `3 TEST INPUTS`	This is the *Manual menu* with the *Test Inputs* option selected.
NEXT	Accesses the *Test Inputs* option and displays the first 16 inputs (*Page 0*).
`(0) ABCDEFGHIJKLMNOP` `--+-++-+---+--+-`	The input display codes shown on the top line refer to the codes in Table 25. Enter a page number to display the corresponding page.
1	Displays the second 16 inputs (*Page 1*).
`(1) ABCDEFGHIJKLMNOP` `---+-----+----+-`	This is *Page 1* of the inputs.
CANCEL	Returns to the *Manual* menu.

Table 25: Standard Microprocessor Inputs

First 16 Inputs (Page 0: A-P)			Second 16 Inputs (Page 1: A-P)		
Display Code	**Input Name**	**Connector & Pin**	**Display Code**	**Input Name**	**Connector & Pin**
A	not used	1MTA38-3	A	Load level	1MTA4-01
B	Program key	1MTA38-2	B	Discharge level	1MTA4-02
C	Signal cancel	1MTA38-1	C	Three wire	1MTA4-03
D	End extract	1MTA38-4	D	Inverter fault	1MTA4-04
E	Excursion	1MTA38-5	E	not used	1MTA4-05
F	not used	1MTA38-6	F	not used	1MTA4-06
G	Brake pad	1MTA39-5	G	not used	1MTA4-07
H	Load chute down	1MTA39-4	H	Brake pressure	1MTA4-08
I	Load chute up	1MTA39-3	I	Speed switch	1MTA4-11
J	Begin discharging	1MTA39-8	J	Load chute blocked	1MTA4-12
K	Load door down	1MTA39-7	K	Loading allowed	1MTA4-13
L	Load door up	1MTA39-6	L	Cycle start	1MTA4-14
M	not used		M	Belt A or B photo-eye	1MTA4-15
N	not used		N	Conveyor door down	1MTA4-16
O	not used		O	Conveyor door up	1MTA4-17
P	not used		P	Discharge allowed	1MTA4-18

4.2.5.2. Viewing the Allied Data Pass Inputs—

If the extractor uses allied data pass to communicate with non-Milnor equipment, the status of the associated inputs can be viewed.

Note 24: Allied data pass requires two additional 16-input/8-output boards and one additional 16-output board.

Note 25: The extractor controller will display the last 32 inputs even if the machine is not equipped for allied data pass, but because none of these inputs are used, they will always appear off ("-") when displayed.

Display or Action	Explanation
MANUAL MENU 3 TEST INPUTS	This is the *Manual menu* with the *Test Inputs* option selected.
2	Displays the third 16 inputs (*Page 2*).
(2) ABCDEFGHIJKLMNOP ---+----+---+---	This is *Page 2* of the inputs. The input display codes shown on the top line of this display refer to the codes in Table 26.
(3) ABCDEFGHIJKLMNOP ---+-----+----+-	Press 3 to view the fourth 16 inputs (*Page 3*).
(4) ABCDEFGHIJKLMNOP +---------------	Press 4 to view the fifth 16 inputs (*Page 4*).
CANCEL	Returns to the *Manual* menu.

Table 26: Optional Allied Data Pass Inputs

Display Code	Third 16 Inputs (Page 2: A-P)		Fourth 16 Inputs (Page 3: A-P)		Fifth 16 Inputs (Page 4: A-P)	
	Input Name	Connector & Pin	Input Name	Connector & Pin	Input Name	Connector & Pin
A	Extract code A	2MTA4-01	Customer code H	3MTA4-01	Photo-eye input	4MTA4-01
B	Extract code B	2MTA4-02	Goods code A	3MTA4-02	not used	4MTA4-02
C	Extract code C	2MTA4-03	Goods code B	3MTA4-03	not used	4MTA4-03
D	Extract code D	2MTA4-04	Goods code C	3MTA4-04	not used	4MTA4-04
E	Dry code A	2MTA4-05	Goods code D	3MTA4-05	not used	4MTA4-05
F	Dry code B	2MTA4-06	Goods code E	3MTA4-06	not used	4MTA4-06
G	Dry code C	2MTA4-07	Goods code F	3MTA4-07	not used	4MTA4-07
H	Dry code D	2MTA4-08	Goods code G	3MTA4-08	not used	4MTA4-08
I	Single cake	2MTA4-11	Destination code A	3MTA4-11	not used	4MTA4-11
J	Customer code A	2MTA4-12	Destination code B	3MTA4-12	not used	4MTA4-12
K	Customer code B	2MTA4-13	Destination code C	3MTA4-13	not used	4MTA4-13
L	Customer code C	2MTA4-14	Destination code D	3MTA4-14	not used	4MTA4-14
M	Customer code D	2MTA4-15	New formula	3MTA4-15	not used	4MTA4-15
N	Customer code E	2MTA4-16	New customer	3MTA4-16	not used	4MTA4-16
O	Customer code F	2MTA4-17	Empty load	3MTA4-17	not used	4MTA4-17
P	Customer code G	2MTA4-18	not used	3MTA4-18	not used	4MTA4-18

4.2.6. 4 = Data Accumulation [Document BICXUT06]

During normal operation the extractor controller stores load processing data for use in accounting and in estimating operational efficiency. This data is available for the last load processed, as well as for each formula and all combined formulas run since the data was cleared. It is protected against loss by the same battery and capacitor system that protects formula memory. These items are tracked:

- Loads—the number of loads processed, if applicable
- Formula number—(if applicable)
- Run time—total time taken to process a load from start to end of cycle, including error and wait time except for WT1 and WT2 (see below)
- WT1 time—time extractor was idle *Waiting for Load*
- WT2 time—time extractor was waiting to discharge because the device to which the extractor sends its goods (e.g., Belt B or the shuttle) was not available
- Error (E, ER, or ERR time)—Time during which normal operation is suspended due to an error condition. This time is included in *Run time* above.

4.2.6.1. Accessing the Data Accumulation Menu

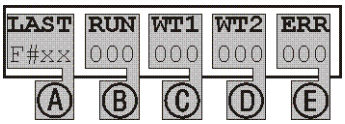
Display or Action	Explanation
MANUAL MENU 4 DATA ACCUMULATION	This is the *Manual* menu with the *Data Accumulation* option selected.
NEXT	Accesses the *Data Accumulation* sub-menu.
0 0=DISPLAY DATA 1=PRINT 2=CLEAR	This is the *Data Accumulation* sub-menu with the *Display Data* option selected.

To back up to the next higher menu level from any data accumulation display, press CANCEL.

4.2.6.2. 0=Display Data (view accumulated data on the controller display)

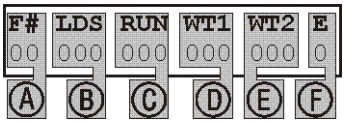
Display or Action	Explanation
0 0=DISPLAY DATA 1=PRINT 2=CLEAR	From the *Data Accumulation* sub-menu with *Display Data* selected, NEXT accesses the *Display Data* sub-menu.
0 0=LAST LOAD 1=FORMS 2=TOTAL	This is the *Display Data* sub-menu with the *Last Load* option selected.
0 NEXT	displays data for the last load processed, as shown in Figure 8

Figure 8: *Last Load* Display

Data Display	Legend
	**A.** Formula number of last load processed **B.** Processing time in minutes, minutes, and tenths **C.** Time spent *Waiting for Load* in minutes, minutes, and tenths **D.** Time *Waiting to Discharge*, excluding commanded wait time, in minutes, minutes, and tenths **E.** Error time in minutes, minutes, and tenths

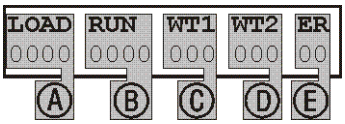
Display or Action	Explanation
CANCEL	returns to the *Display Data* sub-menu
0 0=LAST LOAD 1=FORMS 2=TOTAL	the *Display Data* sub-menu with the *Last Load* option selected
1 NEXT	allows selecting data for a specific formula, as shown in Figure 9
↑ or ↓	scrolls the available formula numbers

