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Controller Reference

Miltrac™ Loader Controller (Front End Loader)

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

Contents

Figures

Tables

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Preface

1 About Manual MTYCFR01—Miltrac™ Loader Controller (Front End Loader)

This manual is intended for use by the technician involved in integrating a Miltrac™ Loader Controller (also called the Front End Loader and referred to throughout this manual as the Loader) into a Milnor® automated laundering system controlled by Miltrac™ or MultiTrac. It is also for laundry personnel responsible for entering batch codes in and/or monitoring the Loader, and the machine it is used with.

1.1 Scope

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This manual provides information on the general function, programming, and operation of Loaders with software date code 92200 and later (the date code appears briefly on the controller display whenever the Loader is powered on). Because the Loader has been used for several applications, only a few of which are currently supported, capabilities still provided with the controller, but not used in currently supported applications are not explained in this manual. Such omissions are noted. The currently supported applications are described in detail in Section 1.1 : Description of the Miltrac™ Loader Controller With Software WUNFNTENDLH, Version 92200, page 3 .

1.2 Trademarks

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

Table 1. Trademarks

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

2 How to Contact Milnor®

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

Table 2. Pellerin Milnor® Corporation Contact Information

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

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1 Description and Operation

1.1 Description of the Miltrac™ Loader Controller With Software WUNFNTENDLH, Version 92200

The Miltrac™ *Loader Controller* (also called the *Front End Loader*) is an ancillary, microprocessor controller for Miltrac™ and MultiTrac systems. The microprocessor and user controls are housed in an electric box of the modular size that can be mounted in a Milnor® *central controls mounting panel (belt box)*. Depending on the application, a second electric box containing peripheral boards may also be included.

The Loader is currently used for two special situations that may arise in Miltrac™ and MultiTrac systems:

1. The Loader provides a user interface for manually entering batch data when a manually loaded device does not provide for this. For example, the Loader is used to enter batch data for manually loaded conveyors controlled by the *Device Master* controller. Device Master itself, does not provide a practical means of doing this. This application requires only one electric box for the Loader processor and user controls (see first note below).
2. The Loader provides a means of communicating between Miltrac™ (or PC Miltrac™) and an allied (non-Milnor®) device (unlike the allied interfaces provided with Milnor® machines (see second note below), which only provide machine-to-machine communication). In this application, the Loader represents the allied device as a Miltrac™ device to Miltrac™. This application requires two electric boxes: one for the Loader processor and user controls and another for the peripheral boards.

NOTE: The Loader will not look for peripheral boards if the following configure values are set: LOAD VIA SERIAL LINK = 0 (no), DISCHARGE TO MILTRAC= 0 (Miltrac™), and ENABLE FLAG DOWN = 0 (No).

NOTE: Refer to manual “Allied Interfaces for Milnor® Automated Laundering System Machines...” for detailed information on allied interfaces.

1.1.1 Loader Controls

The Loader user controls include:

2 x 20 character display displays various prompts (words used to guide the operator) and status messages during operation. Displays configure decisions and prompts during programming.

12 button keypad used to enter cake data and respond to prompts during operation. Used to enter configure values and respond to prompts during programming.

(Master switch) applies ( ) / removes ( ) power to the controller.

(Key switch) used, in conjunction with the keypad, to disable ( ) / enable ( ) programming (see caution statement below).

(Operator signal light and buzzer) used to alert the operator when operator action is needed (typically to clear a fault condition).

(Signal Cancel button) used to extinguish the operator signal and resume operation once a fault condition has been corrected.

CAUTION: **Risk of bad or corrupt configure data —** Unauthorized programming or improper use of the key switch can result in incorrect or corrupt configure data. Improper programming can damage equipment and goods.

▶ Store the programming key so that it is not available to unauthorized personnel.

1.1.2 The Batch Data Entry Application

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When the Loader is used for this application, it is likely to be provided as part of a new installation. This application requires no allied interface signals and thus, no peripheral boards. The electronics are housed in a single control box, which is typically pedestal-mounted and located for convenient data entry by the operator loading the goods. Because the Loader is a Miltrac™ device, batch codes entered at the Loader are transferred directly to Miltrac™. Synchronization of batch codes with the batches being loaded is explained elsewhere in this manual.

1.1.3 The Allied Device Application

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When the loader is used for this application, it is likely to be provided as a modification to an existing installation. This application requires various allied interface signals, requiring two peripheral boards (addressed as board #1 and board #6). The electronics are housed in two control boxes, one for the processor board, keypad and display, and the other for the peripheral boards. See Section 3.1 : On-site Setup When the Loader Controller Serves as an Allied Press Handler, page 19 for recommended box locations and on-site wiring procedures.

1.1.3.1 How the Loader Represents the Allied Device As a Miltrac™ Device

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The Loader is a Miltrac™ (or PC Miltrac™) device that can be used to integrate an allied device into a Miltrac™ or MultiTrac system. Although technically it is the Loader, not the allied device, that the Miltrac™ controller sees, you can think of the Loader as a machine controller that converts the allied device into a Milnor® device. Once the Loader is installed, the allied device can be handled like any other device in Miltrac™: It can be assigned coordinates and represented on the Miltrac™ screens. Like other Miltrac™ devices, the Loader exchanges a full range of batch

data with Miltrac™. This permits the operator to fully describe a batch present in the allied device at startup when the Loader prompts for this information. However, only those batch codes for which allied outputs are provided can be passed to the allied device.

One restriction in this application is that the Loader can only represent one cake position. So it cannot, for example, be used to represent an allied, two-station press.

1.1.3.2 How the Loader Allied Interface Works

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Although the allied interface inputs and outputs provided with the Loader carry much the same kind of data as those provided with Milnor® system machines (e.g., dry code, *load allowed* signal), the interface serves a different purpose. Milnor® system machines provide one group of allied interface signals—a *loading interface*—for communicating with an allied device that **loads** the Milnor® machine and another group—a *discharge interface*—for communicating with an allied device that the Milnor® machine **discharges** to (Refer to manual "Allied Interfaces for Milnor® Automated Laundering System Machines..." for detailed information on allied interfaces). With the Loader, there is only one interface and this for communicating with the allied device that the Loader represents. The signals could still be divided into loading and discharge functions although they are not presented that way in these instructions. For example, batch code signals to the allied device (Loader outputs) serve a loading function because this data is for the batch being **loaded** into the allied device. However, note that this is the opposite situation from a machine-to-machine allied interface, in which allied batch code outputs are part of the discharge interface (they send batch data to the allied device the Milnor® machine is **discharging to**).

The important thing to keep in mind about the Loader allied interface signals is that they are only provided for communication with the allied device represented by the Loader. Neither the Loader, nor the allied device communicate directly with the Milnor® machine(s) that the allied device receives from and/or discharges to. All such communication is through Miltrac™.

1.1.3.3 Available Batch Data Signals

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The Loader does not provide inputs for receiving batch data from the allied device. It provides outputs for sending the following batch data to the allied device:

- 8 dry codes
- 16 press/extract codes
- empty pocket flag
- normal, no, low, and third pressure flags

1.1.3.4 Available Operational Signals

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The Loader provides the operational signals listed in Table 3 :

Table 3. Summary of Loader Operational Signals

Signal Name	Loader Input (passed from allied to Loader when allied discharges)	Loader Output (passed from Loader to allied when allied is loaded*)
Load allowed	X	
You're loaded		X
Discharge allowed	X	
Start discharging		X
Discharge complete	X	
Flag down load		X *
Flag down discharge		X *
* The "flag down discharge" output signal occurs at discharge, not loading. "Flag down load" and "flag down discharge" operate shuttle targets (used to stop the shuttle at the press), not press functions.		

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1.2 Using the Loader Controller

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Loader operation varies with the application; that is, how the Loader is configured (see below note). If the Loader serves as a data entry station for a manually loaded device such as a Device Master-controlled belt, the operator will enter the batch codes at the Loader controller for each successive batch. If the Loader serves as an allied device handler, the only operator actions are responding to the startup prompts, occasional corrective actions, and monitoring operational status.

NOTE: If the **Load Via Serial Link** configure decision is set to **0 (No)**, the Loader expects cake data to be manually entered at the keypad each time the system transfers. If set to **1 (Yes)** the Loader expects to receive cake data automatically from Miltrac™. If the **Store a Load** configure decision is set to **1 (Yes)**, the Loader will prompt the operator to indicate whether the Device has a load at startup, and if so, for cake data. If set to **0 (No)** the Loader will not prompt at startup. For currently supported applications, these configure decisions will either both be set to **0 (No)** or both be set to **1 (Yes)**.

