

BESSERMATIC MODEL MS-9 (26") W/LSC-100 SIDE SHIFTER



OPERATION/MAINTENANCE MANUAL 466362F9902US

APRIL 2000 • US\$250

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COMPANY NAME:	
SERIAL NUMBER:	
ASSEMBLY NUMBER:	
WIRING DIAGRAM NUMBER:	
INSTALLATION DRAWING NUMBER:	



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SAFETY BULLETIN

This notice is issued to advise you that some previously accepted shop practices may not be keeping up with changing Federal and State Safety and Health Standards. Your current shop practices may not emphasize the need for proper precautions to insure safe operation and use of machines, tools, automatic loaders and allied equipment and/or warn against the use of certain solvents or other cleaning substances that are now considered unsafe or prohibited by law. Since many of your shop practices may not reflect current safety practices and procedures, particularly with regard to the safe operation of equipment, it is important that you review your practices to ensure compliance with Federal and State Safety and Health Standards.

IMPORTANT

The operation of any machine or power-operated device can be extremely hazardous unless proper safety precautions are strictly observed. Observe the following safety precautions:

Δ Always be sure proper guarding is in place for all pinch, catch, shear, crush and nip points.

Always make sure that all personnel are clear of the equipment before starting it.

Always be sure the equipment is properly grounded.

- Δ Always turn the main electrical panel off and lock it out in accordance with published lockout/tagout procedures prior to making adjustments, repairs, and maintenance.
- ≙ Always wear appropriate protective equipment like safety glasses, safety shoes, hearing protection and hard hats.

Δ Always keep chemical and flammable material away from electrical or operating equipment. Δ

Always maintain a safe work area that is free from slipping and tripping hazards.

Always be sure appropriate safety devices are used when providing maintenance and repairs to all equipment.

- Δ Never exceed the rated capacity of a machine or tool.
- Δ Never modify machinery in any way without prior written approval of the Besser Engineering Department.

Δ Never operate equipment unless proper maintenance has been regularly performed.

Δ Never operate any equipment if unusual or excessive noise or vibration occurs.

- Δ Never operate any equipment while any part of the body is in the proximity of potentially hazardous areas.
- Δ Never use any toxic flammable substance as a solvent cleaner.
- ≙ Never allow the operation or repair of equipment by untrained personnel. ∕∆
 - Never climb or stand on equipment when it is operational.

It is important that you review Federal and State Safety and Health Standards on a continual basis. All shop supervisors, maintenance personnel, machine operators, tool operators, and any other person involved in the setup, operation, maintenance, repair or adjustment of Besser-built equipment should read and understand this bulletin and Federal and State Safety and Health Standards on which this bulletin is



SAFETY SIGNS

Sign 1	Description Required Electric Motor
2	All Machines1
	All Panels1
3	Mixer4
4	Block Machine1
	SF-7 Cuber
	BTO-6
	Overhead Block Transfer
	Depalleter
	AF-7 Block Pusher
5	Concrete Products Machine1
6	Concrete Products Machine1
7	Concrete Products Machine
8	Besser-Matic
9	Besser-Matic
10	Pallet Transport System4
11	LSC-404
	Overhead Block Transfer4
12	Conveyors6
13	SF-7 Cuber8
14	AF-7 Block Pusher
	Pallet Transport System4
15	All Machines1
	All Panels1
16	SF-7 Cuber
	AF-7 Block Pusher2
	Slat Conveyors
17	Skiploader [Available in 1998]6
18	Generic Falling Hazard [Available in 1998]2
19	Skiploader [Available in 1998]2
20	Skiploader [Available in 1998]2
21	Skiploader [Available in 1998]1

To order safety decals, contact your local Besser representative or the Besser Central Order Department. Thank you!















ELECTRICAL DATA

Plant Power Supply
Total Horsepower
Total Kilowatts
Control Panel Transformer
Total Amp Load
Recommended Branch Circuit Distribution Switch
Recommended Branch Circuit Fuse (FRS-R)
Recommended Branch Feeder (THHN)
Recommended Branch Circuit Feeder Conduit
Short Circuit Interrupting Capacity

380 volt, 3 phase, 50 hz 51.5 38.404 2000 volt-amps 105.02 200 amp 150 amp #1 AWG (42.4 mm²) 1.25 inch [32 mm] 200,000 AIC

NOTE: Electrical may change from machine to machine. Please consult Installation drawings supplied by Besser.

Electrical Data Notes:

For safety purposes, Besser Company requires that this equipment be connected to a lockable electrical disconnect.

DEVICE	HORSEPOWER
LOADER SPADE ELEVATOR	5.00
LOADER SPADE TRANSFER	0.75
LOADER SPADE TURN	1.00
UNLOADER SPADE ELEVATOR	5.00
UNLOADER SPADE TRANSFER	0.75
UNLOADER SPADE TURN	1.00
LOADER ACCUMULATOR	7.50
UNLOADER ACCUMULATOR	7.50
FRONT DELIVERY CONVEYOR #1 & #2	1.50
UNLOADING CONVEYOR #1, #2, #3 & #4	2.00
PALLET RETURN - TRANSFER	1.00
PALLET RETURN - RETURN	1.00
HYDRAULIC POWER UNIT	10.0

Table A POWER DATA TABLE

CAUTION:

To comply with Articles 110-9 and 110-10 of the National Electrical Code:

- The customer shall supply a branch circuit protective device to feed this control panel.
- The protective device shall have a short circuit interrupting rating of no less than the available short circuit current. (Besser Company recommends the use of protective devices with interrupting ratings of no less than 200,000 amps rms symmetrical.)
- See table above for the recommended protection.

Failure to comply with these guidelines may result in a rupture of the protective device while attempting to clear a fault.



MS-9 W/SIDE SHIFTER SPECIFICATIONS

TOTAL WEIGHT:

49,475 Lbs [22488 Kg]

APPROXIMATE WEIGHT OF EACH COMPONENT:

Accumulators (2):	3600 Lbs [1636 Kg] each
Frame:	2500 Lbs [1136 Kg]
Unloading conveyors (3):	1650 Lbs [750 Kg] each
Front delivery conveyors (2)	1500 Lbs [682 Kg] each
Loaders / Unloaders (2)	4500 Lbs [2045 Kg] each
Pallet return conveyors (2)	925 Lbs [420 Kg] each
Rackveyor total	15 860 Lbs [7209 Kg]
Rackveyor front section:	2760 Lbs [1255 Kg]
Rack indexer:	4600 Lbs [2091 Kg]
Side shifter:	8500 Lbs [3864 Kg]
Panel assembly:	725 Lbs [330 Kg]
Graphic control station:	420 Lbs [191 Kg]
Hydraulic power unit:	360 Lbs [164 Kg]
Valve stand assembly:	110 Lbs [50 Kg]
Items shipped loose:	3500 Lbs [1591 Kg]
MINIMUM HYDRAULIC PRESSURE:	850 psi [58 bar]
MACHINE SPEED:	Up to 10 cycles per minute
PRODUCTION CAPACITY:	Up to 11 pallets high with 38 1/2" X 26" [978mm X 660mm] pallets.

OPERATING CONDITIONS:

Besser machinery and equipment is designed to comply with the essential health and sefety regulations (EHSR) that apply to directives which are applicable to an industrial environment. Buyer shall utilize this equipment in a manner consistent with its design and only in an industrial environment.

OPERATING RANGES:

Here are the normal operating ranges for machine sensors (limit, proximity) and control devices contained within the control panels.

Ambient operating temperature range:	32° to 131°F [0° to 55°C]
Humidity range:	5 to 95% (non-condensing)
Line voltage:	85 to 132 Volts - AC 50/60 Hz



PALLET REQUIREMENTS:



WIDTH & DEPTH = Actual size of steel pallet. XMAX & YMAX = Maximum production area of steel pallet.

WIDTH	DEPTH	THICK.	Х	Y	PALLET NO.
38.5" [978mm]	18.5" [470mm]	.375" [9.5mm]	37.5" [953mm]	17.625" [448mm]	470750F0012
38.5" [978mm]	20.5" [521mm]	.375" [9.5mm]	37.5" [953mm]	19.500" [495mm]	470750F0013
38.5" [978mm]	26.0" [660mm]	.375" [9.5mm]	37.5" [953mm]	25.000" [635mm]	470750F0014

Table B STEEL PALLET SPECIFICATIONS



OVERALL DIMENSIONS (ref. installation print #5):



Figure A MS-9 Dimensions



OPERATOR ORIENTATION:

Seen from behind, facing the Concrete Product Machine, the machine shown below is a right hand machine. This means the loading of new units is done from the right side. The sides loading and unloading, as mentioned throughout this manual, are as shown here.







SECTION 1 MACHINE DESCRIPTION

1.1 HOW A BESSER-MATIC MS-9 WORKS.

The Besser-Matic MS-9 is extremely versatile. It is designed to fit into all plant layouts and can handle the output of all Besser concrete products machines. It is built solid with heavy duty components and the most current technology available.

The MS-9 gently loads and unloads concrete products onto and off of racks, automatically. The Multi-Spade Besser-Matic handles paving stone, architectural units and solids as well as it handles standard units. The machine is comprised of two separate accumulators

each equipped with a spade loader or unloader. The loader accumulator of the MS-9 receives pallets of green units from the front delivery conveyor of the concrete products machine.

The spade loader moves in and elevates to pick up a load. Once the loader spade is full, the spade rotates 180 degrees and moves forward, gently depositing the pallets of green units into a rack. The spade then rotates 180 degrees and returns to the accumlator for another load of green concrete units. Simultaneously, the spade unloader of the MS-9 retrieves cured pallets of units from the racks, rotates 180 degrees, travels forward and deposits the pallets into the unloader accumulator, which in turn sets the pallets one at a time onto the unloading conveyor. When the loader and unloader spades have filled or emptied their respective bays, the rack conveyor indexes to the next bay or to the next rack.



