

OHIO MODEL MC-1A AUTOMANUAL DROP MAGNET CONTROLLER



**INSTALLATION, MAINTENANCE,
AND PARTS BULLETIN**

**OPERATING RANGE 20-100 A
(COLD MAGNET CURRENT)**

DESCRIPTION

The MC-1A Controller is a heavy duty magnet controller used for magnets whose cold current ranges from 20 A to 100 A dc. Cold current references the current flowing through the magnet when the magnet temperature is 25°C throughout.

AUTOMATIC DROP

A reverse current adjustment provides for a fast, clean drop of the magnet over a complete range of magnetic material with one movement of the master switch or push button.

MANUAL DROP

Allows for partial dropping of the load by controlling the amount of reverse current to the magnet. A drop position on the master switch or a push button that is spring returned to off, gives the operator complete control of the drop cycle.

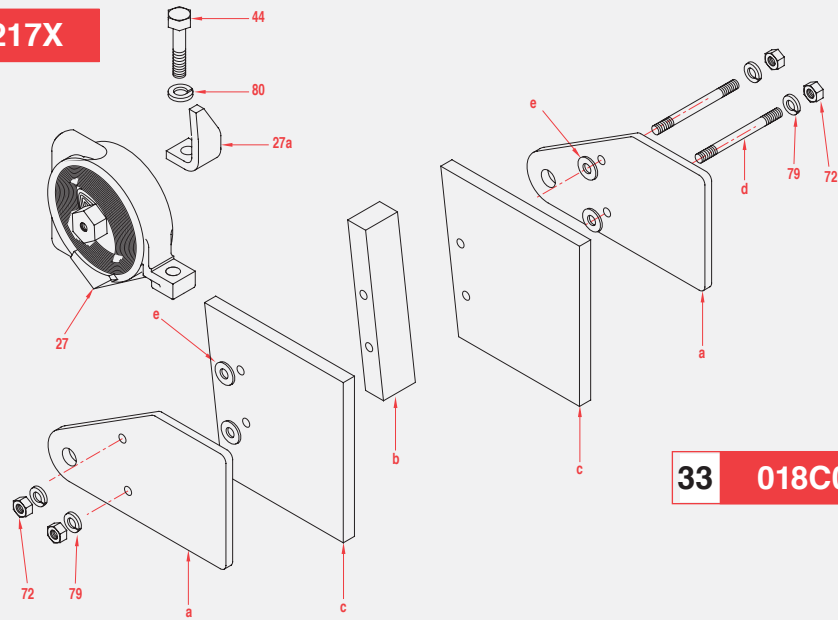
INSTALLATION PROCEDURES

- Mount the controller to a solid surface with the mounting bars provided.
- The controller must be mounted vertically with the "TOP" up to operate properly.
- Mount the controller away from sources of heat and direct exhaust of engines.
- Allow enough room around the controller for air circulation.
- Route electrical wires through bottom of the enclosure and connect securely to the terminals.
- All electrical circuits must be free from grounds and shorts.
- Remove shipping material from the arc shields before operating the controller.
- Adjust the reverse current control rheostat to provide enough reverse current to cleanly drop the magnet load.

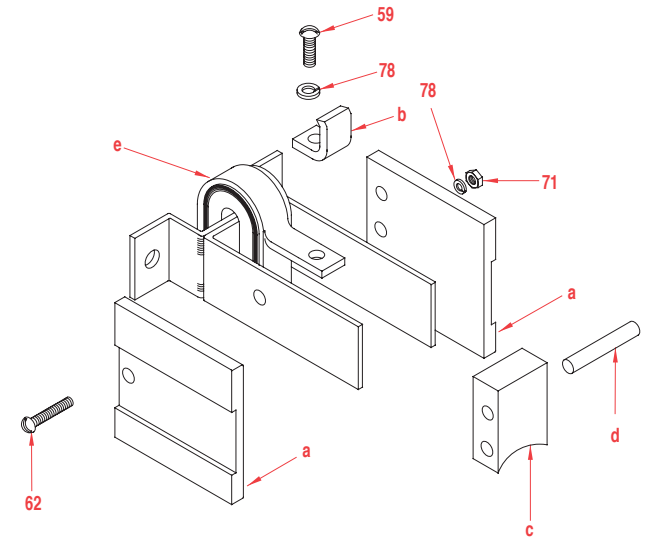
Procedure Start with the dial set at low range. Pick up and drop a load of the material to be handled. If the material does not completely fall off the magnet, increase the adjustment and try another load. If the material drops off and then some jumps back up to the magnet before it can fall free, reduce the adjustment and try another load. When all the material falls cleanly from the magnet, the controller is properly set.