1.2.1 Power On

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The Loader controller must communicate with Miltrac™ (or PC Miltrac™) during normal operation. Therefore, Miltrac™ should be running when the Loader is started. Start the Loader controller when the Master switch is off (⊘) (as will occur at daily startup) as follows:

Display or Action	Explanation
⊘	Applies power to the controller. The display will sequence through a series of messages identifying the software version and other information.

If the loader serves as a data entry station, see Section 1.2.2 : Normal Operation When the Loader Serves as a Data Entry Station, page 7 . If it serves as an allied device handler, see Section 1.2.3 : When the Loader Serves as an Allied Device Handler, page 8 .

1.2.2 Normal Operation When the Loader Serves as a Data Entry Station

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NOTE: The Loader will function as described herein when the **Load Via Serial Link** and **Store a Load** configure decisions are both set to **0 (No)**.

The following is the **data entry screen** as it would appear if all possible batch data types were enabled in **Configure**. It will only display enabled data types. The operator uses this screen to enter the batch codes for each batch when it is loaded.

Display or Action	Explanation
FFEEDDPPCCCGGG L 0200501132003 0	Each group of repeating characters (e.g., “FF”) on the top line represents an enabled batch data type and indicates the number of digits required for that code. The group of numerals directly below each character group is the batch code data field for that data type. Each batch code has a help screen that displays the name of the batch code and automatically appears after eight seconds of inactivity. The possible character groups are as follows: **FF** two digit formula code. This application provides for 64 formula codes. **EE** two digit extract code **DD** two digit dry code **PP** two digit destination code **CCC** three digit customer code **GGG** three digit goods code The “L” at upper right, means “Do you want to load (confirm) these batch codes?” The value can be **0 (No)** or **1 (Yes)**.
SKIP TO	**In any batch code data field** returns the cursor to the previous data field.
1	**(example) In any digit position for a batch code** enters the value 1 and advances to the next digit position or data field (see caution statement later in this document).
	Under “L” indicates that all displayed values are correct.

NEXT

In any batch code data field accepts the displayed batch code and advances to the next data field.

Under "L" if the displayed value is **0**, returns the cursor to the first batch data field. If the displayed value is **1**, confirms the displayed batch codes for manually loaded goods. The cake data will immediately move from the Loader position in Miltrac™ to the next X position (the position for the manually loaded device). Hence, even though the Loader and the manually loaded device are separate (but adjacent) Miltrac™ devices, cake data entered at the Loader is synchronized with the goods on the manually loaded device.

Display or Action	Explanation
WAITING TO DISCHARGE	Indicates that no additional data entry is needed until the next physical transfer occurs.
SKIP TO	While waiting to discharge, returns to the data entry screen to permit changing the data, if needed.
Hold 2	While waiting to, or during discharge, displays the data entry screen as long as the key is held.
READY TO DISCHARGE	This sequence of displays occurs during transfer to indicate the status of the load as it discharges from the manually loaded device. When the transfer is complete, the display returns to the **data entry** screen.
DISCHARGING	
FINISHED DISCHARGE	

1.2.3 When the Loader Serves as an Allied Device Handler

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NOTE: The Loader will function as described herein when the **Load Via Serial Link** and **Store a Load** configure decisions are both set to **1 (Yes)**.

In this application, startup continues as follows:

Display or Action	Explanation
DOES DEVICE HAVE A CAKE? (0=NO 1=YES) 0	The Loader represents a device that may or may not contain a load of goods at startup.
0 (No)	Goods are not present in the device.
1 (Yes)	The device has a load.
NEXT	If **1 (Yes)** was selected, begins the series of cake data prompts explained in Section 1.2.3.1 : Cake Data Prompts (allied device handler), page 9 , to identify the load currently in the device. If **0 (No)** was selected above, begins the normal operating displays (see Section 1.2.3.2 : Normal Operation (allied device handler), page 10).

1.2.3.1 Cake Data Prompts (allied device handler)

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During this process, the Loader will prompt for **all possible** cake data, not merely the types of batch data currently configured. For data types not used, simply press NEXT, retaining a value of zero.

Display or Action	Explanation
ENTER FORMULA FOR DEVICE 000	Enter the formula code for the load currently in the device. Miltrac™ can handle 256 formula codes from 000 to 255. Similar prompts appear for the other numeric batch codes, including: • 16 extract codes from 00 to 15 • 16 dry codes from 00 to 15 • 64 destination codes from 00 to 63 • 1000 customer codes from 000 to 999 • 256 goods codes from 000 to 255 • 1000 soil weight values from 000 to 999. These can be any units (e.g., pounds, kilograms). • 256 cake numbers from 000 to 255

CAUTION: **Risk of bad data —** The controller displays and expects the number of digits applicable to each type of data and it will not accept values outside the valid range.

▶ Enter the value in the correct digit position. For example, if you want to enter customer code 2 (002), you must press 0, 0, 2). Simply pressing 2 will enter customer code 200.

▶ Observe the display when you enter values. If you enter a value outside the valid range, the controller will default to a valid value. For example, if you enter a 3 in the first digit of the dry code field, the display will default to 15 because this is the maximum dry code value.

Display or Action	Explanation
NEXT	For each code above, accepts the displayed value and displays the next batch code.
DEVICE = SINGLE CAKE 0=NO 1=YES 0	This is the *single cake* flag.
0 (No)	Do not flag, or ignore this code.
1 (Yes)	Flag this batch for *single cake* processing (which tells any multi-cake device such as a dryer to process this batch by itself).
NEXT	Accepts the displayed value and displays the next batch code.
PRESS DATA 0 STANDARD PRESSURE	This is the press pressure code, applicable to a membrane press with selectable, fixed pressures.
0	Use standard (full) pressure, or ignore this code.

1 Use no pressure.

2 Use 3rd pressure. This can mean different things on different presses.

3 Use low pressure.

NEXT Accepts the displayed value and begins normal operation.

1.2.3.2 Normal Operation (allied device handler)

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Display or Action	Explanation
WAITING FOR LOAD	While the device represented by the loader is empty (either at startup, because the operator indicated the device does not have a load or during operation, after the device discharges), this message is displayed.
READY TO RECEIVE LOADING..... LOADING COMPLETED	This sequence of displays occurs while the device represented by the Loader is receiving, to indicate the transfer status. Miltrac™ transfers the cake data for the incoming load to the Loader at this time.
TRANSFER ERROR, PRESS SIGNAL CANCEL	If a fault condition affecting the allied device occurs during transfer, (the Operator Signal) is actuated and this message flashes. When the fault condition is corrected, press (the Signal Cancel button) to clear this message and resume operation.
WAITING TO DISCHARGE	This message appears while the device is processing the load and remains on the display after the device signals the Loader that it desires to discharge.
READY TO DISCHARGE DISCHARGING FINISHED DISCHARGE	This sequence of displays occurs while the device represented by the Loader is discharging, to indicate the transfer status.
TRANSFER ERROR, PRESS SIGNAL CANCEL	If a fault condition affecting the allied device occurs during transfer, (the Operator Signal) is actuated and this message flashes. When the fault condition is corrected, press (the Signal Cancel button) to clear this message and resume operation.

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1.3 Viewing Inputs During Operation

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The status of microprocessor inputs can be displayed while the controller is in normal operation. The current Loader software recognizes seven sets of inputs—16 inputs on the processor board, plus 16 on each of up to six optional I/O boards. Although only I/O boards number 1 and 6 are used in currently supported applications, all inputs, including those for not currently supported applications are listed here and can be viewed.

NOTE: Microprocessor outputs are not available for viewing or manual actuation from the keypad.

Display or Action	Explanation
WAITING FOR LOAD	These are typical displays during operation, depending on how the Loader is configured and from which the inputs displays can be accessed.
FFDDPPCCCGGG L 050201044102 0	
Hold 7	Displays the 16 processor board 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 H and J are grounded; all other inputs are not grounded.
Hold 7 + 1	Displays the 16 I/O board #1 inputs (Page 1, items A-P) while the buttons are held depressed.
Hold 7 + 2	Displays the 16 I/O board #2 inputs (Page 2, items A-P) while the buttons are held depressed.
Hold 7 + 3	Displays the 16 I/O board #3 inputs (Page 3, items A-P) while the buttons are held depressed.
Hold 7 + 4	Displays the 16 I/O board #4 inputs (Page 4, items A-P) while the buttons are held depressed.
Hold 7 + 5	Displays the 16 I/O board #5 inputs (Page 5, items A-P) while the buttons are held depressed.
Hold 7 + 6	Displays the 16 I/O board #6 inputs (Page 6, items A-P) while the buttons are held depressed.

