

Ploog Engineering Co., Inc.

814 N. Indiana Ave.
Crown Point, IN 46307 USA
219-663-2854

Owner / Operator Manual for M100-3 Compactor ASTM D698 & D1557, AASHTO T99 & T180



M100-3 Compactor, shown with optional M100-B Safety Cage

SAFETY REMINDER

Please read these instructions thoroughly to become familiar with the operation of the machine, before attempting to run it.

The machine will not operate with the doors open.
It has an electrical door interlock.

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Instructions for Mechanical Compactor M100-3 (starting with serial no. M100-301143692)

Before attempting to run this machine, please read these instructions thoroughly to become familiar with the operation of the machine.

The machine will not operate with the doors open. It has an electrical door interlock.

The mechanical compactor closely duplicates hand compaction methods. It is suitable for standard (ASTM D698, AASHTO T99) or modified (ASTM D1557, AASHTO T180) Proctor compaction tests with adjustment for 12" or 18" drop and accommodating 4" or 6" inside diameter molds. Test results show that the Ploog Compactor can give results within 1% when compared with hand compaction.

INITIAL SET-UP

It is recommended that this compaction machine be bolted to a concrete floor or mounted on a concrete base. We recommend a base approximately 15" wide by 24" deep by 12" to 18" high. The machine should be firmly bolted in place. The machine's four 5/8" diameter mounting holes are 10-3/8" apart in width and 14-1/2" apart in depth intended for use with 1/2" diameter studs and nuts. The machine should be set level, checking that the turntable is level in both directions.

For standard 120 Volt models, a 20 Amp receptacle with an on/off switch should be provided by the user (10 Amp for 230 Volt models). The machine should be de-energized when not in use.

Remove the steel shipping pipe plug in the top of the gear reducer (8), and install the blue breather plug instead.

TURNTABLE MECHANISM

The turntable mechanism assembly is fitted to and contained within the base of the machine. The turntable is rotated by a stepping motor, and begins to rotate as the hammer is being lifted. The amount of rotation of the turntable is controlled by a time-delay circuit. The adjustment knob for the length of the time delay is on the side of the control box. Turn the knob clockwise for more rotation or counter-clockwise for less. Before starting the machine the first time, turn the knob all the way to the left. Start the machine without a hammer, turn the knob slowly to the right until the desired amount of index is accomplished. The knob setting can be left set, except for only minor adjustments.

OPERATION

For compaction with 4" mold.

When using a 4" mold, install the round hammer. The round hammer without the surcharge weight weighs 5.5 lb (e.g. for standard Proctor 12" drop). To increase the weight of the hammer to 10 lb (e.g. for modified Proctor 18" drop), install the surcharge weight and hold in place with the surcharge weight screw. (See hammer instructions below.)

The height change cam can be set for 12" or 18" drop. The machine is shipped from the factory with the cam in the 18" drop position. (See height change mechanism instructions below.)

Swing the yellow safety arm (5) under the hammer and place the mold in position on the turntable and clamp securely. Verify the turntable base is adjusted to the correct position for the 4" mold to allow appropriate clearance between the hammer and the inside diameter of the mold. (See turntable adjustment instructions below.)

With the yellow safety arm (5) under the hammer place the first layer of soil in the mold. Then swing the yellow safety arm (5) away from under the hammer. Set the counter to 24. (See predetermining counter instructions below.) This will ensure that 25 blows are struck, after which the machine will automatically stop. Press reset, and then press the

green run button. Immediately the carriage will rise lifting the hammer until such time as the hammer lifting catch is withdrawn by the upper cam on the cam bar. The hammer will fall, and as the carriage completes its cycle it will be picked up again. As the carriage rises, lifting the hammer with it, the turntable rotating switch is actuated, which actuates the timing circuit, which actuates the turntable.

The machine will continue to run until such time as 25 blows have been struck. When the machine stops, the hammer should be lifted by means of the jog button, the yellow safety arm (5) moved under the hammer, and an additional layer of soil placed in position in the mold and roughly leveled. Then swing the yellow safety arm (5) away from under the hammer. Reset the counter by pressing the reset button and repeat as above. Continue until all layers have been compacted.

For compaction with 6" mold.

When using a 6" mold, install the pie hammer. The pie hammer without the surcharge weight weighs 5.5 lb (e.g. for standard Proctor 12" drop). To increase the weight of the hammer to 10 lb (e.g. for modified Proctor 18" drop), install the surcharge weight and hold in place with the surcharge weight screw. (See hammer instructions below.)