1.2 MULTI-SPADE ASSEMBLY (RIGHT HAND SYSTEM SHOWN)



Figure 1.1 Multiple-spade Assembly



1.3 SIDE SHIFTER AND RACKVEYOR (RIGHT HAND SYSTEM SHOWN)



Figure 1.2 Side Shifter and rackveyor



1.4 CONVEYORS (RIGHT HAND SYSTEM SHOWN)



Figure 1.3 Conveyors



SECTION 2 MACHINE INITIAL SET-UP

THE PRESENT SECTION EXPLAINS HOW TO SET UP THE BESSER-MATIC MULTI-SPADE MS-9. IT WILL TAKE THE OPERATOR STEP BY STEP THROUGH THE FINAL ADJUSTMENTS ON THE MACHINE. FOLLOW THIS SECTION CAREFULLY. IF YOU ARE ALSO INSTALLING A RACK TRANSPORTER SYSTEM SUCH AS A LSC-100, YOU SHOULD FOLLOW INSTRUCTIONS FOR BOTH THESE SYSTEMS SIMULTANEOUSLY. INSTRUCTIONS ON THE RACK TRANSPORTER SYSTEM ARE FOUND IN MANUAL #466364F9602. MAKE SURE THE MACHINE HAS BEEN INSTALLED PROPERLY AS SHOWN IN THE INSTALLATION MANUAL #466362F9601.

2.1 LOADER SIDE INSTRUCTIONS

- Note: All switches must be adjusted in manual mode (see section 4.2)
- 2.1.1 Front Delivery Conveyor set-up (Concrete Product Machine end)
- **2.1.1.1** Set delivery height of the front delivery conveyor (refer to paragraph 3.6.1.2 of the Installation manual or sheet 6 of the Installation drawing).
- 2.1.1.2 Proximity switch (PRS-2A) should be adjusted 1/4"[6.3mm] below the bottom of pallet sitting on chain.



Figure 2.1 PROXIMITY SWITCH PRS-2A.

2.1.2 Front Delivery Conveyor set-up (Accumulator end)

- **2.1.2.1** Switch (PRS-28) should be adjusted 1/4" [6.3mm] below the bottom of pallet. (figure 2.2)
- **2.1.2.2** Switch must be adjusted so pallet is in pick-up position when switch is released.



Figure 2.2 PROXIMTY SWITCH PRS-28.

2.1.3 Position for shelf angle home switch on the accumulator

- 2.1.3.1 PRS-1 is located on the side of the Accumulator and senses the shelf angle in order to stop the Accumulator just before it reaches the pallet. Adjust PRS-1 switch so that shelf angle is stopped when top of angle is 1/4" [6.3mm] below bottom of pallet or as close as possible to provide smooth pallet pick-up. See figure 2.3.
- **2.1.3.2** Run to next shelf angle to verify the position of the switch.



2.1.4 Position for full load switch on accumulator



Figure 2.3 PROXIMITY SWITCH PRS-1.

- 2.1.4.1 PRS-3 (pancake switch) is located on the top of the Accumulator and is the full load indicator. It senses the pallet on the top shelf. It is adjusted according to the number of shelves you run. Adjust switch so that there is 1/2" [12.7mm] between pallet and face of pancake switch.
- **2.1.4.2** LS-55 is a safety switch on top of the Accumulator. It should be adjusted 2" [51mm] above the highest product on the top shelf.



Figure 2.4 PROXIMITY SWITCH PRS-3.

2.1.5 Location of frame actuators



Figure 2.5 LIMIT SWITCH LS-55 AND PROXIMITY SWITCH PRS-3.

Actuators on MS-9 frame are positioned along the track and will trip a switch located on the moving stabilizer. When this switch is tripped, the loading spade stops. It will stop once in the loader Accumulator, once at the entrance of the loader Accumulator, once at center and several times inside the rack. How many times it stops in the rack is dependent on your rack depth. For example, if you have a 4 pallet deep rack system, the loader spade will stop 4 times inside the rack. Use frame assembly drawing along with the written instructions below to adjust frame actuators:

- **2.1.5.1** Locate actuator for center-in/center-out.
- **2.1.5.2** Locate actuator to position pallet in rack (depends on how deep system is).
- **2.1.5.3** Set all actuators according to dimensions shown in figure 2.6 and on frame drawing supplied.
- **Note:** Final adjustments will have to be made when spade actually goes through its cycle (either on manual or automatic runs).





Figure 2.6 FRAME ACTUATORS ON LOADING SIDE (VIEWED FROM ABOVE).



2.1.6 Adjust spade switches

The spade stabilizer has 8 switches: 2 safety proximity switches, 4 turn proximity switches, 1 frame actuator proximity switch and 1 center in/center out limit switch. All of these switches are illustrated in figure 2.7 below and need to be adjusted as follows:

- 2.1.6.1 Adjust switch LS-19 to make sure it trips on frame center in/out actuator.
- 2.1.6.2 Adjust proximity switch PRS-16 to be actuated by frame actuators along the track. Switch should be adjusted 1/4" [6.3mm] above highest frame actuator. Run the spade on manual along the frame to test the switch. Use screen to monitor switch. It should turn ON when switch is above each frame actuator. If not, adjust switch lower.
- 2.1.6.3 Adjust safety switches PRS-51 and PRS-51A 1/4" [6.3mm] above frame track.
- NOTE: Left Hand shown. For Right Hand, PRS7 and PRS7A change locations with PRS8 and PRS8A

2.1.6.4 There is one 180° turn switch at each end of stabilizer, PRS-7 and PRS-8. These proximity switches should be adjusted 1/4" [6.3mm] from actuator (A)(figure 2.8 below). Both these switches are adjustable sideways through slots. Adjust both 180° turns so spade aligns perfectly with Accumulator and rack center line.

Note: Spade should turn toward the inside of frame.

А

14

6.35mm

Figure 2.8

TURN SWITCHES.



Figure 2.7 STABILIZER SWITCHES.



2.1.7 Adjust Multiple Limit Switches (MLS)

A MLS (figure 2.9) is located on the loader spade. 5 switches control the up and down movement of the lower spade. It is important to adjust the cams so that switches are actuated at a precise location. Figure 2.10 below identifies all 5 switches in the switch box.

- 2.1.7.1 Determine if your system is an "*up to rack*" system or a "*down to rack*" system. An "*up to rack*" system is a system where lower spade goes from the Accumulator *up* to the rack. A "*down to rack*" system is a system where lower spade goes from the Accumulator *down* to the rack.
- 2.1.7.2 Make sure all cams trip switches properly. Screen should indicate when switch has been tripped. (refer to section 5, function F3 input/output). It is important to adjust cams knowing up or down direction.
- **2.1.7.3** Refer to figure 2.10 below to identify switch direction and approximate cam locations. Remember that these cam locations are approximate; they will need to be adjusted as shown here.



Figure 2.9 MULTIPLE LIMIT SWITCH (MLS).



Figure 2.10 CAM CONFIGURATION (APPROXIMATE).



- 2.1.7.4 Manually move the spade (see section 4.2) until it reaches the Accumulator but does not enter. Move spade up and down until the spade shelf is 1/2" [12.7mm] below the pallet as presented in figure 2.11. Then, move cam until switch LS-22 is actuated (screen will indicate that switch has been tripped).
- **Note:** After moving cam to desired position, carefully tighten cam so it does not move.



Figure 2.11 SWITCH LS-22 ADJUSTMENT.

2.1.7.5 Manually move the spade (see section 4.2) into the Accumulator. Then move spade up and down until bottom of pallet is 1/2" [12.7mm] above shelf angle (see figure 2.12). Then, move cam until switch LS-12 is actuated (screen will indicate that switch has been tripped).



Figure 2.12 SWITCH LS-12 ADJUSTMENT.



2.1.7.6 Manually move the spade (see section 4.2) until it reaches the rack but does not enter. Then move spade up and down until bottom of pallet is 1/2" [12.7mm] above rack shelf (see figure 2.13). Then move cam until switch LS-13 is actuated (screen will indicate that switch has been tripped).



Figure 2.13 SWITCH LS-13 ADJUSTMENT.

2.1.7.7 Manually move the spade (see section 4.2) inside the rack bay. Then move spade up and down until top of empty spade is 1/2" [12.7mm] below pallet laying on rack shelf (see figure 2.14). Then move cam until switch LS-23 is actuated (screen will indicate that switch has been tripped)



Figure 2.14 SWITCH LS-23 ADJUSTMENT.

2.1.7.8 Adjust safety switch LS-14 (with red dot) 1" [25.4mm] above top of highest stroke (1" [25.4mm] above extreme position) and 1 [25.4mm]" below lowest stroke (lower extreme).



2.2 UNLOADER SIDE INSTRUCTIONS

2.2.1 Accumulator switches

2.2.1.1 PRS-41 indicates that pallet is completely inside Accumulator. Adjust so that, when bar is pushed all the way in, switch PRS-41 is actuated. See figure 2.15.



Figure 2.15 PRS-41.

2.2.1.2 Adjust PRS-95 so that the top of the shelf angle on Accumulator is 1/2" [12.7mm] below the bottom of pallet sitting on conveyor. See figure 2.16.



Figure 2.16 PRS-95.

2.2.2 Unloading conveyor switches

- **2.2.2.1** All switches on unloading conveyor should be adjusted 1/4" [6.35mm] below the bottom of the pallet sitting on chain.
- **2.2.2.** Adjust PRS-42 (figure 2.17) so that pallet is clear of Accumulator conveyor when switch is tripped and released, if PRS-43 is not covered.
- **2.2.2.3** Adjust PRS-43 (figure 2.17) 1/4" [6.3mm] below pallet sitting on chain. PRS-43 is a safety switch. If PRS-43 is tripped, Accumulator will not move.

2.2.2.4 Adjust PER-202, PRS-30 and PRS-9 on Depalleter. Refer to Depalleter manual.
PER-202 is a photoelectric eye switch that senses across the depalleter to detect block on pallet in Depalleter.
PRS-30 stops pallet on unloading conveyor if PRS-9 is covered by pallet.

PRS-9 will stop pallet in center of Depalleter. Adjust switch so pallet is stopped at center line of Depalleter.







Figure 2.17 PRS-42 AND PRS-43.

2.2.3 Rollover switches

- **2.2.3.1** Adjust PRS-641 so that it indicates that pallet is completely into the rollover system. This will start rollover. Also adjust switch 1/4" [6.35mm] below pallet sitting on chain. See figures 2.18 and 2.19.
- **2.2.3.2** Adjust LS-642 home switch so rollover stops at point where it can receive pallet in slot and drop pallet off. See figure 2.18.
- Note: Adjust switch with no pallet in rollover.



Figure 2.19 PRS-642 AND 643 ON ROLLOVER.

- **2.2.3.3** Adjust up position and down position switch on rollover cylinder (switch PRS-644 and PRS-645). See figure 2.18.
- **2.2.3.4** Adjust PRS-643 proximity-switch so it is tripped after rollover is 1/4" [6.35mm] below pallet. It indicates that the rollover is clear and a new pallet can be rolled. See figure 2.18 and 2.19.