MC-1A SUBASSEMBLIES

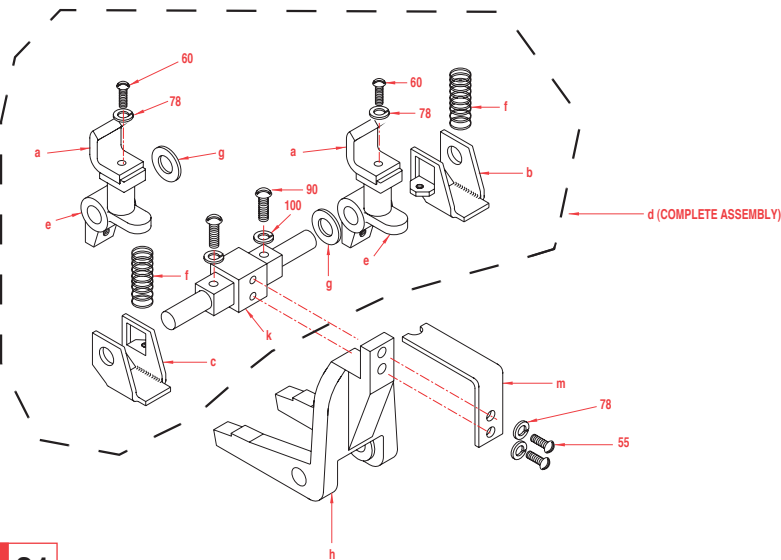
27 018B0217X



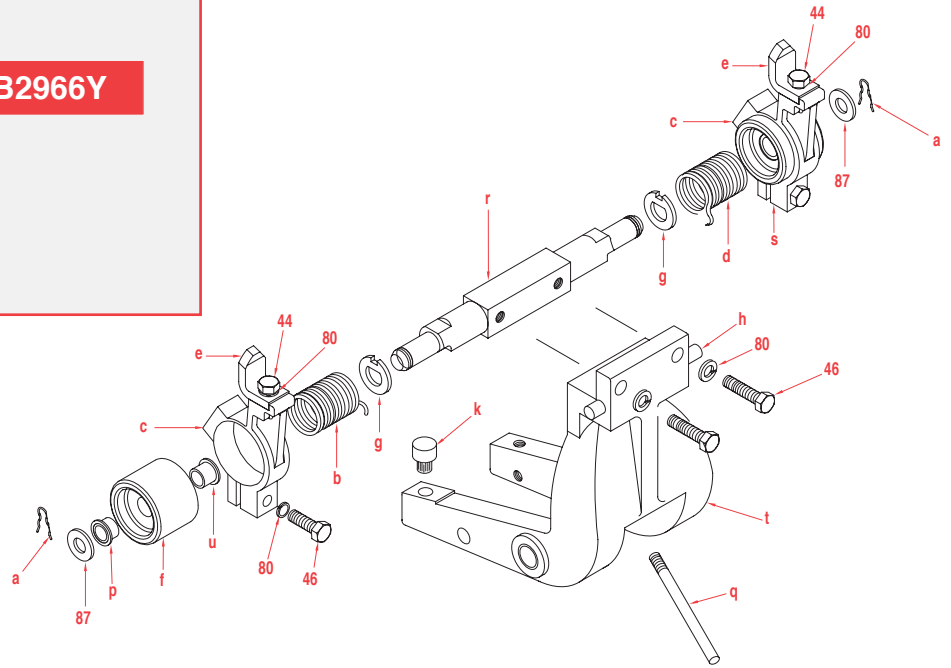