Table 4. 16 Processor Board Inputs (Page 0)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	–not used–		I	Load Allowed	1MTA39–1
B	Program Key	1MTA38–3	J	Discharge Complete	1MTA39–6
C	Signal Cancel	1MTA38–2	K	–not used–	
D	–not used–		L	–not used–	
E	–not used–		M	–not used–	
F	–not used–		N	–not used–	
G	–not used–		O	–not used–	
H	Discharge Allowed	1MTA39–2	P	–not used–	

Table 5. 16 I/O Board #1 Inputs (Page 1)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Loaded	1MTA3–10	I	Binary 5	1MTA4–10
B	Bag Ready	1MTA3–9	J	Binary 6	1MTA4–9
C	I'm Sending a Bag	1MTA3–8	K	Binary 7	1MTA4–8
D	You're Loaded	1MTA3–7	L	Binary 8	1MTA4–7
E	Binary 1	1MTA3–4	M	Binary 9	1MTA4–4
F	Binary 2	1MTA3–3	N	Binary 10	1MTA4–3
G	Binary 3	1MTA3–2	O	Binary 11	1MTA4–2
H	Binary 4	1MTA3–1	P	Binary 12	1MTA4–1

Table 6. 16 I/O Board #2 Inputs (Page 2)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Dry Code 0	2MTA3–10	I	Goods Code 0	2MTA3–10
B	Dry Code 1	2MTA3–9	J	Goods Code 1	2MTA3–9
C	Dry Code 2	2MTA3–8	K	Goods Code 2	2MTA3–8
D	Dry Code 3	2MTA3–7	L	Goods Code 3	2MTA3–7
E	Destination 0	2MTA3–4	M	Goods Code 4	2MTA3–4
F	Destination 1	2MTA3–3	N	Goods Code 5	2MTA3–3
G	Destination 2	2MTA3–2	O	Goods Code 6	2MTA3–2
H	Destination 3	2MTA3–1	P	Goods Code 7	2MTA3–1

Table 7. 16 I/O Board #3 Inputs (Page 3)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Customer Code 0	3MTA3–10	I	Customer Code 8	3MTA4–10
B	Customer Code 1	3MTA3–9	J	Customer Code 9	3MTA4–9
C	Customer Code 2	3MTA3–8	K	Formula Code 0	3MTA4–8

Table 7 16 I/O Board #3 Inputs (Page 3) (cont'd.)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
D	Customer Code 3	3MTA3–7	L	Formula Code 1	3MTA4–7
E	Customer Code 4	3MTA3–4	M	Formula Code 2	3MTA4–4
F	Customer Code 5	3MTA3–3	N	Formula Code 3	3MTA4–3
G	Customer Code 6	3MTA3–2	O	Formula Code 4	3MTA4–2
H	Customer Code 7	3MTA3–1	P	Formula Code 5	3MTA4–1

Table 8. 16 I/O Board #4 Inputs (Page 4)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Translator 0	4MTA3–10	I	Translator 8	4MTA4–10
B	Translator 1	4MTA3–9	J	Translator 9	4MTA4–9
C	Translator 2	4MTA3–8	K	Translator A	4MTA4–8
D	Translator 3	4MTA3–7	L	Translator B	4MTA4–7
E	Translator 4	4MTA3–4	M	Translator C	4MTA4–4
F	Translator 5	4MTA3–3	N	Translator D	4MTA4–3
G	Translator 6	4MTA3–2	O	Translator E	4MTA4–2
H	Translator 7	4MTA3–1	P	Translator F	4MTA4–1

Table 9. 16 I/O Board #5 Inputs (Page 5)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Translator G	5MTA3–10	I	–not used–	5MTA4–10
B	Translator H	5MTA3–9	J	–not used–	5MTA4–9
C	Translator I	5MTA3–8	K	–not used–	5MTA4–8
D	Translator J	5MTA3–7	L	–not used–	5MTA4–7
E	Extract Code 0	5MTA3–4	M	–not used–	5MTA4–4
F	Extract Code 1	5MTA3–3	N	–not used–	5MTA4–3
G	Extract Code 2	5MTA3–2	O	–not used–	5MTA4–2
H	Extract Code 3	5MTA3–1	P	–not used–	5MTA4–1

Table 10. 16 I/O Board #6 Inputs (Page 6)

Display Code	Input Name	Connector and Pin	Display Code	Input Name	Connector and Pin
A	Bag Is Ready	6MTA3–10	I	–not used–	
B	Data Is Valid	6MTA3–9	J	–not used–	
C	Bag Out of Way	6MTA3–8	K	–not used–	
D	–not used–		L	Binary 13	6MTA4–7
E	–not used–		M	Binary 14	6MTA4–4
F	–not used–		N	Binary 15	6MTA4–3
G	–not used–		O	Binary 16	6MTA4–2
H	–not used–		P	Binary 17	6MTA4–1

2 Programming

2.1 Programming the Loader Controller

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The only type of user-programmable data used by the Loader controller is *configure* data; that is, the information that customizes the controller for a particular application. The four available Program menu selections all relate to this data, as follows:

0=OK TURN KEY TO RUN described in Section 2.1.2 : Safely Exiting the Program Menu, page 15 , this display appears when it is safe to turn the key switch to return to the **Run** mode from the **Program** menu, after viewing or making changes to *configure data*.

1=CONFIGURE described in Section 2.1.3 : 1 = Configure, page 15 , this selection guides the programmer through the list of configure decisions, and provides the range of values available for each.

2=DOWNLOAD not currently supported.

3=CLEAR ALL MEMORY described in Section 2.1.5 : 3=Clear Memory, page 18 , use this selection to reset all configure decisions to their default values.

2.1.1 Entering the Program Menu

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Display or Action	Explanation
WAITING FOR LOAD	These are typical displays during operation, depending on how the Loader is configured and from which the Program mode can be accessed. The Program mode should be accessed when the Miltrac™ or MultiTrac system is idle (not processing).
FFDDPPCCCGGG L 050201044102 0	
	Turn the **Run/Program** key switch to **Program** to access the Program mode. If the display below does not appear, press NEXT. If you access the Program mode while the system is running, the Loader will be taken off line and will eventually suspend processing.
PROGRAM 0 MENU OK TURN KEY TO RUN	From the main **Program** menu display, select one of the four available options. Notice that the cursor (the blinking character(s) where data will be entered/changed) is shown in reverse type.
1	Selects option **1** of the **Program** menu (**Configure**).
NEXT	With any menu option selected, this key accesses the option.
LOAD VIA SERIAL LINK 0 = NO [1 = YES]	This is the first configure decision for option **1** (**Configure**).

2.1.2 Safely Exiting the Program Menu

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Display or Action	Explanation
0	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 key switch is turned from the **Program** position ( ) to the **Run** position ( ).
NEXT	When option **0** is visible on the display, turn the key switch to the **Run** position and verify by pressing NEXT. This action causes the run display to reappear.
CONFIG ERROR-ILLEGAL DATA IN CONFIGURE	If this message appears, certain configure data is invalid. Return to the Program mode and review the configure decisions.

2.1.3 1 = Configure

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Configure is a series of menu selections used to customize the controller for a particular application. Some selections must match the physical equipment and some permit a range of operating characteristics. These selections normally need only be made one time, but will need to be redone after clearing memory (**3 = Clear Memory**) or if the Loader must be customized to meet different criteria.

Display or Action	Explanation
PROGRAM 1 MENU CONFIGURE	This menu selection allows you to configure the controller.
NEXT	Selects this menu item.

2.1.3.1 Moving the Cursor in the Configure Menu

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Display or Action	Explanation
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.

SKIP TO	Returns to the previous decision from certain decisions.

TIP: With some configure decisions, it is not possible to move backwards to the previous decision, or to exit **Configure** from any but the last decision. However, you can quickly move forward by pressing NEXT until the display returns to the *Program* menu. Pressing NEXT without changing the value of a configure decision retains the current (most recently programmed) value.

2.1.3.2 The Configure Decisions

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Display or Action	Explanation
LOAD VIA SERIAL LINK 0 = NO [1 = YES]	Specifies how batch data for the batch in this Miltrac™ position (the cake position represented by the Loader) will be communicated to the Loader.
0 (No)	Batch data will be manually entered via the Loader keypad. This selection is required when the Loader serves as a data entry station for a manually loaded device.
1 (Yes)	Batch data will be transferred to the Loader from Miltrac™ (via the serial link). This is the normal procedure when the Loader serves as an allied device handler.
DISCHARGE TO MILTRAC 0 = MILTRAC [1=MAID]	The **Maid** selection applies to a Loader application that is not currently supported. Leave this decision at the default value (**0 = MILTRAC**).
MILTRAC LOADING 0 = MILTRAC [1=MAID]	Only appears if **Load Via Serial Link = 1 (Yes)**. The **Maid** selection applies to a Loader application that is not currently supported. Leave this decision at the default value (**0 = MILTRAC**).
MILTRAC ADDRESS 000	Because the Loader is a Miltrac™ device, it must be assigned a Miltrac™ 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
CODES TRANSLATION 0 = NO [1 = YES]	Only appears if **Load Via Serial Link = 0 (No)**. This decision applies to a Loader application that is not currently supported.