Figure 9: *Selected Formula* Display

Data Display	Legend
	**A.** Formula number of selected formula **B.** Number of loads processed with this formula **C.** Processing time for all loads using this formula in hours, hours, and tenths **D.** Time spent *Waiting for Load* in hours, hours, and tenths **E.** Time *Waiting to Discharge*, excluding commanded wait time, in hours, hours, and tenths **F.** Error time in tenths of an hour

Display or Action	Explanation
CANCEL	returns to the *Display Data* sub-menu
0 0=LAST LOAD 1=FORMS 2=TOTAL	the *Display Data* sub-menu with the *Last Load* option selected
2 NEXT	displays total cumulative data for all formulas, as shown in Figure 10

Figure 10: *All Formulas* Display

Data Display	Legend
	**A.** Total number of loads run **B.** Total processing time in hours, hours, hours, and tenths **C.** Time spent *Waiting for Load* in hours, hours, and tenths **D.** Time *Waiting to Discharge*, excluding commanded wait time, in hours, hours, and tenths **E.** Total error time in hours and tenths

4.2.6.3. 1=Print (print accumulated data to an installed printer)

Display or Action	Explanation
1 NEXT	From the *Display Data* sub-menu, enables printing accumulated data and prompts for the date.
DATE: MM-DD-YYYY XX-XX-XXXX	The date entered here is printed at the top of the report.
NEXT NEXT NEXT	retains the date displayed and prints the report immediately

To change the date, enter the desired characters in each field and press NEXT to advance to the next field. See the example below:

2 8 NEXT	enters 28 for the day and advances the cursor to the month field
0 4 NEXT	enters 04 for the month and advances the cursor to the year field
2 0 0 2	enters 2002 for the year
NEXT	accepts the new date and prints the report, as shown in Figure 11.
PRINTING . . . **PLEASE WAIT**	display while data is sent to printer
0 0=DISPLAY DATA 1=PRINT 2=CLEAR	After printing, the *Data Accumulation* sub-menu is displayed.

Figure 11: Sample Data Accumulation Report

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

4.2.6.4. 2=Clear (reset all accumulated totals to zero)

Display or Action	Explanation
2 NEXT	from the *Data Accumulation* sub-menu, enables clearing of all accumulated data
NEXT TO CLEAR DATA CANCEL = ESCAPE	The *Clear Accumulator Data help* screen defines the two available options from this display: *clear data* and *escape*.
NEXT	Clears all accumulated data from memory.
or CANCEL	Returns to the *Data Accumulation* menu without clearing the data.
0 0=DISPLAY DATA 1=PRINT 2=CLEAR	After either action from the *Clear Accumulator Data help* screen, this display appears.

4.2.7. 5 = Print Data [Document BICXUT07]

The extractor controller is capable of printing the formulas and configuration codes to a serial printer connected to the extractor. Sample formula and configuration reports are shown in Figure 12 and Figure 13, respectively.

Note 26: The printer socket is located on the outside of the extractor control box. See Section 5.3.2.2 "Connecting a Machine to a Printer for "Print Data"" for complete instructions on wiring the necessary printer cable, and refer to the related section in document BICWPF01 for printer specifications.

Display or Action	Explanation
`MANUAL MENU` `5 PRINT DATA`	This is the *Manual* menu with the *Print Data* option selected.
NEXT	Accesses the *Print Data* sub-menu.
`PRINT DATA` `0 FORMULAS`	This is the *Print Data* sub-menu, with the *Formulas* report option selected.

4.2.7.1. Printing the Formulas Report

Display or Action	Explanation
NEXT	From the *Formulas* report option, this keystroke causes the controller to prompt for today's date to be included in the report.
`DATE: MM-DD-YYYY` `mm-dd-yyyy`	The date entered here is printed at the top of the report. See Section 4.2.6.3 "1=Print (print accumulated data to an installed printer)" for a detailed explanation of the date format.
`PRINTING . . . .` `** PLEASE WAIT **`	Appears on the display while the report is printing.
`MANUAL MENU` `1 RUN FORMULA`	When printing is finished, the controller returns to the *Manual* menu.

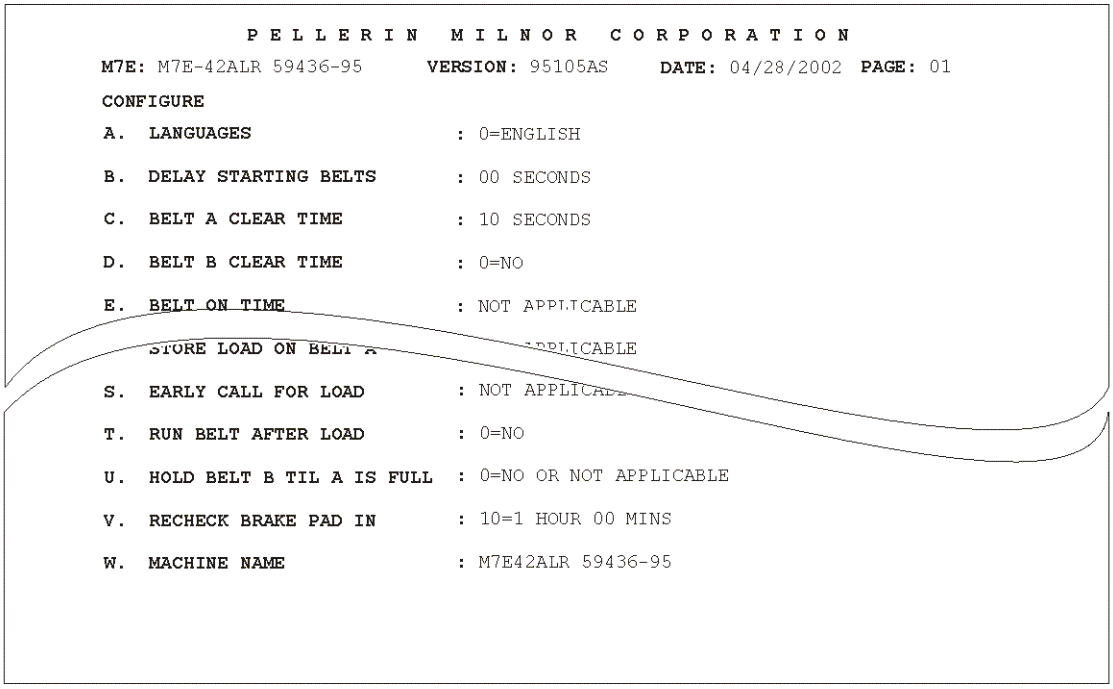
Figure 12: Typical Formula Report

```
                    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 -                 EXTIMATED 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
```

4.2.7.2. Printing the Configuration Report

Display or Action	Explanation
↑ or ↓	From the *Formulas* report option, scrolls to the *Configuration* report option.
PRINT DATA 1 CONFIGURATION	This is the *Print Data* sub-menu, with the *Configuration* report option selected.
NEXT	From the *Configuration* report option, this keystroke causes the controller to prompt for today's date to be included in the report.
DATE: MM-DD-YYYY mm-dd-yyyy	The date entered here is printed at the top of the report. See Section 4.2.6.3 "1=Print (print accumulated data to an installed printer)" for a detailed explanation of the date format.
PRINTING . . . . ** PLEASE WAIT **	Appears on the display while the report is printing.
MANUAL MENU 1 RUN FORMULA	When printing is finished, the controller returns to the *Manual* menu.