The height change cam can be set for 12" or 18" drop. The machine is shipped from the factory with the cam in the 18" drop position. (See height change mechanism instructions below.)

Swing the yellow safety arm (5) under the hammer and place the mold in position on the turntable and clamp securely. Verify the turntable base is adjusted to the correct position for the 6" mold to allow appropriate clearance between the hammer and the inside diameter of the mold. (See turntable adjustment instructions below.)

With the yellow safety arm (5) under the hammer place the first layer of soil in the mold. Then swing the yellow safety arm (5) away from under the hammer. Set the counter to 55. (See predetermining counter instructions below.) This will insure that 56 blows are struck, after which the machine will automatically stop. Press reset, and then press the green run button. Immediately the carriage will rise lifting the hammer until such time as the hammer lifting catch is withdrawn by the upper cam on the cam bar. The hammer will fall, and as the carriage completes its cycle it will be picked up again. As the carriage rises, lifting the hammer with it, the turntable rotating switch is actuated, which actuates the timing circuit, which actuates the turntable.

The machine will continue to run until such time as 56 blows have been struck. When the machine stops, the hammer should be lifted by means of the jog button, the yellow safety arm (5) moved under the hammer, and an additional layer of soil placed in position in the mold and roughly leveled. Then swing the yellow safety arm (5) away from under the hammer. Reset the counter by pressing the reset button and repeat as above. Continue until all layers have been compacted.

HAMMER INSTRUCTIONS

The hammer with the 2" diameter round foot and the hammer with the pie foot each weigh 5.5 lbs. To change either hammer to 10 lbs, a surcharge weight (417) is added to the hammer. It is inserted into the top of the hammer and held in place with a socket head capscrew (417.1). NEVER DROP THE HAMMER ON THE TURNTABLE OR IN AN EMPTY MOLD.

One of the two hammers should be inserted into the hammer cage, the round type for the 4" mold or the pie foot hammer for the 6" mold. In order to perform this operation proceed as follows:

1. By means of the jog button located on the right hand side of the machine, jog the machine until the carriage (30) is on a downward travel, i.e., the brass block (13) is on the left side of the carriage, so that the hammer catch (33) is in its rearward position. The hammer catch is located at the top of the carriage. (Also see notes on the hammer lifting mechanism.)
2. Open the metal doors by means of the front latch.
Remove the front cage bar by pulling down the spring loaded retaining pin at its top and lift out. Insert the hammer with foot down in to the hammer cage from the front of the machine. Slide the hammer down slowly. DO NOT DROP, taking care not to trap fingers. Replace front cage bar. Close metal doors and secure latch.
3. The hammer can now be lifted by manipulating the jog button, until it is high enough to swing the hammer safety device under the hammer opening, then soil can be added to mold.
4. Whenever a mold is being changed or inspected, run the hammer up in the machine by means of the jog button. Then swing the hammer safety arm (5), painted yellow, under the hammer opening. If the hammer should float down from its own weight, it will come to rest on the safety device. When ready to proceed with the testing, just jog the hammer up and swing the safety arm out of the way to the right.

HAMMER LIFTING MECHANISM

A ½ hp electric motor (7) is fitted with a gear reducer (8) which drives an endless chain. A link (16) on this chain (19) carries a spindle (14) which fits into a brass block (13). The brass block slides in a horizontal groove in the carriage (30). The carriage slides up and down on two steel guide bars (51). The cam bar (52) has a slot at the upper end in which the upper cam (57) is located. In a slot at the lower end, the lower cam (58) is located. It is spring loaded. With the carriage in the low position, the spring loaded cam will push the catch (33) into the hammer grooves. The carriage will carry the hammer up where the top cam pulls the catch back and drops the hammer.

The hammer is guided in its free fall by three vertical rods (50, 45). The removable rod (45) acts as a guide to keep the pie hammer from rotating. The hammer must free-fall. The front cage bar is adjustable. This can be done by moving the adjusting plates, top (62) and bottom (65), in or out. Re-tighten screws.

HEIGHT CHANGE MECHANISM INSTRUCTIONS

The upper cam (57) is located on the cam bar (52) at the rear of the carriage. The cam disengages the catch (33) and causes the hammer to fall. There are two positions in which this cam can be placed. The lower position will release the hammer from a 12" drop and the upper position will release the hammer from an 18" drop. To change the cam from one position to another, it is only necessary to remove the top cam screw (61). The cam is inserted in a slot and can be pulled out by hand. Insert cam in the desired position and replace the screw. The slot in the upper cam is meant for calibration adjustment.