NOTICE: Leave the "Codes Translation" decision set at the default **(0 = NO)**. Selecting **1 = YES** will cause several additional configure decisions not explained in this document to appear.

ALLIED LOADING 0=NO [1=YES, 2=RAIL]	Only appears if **Load Via Serial Link = 0 (No)**. Specifies whether this cake position is loaded by an allied device.
0 (No)	This position is loaded by a Miltrac™ (Milnor®) device.
1 (Yes)	This position is loaded by an allied device other than an allied rail system.
2 (Rail)	This position is loaded by an allied rail system.
ENABLE FLAG DOWN 0 = NO [1 = YES]	Disables/enables 1) Loader I/O board #6, and 2) Loader control of a retractable shuttle target.
0 (No)	Disable.
1 (Yes)	Enable. Must be enabled whenever the Loader is used as an allied device interface.
STORE A LOAD 0 = NO [1 = YES]	Determines whether the Loader represents a cake position.

0 (No) Batch codes received by the Loader immediately move to the next Miltrac™ device (immediate Miltrac™ discharge). Must be set this way when the Loader is used to enter batch data for a manually loaded device (typically a Device Master-controlled belt).

1 (Yes) Batch codes received by the Loader are retained until the next transfer. Must be set this way when the Loader is used when the Loader is used as an allied device interface (e.g., when it represents an allied press).

```
TICKET PRINTER
0 = NO [1 = YES]
```

This decision applies to a Loader application that is not currently supported. **Leave this decision set at the default (0 = NO).**

```
DATA ENTRY:    FEDPCG
               0 00000
```

Only appears if **Load Via Serial Link = 0 (No)**; that is, if the Loader is being used to enter batch data for a manually loaded device. Determines which batch codes the Loader will prompt for when each successive batch is loaded. Each character (FEDPCG) represents a batch code type, as follows:

F Formula code
E Press/extract code
D Dry code
G Destination code
C Customer code
G Goods code

NOTE: This decision has a help screen for each goods type that displays the name of the goods type. The help screen for the current cursor position will appear after eight seconds of inactivity.

For each code type,

0 (No) Disables.

1 (Yes) Enables.

SKIP TO At any position following **F** (Formula code), returns to the previous position.

```
MILTRAC BYTES IN
NETWORK          00
```

Leave at the default (**00**) for Miltrac™ systems with versions 89100 and later. For Miltrac™ systems prior to 89100, enter the number of bytes in the network string (11, 24, or 30).

```
RECEIVE DEVICE LOAD
LEVEL  (0-7)      0
```

Except when the loader is used as an interface with an allied shuttle, this decision must remain at the default value (0). If this is an allied shuttle, the value must be determined on a case by case basis.

```
RECEIVE DEVICE LOAD
DIR  (0-7)        0
```

Except when the loader is used as an interface with an allied shuttle, this decision must remain at the default value (0). If this is an allied shuttle:

0 (Fwd) Specifies that the belt must run forward to discharge a cake.

1 (Rev) Specifies that the belt must run in reverse to discharge a cake.

HOLD RECEIVE DEVICE 0 = NO [1 = YES]	Only appears if **Store a Load = 1 (Yes)**. If the receiving device is multi-cake shuttle (e.g., used to load multi-cake dryers), this decision specifies whether the shuttle should wait for more than one cake.
0 (No)	Either the receiving device is not a multi-cake shuttle or it does not need to wait for multiple cakes
1 (Yes)	The receiving device is a multi-cake shuttle and it should wait until it has a full load of cakes.
EMPTY POCKET OUTPUT ON TIME (S) 0	Only appears if **Store a Load = 1 (Yes)**. Specifies the duration, in seconds, that the *empty pocket* allied output signal (the signal that means the device will not receive any goods with the incoming batch codes) remains on (contact remains closed). This accommodates different operating characteristics of various allied devices.
000	Minimum value. Disables the *empty pocket* output.
005	Output remains on for five seconds.
255	Maximum allowable value.

2.1.4 2 = Download

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Although this menu option is accessible, it is not needed with the currently supported applications, nor is its use supported. With current applications, user programmable data consists of only a small amount of configure data. It is less time-consuming (but very important) to simply make a written record of how the controller is configured, for future reference.

2.1.5 3=Clear Memory

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Use this selection to voluntarily clear all programmed configure values from controller memory and restore the default values.

Display or Action	Explanation
PROGRAM 3 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	All machine configuration decisions are reset to the default values.

NOTICE: Always configure the controller when commissioning the machine for the first time and whenever the display says “Config Error.”

3 Supplemental Information

3.1 On-site Setup When the Loader Controller Serves as an Allied Press Handler

This document provides a quick guide for electrically interfacing an allied (non-Milnor®) single stage press (see first note below) with Miltrac™ or MultiTrac, using the Loader controller. This involves installing, wiring, and configuring the Loader for this application. It may also involve re-configuring the Miltrac™ (or PC Miltrac™) controller (see second note below).

NOTE: Because the Loader only represents a single cake position, it cannot handle a two-stage press.

NOTE: If the allied press replaces a Milnor® press that is already a device in Miltrac™, the Loader will simply replace the Milnor® press as this device, avoiding the need to re-address devices. However, other changes to the Miltrac™ programming may be required.

3.1.1 Loader Hardware Placement

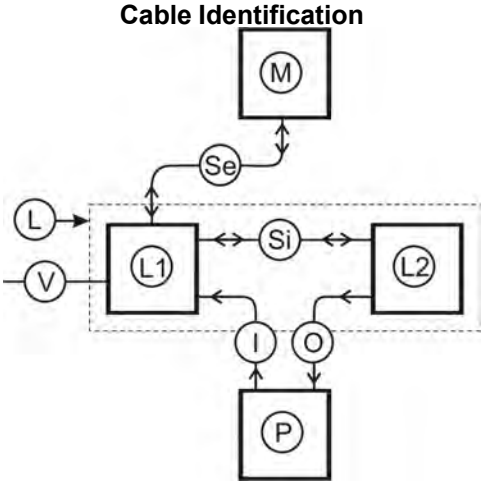
For this application, the electronics will be supplied in two electric boxes. One contains the processor board, keypad, display and other face plate controls. The other contains two required peripheral boards (addressed as I/O boards #1 and #6). Both boxes are the standard modular size needed for installation in a Milnor® *central controls mounting panel* (belt box), used with older Miltrac™ systems. Typically, this hardware will be added to an existing system. If mounted in the belt box, the processor box must be mounted in the top or middle row. The other box may be mounted in any row, but should be as close to the processor box as possible. If insufficient space is available in the belt box, or this is a MultiTrac system, consult Milnor® Technical Support for placement.

3.1.2 Loader Wiring

Figure 1 provides an overview of the cabling required. Connection points on Milnor® equipment and cable specifications are provided in Table 11 . The values in the first column of the table, with the heading * correspond to items in the Figure 1 legend.

Figure 1. Cabling Schematic

Cable Identification



Legend

L. . . Loader controller
L1. . Loader processor box
L2. . Loader peripheral boards box
M. . . Miltrac™ or MultiTrac
P. . . Allied press controller
Si. . Internal serial link
Se. . External serial link
L. . . Allied interface inputs
O. . . Allied interface outputs
V. . . 120VAC power for controller. Power is available in belt box.

Table 11. Loader On-Site Control Connections for Allied Press Handler Application

*	Purpose	Cable Specifications	Connector	Pin	Connector	Pin
		Located on–>	Loader processor		Belt Box	
V	Earth gnd.	14AWG (2.5mm²) with 600VAC insul.	TB2F (ground)		TB2F (ground)	
	120VAC power	Two conductors: 18AWG (1.0mm²) with 300VAC insulation	TBP **	1 **	Varies. Ask Technical Support	
			TBP **	2 **		
		Located on–>	Loader processor		Loader peripheral	
Si	Internal serial link	Same as for external serial link, below.	WC33 **		_MTA2 **	3 **
			WC33 **		_MTA2 **	1 **
		Located on–>	Loader processor		If Miltrac™	
Se	External serial link	Two-conductor shielded cable: 18AWG (1.0mm²) twisted pair with 300VAC color coded insulation and 85% braided shield. Ground shield, processor end only.	1MTA32	1 or 2	IMTA32	1 or 2
			1MTA32	3 or 4	IMTA32	3 or 4
					If MultiTrac	
			1MTA32	1 or 2	Miltrac™	SRL
			1MTA32	3 or 4	Miltrac™	SRH
		Located on–>	Loader processor		Allied press	
I	Allied interface inputs	Circuitry capable of faithfully conducting Milnor®-supplied 5VDC or 12VDC @ 5 milliamps. Refer to manual "Allied Interfaces...".	1MTA39	1	Load Allowed	
			1MTA39	2	Discharge allowed	
			1MTA39	6	Disch. complete	
		Located on–>	Loader peripheral		Allied press	
O	Allied interface outputs	Cabling as required by allied device. Electrical load imposed by allied must not exceed 240VAC, 0.5 amps, and 3VA per output. Refer to manual "Allied Interfaces..." for more information.	1MTA5	8, 9	You're loaded	
			1MTA6	8, 9	Start discharge	
			1MTA5	3, 4	Normal pressure	
			1MTA5–2, 6–10		No pressure	
			1MTA6	4, 5	Low pressure	
			1MTA6	6, 7	3rd pressure	
			6MTA5	8, 9	Dry code 0	

Table 11 Loader On-Site Control Connections for Allied Press Handler Application (cont'd.)