Figure 13: 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
```

4.2.8. 6 = Load Eye Report [Document BICXUT08]

During operation the extractor controller stores data associated with photoeye errors. The data categories listed below can be used to troubleshoot continuing receiving and discharging problems. This data is protected against loss by the same battery and capacitor system that protects formula memory. From this menu selection, the user can choose to **print the error report** or **clear the accumulated photoeye error data**.

- Load number—the number of loads processed
- Load weight—the total weight of the loads processed
- Goods code—the types of goods processed

- Formula number—the formula numbers used in processing
- Begin—the number of errors detected in the first distribution (loading) sequence
- Redis—the number of errors detected in the redistribution phase of pre-extract
- Total—the total number of errors detected for the processed formula

4.2.8.1. Accessing the Load Eye Report Menu

Display or Action	Explanation
MANUAL MENU 6 LOAD-EYE REPORT	This is the *Manual* menu with the *Load Eye report* selected.
NEXT	Accesses the *Load Eye report* sub-menu.
LOAD-EYE REPORT 1 PRINT REPORT	This is the *Load Eye report* sub-menu, with the *Print Report* option selected.

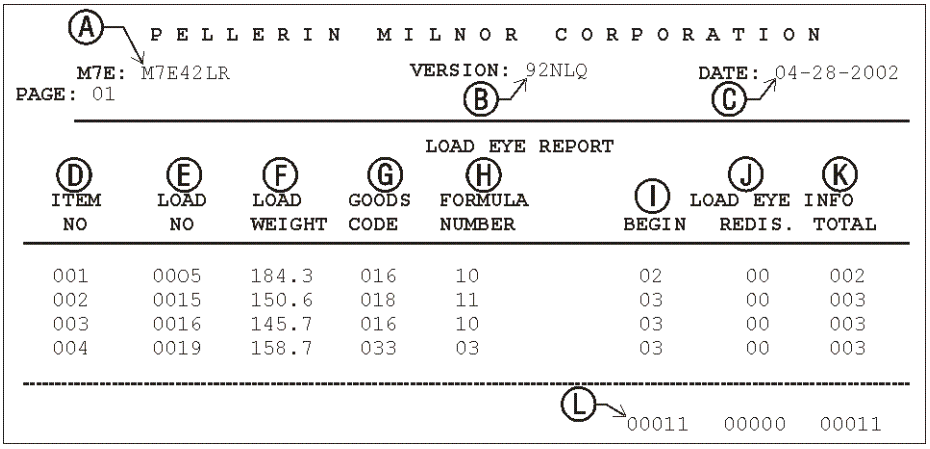
4.2.8.2. Printing the Load Eye Report

Display or Action	Explanation
NEXT	From the *Print Report* option, this keystroke causes the controller to prompt for today's date for inclusion in the report.
DATE: MM-DD-YYYY mm-dd-yyyy	The date entered here is printed at the top of the report. See Section 4.2.6.3 for a detailed explanation of the date format.

The *Load Eye report* menu returns after the report (Figure 14) is printed.

Figure 14: Interpreting the Load Eye Report

Sample Load Eye Report



Legend

- **A.** Machine name
- **B.** Software version number
- **C.** Date report requested
- **D.** Sequential item number
- **E.** Load number since cleared
- **F.** Weight of load
- **G.** Goods code number
- **H.** Extractor formula number
- **I.** First distribution (loading) errors
- **J.** Redistribution errors
- **K.** Total errors per report item
- **L.** Total errors of each type

4.2.8.3. Clearing the Accumulated Data

Display or Action	Explanation
`MANUAL MENU` `6 LOAD-EYE REPORT`	This is the *Manual* menu with the *Load Eye report* selected.
NEXT	Accesses the *Load Eye report* sub-menu.
`LOAD-EYE REPORT` `1 PRINT REPORT`	This is the *Load Eye report* sub-menu, with the *Print Report* option selected.
2, NEXT	Accesses the sub-menu for clearing all extractor photoeye data.
`CLEAR ALL DATA` `PRESS 4 + 5 + 6`	*Clear All Data* sub-menu selected.
4+5+6	Clears the *Load Eye* report.
`LOAD-EYE REPORT` `2 CLEAR ALL DATA`	Display returns after photoeye data is cleared. Press CANCEL to back up to the next higher menu. Repeat until you reach the desired menu.

— End of BICXUT02 —

BICWPF02 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

4.3. Operation and Troubleshooting of the Speed Limiting System on Centrifugal Extractors

Notice 25: This document applies to the specific models and software versions listed in Table 27 below, as well as certain machines in which the speed limiting system was installed as a field retrofit.

Table 27: Models and Software Versions Covered by this Document

Machine Model Number	Balancing Software and Version	Controller Software and Version
48040 M9V centrifugal extractor	WUBAL8/20001 and later	WUEXTH/20105 and later

4.3.1. General Information

For the machine models listed in Table 27, the speed limiting system provides an extra measure of protection from premature wear to some components. When a load is properly balanced and all components of this system are functioning, the machine runs at the programmed extract speed. However, if the system detects that the load is severly imbalanced, it signals the inverter to stop accelerating the motor.

This document describes the operation of the speed limiting system which minimizes the possibility of vibration-induced machine damage. This information can also be used to determine if this system is in good working order.

Tip: If a machine equipped with the speed limiting system regularly extracts at a speed slower than the programmed speed, the information in this document allows a qualified technician to determine if the speed limiting system is functioning.