TURNTABLE ADJUSTMENT INSTRUCTIONS, WHEN CHANGING MOLD SIZES

Place a mold on the turntable. A 1/4" diameter pin extends from the center of the turntable. After locating the mold in position bolt it down to the turntable. Two sets of holes are located on the turntable for mounting the 4" or 6" molds.

When changing molds from 4" to 6" or vice versa the whole turntable base (71) must be moved. Loosen the four hex bolts (74) on the turntable base. The whole assembly now can be moved in or out for adjusting the clearance between the hammer and the inside diameter of the mold. This adjustment must be made when changing from one mold size to another. The clearance should be about 0.1 inch (2.5 mm). Then tighten bolts (74) again.

PREDETERMINING COUNTER INSTRUCTIONS

When the machine is energized (your wall switch) the counter will light up showing "00". At this point the jog button is operative. Set the counter by pressing "X10" for tens, and "X1" for single digits, and then press "reset". Now the counter is set.

When the run button is pressed, the machine will start up, and when the counter shows "00" the machine will stop. To repeat the same number of blows, only the "reset" needs to be pressed. When the hammer is picked up by the jog button, or being held up to add more soil, the counter should be set to one count less than the desired count. When the machine is not in use, the power should be turned off (your wall switch).

CHAIN ADJUSTMENT

With the carriage (30) in its lowest position, one should be able to move the chain (19) about 1/4" sideways. If it gets to be a lot more, it can break the microswitch (100). To adjust the chain, loosen the four bolts (95) holding the idler (90). Push the idler (90) up with the 1/4" chain adjustment screw (98) under the idler shaft. Then tighten bolts (95) again.

DOOR SWITCH

The door switch (100.1) is a safety feature which de-energizes the drive motor (7) and the turntable motor (72) when the doors (1) are open. Neither the jog button or the run button operate when the doors are open.

CALIBRATION

The calibration procedure is described in ASTM D2168, method B. However, in paragraph 6.5 of ASTM D2168 adjust the height instead of the weight. Adjustment is made with the upper cam (57) as described in the height change mechanism instructions above. Ploog also offers the following, sold separately:

- M125, Calibration Kit with Micrometer and 50 Lead Cylinders
- M130, Additional 100 Lead Cylinders
- M150, Manual Rammer, 5.5 lb x 12"
- M151, Manual Rammer, 10 lb x 18"

MOLDS

The following molds are made special for our compactors:

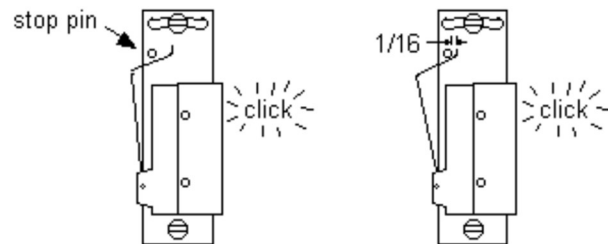
- S1410, 4" mold
- S1415, 6" mold
- S1411, 4" split mold
- S1416, 6" split mold

MICROSWITCH REPLACEMENT INSTRUCTIONS

Remove hammer and de-energize (your wall switch) the machine.

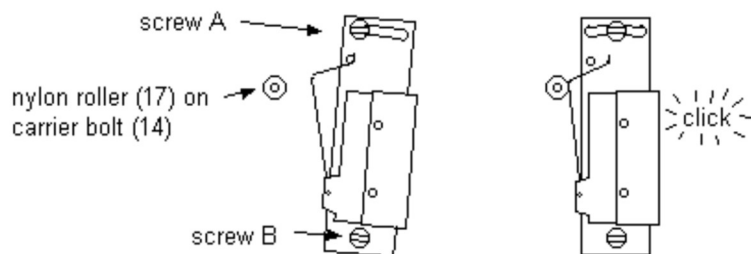
Replacement

Remove defective microswitch (100) from bracket (101), and install new microswitch (100) on bracket (101). Check the new microswitch by pressing the lever down by hand to where you hear or feel a click (see figure). Release the lever slowly, you should hear or feel another click. At this point the lever should be about 1/16" away from the stop pin.