*	Purpose	Cable Specifications	Connector	Pin	Connector	Pin
			6MTA5	5, 6	Dry code 1	
			6MTA5	3, 4	Dry code 2	
			6MTA5–2, 6–10		Empty pocket	
			6MTA6	1, 2	Empty code 0	
			6MTA6	4, 5	Empty code 1	
			6MTA6	6, 7	Empty code 2	
			6MTA6	8, 9	Empty code 3	
		Located on–>	Loader peripheral		Shuttle	
			1MTA5	5, 6	Flag down load	
			1MTA6	1, 2	Flag down disch.	

* The values in this column are the cable item numbers shown on the cabling schematic.

** Alternatively, connection points may be on a terminal strip with hand-labeled pins.

3.1.3 Loader Configuration

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Make the configuration selections listed in Table 12 to properly customize the loader for this application:

Table 12. Configure Values for Allied Press Application

Decision	Value	Decision	Value
Load via serial link	1 (Yes)	Ticket printer	0 (No)
Discharge to Miltrac™	0 (Miltrac™)	Miltrac™ bytes in network	*
Miltrac™ loading	0 (Miltrac™)	Receive device load level	0 (level 0)
Miltrac™ address	address of press	Receive device load dir.	0 (forward)
Enable flag down	1 (Yes)	Hold receive device	**
Store a load	1 (Yes)	Empty pocket output on time	005***

* Leave at the default (00) for Miltrac™ systems with versions 89100 and later. For Miltrac™ systems prior to 89100, enter the number of bytes in the network string (11, 24, or 30). See Miltrac™ manual.

** 1 (Yes) if the press discharges to a multi-cake shuttle. Otherwise, 0 (No).

*** Try 005 (5 seconds). This may require adjustment by trial and error. See "1 = Configure."

3.1.4 General Sequence of Operation

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Once the startup procedures are completed, the normal repeating cycle of loading, processing and discharging occurs as follows:

3.1.4.1 Loading

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1. When the Loader receives the **load allowed** allied input from the press, it signals Miltrac™ (via the serial link) that it wants to receive.
2. Assuming that the loading device is not yet ready, Miltrac™ tells the Loader to **do nothing** and the Loader displays **WAITING FOR LOAD**.
3. When a load is available for transfer to the press, Miltrac™ tells the Loader and the loading device to **get ready**. Assuming the Loader detects all conditions ready for loading, it tells Miltrac™ that it is ready, closes the **flag down load** output, and displays **READY TO RECEIVE**.
4. Miltrac™ tells both the Loader and the loading device to **start** and sends the cake data for this load to the Loader. The Loader displays **LOADING**..... and closes the available allied outputs corresponding to the cake data it received. These outputs remain closed until the Loader receives the **do nothing** command from Miltrac™, but for a minimum of five seconds (see first note below).
5. When Miltrac™ signals the Loader that the transfer is complete, the Loader closes the **you're loaded** allied output for five seconds and briefly displays **LOADING COMPLETED** (see second note below).

NOTE: No cake data is returned by the press. However, the Loader retains all cake data it received from Miltrac™ and returns it to Miltrac™ at the next transfer.

NOTE: If the Loader receives and empty pocket, it returns to **WAITING FOR LOAD**.

3.1.4.2 Processing

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While the load is being processed in the allied press and the Loader is waiting for the **discharge allowed** input, the Loader displays **WAITING TO DISCHARGE**.

3.1.4.3 Discharging

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1. When Loader receives the **discharge allowed** allied input from the press, the Loader signals Miltrac™ (via the serial link) that it wants to discharge.
2. Assuming that the discharging device is not yet ready, Miltrac™ tells the Loader to **do nothing** and the Loader continues to display **WAITING TO DISCHARGE**.
3. When the discharging device is available to receive from the press, Miltrac™ tells the Loader and the discharging device to **get ready**. Assuming the Loader detects all conditions ready for discharge, it tells Miltrac™ that it is ready, closes the **flag down discharge** output, and displays **READY TO DISCHARGE**.
4. Miltrac™ tells both the Loader and the discharging device to **start**. The Loader displays **DISCHARGING**... (see below note).
5. The Loader closes the *start discharging* allied output and displays **DISCHARGING**...

6. When the transfer is completed, the Loader is notified that the transfer is complete either by Miltrac™ (via the serial link) or by the allied press, via the *discharge complete* allied input (depending on the specific hardware and handshaking arrangement). The Loader briefly displays **FINISHED DISCHARGE**.

The cycle then begins again with the loading sequence.

NOTE: No cake data is returned by the press. However, the Loader retains all cake data it received from Miltrac™ and returns it to Miltrac™ at the next transfer

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3.2 How to Upgrade Microprocessor EPROM Chips

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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.

3.2.1 How to Change EPROMs

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

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

3.2.1.1 Remove and Replace EPROM Chips

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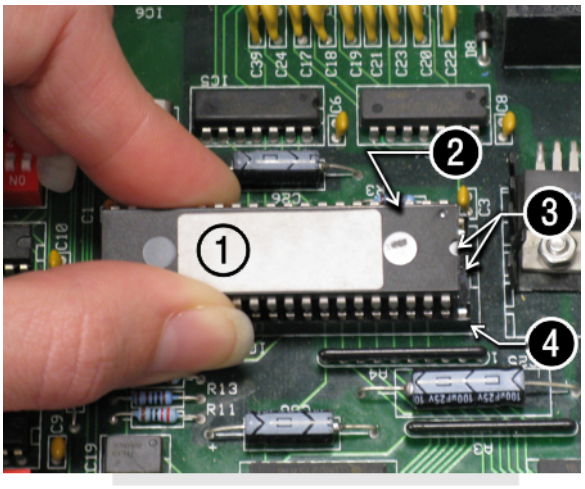
1. Make sure all power to the machine is off.
2. Locate the chips as described in Section 3.2.2 : Location of EPROM Chips, page 24 . Note the orientation of the chips as shown in the figure(s) below.
3. Use a chip removal tool or another small flat tool to carefully remove each EPROM chip from its base. 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 2 . 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 2. EPROM Chip Identification and Installation

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

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

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

3.2.1.2 Verify Proper EPROM Chip Installation

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

3.2.2 Location of EPROM Chips

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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 13. 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—	

Table 13 Processor Boards and Applications (cont'd.)

Processor Part Number	Typical Machine Applications	Comments
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)	

3.2.2.1 8085 Processor Boards (except Coin Machines)

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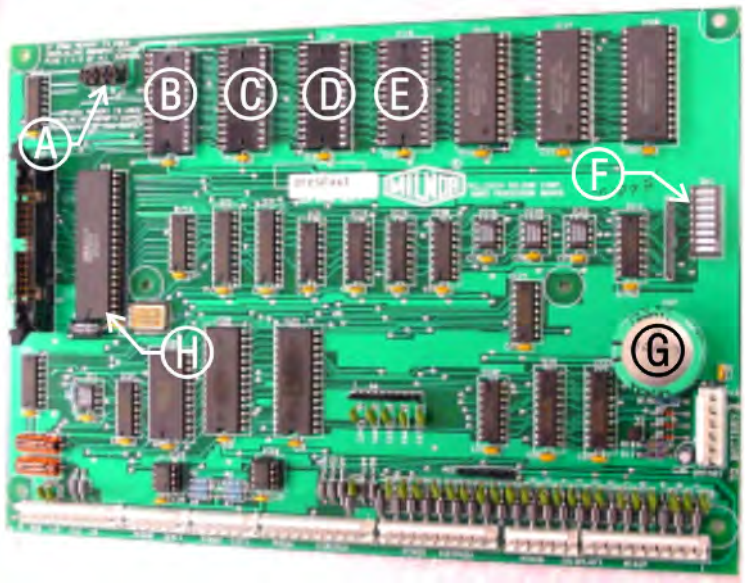
See Figure 5: 8085 Processor Boards (Except Coin Machine), page 27 . Install EPROM #1 at the end of the row nearest the corner of the board, then #2, #3, and #4. Chip #4 goes next to the two chips soldered to the board. See Figure 4: Where to Check Processor Board Voltages, page 26 for where to check for proper voltages.