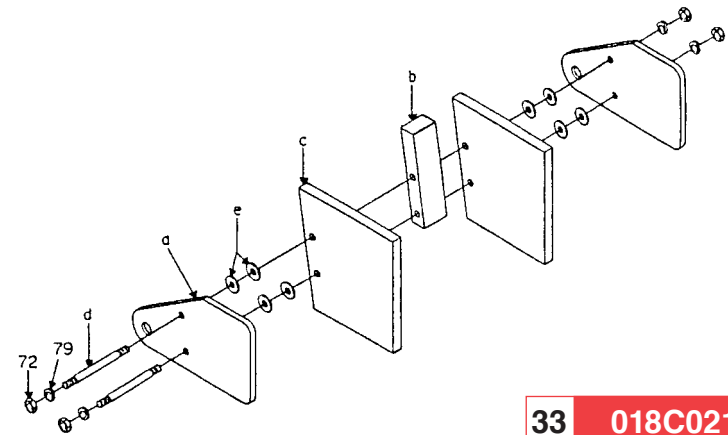
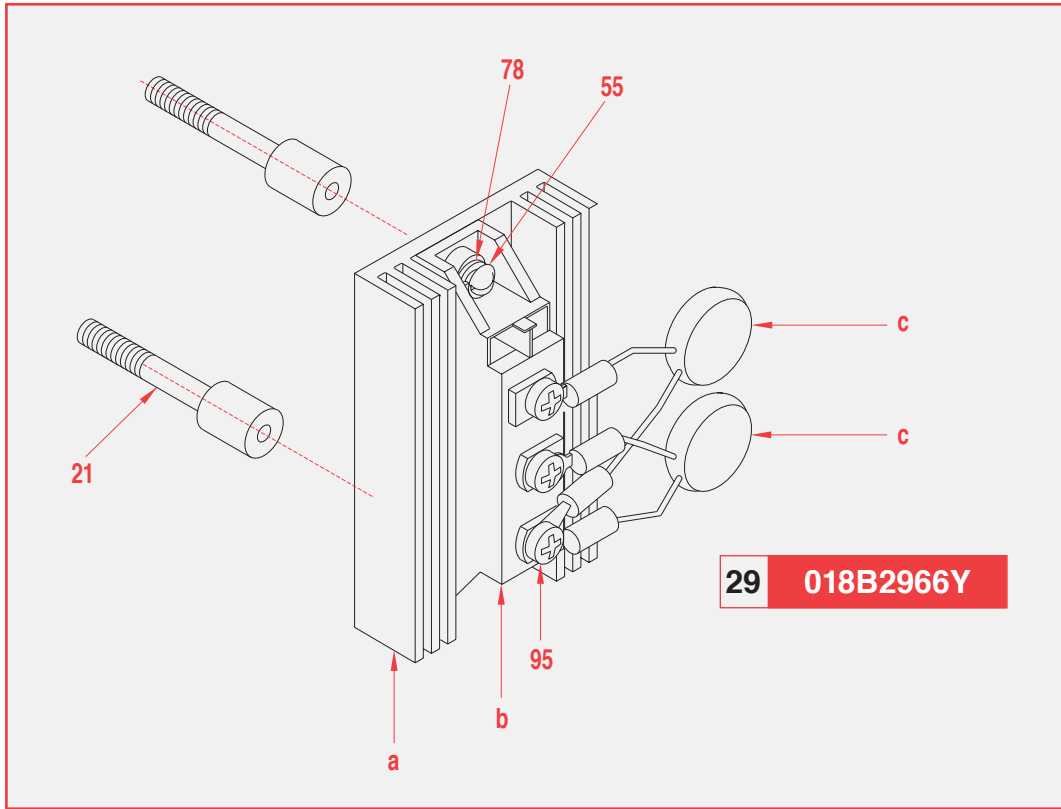
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28 018B1478X