Proper adjustment of switch bracket

Loosen screws A and B slightly. Move the switch bracket all the way to the right. By means of the jog button, manipulate the carrier bolt (14) to the highest point on the switch lever (see figure). Now move the switch bracket to the left, until you hear a click in the switch. Move it about 1/16" to 3/32" beyond this point, further to the left. Then tighten screws A and B. After this is done the machine is ready to run. Note, there must be a nylon roller (17) on the carrier bolt (14). Also, the chain should not be too loose and flapping.



RECOMMENDED MAINTENANCE

Daily

1. On each day that the compactor will be used, before using it perform the following:
 - A. Apply a drop of light oil to the hole in the catch (33) and verify the catch moves freely (3-in-One Multi-Purpose Oil, or equal). Also lubricate the two grease fittings (13 brass block and 16 carrier link) with a grease gun, using a good grade ball bearing grease (Mobilgrease XHP 222 or equal).
 - B. Wipe the guide bars (51) clean with a rag or paper towel (no oil or grease).
 - C. Verify proper clearance between the hammer and the front cage bar (approximately 1/32" clearance). See "Hammer Lifting Mechanism" section in this manual.
2. At the end of each day of use, brush off any excess dirt from the turntable area.
(Do not wash with a water hose or flush with water. It will rust.)

Monthly

1. Verify proper chain adjustment. See "Chain Adjustment" section in this manual.
2. Apply a spray type lubricant to the drive chain (19) (WD-40 Multi-Use Product, or equal).

Every Two Years

1. Verify the oil level in the gear reducer (8) is at the side plug (Mobil SHC 634, or equal).
2. Replace the four carriage bushings (31).
3. Replace the catch assembly (33).
4. Replace the upper and lower cams (57 and 58).
5. Replace the micro-switch and nylon roller (100).
6. Inspect the brass block for wear (13). Replace if worn.
7. Inspect the cage bars for flat areas (50). Replace if necessary.

M100-3 PARTS LIST
 ALWAYS GIVE COMPLETE SERIAL NUMBER
 WHEN ORDERING PARTS
 Starting with S/N # M100-302143692

REF.#	PART #	PART NAME	QUANT.
1	102-A	Cover w/Hinges,Latch & Rivets	1
2	103	Latch Assy w/ Rivets	1
3	104	Rivets for Hinges	12
4	105	Name Plate w/ rivets	1
5	111.1	Hammer Safety Arm 5/8" dia.	1
6	112	Pin for above	1
7	201	Drive Motor 60Hz	1
7	201.1	Drive Motor 50Hz	1
8	202	Gear Reducer	1
9	411	Capscrew	14
9.1	411.1	Capscrew	4
11	412.1	Lockwasher	18
12	412.2	Hex Nut	4
13	203	Brass Block	1
	203-A	Brass Block & Bolt Assembly	1
14	204	Carrier Bolt	1
15	205	Lock-Nut	1
16	206	Carrier Link	1
17	207	Nylon Roller	1
18	203.1	Grease Fitting	2
19	208	Drive Chain	1
	208-A	Drive Chain w/Conn. & Carrier Link	1
20	209	Conecting Link	1
	209.1	Roller Link	1
21	210	Drive Sprocket	1
22	211	Key	1
23	212	Motor Key	1
30	2301.1	Carriage	1
	2301.1-A	Carriage Assy. w/all Parts	1
31	2302.1	Carriage Bushings	4
31.1	2302.2	Bushing Retaining Ring	4
33	304	Catch	1
	304-A	Includes: part 304,305 &306	
34	305	Steel Ball	1
35	306	Spring	1
36	308	Hold-Down Plate	2
37	309	Screw	4
40	401	Lower Angle Bracket	1
41	402	Upper Angle Bracket	1
42	402.1	Set Screw	2
45	403-A	Front Cage Bar Assy.w/all Parts	1
46	403.1	Pin	1
47	403.2	Lock-Pin	1
48	403.3	Retaining Pin	1
49	403.4	Spring	1
50	408	Cage Bar	2
51	409.1	Guide Bar	2
52	1410	Cam Bar	1
52	1410-A	Cambar Assy w/Upper and Lower Cams	1
54	412	Flat Washer	2
55	412.3	Internal Tooth Lockwasher	2