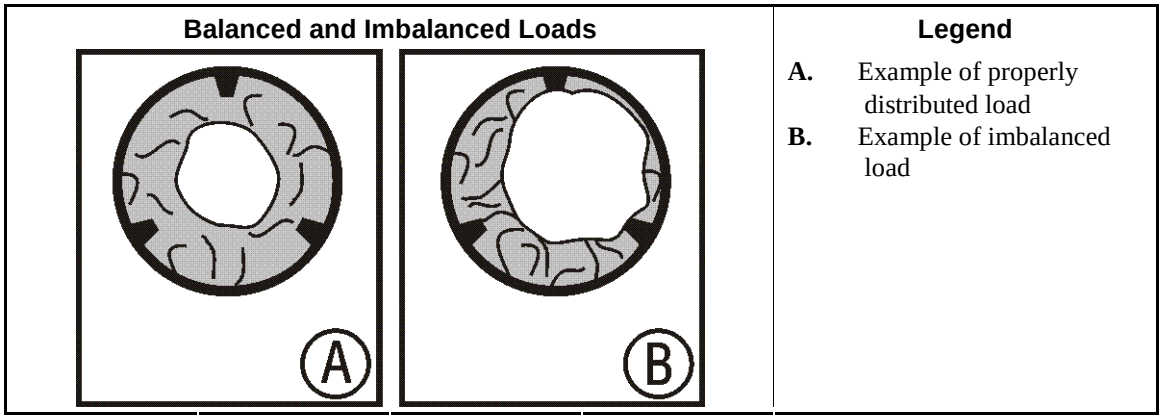
The software and devices described in this document work together to prevent premature machine wear while allowing the maximum safe extract speed for any reasonable degree of imbalance in the cylinder.

- The balancing software monitors the horizontal acceleration of the shell (detected by the accelerometer) while the cylinder speed approaches extract speed. If the horizontal acceleration exceeds a predetermined value, the controller software prevents the machine from accelerating to a faster extract speed.
- An accelerometer and a photo-eye provide information used by the balancing software. The accelerometer produces a voltage that increases in proportion to machine shell acceleration; i.e., the accelerometer puts out a lower voltage during small excursions at slow speeds than it does if the machine is shaking violently.

  Note 27: When the machine is idle and waiting for a load, the voltage output from the accelerometer should be 2.5 volts DC. If necessary, adjust the accelerometer mounting bracket to achieve this voltage. An output voltage below 2.2 volts or above 2.8 volts usually indicates that the accelerometer has failed and must be replaced.

Tip: To ensure the highest safe extract speeds, load the machine at or near its rated capacity whenever practicable. At the beginning of the extract sequence, the goods will distribute around the cylinder as illustrated in Figure 15.

Figure 15: Load Distribution



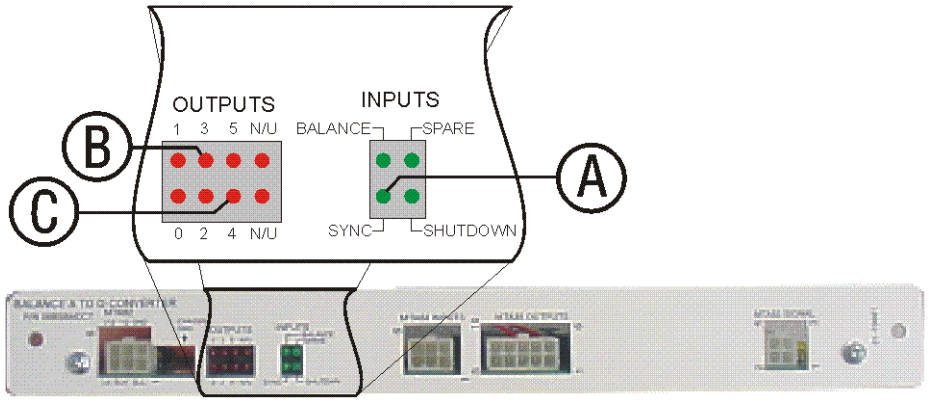
4.3.2. Mode 1: Photo-eye not Functioning Properly

The software on these machines allows the controller to determine if the load is sufficiently balanced to run at the maximum programmed extract speed. This determination is based on a **timing** input from a photo-eye and a digital input from an accelerometer. The balance board verifies that the photo-eye is present and working by monitoring the photo-eye input during each drain sequence.

The photo-eye output goes to the balance board and the speed sensing board. To verify the circuit between the photo-eye and the balance board, observe the *SYNC* light on the balance board (see Figure 16). This light flashes with each pulse from the photo-eye to the balance board.

Figure 16: Balance Board Detail

Input and Output Indicator Lights



Legend

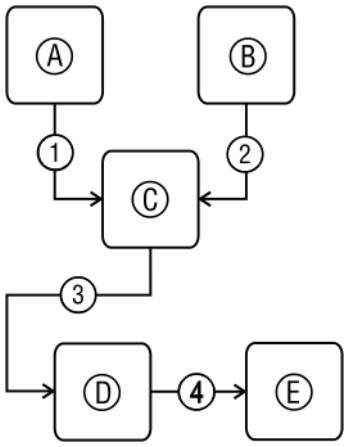
A. Sync light (flashes with input from photo-eye)
B. Output 3 light (on when accelerometer threshold is exceeded)
C. Output 4 light (on when machine has power)

4.3.3. Mode 2: Photo-eye Present and Functioning

If the photo-eye is functioning properly, the system (shown in Figure 17) functions as described here.

Figure 17: Speed Limiting Circuit

Block Diagram

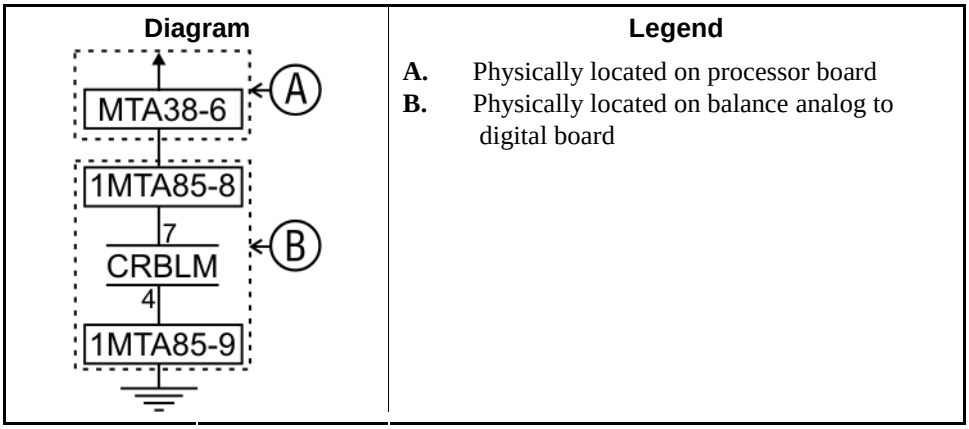


Legend

A. Accelerometer
B. Photo-eye
C. Balance analog-to-digital converter board
D. Processor board
E. Inverter
1. Accelerometer output voltage (analog signal)
2. Pulse signal for RPM
3. Out-of-balance output
4. Control output

1. The balance board monitors the output voltage of the accelerometer.
2. If the output voltage from the accelerometer exceeds the threshold value shown in Table 28, contact 4-7 on relay CRBLM on the balance board closes.
3. When relay CRBLM 4-7 closes, it grounds the machine microprocessor controller input at MTA38-6 (see Figure 18).

Figure 18: Partial Schematic Diagram



4. The machine controller turns on output 11 on output board #1 (address 11H), which activates the inverter multifunction input on terminal S7 (see schematic W6EX5VPA for connections). When the inverter is correctly programmed, this input initiates a Ramp Hold which suspends further acceleration.
5. The current extract step runs to completion at the speed achieved when acceleration was halted.

Table 28: Accelerometer Output Voltage Thresholds

Machine Model	Controller Software Version	Balance Software Version	Threshold Voltage
48040 M9V	WUEXTH/20105 and later	WUBAL8/20001	3.4V
		WUBAL8/20002	Selectable (see below)

Table 29: Selecting Balance Threshold Voltage

To select this threshold voltage	this input is grounded
3.1V	none
3.2V	MTA84-1
3.3V	MTA84-2
3.4V	MTA84-3

— End of BICWPF02 —

Chapter 5
Supplemental Information

BICWUI01 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