Figure 3. Replacement Processor Board

08BSPAA_

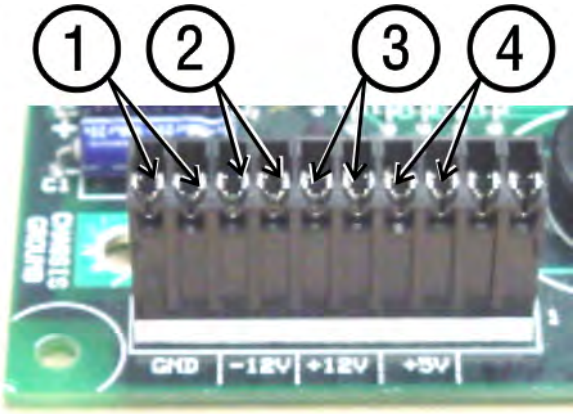


Legend

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 4. Where to Check Processor Board Voltages

Typical MTA-31

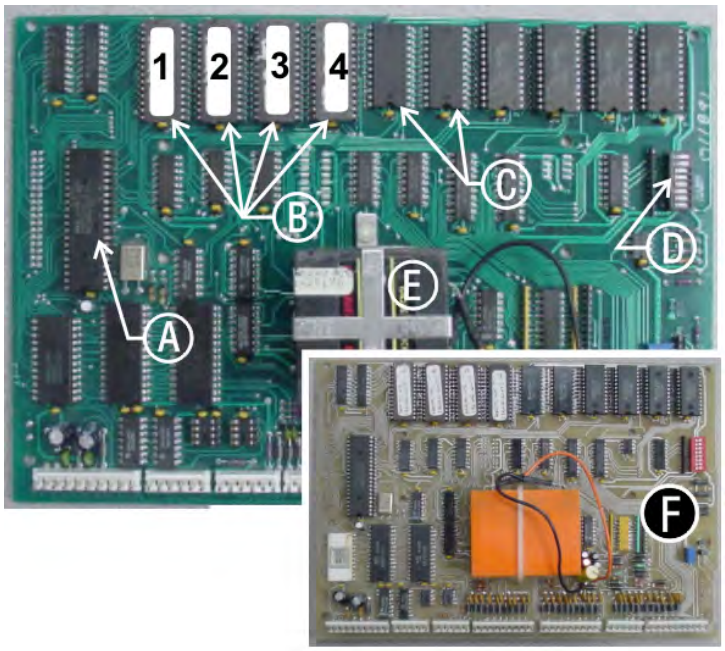


Legend

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

Figure 5. 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

3.2.2.2 8088 Processor Boards without Memory Expansion Board

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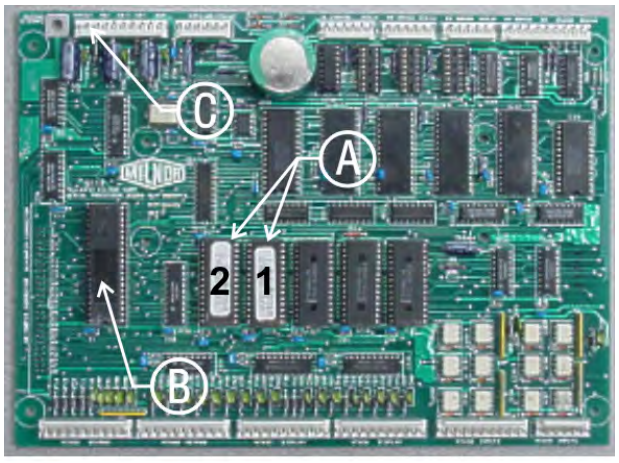
See Table 14: EPROM Locations for 8088 Processor Applications, page 28 and Figure 7: 8088 Processor Board and Optional Memory Expansion Board, page 28 . If the set consists of only one EPROM, install it in socket A of Figure 7 . If two EPROMs comprise the set, install EPROM #2 in socket A and EPROM #1 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 6. Typical 8088 Processor Board without Memory Expansion Board

08BSPC_ Processor Board



Legend

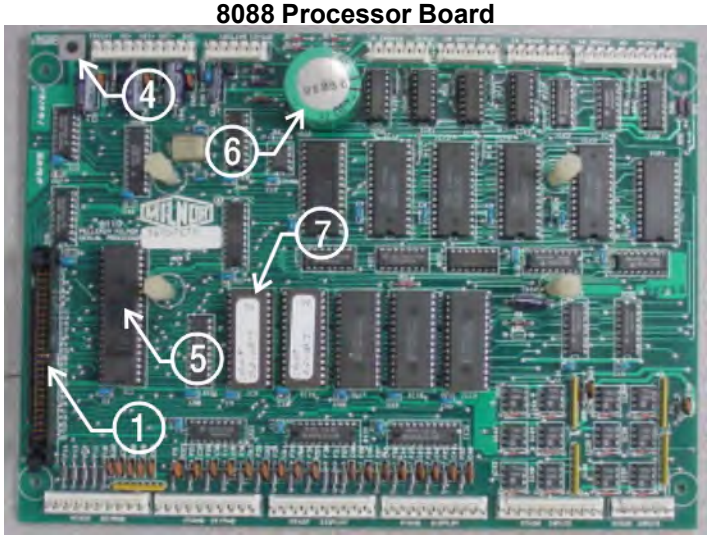
A . . . EPROMs
B . . . 8088 processor chip
C . . . MTA31 for voltage verification

Table 14. EPROM Locations for 8088 Processor Applications

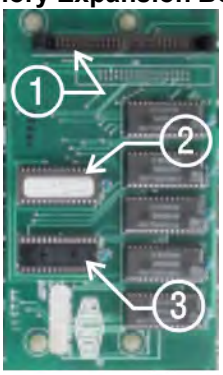
	EPROM Location by Socket			
EPROMS in Set	**A**	**B**	**IC-1**	**IC-2**
4 chips	4	3	2	1
3 chips	3	2	1	—
2 chips	2	1	—	—
1 chip	1	—	—	—

Figure 7. 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

3.2.2.3 8088 Processor Boards with Memory Expansion Board

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

See Table 14: EPROM Locations for 8088 Processor Applications, page 28 and Figure 7: 8088 Processor Board and Optional Memory Expansion Board, page 28 . 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.

3.2.2.4 80186 Processor Boards

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

This processor board (see Figure 8: 08BSPET 80186 Processor Board, page 29) 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.

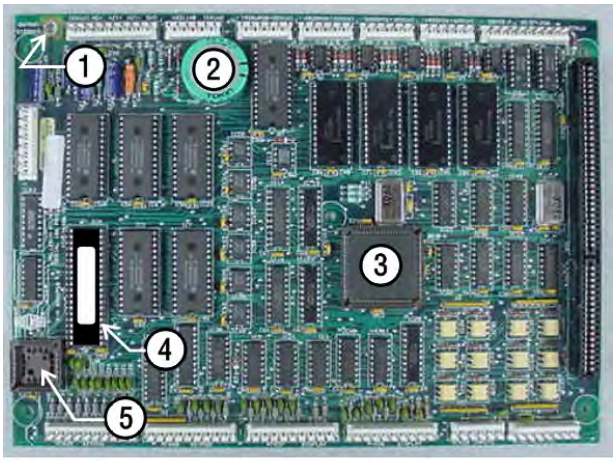
TIP: For maximum reliability and to minimize the chances of the processor board resetting due to low voltage, adjust the power supply voltage for 80186 processors to 5.10 VDC at the processor board.