REF.#	PART #	PART NAME	QUANT.
57	413	Upper Cam	1
58	414	Lower Cam	1
	414-A	includes: part 414,429 &430	
59	417	Hammer Surcharge weight	1
60	417.1	Screw,Hammer Weight	1
61	418	Top Cam Screw	1
62	419	Cage adjust Plate-Top	1
63	422	Lockwasher	12
64	421	Hex Capscrew	8
65	420	Cage adjust Plate -Lower	1
66	423	Cambar Key	1
67	429	Pin, lower Cam	1
68	430	Lower Cam Spring	1
70	501A	Turntable & Shaft assy, incl.515 Bearing	1
71	502	Turntable Base	1
72	503.2	Turntable Motor	1
73	504.3	Motor mounting Plate w/ Seal	1
74	505	Hex Capscrew	4
75	506	Washer	4
76	507	Drive Gear, 15 Teeth	1
77	508	Table Gear, 100 Teeth	1
78	509	Pin, Turntable	1
80	510.1	Screw, for cable clips	2
81	510.2	Nylon Cable Clip, Small	3
81.1	510.3	Nylon Cable Clip, Large	1
83	513.1	Rollpin for 507	1
84	514	Rollpin for 508	1
85	515	Bearing	1
86.1	516.1	TT Motor shaft seal	3
87	522	Mold-Screw	2
90	601	Idler Bracket	1
91	602	Bearing	2
92	603	Snapping	1
93	604	Idler Sprocket	1
	604-A	Idler Sprocket w/ Bearings	1
94	605	Snapping	1
95	606	Hex Capscrew	4
96	606.1	Star Lockwasher	4
98	609	Setscrew, Chain adjustment	1
99	609.1	Hex Nut	8
100	701	Counting MicroSwitch	1
100	701K	Switch Kit, incl.:1ea.701, 703,207,817. 2ea.704,705, 705.1.	1
100.1	701.1	Door Switch	1
101	702	Switch mounting Plate	1
102	703	Cover, Switch	2
103	702.1	Screw, TT motor & switch plate	5
104	702.2	Pivot Screw	1
105	704	Screw	2
105.1	705	Washer	4
105.2	705.1	Lockwasher	4
105.3	704.1	Switch mounting screw (door interlock)	2
	706	Switch cord	1
106	800.3-A	Complete Control	1
109	802	Rubber Mounts	4
	5655	Special Gear Oil	1

PARTS FOR 800.3 CONTROL			
REF.#	PART #	PART NAME	QUANT.
	804	Cordgrips	4
5	805.1	Power Relay	1
6	806.1A	Stop-Jog Push Button Assy.	1
7	807.1A	Start Pushbutton Assy.	1
8	809.1	Terminal Strip 2 pos.	1
9	809	Terminal Strip 10pos.	1
10	810.2A	Capacitator-Resistor assembly	1
11	812.2A	Counting Module	1
12	812.2B	Counting Module Display	1
	816	Power Cord 115 volt	1
	817	Switch Cord	1
	818	Drive Motor Cord	1
24	824	Knob	1
25	825.2A	Potentiometer	1
26	826.2	Timing Module	1
	800.4	Decal	1

M100 Compactor Troubleshooting

"Run" button does not work, "jog" button works, counts are displayed.
"Reset" must be pressed before pressing "run".

Turntable does not turn or move, drive motor works. Does not count down.
1. Microswitch out of adjustment, or broken.
2. Nylon roller missing.

Machine occasionally misses count.
Microswitch out of adjustment.

Turntable does not turn, but growls, vibrates, or only turns slightly. Counts down.
1. Index knob at zero (too far left).
2. Index pot shorted.
3. Turntable motor is defective.
4. Capacitor/resistor assemble is defective.
5. Turntable bearing bad

Turntable turns continuously when drive motor is running. Does not count down.
1. Index knob too far to the right.
2. Microswitch stuck closed or shorted closed.
3. Microswitch wired to "NORM CLOSED" contact instead of "NORM OPEN" contact.
4. Microswitch (white wire COMMON) shorted to ground (mounting bracket or frame).
5. Index pot open circuit.

Microswitch keeps breaking
Chain too loose - adjust tension.

Machine starts when "reset" is pressed, even before pressing "run".
1. Relay contacts 6-8 stuck closed - replace.
2. Microswitch (black wire NORM OPEN) shorted to ground (mounting bracket or frame).