5.1. Printer Requirements and Settings

Notice 26: 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.

5.1.1. Cable Requirements

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

Table 30: 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

5.1.2. Configuring the Citizen GSX-190 Printer

Table 31 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 31: Required Settings for Citizen GSX-190 Printer

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

5.1.3. Configuring the Epson LX300 Printer

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

Table 32: 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		

5.1.4. Previous Printer Models

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

— End of BICWUI01 —

BICUDC01 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

5.2. Serial Memory Storage Device Applications

A serial memory storage device similar to one shown below can be used to store machine configuration and formula data for most current models of Milnor® machines. DIP switches inside the storage device allow you to configure the device to accept data from several 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 19: Serial Memory Storage Device

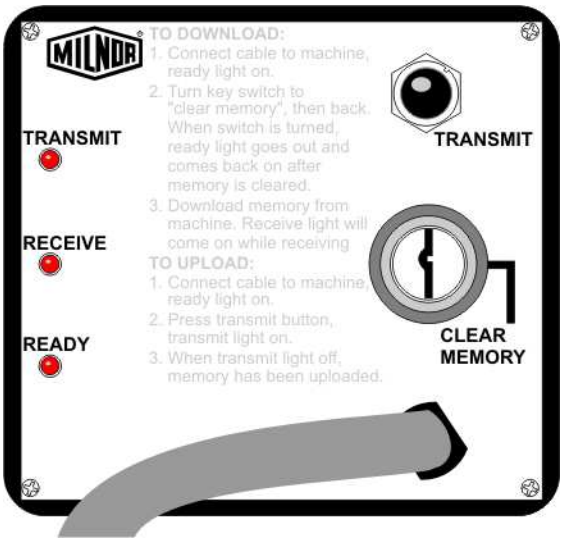


Figure 20: Rear View of Circuit Board

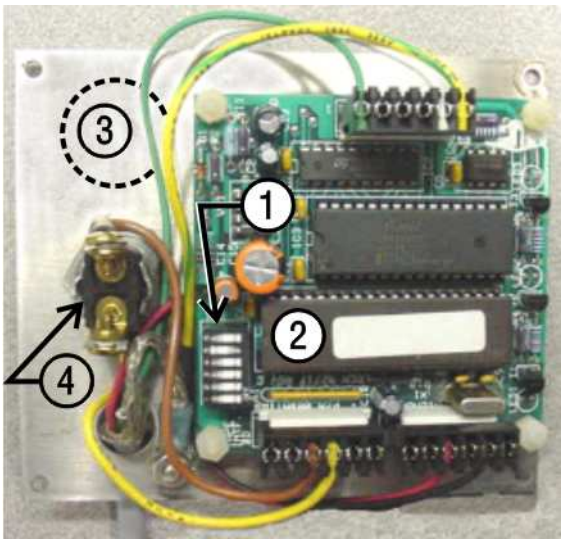
View	Legend
	**1.** DIP switch **2.** Software chip **3.** Location of *Transmit button*, if equipped **4.** Key switch

Table 33: 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	

— End of BICUDC01 —

BICWUC01 (Published) Book specs- Dates: 20140404 / 20140404 / 20140404 Lang: ENG01 Applic: CXU

5.3. Construction of External Serial Link Cables

This document provides information for on-site fabrication of certain types of serial communication cables. An individual machine can be connected to certain makes and models of serial printer (see Note 28) using the printer cable described in Section 5.3.2.2. Programmable data can be transferred between compatible machines or between a machine and a Milnor serial memory storage device (see Note 29), using the download cables described in Section 5.3.2.3 and

Section 5.3.2.4 respectively. These cable(s) connect to the cabinet-mounted 9-pin DIN type receptacle shown in Figure 21 and may be installed temporarily or permanently, as appropriate.

If the machine is connected to a Mildata® or Drynet (dryer/shuttle controller) network (see Note 30), downloading is more likely to be handled by these products. Another Milnor document—the related section in document BICCUC01—describes the permanent cables needed to communicate across a Mildata, Drynet, or Miltrac™, network. In the unlikely event that personnel will want to download data via the download cables described herein, rather than via Mildata, all energized machines on the Mildata network will receive the downloaded data. **Turn off power to any machines to which you do not wish to download.**

Note 28: The currently approved printers and printer configuration settings are provided in Section 5.1. "Printer Requirements and Settings". A pre-assembled machine-to-printer cable similar to the cable described here, is available from Milnor (P/N 10YMK2PNTR).

Note 29: The Milnor serial memory storage device (also known as a download box) contains nonvolatile memory to hold a back-up copy of the programming and configuration data for **one machine**. This data is transferred between the machine and the memory storage device via the DIN receptacle on the machine. Two models are currently available: KXMIC00507 and KXMIC00508. The already wired cable and DIN connector are included as part of the memory storage device. Consult the Milnor Service department to determine the correct device for a particular application.

Note 30: Mildata is Milnor's PC-based product for centralized data collection, productivity analysis, report generation, formula development and data downloading. Drynet permits supervisory and manual functions for a group of dryers and the shuttle that serves them to be performed from a central PC.

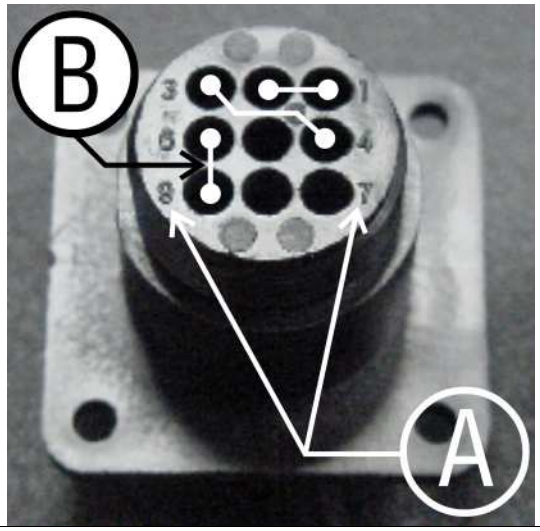
Applicable machines are provided with a single DIN receptacle for both downloading and printing. Only one function at a time (downloading or printing) can be performed using this connection.

5.3.1. Pin Identification

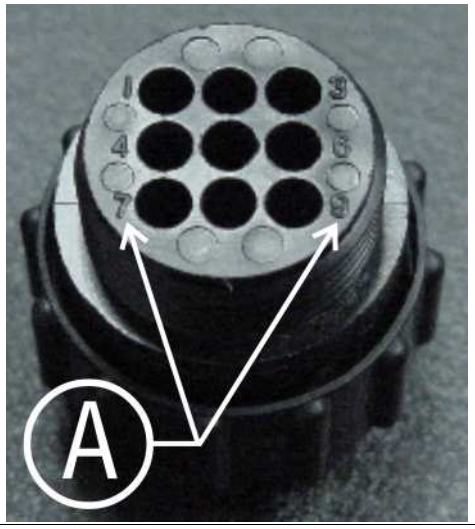