Figure 2.18 ROLLOVER SWITCHES.



2.2.4 Location of frame actuators

Actuators on MS-9 frame are positioned along the track and will trip a switch located on the moving stabilizer. When this switch is tripped, the unloading spade stops. It will stop once in the unloader Accumulator, once in the center and several times inside the rack. How many times it stops in the rack is dependent on your rack depth. For example, if you have a 4 pallet deep rack system, the unloader spade will stop 4 times inside the rack. Use frame assembly drawing along with the written instructions below to adjust frame actuators:

2.2.4.1 Locate actuator for center-in / center-out (shown below).

- **2.2.4.2** Locate actuator to position pallet in rack (depends on how deep system is).
- **2.2.4.3** Set all actuators according to dimensions shown in figure 2.20 below and on frame drawing supplied.
- **Note:** Final adjustments will have to be made when spade actually places pallets in rack as it goes through its cycle (either on manual or automatic runs).



Figure 2.20 FRAME ACTUATORS ON UNLOADING SIDE (VIEWED FROM ABOVE).



2.2.5 Adjust spade switches

The spade stabilizer has 8 switches: 2 safety proximity switches, 4 turn prox-switches, 1 frame actuator proximity switch and 1 center-in/center-out limit switch. All of these switches are illustrated in figure 2.21 below and need to be adjusted as follows:

- **2.2.5.1** Adjust switch LS-26 to make sure it trips on frame center in/out actuator.
- **2.2.5.2** Adjust proximity switch PRS-25 to be actuated by frame actuators along the track. Switch should be adjusted 1/4" [6.3mm] above highest frame actuator. Run the spade on manual along the frame to test the switch. Use screen to monitor switch. It should turn ON when switch is above each frame actuator. If not, adjust switch lower.
- 2.2.5.4 There is one 180° turn switch at each end of stabilizer , PRS-47 and PRS-48. These proximity switches should be adjusted 1/4" [6.3mm] from actuator (A)(figure 2.22 below). Both these switches are adjustable sideways through slots. Adjust both 180° turns so spade aligns perfectly with Accumulator and rack center line.





Figure 2.21 STABILIZER SWITCHES.



2.2.6 Adjust Multiple Limit Switches (MLS)

A MLS (figure 2.23) is located on the loader spade. 5 switches control the up and down movement of the lower spade. It is important to adjust the cams so that switches are actuated at a precise location. Figure 2.24 below identifies all 5 switches in the switch box.

- **2.2.6.1** Determine if your system is an "*up to rack*" system or a "*down to rack*" system. An "*up to rack*" system is a system where lower spade goes from the Accumulator *up* to the rack. A "*down to rack*" system is a system where lower spade goes from the Accumulator *down* to the rack.
- **2.2.6.2** Make sure all cams trip switches properly. Screen should indicate when switch has been tripped. (refer to section 3, function F3 input/output). It is **important** to adjust cams knowing up or down direction.
- **2.2.6.3** Refer to figure 2.24 below to identify switch direction and approximate cam locations. Remember that these cam locations are approximate; they will need to be adjusted as shown here.







Figure 2.24 CAM BOX CONFIGURATION (APPROXIMATE).



- 2.2.6.4 With empty pallets set on the unloading spade, manually move the spade (see section 4.2) until it reaches the Accumulator but does not enter. Then move spade up and down until the bottom of pallet is 1/2" [12.7mm] above shelf angle as presented in figure 2.25. Then move cam until switch LS-24 is actuated (screen will indicate that switch has been tripped).
- **Note:** After moving cam to desired position, carefully tighten cam so it does not move.



Figure 2.25 SWITCH LS-24 ADJUSTMENT.

2.2.6.5 Manually move the spade (see section 4.2) inside the Accumulator. Then move spade up and down until bottom of pallet is 1/2" [6.3mm] below shelf angle (see figure 2.26). Then move cam until switch LS-31 is actuated (screen will indicate that switch has been tripped).



Figure 2.26 SWITCH LS-31 ADJUSTMENT.



2.2.6.6 Manually move the spade (see section 4.2) until it reaches the rack but does not enter. Then move spade up and down until top of spade is 1/2" [12.7mm] below bottom of pallet (see figure 2.27). Then move cam until switch LS-35 is actuated (screen will indicate that switch has been tripped).



Figure 2.27 SWITCH LS-35 ADJUSTMENT.

2.2.6.7 Manually move the spade (see section 4.2) inside the rack bay. Then move spade up and down until bottom of pallet is 1/2" [12.7mm] above rack shelf (see figure 2.28). Then move cam until switch LS-32 is actuated (screen will indicate that switch has been tripped)



Figure 2.28 SWITCH LS-32 ADJUSTMENT.

2.2.6.8 Adjust safety switch LS-34 (with red dot) 1"
[25.4mm] above top of highest stroke. (1"
[25.4mm] above extreme position) and .1"
[25.4mm] below lowest stroke (down extreme).


2.2.7 Conveyor switches

- **2.2.7.1** The PRS-630 (figure 2.29) switch is located on the unloading conveyor (just before the Pallet Transfer conveyor). It is used to stop the unloading conveyor when Pallet Transfer is in motion (not in home position).
- **2.2.7.2** Pallet Transfer conveyor PRS-69 switch (figure 2.29) indicates pallet is on transfer conveyor and starts Pallet Transfer motor. Should be adjusted 1/4" [6.3mm] below pallet.
- 2.2.7.3 LS-63 switch stops the Pallet Transfer conveyor at home position when lug is approximately 2" to 3" [51 to 76mm] behind pallet, ready to push next pallet. See figure 2.30.
- **2.2.7.4** PER-68 is a photoelectric switch located on the Pallet Return conveyor. It is used to detect a pallet jammed between rollers. A timer will shut off machine after a preset timer has timed out. See figure 2.31







Figure 2.29 SWITCHES PRS-630 AND PRS-69.



2.2.8 Concrete Product Machine pallet magazine

The Pallet Return conveyor will be shut off by two proximity switches located in the Concrete Product Machine. These indicate either a pallet low or pallet high condition. Verify these switches; they should be wired and should work properly.

2.2.9 Pallet roller guides

Adjust roller guides to center pallets in unloader Accumulator.



Figure 2.32 ROLLER GUIDES.

2.3 INSTRUCTIONS ON SETTING-UP THE RACKVEYOR AND SIDE SHIFTER. (LOADER SIDE SHIFTER)

- 2.3.1 Set two racks on Rackveyor indexer.
- **2.3.2** Adjust threaded rod on cap end of cylinder (figure 2.34, item A) so loader pushers center rack bay with loader center line.
- **2.3.3** Adjust tie-plate (figure 2.34, item B) that links the two carriages together so unloader pushers center rack bay with unloader center line while the loader rackbay is centered.
- **2.3.4** PRS-105 (figure 2.33 and 2.34) switch indicates the "forward" position where racks are centered with loader center line and unloader center line. Adjust PRS-105 to tie-plate actuator.

- **2.3.5** PRS-104 (figure 2.33) switch indicates the "reverse" position to index to next bay. PRS-104 should be adjusted so that carriage hooks the next leg of the rack. Adjust PRS-104A to tie-plate actuator.
- **2.3.6** PRS-104A (figure 2.33) switch indicates carriage is reversing to pick up a new rack when bay is full (only on loader-side shifter). It should be adjusted to go past the first up rack to pick-up a fresh rack (full rack). Adjust PRS-104A to tie-plate actuator.
- **2.3.7** Switches PRS-104, 104A and 105 need to be adjusted 1/4" [6.3mm] from tie plate actuator.
- **2.3.8** LS-110 limit switch (figures 2.33 and 2.34) indicates rack in position for loader. Should be adjusted to actuate off rack legs.
- **2.3.9** LS-111 limit switch (figure 2.33) indicates rack in position for unloader. Should be adjusted to actuate off rack legs.
- **2.3.10** When PRS-132 and PRS-133 (figure 2.33) are both covered by a rack, the indexer strokes to PRS-104A to get new rack. Adjust switches to within 1/4" [6.3mm] from bottom of rack.
- **2.3.11** When PRS-132 is covered and PRS-133 is not, racks will index to PRS-104 for next bay.
- **2.3.12** When neither PRS-132 and PRS-133 are covered by rack, EMITTER-100 will be turned on to signal crawler to bring in new rack.
- **2.3.13** PRS-129 (figure 2.33) indicates that crawler is clear and rack index can take place. This switch should be adjusted to actuate off bottom of crawler (1/4" [6.3mm] below bottom).
- **2.3.14** PRS-127 indicates Side Shifter is in position at Rackveyor. Adjust switch (lateral adjustment) to allow Side Shifter to line up with Rackveyor.
- **2.3.15** LS-123 (figure 2.35) is located on the Side Shifter. It should be adjusted to actuate off cylinder to indicate locks are unlocked.
- **2.3.16** PRS-121 (figure 2.35) will indicate the left lock on the Side Shifter is locked up.
- **2.3.17** PRS-122 (figure 2.35) will indicate the right lock on the Side Shifter is locked up.





Figure 2.33 RACKVEYOR AND SIDE SHIFTER SWITCHES.



Figure 2.34 RACKVEYOR.



- **2.3.18** PRS-124 (figure 2.33) indicates that a rack is on the Side Shifter. It should actuate off bottom of rack (1/4" [6.3mm] below).
- **2.3.19** PRS-125 (figure 2.33) indicates that Crawler is clear of the Side Shifter. EMITTER-101 comes on when Side Shifter is locked up at rails and there is a rack on the Side Shifter (PRS-126 and PRS-124 actuated).