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 10: 08BSPE2T 80186 Processor Board, page 30) 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 8. 08BSPET 80186 Processor Board

Overview

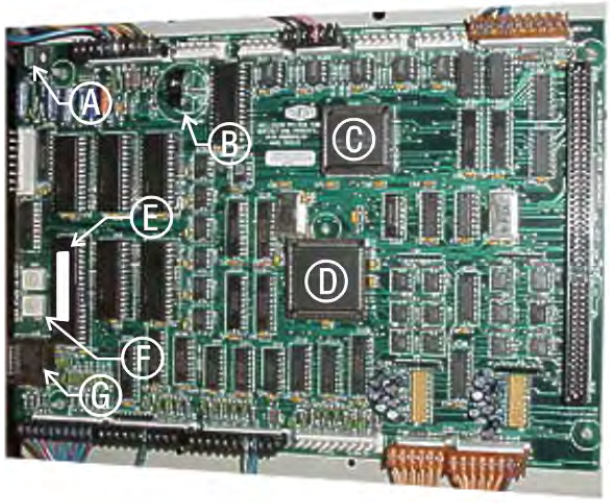


Legend

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

Figure 9. 08BSPE1T 80186 Processor Board

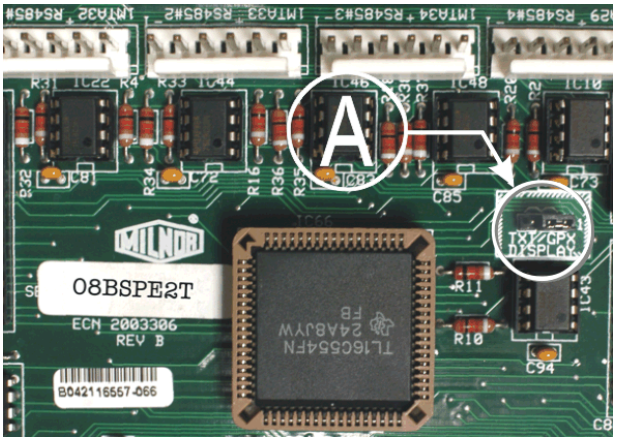
Overview



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 10. 08BSPE2T 80186 Processor Board

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

BNCEUF01 / 2019065 BNCEUF01 0000217707 A.8 1/2/20 1:12 PM Released

3.3 Hardware Components of Serial Microprocessor Controllers

BNCEUF01.C01 0000217706 A.2 A.8 A.3 1/2/20 1:12 PM Released

3.3.1 General

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

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

3.3.2 Microprocessor Components

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

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

3.3.2.1 Keypad or Keyboard

BNCEUF01.C04 0000217703 A.2 A.8 A.3 1/2/20 1:12 PM Released

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

3.3.2.2 Keyswitch

BNCEUF01.C05 0000217702 A.2 A.8 A.3 1/2/20 1:12 PM Released

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

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

3.3.2.3 Display

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

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

Liquid Crystal Display This type of display is identified by dark green characters on a lighter gray background.

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

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

3.3.2.4 Power Supply

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

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

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

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

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

3.3.2.5 Central Processing Unit (CPU) Board

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

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

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

3.3.2.6 Memory Expansion Board

BNCEUF01.C09 0000217698 A.2 A.8 A.3 1/2/20 1:12 PM Released

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

3.3.2.7 Battery

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

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

3.3.2.8 Opto-Isolator Board

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

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

3.3.2.9 Input/Output Board

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

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

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

This board has 25 status lights. The amber light flashes when the board is communicating. Each of the 24 remaining lights represent an input (green lights) or output (red lights) on that board, and illuminates when the corresponding input or output is made. This board has two rotary dials which must be adjusted to set the board's address (see Section 3.3.4 : Assigning Board Addresses, page 38 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.

3.3.2.10 Output Board

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

A 24-output board contains 24 output relays identical to those described in Section 3.3.2.9 : Input/Output Board, page 32 .

3.3.2.11 CRT (Video Display) Board

BNCEUF01.C14 0000217739 A.2 A.8 A.4 1/2/20 1:12 PM Released

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

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

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

3.3.2.12 Resistor Boards

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

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

3.3.2.13 Temperature Probe

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

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

3.3.2.14 8 Output/16 Input Chemical Flow Meter Board

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

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

3.3.3 Serial Communications Port

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

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

For more information on the various separate serial cables required for these functions, see Section 3.4 : Construction of External Serial Link Cables, page 40 , if applicable.

Table 15. 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

Table 15 Board Application by Device (Part A) (cont'd.)

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
2														
3														
4														
5														
6														
7	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8														
9														
10														

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 16. 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

Table 16 Board Application by Device (Part B) (cont'd.)

Device	Board Name: CPU	Input/Output	Output	Analog to Digital	Digital to Analog	CRT	Opto-isolator	Temperature Sensing Resistor	Gas Valve Resistor	Steam Valve (4–20mA)	Thermocouple Signal Conditioner	Chemical Flow Meter	Rotation Safety	Weight Scale Interface
2														
3														
4														
5														
6														
7	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8														
9														
10														

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

3.3.4 Assigning Board Addresses

BNCEUF01.C19 0000217781 A.2 A.8 A.4 1/2/20 1:12 PM Released

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 17. 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.

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3.4 Construction of External Serial Link Cables

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This document provides information for on-site fabrication of certain types of serial communication cables. Programmable data can be transferred between compatible machines or between a machine and a Milnor® *serial memory storage device* (see related note below), using the download cables described in Section 3.4.2.2 : Connecting Two or More Machines for Machine-to-machine Transfer, page 42 and Section 3.4.2.3 : Connecting a Machine to a Serial Memory Storage Device, page 43 respectively. These cable(s) connect to the cabinet-mounted 9-pin DIN type receptacle shown in Figure 11: 9-Pin DIN Connector Pin Identification (from wire entry side of connectors), page 41 and may be installed temporarily or permanently, as appropriate.

NOTE: The currently approved printers and printer configuration settings are provided in Section 3.5 : Printer Requirements and Settings, page 44 . A pre-assembled machine-to-printer cable similar to the cable described here, is available from Milnor (P/N 10YMK2PNTR).

NOTE: 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.

3.4.1 Pin Identification

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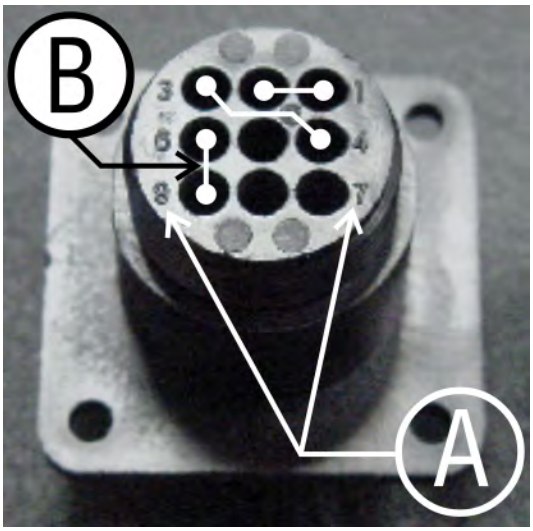
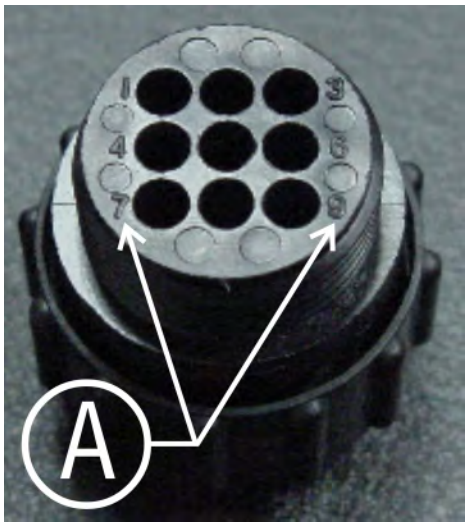
Figure 11: 9-Pin DIN Connector Pin Identification (from wire entry side of connectors), page 41 illustrates the DIN receptacle (which uses male pins) and the mating plug (which uses female pin sockets), each viewed from the **wire entry** side. The receptacle is normally installed and wired at the Milnor factory. The plug and female pin sockets for customer use are provided in a bag inside the electric box. Table 18: External Serial Link Pin Assignments, page 41 shows the function of each pin.

Figure 11. 9-Pin DIN Connector Pin Identification (from wire entry side of connectors)

Receptacle (uses male pins)	Plug (uses female pin sockets)
	

Legend

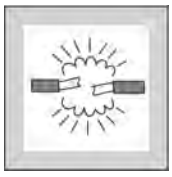
A . . . Pin numbers molded into parts

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

Table 18. 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 (not used on these models)	CTS	Blue and orange
6	Electronic ground	2G	Blue and white
9			
7	Transmit data (not used on these models)	TXD	Blue and orange
8	+5 volts DC (used for serial memory storage device only)	V1	Blue

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



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

3.4.2 How to Wire the Cables

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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.