The download and printing functions use different data communication lines, but the DIN receptacle on the machine contains all of the pins used for either function. Figure 21 illustrates the DIN receptacle (which uses male pins) and the mating plug (which uses female pin sockets), each viewed from the **wire entry** side. The receptacle is normally installed and wired at the Milnor factory. The plug and female pin sockets for customer use are provided in a bag inside the electric box. Table 34 shows the function of each pin.

Figure 21: 9-Pin DIN Connector Pin Identification (from wire entry side of connectors)

Receptacle (uses male pins)



Plug (uses female pin sockets)



Legend

A. Pin numbers molded into parts

B. Heavy white lines terminated with dots indicate pins normally connected together at the Milnor factory

Table 34: External Serial Link Pin Assignments

Pin Number	Function	Receptacle Wiring (inside electrical enclosure)	
		Wire Number	Color Code
1	Serial low	DLL	Blue and black
2			
3	Serial high	DLH	Blue and red
4			
5	Clear to send (used for printing only)	CTS	Blue and orange
6	Electronic ground	2G	Blue and white
9			
7	Transmit data (used for printing only)	TXD	Blue and orange
8	+5 volts DC (used for serial memory storage device only)	V1	Blue

CAUTION 27: 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.

5.3.2. How to Wire the Cables

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

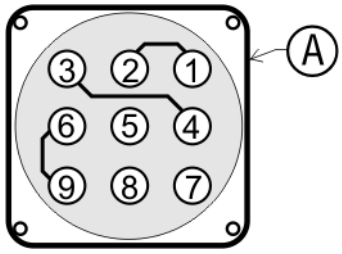
5.3.2.1. **Cable Specifications**—Multi-conductor shielded cable that meets the following minimum requirements must be used in the applications covered herein. Conforming cable may be purchased from Milnor (P/N 09V300A04S) or purchased from another source:

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

5.3.2.2. **Connecting a Machine to a Printer for "Print Data"**—Many Milnor microprocessor-controlled machines allow permanent or temporary connection of a serial printer for generating printed copies of formulas or status reports during operation. Figure 22 shows how to wire the machine-to-printer cable. Milnor has tested and approved certain printers for this application (see Note 28).

Figure 22: Wiring Diagram for Cable to Connect a Machine to a Printer

Receptacle

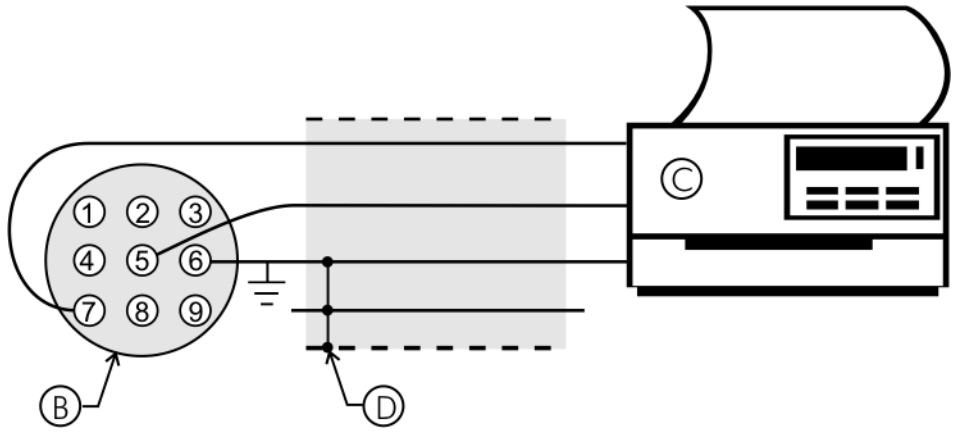


Legend

A. Receptacle (with male pins). Pin functions are as follows:
- **5.** Clear to send (CTS).
- **7.** Transmit data (TXD)
- **6&9.** Ground. This application only uses Pin 6.
- **1&2.** Not used in this application
- **3&4.** Not used in this application
- **8.** Not used in this application. See caution statement **27** .

B. Plug (with female pin sockets)
C. Approved serial printer (see Note 28)
D. Tie shield and spare conductor(s) on this end of cable to ground. Leave unconnected on other end.

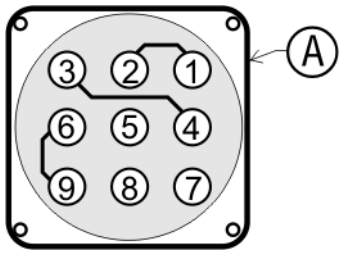
Cable Wiring



5.3.2.3. **Connecting Two or More Machines for Machine-to-machine Transfer**—Figure 23 shows how to wire a cable to connect a bank of identical machines (the Figure 23 example shows connections for four machines) so that data programmed on one machine in the group can be downloaded to all other machines simultaneously. This cable is referred to as a daisy chain because it runs in segments from machine to machine, connecting all machines in the group.

Figure 23: Wiring Diagram for Cable to Connect Two or More Machines

Receptacle On Each Machine



Legend

A. Receptacle on machine (with male pins). Pin functions are as follows:
- **1&2.** Serial low
- **3&4.** Serial high
- **6&9.** Ground
- **5&7.** Not used in this application
- **8.** Not used in this application. See caution statement **27** .

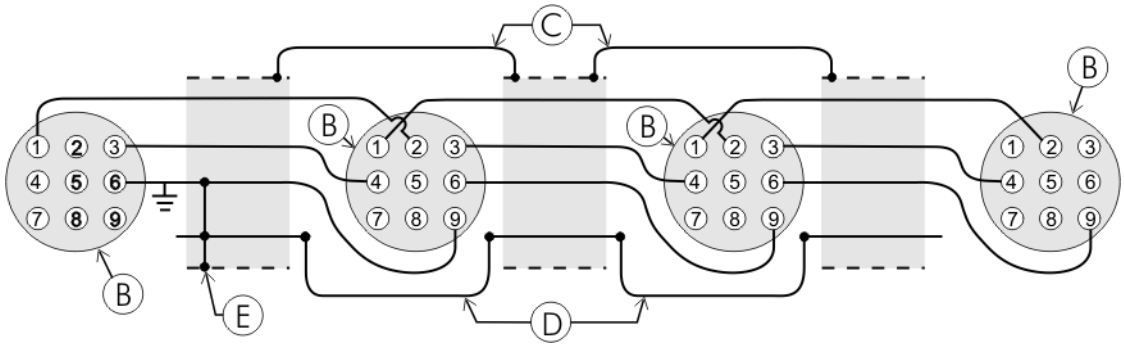
B. Plug on cable (with female pin sockets)

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

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

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

Cable Wiring



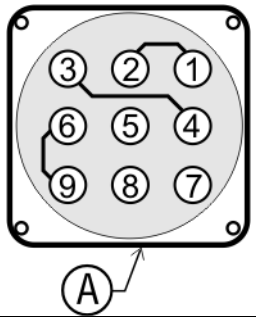
The internal connections on each receptacle (machine) between pins 1 and 2, 3 and 4, and 6 and 9 make it easier to wire the cable because it is not necessary to jumper these pins together on the cable. However, this also means that every plug on the daisy chain must be plugged into a receptacle. Otherwise,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