2.4 INSTRUCTIONS ON SETTING-UP THE RACKVEYOR AND SIDE SHIFTER. (UNLOADER SIDE SHIFTER)

- 2.4.1 Set two racks on Rackveyor indexer.
- **2.4.2** Adjust threaded rod on cap end of cylinder (figure 2.34, item A) so loader pushers center rack bay with loader center line.
- **2.4.3** Adjust tie-plate (figure 2.34, item B) that links the two carriages together so unloader pushers center rack bay with unloader center line while the loader rackbay is centered.
- **2.4.4** PRS-105 (figure 2.33 and 2.34) switch indicates the "forward" position where racks are centered with loader center line and unloader center line. Adjust PRS-105 to tie-plate actuator.
- 2.4.5 PRS-104 (figure 2.33) switch indicates the "reverse" position to index to next bay. PRS-104 should be adjusted so that carriage hooks the next leg of the rack. Adjust PRS-104A to tie-plate actuator.
- **2.4.6** Switches PRS-104, 104A and 105 need to be adjusted 1/4" [6.3mm] from tie plate actuator.
- **2.4.7** LS-110 limit switch (figures 2.33 and 2.34) indicates rack in position for loader. Should be adjusted to actuate off rack legs.
- **2.4.8** LS-111 limit switch (figure 2.33) indicates rack in position for unloader. Should be adjusted to actuate off rack legs.
- **2.4.9** When PRS-132 and PRS-133 (figure 2.33) are both covered by a rack, the indexer strokes to PRS-104A to get new rack. Adjust switches to within 1/4" [6.3mm] from bottom of rack.

- **2.4.10** PRS-129 (figure 2.33) indicates that crawler is clear and rack index can take place. This switch should be adjusted to actuate off bottom of crawler (1/4" [6.3mm] below bottom).
- **2.4.11** PRS-127 indicates Side Shifter is in position at Rackveyor. Adjust switch (lateral adjustment) to allow Side Shifter to line up with Rackveyor.
- **2.4.12** PRS-126 indicates Side Shifter is in position at the Crawler rails. Adjust switch (lateral adjustment) to allow Side Shifter to line up with Rackveyor.
- **2.4.13** LS-123 (figure 2.35) is located on the Side Shifter. It should be adjusted to actuate off cylinder to indicate locks are unlocked.
- **2.4.14** PRS-121 (figure 2.35) will indicate the left lock on the Side Shifter is locked up.
- **2.4.15** PRS-122 (figure 2.35) will indicate the right lock on the Side Shifter is locked up.
- **2.4.16** PRS-124 (figure 2.33) indicates that a rack is on the Side Shifter. It should actuate off bottom of rack (1/4" [6.3mm] below).
- **2.4.17** PRS-125 (figure 2.33) indicates that Crawler is clear of the Side Shifter. EMITTER-101 comes on when Side Shifter is locked up at rails and there is a rack on the Side Shifter (PRS-126 and PRS-124 actuated).





Figure 2.35 SIDE SHIFTER.





SECTION 3 GRAPHIC CONTROL STATION

3.0 MANUAL CONTROLS

		PEt A B C	
		P52 7 8 9	
		PE1 4 5 6	
		PF4 1 2 3	
		PFS 0 + -	
		PE4 ** 1 **	
		PR7 • *** •	
		PEA North Dates	
	F1 B2 B3 F1 F6 F8 F0	10 10 FB	
8			
			T C



Emergency Stop, complete shut off of machine. Needs to be pulled out to start the machine.



Master Control Relay reset. Enables the machine to function (emergency button has to be pull out first).



Starts the hydraulic power unit pump. Pull button to start pump. Push button to stop pump.





Spade manual control joystick. Operator must set Loader or Unloader to HAND before using. Operates the loader and unloader spades, UP - DOWN - IN -OUT.



Loader controls.

To use spade manually, set to HAND then use joystick to move. To use accumulator manually, set to HAND then use F6 and F7 keys to move up and down.



Unloader controls.

To use spade manually, set to HAND then use joystick to move.

To use accumulator manually, set to HAND then use F6 and F7 keys to move up and down.



Rackveyor controls.

To use manually, set to HAND then use "F" keys as required or use manual control. Also operator must place remote control station into the HAND position.



Depalleter and Pallet Return ON and OFF switch.



Front Delivery Conveyor ON and OFF switch.



Pallet Rollover ON and OFF switch. ON will raise rollover. OFF will lower rollover.



3.1 PROGRAMMING KEYS

0	BESSER	0
	PFI A B C PF2 D E F PF2 7 0 9 PF2 7 0 9 PF2 1 2 3 PF3 1 2 3 PF3 1 2 3 PF3 1 2 3 PF3 1 1 1 PF3 1 1 1	
	506 000 00	

- F1 To F10 Use these keys to select a menu.
 - & B These keys are used to enter starting parameters.
- . 0 To

Δ

9 These keys are used to enter a parameter.



These keys are used to move cursor up and down and left to right.

This key allows the operator to erase a parameter.



This key is used to accept a parameter after it has been typed in.



3.2 MAIN MENU



stopped due to mechanical or

electrical error.

Here, the screen tells the operator what action he should take to correct the situation.

every time he puts the

machine in operating mode.



3.2.1 LIST OF POSSIBLE MESSAGES ON OPERATOR MESSAGE CENTER.

BESSERMATIC:	PRS-51 OR PRS-51A OR PRS-52 OR PRS-52A IS NOT MADE.
INFORMS	THESE SWITCHES ARE LOCATED ON THE LDR AND UNL SPADES.
OPERATOR ACTION:	CHECK FOR PROPER SWITCH ADJUSTMENT. CHECK LDR-CR1 AND UNL-CR1 RELAYS FOR FUNCTION. REFER TO SHEET 1 OF THE ELEMENTARY WIRING DIAGRAM.

	ODERATOR MESSAGE (ENTER
BESSERMATIC: INFORMS	PRS-7A, PRS-BA OR LS-14 IS TRIPPED. THESE SWITCHES ARE LOCATED ON THE LOADER SPADE.
OPERATOR ACTION:	CHECK FOR PROPER SWITCH ADJUSTMENT. CHECK LDR-CR1 AND UNL-CR1 RELAYS FOR FUNCTION. REFER TO SHEET 1 OF THE ELEMENTARY WIRING DIAGRAM.

BESSERMATIC:	PRS-47A, PRS-48A OR LS-34 IS TRIPPED.
Informs	THESE SWITCHES ARE LOCATED ON THE UNLOADER SPADE.
OPERATOR ACTION:	MANUALLY MOVE THE SPADE TURN OR ELEVATOR TO RELEASE THE SWITCHES. IF ALL SWITCHES ARE CLEAR, CHECK UNL-CR2 CIRCUIT. REFER TO SHEET 3 OF THE ELEMENTARY WIRING DIAGRAM.

OPERATOR NECCOLE (FILE)			
BESSERMATIC: INFORMS	AN OVERLOAD HAS TRIPPED ON THE LOADER ELEVATOR, TRANSFER, TURN OR STACKER MOTOR STARTER.		
OPERATOR ACTION:	LOCATE THESE MOTOR STARTERS IN THE ELECTRICAL PANEL AND RESET THE TRIPPED OVERLOAD. REFER TO SHEET 2 OF THE ELEMENTARY WIRING DIAGRAM.		

OPERATOR MESSAGE CENTER BESSERMATIC: A LOADER OR UNLOADER SAFETY GATE IS IN THE UP POSITION. INFORMS OPERATOR ACTION: PLACE BOTH SAFETY GATES IN THE DOWN POSITION.



BESSERMATIC: INFORMS	OPERATOR MESSAGE CENTER THE MASTER CONTROL RELAY IS NOT ENERGIZED- PRESS THE MCR PUSHBUTTON LOCATED BELOW-	
OPERATOR ACTION:	IF THE MCR DOES NOT LATCH, HOLD THE MCR PUSHBUTTON TO CONTINUE THE DIAGNOSTIC CHECK. REFER TO SHEET 3 OF THE ELEMENTARY WIRING DIAGRAM.	

OPERATOR MESSAGE CENTER			
BESSERMATIC: INFORMS	AN OVERLOAD HAS TRIPPED ON THE UNLOADER ELEVATOR, TRANSFER, TURN OR STACKER MOTOR STARTER.		
OPERATOR ACTION:	LOCATE THESE MOTOR STARTERS IN THE ELECTRICAL PANEL AND RESET THE TRIPPED OVERLOAD. REFER TO SHEET 2 OF THE ELEMENTARY WIRING DIAGRAM.		

OPERATOR MESSAGE CENTER			
BESSERMATIC:	AN OVERLOAD HAS TRIPPED ON THE UNLOADING CONVEYOR MOTOR		
INFORMS	STARTER-		
OPERATOR ACTION:	LOCATE THESE MOTOR STARTERS IN THE ELECTRICAL PANEL AND RESET THE TRIPPED OVERLOAD(S).		
	REFER TO SHEET 2 OF THE ELEMENTARY WIRING DIAGRAM.		

BESSERMATIC: INFORMS	AN OVERLOAD HAS TRIPPED ON THE RACKVEYOR MOTOR STARTER.	
OPERATOR ACTION:	LOCATE THIS MOTOR STARTER IN THE ELECTRICAL PANEL AND RESET THE TRIPPED OVERLOAD- REFER TO SHEET 2 OF THE ELEMENTARY WIRING DIAGRAM-	

	OPERATOR MESSAGE CENTER
BESSERMATIC:	AN OVERLOAD HAS TRIPPED ON THE FRONT DELIVERY CONVEYOR
INFORMS	NOTOR STARTER-
OPERATOR ACTION:	LOCATE THIS MOTOR STARTER IN THE ELECTRICAL PANEL AND RESET THE TRIPPED OVERLOAD. REFER TO SHEET 2 OF THE ELEMENTARY WIRING DIAGRAM.



3.3 AUTOMATIC SCREEN

This screen is displayed during normal automatic operation, with the loader, unloader and rackveyor selector switches set to AUTO.





3.4 MANUAL CONTROL SCREENS

3.3.1 LOADER HAND CONTROL SCREEN

This screen is displayed only when the loader HAND-OFF-AUTO selector switch is set to HAND.





3.4.2 UNLOADER HAND CONTROL SCREEN

This screen is displayed only when the unloader HAND-OFF-AUTO selector switch is set to HAND.





3.4.3 RACKVEYOR HAND CONTROL SCREEN

This screen is displayed only when the rackveyor HAND-OFF-AUTO selector switch is set to HAND.





3.5 RACK DEPTH ADJUSTMENT F1

This function is to adjust depth of the spade going into the racks. You must adjust the depth on both the loader and unloader side. To access this screen from the **MAIN MENU**, press **F1** or from any hand control screen, press **F10**. The screen will display a top view of the loader and unloader.

NOTE: Depths can only be adjusted if loader & unloader HAND-OFF-AUTO switches are set to HAND.





3.6 LOADER SPADE FAULT SCREEN F8

This screen will be displayed each time a fault occurs on the loader spade. Refer to section 6 "Troubleshooting" for description of all fault screens. To access the screen from the main menu, press the F8 key. The screen below is the no fault screen. It is displayed when all faults have been cleared.