3.4.2.1 Cable Specifications

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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

3.4.2.2 Connecting Two or More Machines for Machine-to-machine Transfer

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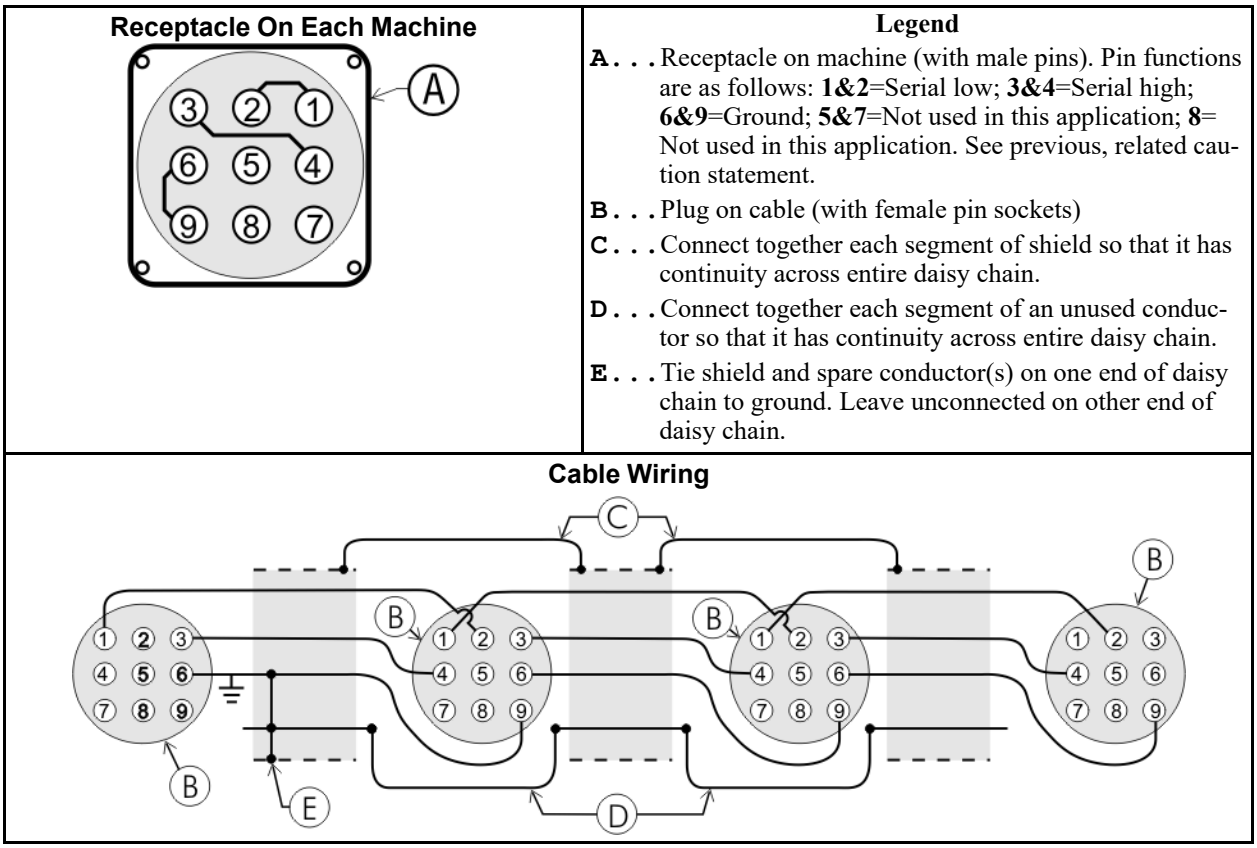
Figure 12: Wiring Diagram for Cable to Connect Two or More Machines, page 43 shows how to wire a cable to connect a bank of identical machines (the Figure 12: Wiring Diagram for Cable to Connect Two or More Machines, page 43 example shows connections for four machines) so that data programmed on one 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 12. Wiring Diagram for Cable to Connect Two or More Machines



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.

3.4.2.3 Connecting a Machine to a Serial Memory Storage Device

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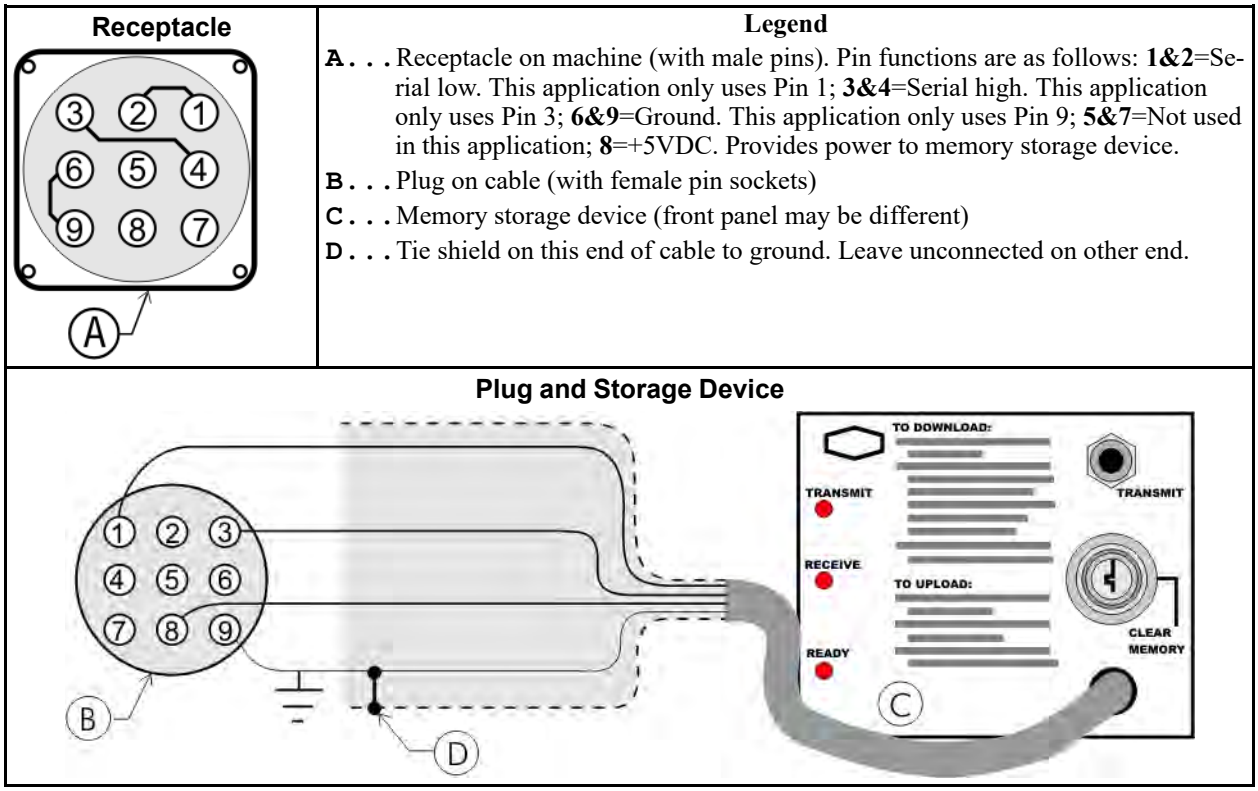
The cable used with the serial memory storage device (download box) available from Milnor, see related note in Section 3.4 : Construction of External Serial Link Cables, page 40 , is permanently attached to the storage device. Cable fabrication, as shown in Figure 13: Wiring Diagram for Cable to Connect a Machine to a Serial Memory Storage Device, page 44 , 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 13. Wiring Diagram for Cable to Connect a Machine to a Serial Memory Storage Device



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3.5 Printer Requirements and Settings

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

3.5.1 Cable Requirements

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

Table 19. 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

3.5.2 Configuring the Citizen GSX-190 Printer

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Table 20: Required Settings for Citizen GSX-190 Printer, page 45 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 20. Required Settings for Citizen GSX-190 Printer

Menu	Data Field	Value
Install 1	Ribbon	Normal
	A.S.F.	Off
	Emulation	Epson
Print Style	Font	Draft
	Emphasized	Off
	Pitch	10 characters inch
	Front lock	Off
Page Layout	Line spacing	6 lines per inch
	Form length	Letter
	Page skip	Off
Print Mode	NLQ Dir	Uni-directional
	Graphic Dir	Uni-directional

Menu	Data Field	Value
Character	Slash zero	Off
	Character set	Graphics
	Intl character set	U.S.A.
	Code page	U.S.A.
Install 2	Tear off	Off
	Paper out	Enable
	Auto linefeed	Off
	Copy mode	Off
	Envelope	Off
Serial I/F	Baud rate	9600
	Parity	Even
	Data bits	8 bits
	Stop bits	1 bit
	Protocol	DTR

3.5.3 Configuring the Epson LX300 Printer

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

Table 21. Required Settings for Epson LX300 Printer

Data Field	Value
Character spacing	10 characters per inch
Shape of zero	0
Skip over perforation	Off
Character table	PC 437
Auto line feed	Off
Page length	11 inches
Auto tear off	Off

Data Field	Value
Tractor	Single
Interface	Serial
Bit rate	9600 bps
Parity	Even
Data length	8 bits
ETX/ACT	On

3.5.4 Previous Printer Models

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