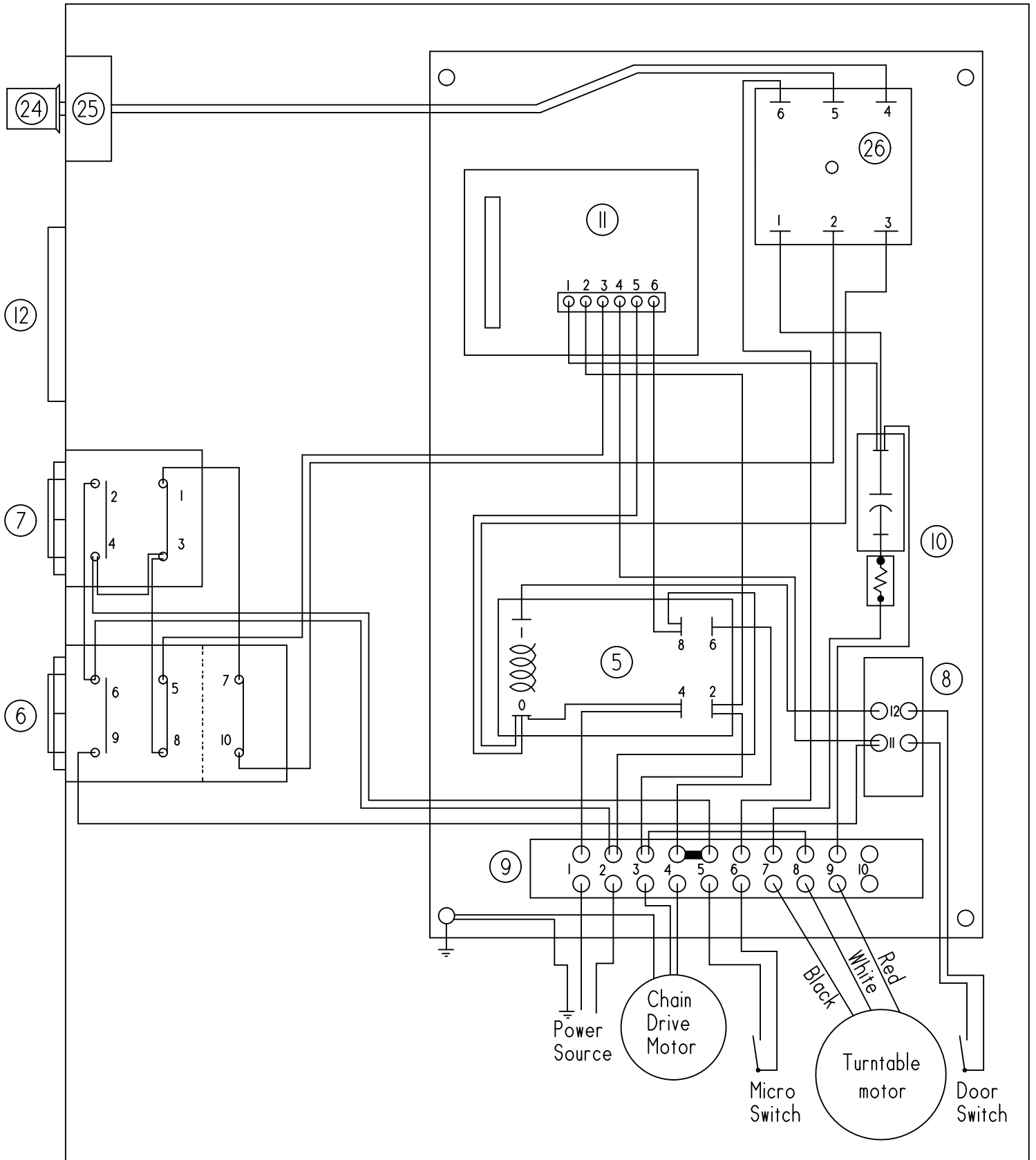
Chain drive motor only runs when "run" button is held in.
Relay contacts 6-8 stuck open - replace.

Hammer does not pick-up
1. Front cage bar too loose.
2. Lower cam not moving freely.
3. Lower cam spring defective.
4. Cam bar adjustment too low.

Hammer drops on the way up.
1. Front cage bar too loose.
2. Catch worn.
3. Steel ball under catch not effective.

Hammer hits mold after mold change.
Turntable not adjusted properly after mold change - adjust.

Drive motor runs excessively hot, runs slow, struggles to lift hammer, or stalls
1. clean guide bars
2. replace carriage bushings
3. grease both fittings
4. brass block is worn - replace
5. oil catch
6. adjust front cage bar
7 verify cam bar hex head screws are not excessively tight



Starts with Serial # M100-302143692		
Scale:	800.3 Control	Drawn by: RF
Date: 08/05/97		Revised: 08/22/2023
Ploog Engineering Co. Inc Crown Point, In. 46307		
Schematic M100/105	Drawing Number PA 246.3	