3.7 UNLOADER SPADE FAULT SCREEN F9

This screen will be displayed each time a fault occurs on the unloader spade. Refer to section 6 "Troubleshooting" for description of all fault screens. To access the screen from the main menu, press the F9 key. The screen below is the no fault screen. It is displayed when all faults have been cleared.





3.8 FRONT DELIVERY CONVEYOR FAULT

This screen will be displayed if a front conveyor fault occurs. PRS-28 was tripped too long. A pallet jammed going into the loader accumulator or timer #1 preset value is too low. To reset fault, clear PRS-28 then cycle the front delivery conveyor ON/OFF switch. To adjust timer #1 preset value, refer to section 3.8.





3.9 INPUT/OUTPUT STATUS F3

These screens represent the status of all electrical components on the Besser-Matic. They can be used to isolate one component on the machine or to locate an electrical fault on one of the components.

To access this screen from the **MAIN MENU** or **AUTO MENU**, press **F3**. To access it from the **DIAGNOSTIC HELP SCREEN**, press F2.





















3.10 TIMER ADJUSTMENT F3

These four screens allow the operator to visualize and change preset timer values. There are 40 timers which are accessible through these screens. Additional timers are accessible through the DATA TABLE DISPLAY (F6 then F4). See page 3-23 for all timer addresses and descriptions. Each timer has a specific function related to the machine's overall performance. To access this screen from the **MAIN MENU**, press **F2**.



3.10.1 TO MODIFY A TIMER VALUE

- 1. Use F10 key to select page where desired timer is located.
- 2. Once in proper page, use arrows 1 loselect timer to be adjusted.
- 3. Press F6 key; the preset value changes to 0.00.
- 4. Use the 0 to 9 and the . keys to enter new preset value.
- 5. Press ENTER to load the new preset value.
- 6. Repeat steps 1 to 5 if an error occurs.











TIMER	FUNCTION	PRESET VALUE
1.	Pallet jam on the loader side. Switch is located on pallet delivery conveyor in front of loader stacker. If pallet trips PRS-28 longer than set time (delay), a fault will come up and front conveyor will stop.	5 sec.
2.	Controls the beginning of the slowdown of spade from center to outside of stacker entrance stop point.	2.5 sec.
3.	Controls the beginning of slowdown of spade from outside of stacker entrance point to inside stacker stop point.	.5 sec.
4.	Delay start of a turn after transfer stops. Do not adjust this timer.	.5 sec.
5.	Begins slowdown of the turn when turning towards stacker.	3.5 sec.
6.	Begins slowdown of the turn when turning towards rack.	3.5 sec.
7.	Delay start of a transfer after a turn is complete.	0.51 sec.
8.	Begins slowdown of spade before reaching center in when traveling from loader stacker.	3.5 sec.
9.	Do not adjust.	.15 sec.
10.	Do not adjust.	.15 sec.
11.	Delays the start of the lowering of pallets inside the rack.	.5 sec.
12.	Controls the beginning of slowdown of unloader spade from center out to inside of unloader stacker.	4 sec.
13.	Delay start of a turn after transfer stops on unloader side . Do not adjust this timer.	.5 sec.
14.	Begins slowdown of the turn when turning towards rack on unloader side.	3.5 sec.
15.	Begins slowdown of the turn when turning towards stacker on unloader side.	3.5 sec.
16.	Delay start of a transfer after a turn is complete, on unloader side.	.5 sec.
17.	Begins slowdown of spade before reaching center in when traveling from unloader stacker.	4 sec.
18.	Do not adjust.	.15 sec.
19.	Do not adjust.	.15 sec.
20.	Do not adjust.	.5 sec.
21.	Do not adjust.	14 sec.
22.	Do not adjust.	14 sec.
23.	Do not adjust.	6 sec.
24.	Do not adjust.	30 sec.

25 thru 43 Diagnostic timers - Do not adjust..



TIMER	FUNCTION	PRESET VALUE
44	Stops the depalleter in forward position if pusher does not raise in time.	.10 sec.
45.	Amount of time we allow PRS-18 in block machine pallet magazine to be tripped before the depalleter is shut off.	1 sec.
46.	Amount of time PRS-18 is not tripped before depalleter restarts.	5 sec.
47.	Amount of time we allow PRS-68 to be blocked by pallet before the Pallet Return Conveyor (PRC) shuts down.	3 sec.
48.	Time it takes for roll-over, once it starts, to release the LS-642 (roll-over home switch).	1.40 sec.
49.	This timer has to time out before any other function can occur after initial power up.	.75 sec.
50.	Rack conveyor with rack shuttle Delay rack index forward.	0.20 sec.
51.	Rack conveyor with rack shuttle Delay crawler is clear signal at removal.	3 sec.
52.	Rack conveyor with rack shuttle Delay crawler is clear signal at placement.	3 sec.
53.	Rack conveyor with rack shuttle Time PER-109 is allowed to be blocked by the crawler at removal before a fault occurs.	50 sec.
54.	Rack conveyor with rack shuttle Time PER-109 is allowed to be blocked by the loader shuttle before a fault occurs.	5 sec.
55.	Rack conveyor with rack shuttle Time PER-103 is allowed to be blocked by the crawler at placement before a fault occurs.	50 sec.
56.	Rack conveyor with rack shuttle Time PER-103 is allowed to be blocked by the unloader shuttle before a fault occurs.	5 sec.
57.	On standard rack conveyor. Timer to allow gap (between rack) to be ignored by LS-5 - LS-5A.	.3 sec.
58.	Not in use.	0 sec.
59.	Not in use.	0 sec.
60.	Not in use.	0 sec.
61.	Used with Lithibar depalleter. Delays the signal to depalleter that pallet is fully ready for pick up (to allow for things to settle down).	.20 sec.
62.	Delays the start of the unloader accumulator down. Changes space between pallets on the unloading conveyor. More time = larger gap.	2 sec.



5.11 PRODUCT REPORT F4

This menu informs the operator on the production count. The operator may also reset the production count in this menu. To access this screen from the **MAIN MENU**, press **F4**.





3.12 DATA TABLE ACCESS F7

The Data table enables the operator to monitor or change parameters concerning: Control relays, Timer and Counter presets as well as Integer value.

To access the Data table from the **MAIN MENU**, press the **F6** key.

			<u> </u>			101			3r			_		_
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	-	_		-	-	-	-	-	-	-				_
	- WR	KING	٥ŀ	КГ.М.	HE)	R0	1010	1.11	AT1	Y J.	SABL	Ð		
şi çi	ii (š	FƏ MTRO FLAV	4,3		ţ lg	UNTE NUNTE	, Q	FL Inter	INTE	GEN	f	•	F٩	-F30
	5LCS	ELECT F C B 4 B 3 SL(30) CO	ELECT F KEY	LECT F KEY BEL	ELECT F KEY BELIN LANKING OF REAC UNREING OF REAC SLCSDD CONTROL TIMES	ELECT F KEY BELIN B 4 1 3 1 2 1 1 0 0 4 UARKING OF REACHED SLESSIN CONTROL TIMER (C	ELECT F KEY BELOW BIT D BIT D	ELECT F KEY BELOW BIT NUM BIT SIDE DID TO TO TO TO UNRENG OF REACHED PRODUCTION SICSOD CONTROL TUNER COUNTER CO	BIT NUMBER BIT NUMBER BIT NUMBER BIT SI	BIT NUMBER BIT NUMBER BIT STERNES OF REACHED PRODUCTION SUMMER SLESDS CONTROL TIMER COUNTER COUNTERINGS	BIT NUMBER BIT NUMBER BIT SUBER BIT SUBBER BIT SUBER BIT SUBER BIT SUBER BIT	DIT NUMBER DIT NUMBER	ELECT F KEY BELOW BIT NUMBER BIT SUMBER BIT	DIT NUMBER DIT NUMBER DIT NUMBER DIT SUBER DIT NUMBER DIT NUMBER D

From this screen, the operator has access to 6 different menus. See next pages for description of these menus.



To change or monitor any of the parameters, press any of the keys between F2 and F7.

3.12.1 TO MONITOR A SLC500 STATUS (F2):

From the DATA TABLE DISPLAY SCREEN,

1. Press the **F2** key.

The display will read:



2. Enter a status *word* here then press ENTER. A *word* is an address to a memory location for a timer, a counter, an integer value or a control relay. Refer to appendix A for address location.

The screen here shows the word preset value that is stored in the programmable logic controller.

To change a preset value:

- 3. Press the A and then the B key.
- 4. Enter new value.
- 5. Press ENTER.



3.12.2 TO MONITOR A CONTROL RELAY (F3):

From the DATA TABLE DISPLAY SCREEN,

1. Press the **F3** key.

The display will read:

BIT NUMBER 15445352550000000000000000000000000000000	BIT ADDRESS	BIT VALUE
000000001700700 727473757700409020403050700	BIT	NUMBER
	1514131211009 00000000	

2. Enter a *control relay* bit address here then press ENTER. Refer to the logic diagram in appendix A for proper address location.

To change a preset value:

- 3. Press the A and then the B key.
- 4. Enter new value.
- 5. Press ENTER.

The screen here shows the bit value for this logic address.



3.12.3 TO MONITOR OR CHANGE A TIMER PRESET (F4):

From the DATA TABLE DISPLAY SCREEN,

1. Press the **F4** key.

The display will read:



2. Enter a *Timer* address here then press ENTER. (Example here is 0)Refer to appendix A for proper address location and description. The screen here shows the preset value for this timer. NOTE: A time base should be taken into account when establishing true time value.

To change a preset value:

- 3. Press the A and then the B key.
- 4. Enter new value.
- 5. Press ENTER.



3.12.4 TO MONITOR OR CHANGE A COUNTER PRESET (F5):

From the DATA TABLE DISPLAY SCREEN,

1. Press the **F5** key.

The display will read:

CONTER PRESET	0100
BIT BIT	NUMBER
000000000	01100100
WARNING OF REACHED PRO	NUCTION RUNNTITY DISUBLED
F1 F2 F3 F4 F5 PREV SLCSDD CONTRAL TIMESE COUNT MEMU STATUS RELAT PRESET PRESE (S1) CD (LTPRE) CC.PRE	FL F2 F8 F9 FL0 En colnten integer 7 accut. Value 11 (c. Accut. (n)

2. Enter a *Counter* address here then press ENTER. (example here is 5) Refer to appendix A for proper address location and description.