Rules and details about downloading among machines are fully described in the programming section of the reference manual.

5.3.2.4. Connecting a Machine to a Serial Memory Storage Device—The cable used with the serial memory storage device (download box) available from Milnor, see Note 29, is permanently attached to the storage device. Cable fabrication, as shown in Figure 24, 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 24: Wiring Diagram for Cable to Connect a Machine to a Serial Memory Storage Device

Receptacle

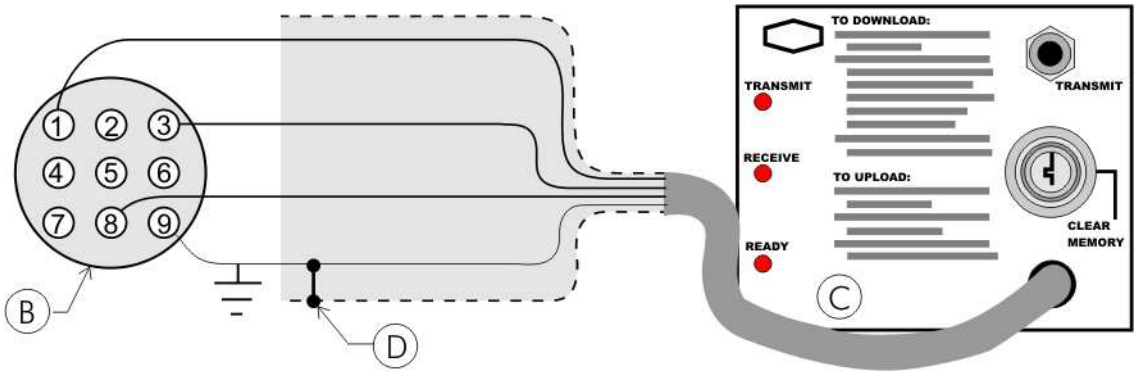


Legend

A. Receptacle on machine (with male pins). Pin functions are as follows:
- **1&2.** Serial low. This application only uses Pin 1.
- **3&4.** Serial high. This application only uses Pin 3.
- **6&9.** Ground. This application only uses Pin 9.
- **5&7.** Not used in this application.
- **8.** +5VDC. Provides power to memory storage device.

B. Plug on cable (with female pin sockets)
C. Memory storage device (front panel may be different)
D. Tie shield on this end of cable to ground. Leave unconnected on other end.

Plug and Storage Device



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5.4. How to Upgrade Microprocessor EPROM Chips

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

5.4.1. How to Change EPROMs

WARNING 28: 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.

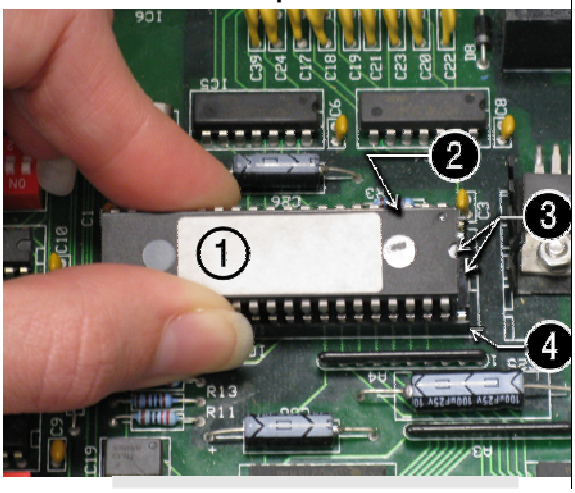
5.4.1.1. Remove and Replace EPROM Chips

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

2. Locate the chips as described in Section 5.4.2 "Location of EPROM Chips". Note the orientation of the chips as shown in the figure(s) below.
3. Use a chip removal tool or another small flat tool to carefully remove each EPROM chip from its base. Be sure to note the numerical order of each chip and the orientation to the key notch on the socket.
4. Install new chips, making sure the key notch on each chip is properly oriented and that all pins enter the proper holes in the socket, as shown in Figure 25. 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 25: 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 29: 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.

5.4.1.2. Verify Proper EPROM Chip Installation

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

5.4.2. Location of EPROM Chips

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

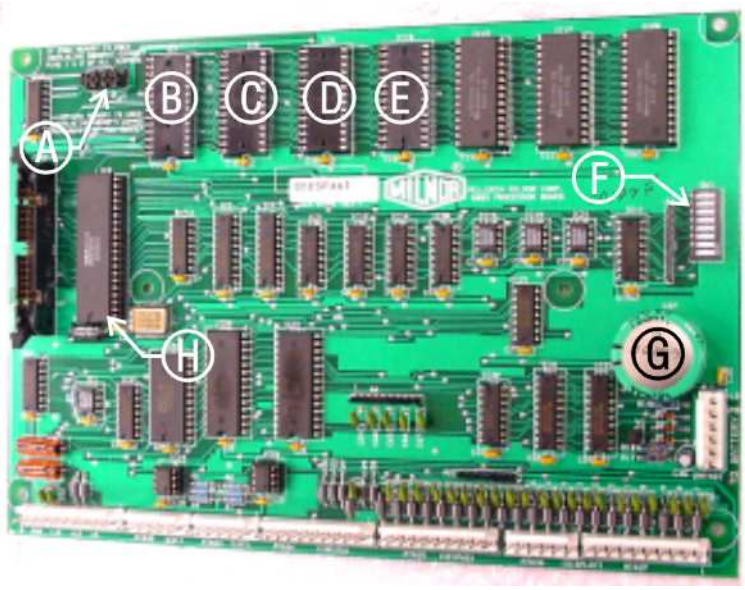
Table 35: Processor Boards and Applications

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)	

5.4.2.1. **8085 Processor Boards (except Coin Machines)**—See Figure 28. 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 27 for where to check for proper voltages.

Figure 26: Replacement Processor Board

08BSPAA_

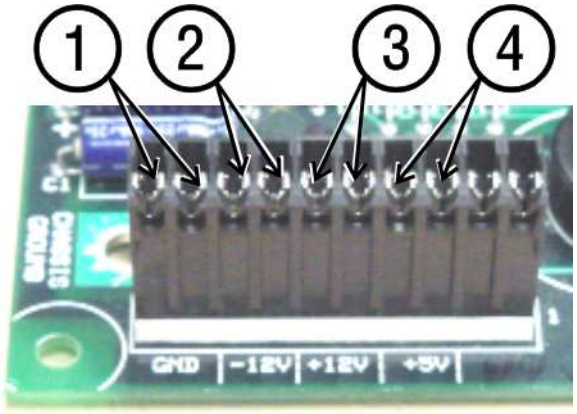


Legend

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 27: Where to Check Processor Board Voltages

Typical MTA-31

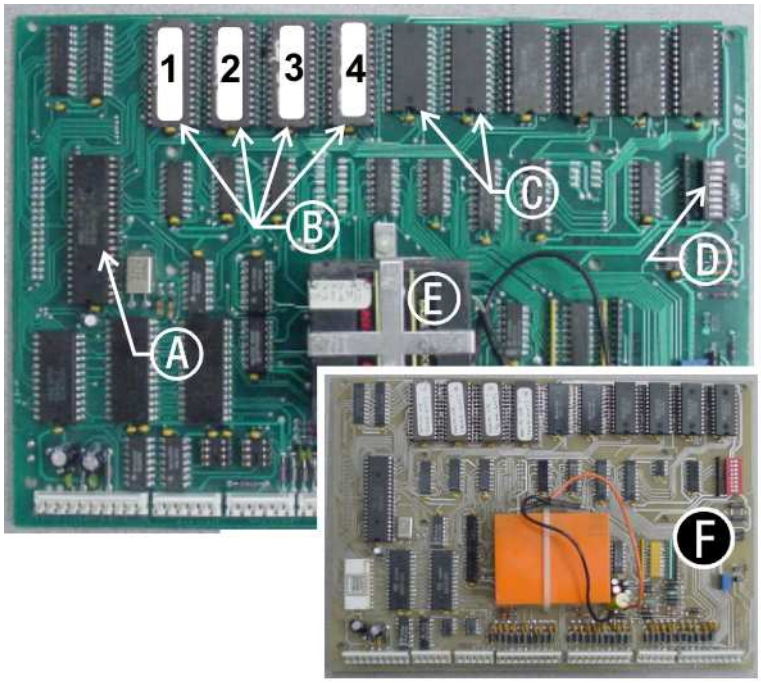


Legend

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

Figure 28: 8085 Processor Boards (Except Coin Machine)

Typical 08BSP_ and 08BSPx_ Processor Boards



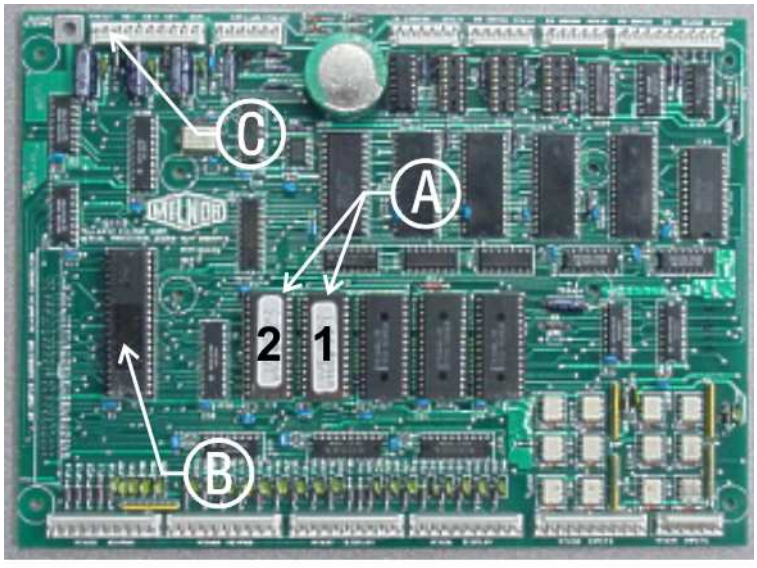
Legend

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

5.4.2.2. 8088 Processor Boards without Memory Expansion Board—See Table 36 "EPROM Locations for 8088 Processor Applications" and Figure 30. If the set consists of only one EPROM, install it in socket A of Figure 30 . 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 29: Typical 8088 Processor Board without Memory Expansion Board

08BSPC_ Processor Board



Legend

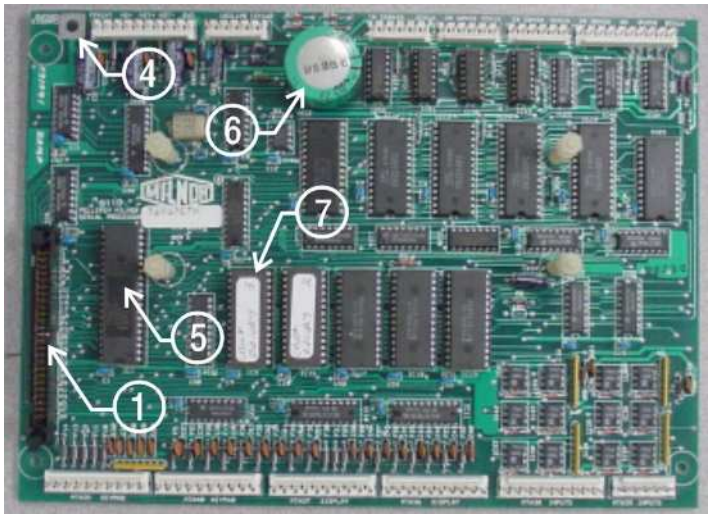
- **A.** EPROMs
- **B.** 8088 processor chip
- **C.** MTA31 for voltage verification

Table 36: EPROM Locations for 8088 Processor Applications

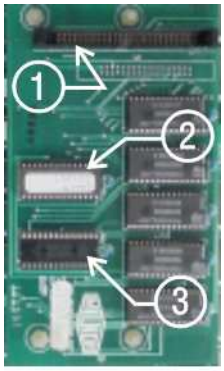
	EPROM Location by Socket			
EPROMS in Set	**A**	**B**	**IC-1**	**IC-2**
4 chips	4	3	2	1
3 chips	3	2	1	—
2 chips	2	1	—	—
1 chip	1	—	—	—

Figure 30: 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

5.4.2.3. **8088 Processor Boards with Memory Expansion Board**—See Table 36 and Figure 30. 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.

5.4.2.4. **80186 Processor Boards**—This processor board (see Figure 31) 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

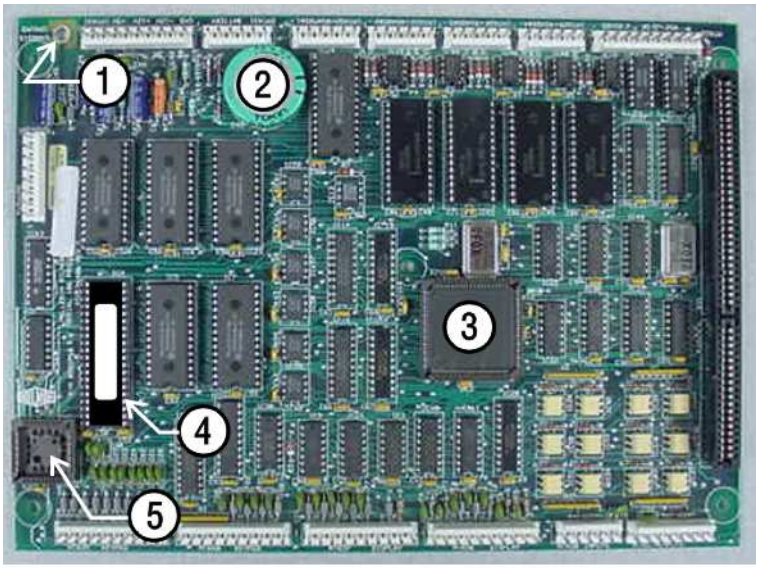
board.