To change a preset value:

- 3. Press the A and then the B key.
- 4. Enter new value.
- 5. Press ENTER.

The screen here shows the preset value for this counter.


3.12.5 TO CHANGE THE ACCUMULATED VALUE OF A COUNTER (F6):

From the DATA TABLE DISPLAY SCREEN,

1. Press the **F6** key.

The display will read:



To change the accumulated value of a counter:

The screen here shows the preset value for this counter.

- 2. Press the A and then the B key.
- 3. Enter new value.
- 4. Press ENTER.



3.12.6 TO MONITOR OR CHANGE A INTEGER WORD VALUE (F7):

From the DATA TABLE DISPLAY SCREEN,

1. Press the **F7** key.

The display will read:



2. Enter a *Integer word* address here then press ENTER.(example here is 7)

The screen here shows the *word* value for this *Integer*.

3. Enter a *word* value then press ENTER (example here is 35)

Refer to the logic diagram in appendix A for proper address location and description.

To change a preset value:

- 4. Press the A and then the B key.
- 5. Enter new value.
- 6. Press ENTER.



3.13 ELECTRICAL PART NUMBERS F5

This screen offers the operator and the service crew a partial list of electrical spare parts available for the BESSER-MATIC at BESSER. Use the phone and/or fax number on the screen to order parts.





SECTION 4 OPERATING THE MACHINE

4.1 OPERATING IN AUTOMATIC MODE.

If operating the machine for the first time, make sure you have set-up the machine as shown in section 2.

- **4.1.1** Pull out the EMERGENCY STOP button.
- 4.1.2 Press the MCR button.
- **4.1.3** Adjust rack depth if necessary. To do so, follow instructions given in section 5.4 of this manual.
- **4.1.4** Set the Unloader, Loader and Rackveyor switches to AUTO. Refer to section 3.0 for switch locations.
- **4.1.5** Set the Front Delivery conveyor, Depalleter & pallet return conveyor and rollover selector switches to AUTO.
- **4.1.6** Press the PUMP button to start pump.
- **4.1.7** Set the Side Shifter switch to AUTO. This switch is located at the Side Shifter Control Station (shown in figure 4.1).
- **4.1.8** Press the Side Shifter AUTO START button.
- **4.1.9** Make sure the EMERGENCY STOP button is pulled.
- **4.1.10** Monitor the automatic screen that is displayed during normal automatic operation. It will indicate rack flow (refer to section 3.2 of this manual).

4.2 OPERATING IN MANUAL MODE.

- **4.2.1** Operating the loader in semi-auto mode (also refer to section 3.3.1)
- **4.2.1.1** Set Loader switch to HAND.
- **4.2.1.2** Use the joystick on Graphic Control Station to operate the spade. Note that the spade will still automatically turn at center-in/center-out.
- **4.2.1.3** Press F7 to lower Accumulator shelves.
- 4.2.1.4 Press F6 to raise Accumulator shelves.

4.2.2 Operating the unloader in semi-auto mode (also refer to section 3.3.2)

- **4.2.2.1** Set Unloader switch to HAND.
- **4.2.2.2** Use the joystick on Graphic Control Station to operate the spade. Note that the spade will still automatically turn at center-in/center-out.
- **4.2.2.3** Press F7 to lower Accumulator shelves.
- **4.2.2.4** Press F6 to raise Accumulator shelves.

4.2.3 Operating the spades in manual mode

The manual mode is only used in troubleshooting situation.

- **4.2.3.1** Set the Loader or Unloader switch to HAND, which ever you wish to operate manually.
- **4.2.3.2** Press and hold F9 to turn spade 180° to rack NOTE: Spade can only turn at center-in or center-out position,LS-19 or LS-26 tripped.
- **4.2.3.3** Press and hold F8 to turn spade 180° to Accumulator. NOTE: Spade can only turn at center-in or center-out position,LS-19 or LS-26 tripped.



4.2.4 Operating the Rackveyor and the Side Shifter in manual mode (also refer to section 3.3.3)

- 4.2.4.1 Set Rackveyor switch to HAND.
- 4.2.4.2 Press F1 to move rack Indexer forward.
- 4.2.4.3 Press F2 to move rack Indexer back (reverse).
- **4.2.4.4** Press F3 to move the Side Shifter forward, towards the Rackveyor.
- **4.2.4.5** Press F4 to move the Side Shifter to the Crawler rails.
- 4.2.4.6 Press F6 to [retract] unlock the Side Shifter locks
- 4.2.4.7 Press F5 to [extend] lock the Side Shifter locks.

- 4.2.5 Operating the Side Shifter in manual mode. Using Side Shifter Control Station (see figure 4.1 below)
- **4.2.5.1** Set Side Shifter switch to HAND.
- 4.2.5.2 Press the AUTO START button to start pump.
- **4.2.5.3** Use Side Shifter joystick to move Forward and Reverse.
- **4.2.5.4** Use the Locks joystick to lock and unlock rail locks.





4.2.6 Rackveyor/Side Shifter speed adjustment

Speed of the Side Shifter, rail locks and Rack Indexer is controlled through valves located on the valve stand shown below.

Speed of each of these components is controlled by two flow controls, one in the front of the manifold block, the other on the back, as shown in figure 4.2 below. One controls the forward movement, the other controls the reverse motion. Turning the flow control counter clockwise will increase speed; turning flow control clockwise will decrease speed.



Figure 4.2 THE VALVE STAND.





SECTION 5 MAINTENANCE

Correct maintenance is largely a matter of good judgment on the part of the operator in charge. The BESSER-MATIC, like any other machine, will do the work required just as long as it is properly maintained. A good preventive maintenance program based on the recommendations below will extend the machine's life at a high level of performance.

5.1 BALL SCREW MAINTENANCE.

5.1.1 General instructions

Ballscrews tend to have a shroud of mystique about them. In simple terms, they are no more than a leadscrew and nut that have recirculating ball bearings. This greatly reduces the friction between the two, which results in lower drive torque requirements, less heat generated, and more predictable longevity. They should be treated with all the care and respect that you would give a ball bearing in terms of handling and maintenance.

With this in mind, you can expect to see some signs of wear show up with the ballscrew in the same way as with the ball bearing. This includes loss of repeatability, increased lash in the system, and increased tool chatter (all symptoms of loss of preload due to wearing of the balls). In a medium duty machine tool, signs of wear will start to surface normally in 3 to 5 years and should be considered the most advantageous time to think about ballscrew repair - before it starts to wear the ball nut and/or the screw. The repair, at this time, may only involve reballing the assembly to return it to its proper preload and possibly replacing the return guides which may have worn pick-up fingers.

More advanced damage or wear may include brinelling (both false and actual), spalling, chipped lands, or worn ball grooves. These types of repair will involve regrinding either the ballscrew or ballnut, providing that the damage has not broken through the heat treatment. In either case, this (sad to say) will cost more and takes longer to do. Some obvious but often overlooked points:

 Lubrication - Keep them lubricated just as you would a bearing. This does not have to be rocket science material. Oil is great, grease is wonderful, and even strained bacon drippings will do in a pinch. Stay away from moly grease or graphite products - they tend to clog the return circuitry. Linear lube - BESSER #090121 is recommended.

- Dirt/Chips Ballscrews don't like either of them. Wipers are the norm in precision screws; be sure they are in good condition. In extreme environments, use protective shields or bellows.
- 3. The dreaded "crash" Disliked by all and hated by machine components. You have two choices: one, accept the fact that they are going to happen and plan for them by using torque limiting, machine saving clutches, or two, hope they don't happen. When they do, examine the ballscrew and support bearings and witness classic brinelling and then hope it can be repaired.

5.1.2 Instructions for inspecting ball bearing screw

COMPONENT INSPECTION

Ball bearings - If there is more than one circuit in the ball nut, count the bearing balls (C) in each of the separate containers to be sure each has the same number (within a variation of three balls.)

Check random samples (about 1/4 of the balls for a circuit) for the following:

- 1. True roundness .0001 maximum variation.
- 2. Signs of scuffing or fish scaling.
- 3. More than 0.0001 inch diameter variation between balls of the same circuit.

Where the random sampling shows balls out of round, signs of scuffing or variations of diameter in excess of 0.0001 inch, or short count in any circuit, all balls in the unit must be replaced with a complete set of new bearing balls. (Ball Kits are available from Besser Company)



5.1.3 Instructions for inspecting ball bearing screw for wear

CAUTION:

In order to insure proper operation and long life of the serviced assembly, it is imperative that the diameters of all the replacement balls do not vary in excess of .005" [.125mm]. If Besser Ball Kits are not used for service, make certain that balls used meet the above specifications. (Note: use only chrome alloy steel balls - carbonized balls or carbon steel balls will not provide adequate life.)

Pick-up fingers and deflectors. Ball bearing screws use two methods of directing the bearing balls into return circuit ball guides: -deflectors which are yoke shaped units located within the ball nut and pick-up fingers integral with the ball guides.

5.1.3.1 Deflectror yokes (see figure 5.1)

Ball nut assemblies using deflector yokes (G) are characterized by what appears to be threaded studs extending out of the ball nut in the area of the return circuits. Lock nuts are used as clamp fasteners (F) and hold the ball guide clamp (E) securely in place.

To remove yoke deflectors (G) from the ball nut, it is necessary to remove the ball nut (A) completely from the screw shaft (1). This permits the deflector to be removed from the ball nut.

- **Note:** Mark the two deflectors removed from the opposite ends of the ball nut so you can use them as reference. Examine the ends of the deflection yokes for wear or brinelling. Wear can be determined by comparison with the unused ends of the two outside yokes. Since these ends have not been subjected to wear from balls, they are in a like-new condition. Where wear or brinelling are evident, it is best to replace the deflector yokes with new ones.
- **Note:** If the assemblies have had extended use, it is wise to replace all low cost items with new parts (i.e. bearing balls, ball guides, deflector yokes).

5.1.3.2 Pick-up fingers (See figure 5.1)

Inspect the pick-up fingers which consist of short extensions at the end of the ball return guides (D).

Replace with new guides, if a ball brinell impression appears on the tip.

Remove any burrs on the fingers.

Note: If the ball guides were distorted during removal, replace with new guides.

5.1.3.3 Ball nut (A)

Inspect the internal threads of the ball nut for signs of excessive wear, pitting, gouges, corrosion, spalling or brinelling in the ball groove area. On large ball nuts, running the tip of your finger along the groove which is accessible will enable you to detect a secondary ridge in the ball groove when wear is excessive or brinelling has occurred. (The extended lead of a mechanical pencil can also be used as a groove probe). If inspection indicates any of these flaws, all components of the ball nut assembly should be replaced.

When ball nut is usable proceed with reassembly.

Note: Clean all components with a commercial solvent and dry thoroughly before reassembling.

5.1.4 INSTRUCTIONS FOR DISASSEMBLY OF BALL BEARING SCREW

CAUTION:

Ball Bearing Screw disassembly should be attempted only after being positive that the ball screw assembly is at fault. Disassembly should be done only by personnel familiar with ball bearing screw principles.

5.1.4.1 General inspection Screw Shaft

Inspect the shaft ball grooves (2) for signs of excessive wear, pitting, gouges, corrosion, spalling or brinelling. Normally, where any of the above conditions exist, it is less expensive to replace with a new screw shaft than to rework the old. If, in your opinion, the screw can be reworked, return to your supplier for final evaluation.





Figure 5.1 BALLSCREW.



5.1.5 INSTRUCTIONS FOR DISASSEMBLY OF BALL BEARING SCREW

Backlash:

If the screw appears to be still usable, then inspect assembly for looseness as follows:

Secure the screw shaft (1) (rigidly) in a table clamp or similar fixture.

Make sure that the screw shaft cannot rotate.

Push firmly on the ball nut assembly (A) first in one direction and then in the opposite direction. The axial movement of the ball nut is the backlash (this reading can be taken with a dial indicator)

- **Note:** Make sure that neither member rotates while the readings are taken.
- Note: Measure backlash at points of maximum usage or wear.

5.1.5.1 Disassembly

At this point, if the screw appears usable, and the backlash is excessive, the unit should be disassembled for further inspection.

There are two basic types of recirculation systems in the standard b/b screw. The disassembly and inspection for each is noted.

Note: Have a clean container handy (tote tray, cardboard box, etc.) for each ball return circuit of the nut.

A piece of clean cloth approximately a yard square should be placed on the work table and gathered around the edge to form a pocket to retain the balls.

Place the b/b screw assembly over cloth and remove ball guide clamp (E).

- **Note:** Where more than one return circuit ball guide is held in place by a single clamp (E), secure each remaining ball guide (D) with a strip of tape around the diameter of the nut (A)
- **CAUTION**: to prevent accidental ball guide removal before you are ready for that circuit.

Remove both halves of the ball return guide (D), simultaneously to prevent distortion to either half. Catch all the bearing balls (C) from this circuit on the cloth by rotating the screw or ball nut slowly. Place the removed components into a container.

Identify the container, the ball guide, and the circuit of the ball nut so the components can be reassembled in the same circuit from which they were removed.

Repeat for each circuit. (On unit having yoke deflectors (G), ball nut must be rotated to remove from screw since deflectors engage loosely in screw grooves and act as a thread.)

5.1.6 INSTRUCTIONS FOR RE-ASSEMBLING BALL BEARING SCREW

5.1.6.1 Reassembly

Where the ball nut is equipped with deflector yokes (G), install these and secure temporarily by running the lock nut down the studs and tightening slightly.

Position the ball nut on the screw shaft (Ball nuts with deflector yokes will have to be screwed on. Other ball nuts should slide up the screw shaft without trouble.)

Using dowels with an O.D. approximately equal to the diameter of the bearing balls, center the ball nut grooves (B) with the shaft ball grooves (2) by inserting dowels into each of the ball nut return circuit holes.

Remove the second dowel from one end.

With the ball return holes up, fill the circuit with bearing balls from the container corresponding to that circuit.

Note: Turning the screw in the ball nut will help to feed the balls into the groove.

When the circuit is full, the balls will begin to lift the end dowel from its position. To be sure there are no voids and lightly tap the top bearing ball and see if the end dowel moves.

The remaining balls in the container should fit into one of the halves of the return guide with space for about two to four balls left.

Note: There must be some free space in the ball circuit so the balls will roll and not skid. Do not try to add extra balls into circuit.

Place a dab of bearing grease at each end of the half return guide to hold the balls in place.

Take the other half of the return guide and place over the ball nut circuit you have filled with bearing balls and insert the two ends of the ball guide into the respective holes in the ball nut.



Seat by tapping gently with a rawhide or plastic mallet.

Note: Where more than one ball circuit must be filled in , tape the ball return circuit guide to the ball nut to prevent accidental removal.

Repeat the filling procedure for the remaining ball circuits.

With all ball circuits filled and all return guides in place, secure the return guides with the retaining clamp.

CAUTION:

Care should be taken to insure that balls are not accidentally trapped between circuits in units having pick-up fingers. (In deflector type design - the deflectors fill this void space.)

Note: Be sure screw and ball nut are properly lubricated. (see Lubrication Drawing No. 252782)

5.1.6.2 Assembly inspection

Wrap tape around the ball grooves at the ends of the screw shaft to prevent the ball nut from accidentally rolling off.

Inspect the assembly for free movement of the ball nut along the entire stroke. There should be no binding, squeal, or roughness at any point.

5.1.6.3 Checking play or backlash

Backlash from 0.001" - 0.006" is acceptable.

5.1.6.4 Reducing backlash

Backlash can be reduced by replacing all the bearing balls with a larger size. If the diameters of the bearing bails are increased by 0.001 inch, backlash is decreased by 0.003".

5.2 DODGE/MASTER GEAR BOXES.

Lubrication is extremely important for satisfactory operation. The proper oil level must be maintained in the gearcase at all times. The correct level is indicated by the red head pipe plug. Frequent inspections with the unit not running (preferably when warm), should be made by removing the plug to see that the level is being maintained. If low, (without replacing oil level plug), add lubricant through one of the proper holes until it comes out the oil level hole. Replace the oil level plug securely. The satisfactory performance of gears and bearings in gear-motors and reducers depends on clean lubricant, free from dust, grit, sludge, and moisture. Depending on operating conditions, the lubricant will eventually become contaminated and should be replaced periodically. When first put into operation, the lubricant in new gearcases becomes contaminated with grit and metal particles from the run-in period.

Lubricant should be drained, the gearcase flushed with mineral spirits and refilled after the first 250 hours of operation; then every 1500 hours or six months thereafter, whichever occurs first. (Normal operation is running 16 hours per day in 80°F. [27°C] ambient). More frequent oil changes may be necessary when running continuously at high temperatures. Use only recommended lubricants as listed in the manufacturer's manual and refer to section 5.10, Lubricant Specifications.

Please read the manufacturer's manual for more important maintenance tips.

5.3 CONE DRIVE GEAR BOXES. (2 TURN MOTORS ON SPADE)

5.3.1 MAINTENANCE

- **5.3.1.1** The reducer oil level should be checked weekly and the recommended oil added as required to maintain the proper oil level.
- **5.3.1.2** The oil should be changed as outlined in the lubrication section.
- **5.3.1.3** All grease fittings should be lubricated with the recommended grease once per month.
- **5.3.1.4** The reducer, particularly finned areas and fan covers, should be kept clean to allow maximum heat dissipation.
- **5.3.1.5** All reducer and foundation bolts should be checked for tightness after three (3) months of service and annually thereafter.
- **5.3.1.6** If a reducer has to be repaired, contact Besser Company for detailed instructions, blueprints, parts lists, etc. If it is necessary, field service is available.
- **5.3.1.7** If a reducer is to be returned, contact Besser Company for instructions.



5.3.2 LUBRICATION DATA

Lubrication is very important for successful operation of these drives and reducers. Inadequate lubrication can result in increased power consumption, added maintenance and gearset failure. Please review the following recommendations and the manufacturer's manual. Besser recommends only those lubricants listed in the manufacturer's manual.

5.3.2.1 Type of oil

Lubricating oils for use in gear units should be high quality, well-refined, steam cylinder petroleum oils. They must not be corrosive to gears, to ball, roller or sleeve bearings; they must be neutral in reaction; free from grit or abrasive; and have good defoaming properties. As they may be subject to high operating temperatures, they must have good resistance to oxidation. For worm-gears, additions of 3 percent to 10 percent of acidless tallow or similar animal fats are desirable.

Note: If Mobil SHC-634 is used as recommended in the Lubricant chart (section 710) for normal operation (viscosity group 318.62), the time for changing the lubricant may be extended. Drain, flush, and refill after the first 1500 hours of operation; then every 5000 hours thereafter. (SHC is a registered trademark of the Mobil Corporation).

5.3.2.2. Ambient Temperature

The oils shown on the list of approved lubricants shipped with all Cone Drive gearsets and speed reducers are for use in an ambient temperature range of approximately 15° to 100°F [-9° to 38°C] with the low end of the range depending on the pour point of the specific oil used. If the ambient temperature will be below or above this range please contact Besser Company for specific recommendations on proper lubricant as well as proper oil seal and shim materials.

5.3.2.3 Sludge

It is necessary that the oil be clean and free from sludge at all times to obtain long life from gear unit. Sludge in gear units may be caused by excessive heat, from dust and dirt and other contaminates and by the presence of moisture or chemical fumes. Therefore, every precaution should be taken to prevent water and foreign particles from entering the gear case.

5.3.2.4 Oil change

Oil change should be carried out after 5000 hours of operation or once per year, whichever occurs first. These change intervals are recommended for units operating under favorable conditions. Where operating conditions are severe, such as a rapid rise and fall in temperature of the gear case with accompanied sweating of the inside walls and resulting formation of sludge, or where operation is in moist or dusty atmospheres, or in the presence of chemical fumes or extended running at sump temperatures in excess of 180°F [82°C], It may be necessary to change the oil at intervals of one to three months. It is recommended that a sampling program be established with your lubricant manufacturer or with Besser Company where reducers are exposed to the severe operating conditions, mentioned above.

5.3.2.5 Oil Level

These drive reducers are furnished with a bronze colored hex head pipe plug to indicate oil level. An oil level tag is affixed to the unit near the oil level indicator. Oil level should always be checked with the unit stopped. Estimated oil capacities for standard reducers are listed on the following page.

5.3.2.6 Grease Packed Bearings

Bearings that are at least partially submerged in oil or oiled by internal oil scoops do not require special maintenance. However, bearings that are not lubricated as above require grease lubrication. Grease fittings and internal retainers are furnished when required. They should be greased with a high quality lithium base NLGI #2 or NLGI #3 bearing grease at normal maintenance intervals.