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 33) 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 31: 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 32: 08BSPE1T 80186 Processor Board

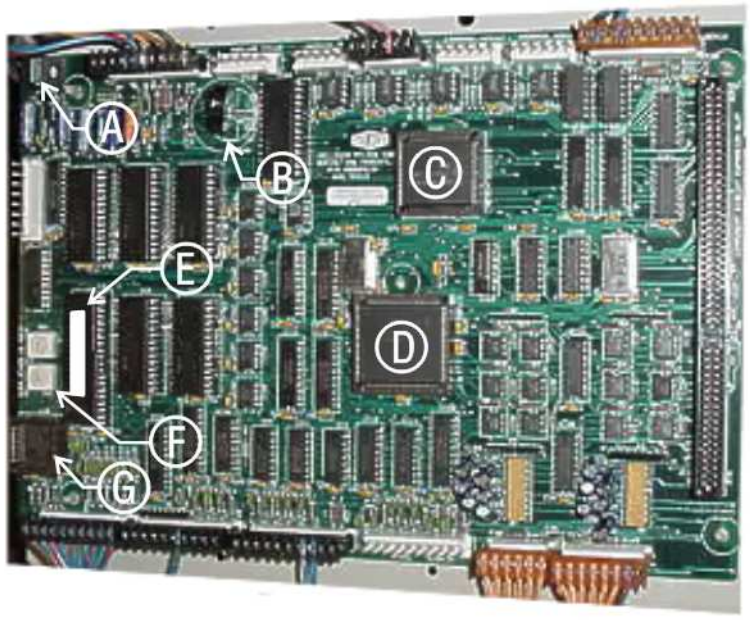
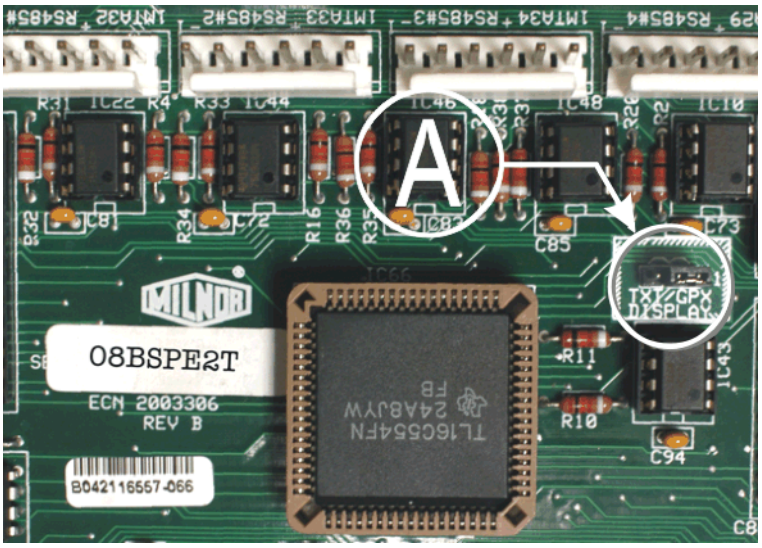
Overview	Legend
	**A.** Chassis ground **B.** Capacitor **C.** Quad-UART chip **D.** 80186 microprocessor **E.** EPROM **F.** Rotary DIP switches for keypad **G.** ROM socket (empty except in Japan)

Figure 33: 08BSPE2T 80186 Processor Board

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

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5.5. Hardware Components of Serial Microprocessor Controllers

5.5.1. General

Milnor® serial microprocessor controls are designed specifically for Milnor® machines and systems. Along with certain external electromechanical relay logic and sensing devices, they

control all machine and system functions. **Not every microprocessor controller includes all the components described in this section.**

5.5.2. Microprocessor Components

Note 31: This is a list of all components for Milnor® microprocessor controllers. Not every Milnor® microprocessor controller includes all of the following components.

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

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

CAUTION 30: 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.

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

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.

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

- The 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.

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

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

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

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

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

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

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

This board has 25 status lights. The amber light flashes when the board is communicating. Each of the 24 remaining lights represent an input (green lights) or output (red lights) on that board, and illuminates when the corresponding input or output is made. This board has two rotary dials which must be adjusted to set the board's address (see Section 5.5.4 “Assigning Board Addresses” in this document). This board also has convenient test points that can be used to test voltage to the board.

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

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

5.5.2.10. Output Board—A 24-output board contains 24 output relays identical to those described in Section 5.5.2.9 "Input/Output Board".

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

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

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

5.5.2.13. 8 Output/16 Input Chemical Flow Meter Board—This board is used with the metered chemical injection option on textile machines. Eight outputs and eight counters respectively are assigned to chemical valves and chemical flow meters. Two of the counters are non-isolated direct inputs to the microprocessor on this board and are capable of counting pulses of 0 to 5VDC at a frequency of up to 10kHz. The remaining six counters are optically isolated from the peripheral board microprocessor and are capable of counting pulses from 0 to 12VDC at a frequency up to 150 Hz.

5.5.3. Serial Communications Port

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

For more information on the various separate serial cables required for these functions, see Section 5.3. "Construction of External Serial Link Cables", if applicable.

Table 37: Board Application by Device (Part A)

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

Notes:

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

Table 38: Board Application by Device (Part B)

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

Notes:

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

5.5.4. Assigning Board Addresses

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

Table 39: Rotary Switch Settings

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

Notes:

* Optional boards

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

— End of BICMDF01 —