5.4 TORQUE LIMITER



Figure 5.2 TORQUE LIMITER.

5.4.1 TORQUE ADJUSTMENT

- **5.4.1.1** Torque should be adjusted when the accumulator chain starts to slip and the shelves angles do not stop at a precise location as desired. (see section 4 Initial set-up).
- **5.4.1.2** To add torque, tighten adjusting bolts (item A in figure 5.2) equally around load plate until torque limiter holds load and accumulator chain stops perfectly. Tighten bolts equally in small increments. Do not completely flatten the disk springs.
- **5.4.1.3** When making trial run to test the torque limiter, use fully loaded accumulators.
- **5.4.1.4** After the final adjustment, lace the adjusting bolts together with the soft steel wire which is supplied with the torque limiter.

5.4.1.5 Maintenance

At periodic Intervals, or if desired torque is not maintained, inspect Torque Limiter for presence of oil, grease, moisture, or corrosion on the driving surfaces and for proper setting of spring load. Clean and adjust as required (friction facings and bushings are replaceable parts. Contact Besser Company for part orders).



Figure 5.3 WARNER BRAKE.

5.5 WARNER BRAKES

Warner brakes are used on the Accumulator gear motors, spade gear motors and pallet transfer gear motor and are mainly used to stop the motor when a precise stop is necessary. These brakes are adjustable. The Warner brakes on the turn and transfer gear motors are adjustable in the panel (see panel in appendix B) at 90 V. To adjust, first locate the controls in the panel; the Transfer brake control and the Turn brake control. Then adjust voltage by turning voltage button on each control until desired voltage is obtained. The remaining Warner brakes on the Accumulator motors are adjustable through a multi-voltage power supply at motor also at 90 V.(figure 5.3 above shows one of the Accumulator motors with adjustable multi-voltage power supply). To adjust, open cover (shown by arrow) and use screwdriver to adjust to 90V. 90V DC is nominal. ±10% may be used if brake is dragging.



CAUTION: This is an initial set-up! Do not use this adjustment if brakes begin to wear.



5.6 DAILY SERVICE SCHEDULE

COMPONENT	REF.	CHECK FOR	ACTION
Spades, Accumulators, Rackveyor, Side Shifter, Conveyors		Guards in place	
		Sensors working	Adjust or replace
		Safety signs	Clean or replace



5.7 WEEKLY SERVICE SCHEDULE

5.7.1 CHECKS ON UNLOADER SPADE

COMPONENT	REF.	CHECK FOR	ACTION
Ball screw	5-1	Dirt or wear	Clean or replace
Turn gear box	2-4	Oil	Add
Turn brake	2-4	Wear	Replace
Taperlock bushing on turn link	2-4	Tension	Tighten
Transfer gear box	2-4	Oil	Add
Transfer brake	2-4	Wear	Replace
Transfer V-belts	2-4	Tension or wear	Tighten or replace

5.7.2 CHECKS ON LOADER SPADE

COMPONENT	REF.	CHECK FOR	ACTION
Ball screw	5-1	Dirt or wear	Clear or replace
Turn gear box	2-4	Oil	Add
Turn brake	2-4	Wear	Replace
Taperlock bushing on turn link	2-4	Tension	Tighten
Transfer gear box	2-4	Oil	Add
Transfer brake	2-4	Wear	Replace
Transfer V-belts	2-4	Tension or wear	Tighten or replace
Transfer guide rollers		Adjustment	Adjust
Elevator gear box		Oil	Add
Elevator brake		Wear	Replace
Elevator V-belts		Tension and wear	Tighten or replace

5.7.3 CHECKS ON LOADER ACCUMULATOR

COMPONENT	REF.	CHECK FOR	ACTION
Drive chain		Tension	Adjust
Gear box	5-8	Oil	Add
Elevator brake	5-8	Wear	Replace
Elevator chain		Tension	Tighten
Taperlocks		Tension	Tighten

5.7.4 CHECKS ON UNLOADER ACCUMULATOR

COMPONENT	REF.	CHECK FOR	ACTION
Drive chain		Spring tension	Adjust
Gear box	5-8	Oil	Add
Elevator brake	5-8	Wear	Replace
Elevator chain		Tension	Tighten
Taperlocks		Tension	Tighten



5.7.5 CHECKS ON FRONT DELIVERY CONVEYOR.

COMPONENT	REF.	CHECK FOR	ACTION
Drive chain		Tension	Adjust
Gear box		Oil	Add
Conveyor chain		Tension	Adjust

5.7.6 CHECKS ON UNLOADING CONVEYOR.

COMPONENT	REF	CHECK FOR	ACTION
Drive chain		Spring tension	Adjust
Gear box		Oil	Add
Conveyor chain		Tension	Adjust
Brake		Adjustment	Adjust
Chain rails			

5.7.7 CHECKS ON RACKVEYOR.

COMPONENT	REF.	CHECK FOR	ACTION
Guide rollers		Lubrication	Lubricate
Cam followers		Lubrication	Lubricate
Pusher springs		Tension	Adjust

5.7.8 CHECKS ON SIDE SHIFTER.

COMPONENT	REF.	CHECK FOR	ACTION
Hydraulics		Leaks	Tighten and replace

5.7.9 CHECKS ON PALLET TRANSFER CONVEYOR.

COMPONENT	REF.	CHECK FOR	ACTION
Drive chain		Tension	Adjust
Gear box		Oil	Add
Transfer chain		Tension	Adjust
Brake		Wear	Replace
Clutch roller		Should roll in 1 direction	Adjust



5.8 MONTHLY SERVICE SCHEDULE

5.8.1 CHECKS ON UNLOADER SPADE

COMPONENT	REF.	CHECK FOR	ACTION
Turn chain		Condition	Replace
Bearings in turn links		Wear	Replace
Elevator ball screw		Wear	
Ball screw support bearing		Wear	
Relays and timers		Working condition	Replace

5.8.2 CHECKS ON LOADER SPADE

COMPONENT	REF.	CHECK FOR	ACTION
Turn chain		Condition	Replace
Bearings in turn links		Wear	Replace
Elevator ball screw		Wear	
Ball screw support bearing		Wear	
Relays and timers		Working condition	Replace

5.8.3 CHECKS ON LOADER ACCUMULATOR

COMPONENT	REF.	CHECK FOR	ACTION
Torque limiter		Slipping	Adjust
Shaft bearing		Wear	Replace
Elevator chains		Lubrication	Grease
Shelf angles		Bent, wear	Replace
Relays and timers		Working condition	Replace

5.8.4 CHECKS ON UNLOADER ACCUMULATOR

COMPONENT	REF.	CHECK FOR	ACTION
Torque limiter		Slipping	Adjust
Shaft bearing		Wear	Replace
Elevator chains		Lubrication	Grease
Shelf angles		Bent, wear	Replace
Relays and timers		Working condition	Replace



5.9 QUARTERLY SERVICE SCHEDULE

5.9.1 CHECKS ON UNLOADER SPADE

COMPONENT	REF.	CHECK FOR	ACTION
Transfer tracks		Alignment or wear	Align or replace
Elevator tracks		Alignment or wear	Align or replace

5.9.2 CHECKS ON LOADER SPADE

COMPONENT	REF.	CHECK FOR	ACTION
Transfer tracks		Alignment or wear	Align or replace
Elevator tracks		Alignment or wear	Align or replace

5.10 LUBRICANT SPECIFICATIONS

COMPONENT	RECOMMENDED LUBRICANT
Drive chains	All purpose grease
Conveyor chains	Dry lubricant
Accumulators, transfer spades and conveyor gear boxes,	Shell Omala 320 ISO 320 (8 motors X 1.5 gal. each)
Bearings	
Spade turn motor gear boxes	Mobil SHC 634 (2 motors X 1.5 gal. each)
Hydraulic power unit	Hydraulic oil Shell Tellus 46 ISO 3448



SECTION 6 TROUBLESHOOTING

THIS SECTION WILL HELP YOU SOLVE TWO KINDS OF PROBLEMS:

- 1. Electrical problems. Those problems are diagnosed by the Small Logic Controller (see section 5) and will show up on the screen as outlined in section 6.1 and 6.2.
- 2. Mechanical problem. Some of the more common mechanical problems are listed in section 6.3.

6.1 LOADER SPADE FAULT SCREEN F8

This screen will be displayed every time a fault occurs on the loader spade. The screen will indicate the last known direction of travel. This is the direction of travel of the spade as it stopped by a fault. Also, the screen displays a series of items to check for troubleshooting. To access the screen from the main menu, press the F8 key.



Last direction of travel

SECTION 6 TROUBLESHOOTING



























SECTION 6 TROUBLESHOOTING







6.2 UNLOADER SPADE FAULT SCREEN F8

This screen will be displayed every time a fault occurs on the unloader spade. The screen will indicate the last known direction of travel. This is the direction of travel of the spade as it stopped by a fault. Also, the screen displays a series of items to check for troubleshooting. To access the screen from the main menu, press the F9 key.





SECTION 6 TROUBLESHOOTING







SECTION 6 TROUBLESHOOTING











SECTION 6 TROUBLESHOOTING







SECTION 6 TROUBLESHOOTING







6.3 POSSIBLE MECHANICAL FAULT

Here is a list of possible mechanical problems related to the MS-9

PROBLEM	POSSIBLE CAUSE	SOLUTION
Lower spade does not move up and down.	Roll guides on lower spades are worn out and spade does not slide up and down.	Replace Roll guides.
Spade does not reach racks; it keeps goes back and forth with out reaching racks.	Center limit switch is getting second input because it is loose and switch arm swings back.	Adjust switch arm.
Lower spade has lost its setting.	Loosen cam box	Tighten cam box correctly.
	Rocks or dirt on cam box.	Clean cam box
	Worn switch actuator on cam box.	Replace switch actuator.
A shelf is missing a pallet.	Prox-switch can't read shelf.	Replace prox-switch.
	Accumulator chain too loose.	Tighten chain.
	Torque limiter too loose.	Adjust torque limiter.
	Warner brake not adjusted correctly.	Adjust Warner brake.





APPENDIX A ELECTRICAL DIAGRAMS

Because of different voltages, models and customer's control preferences, we have not included the electrical wiring diagrams, list of materials and electrical information in this manual.

The electrical wiring diagrams of your machine and other electrical information are supplied with your equipment, depending of the type of controls and electrical system.



APPENDIX B ELECTRICAL PANEL