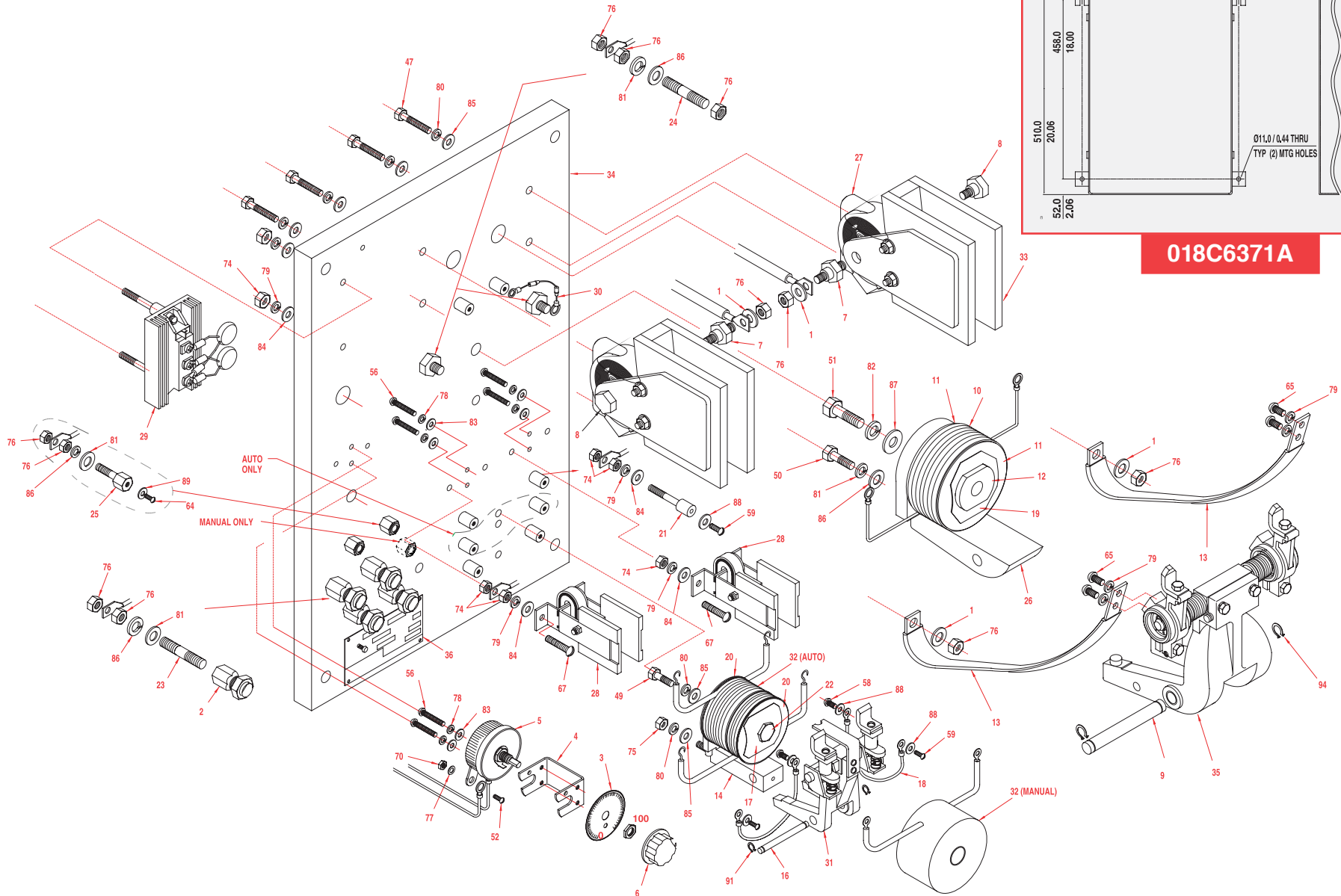


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OHIO MODEL MC-1A AUTO/MANUAL DROP MAGNET CONTROLLER

MC-1A CONTROLLER EXPLODED ASSEMBLY VIEW



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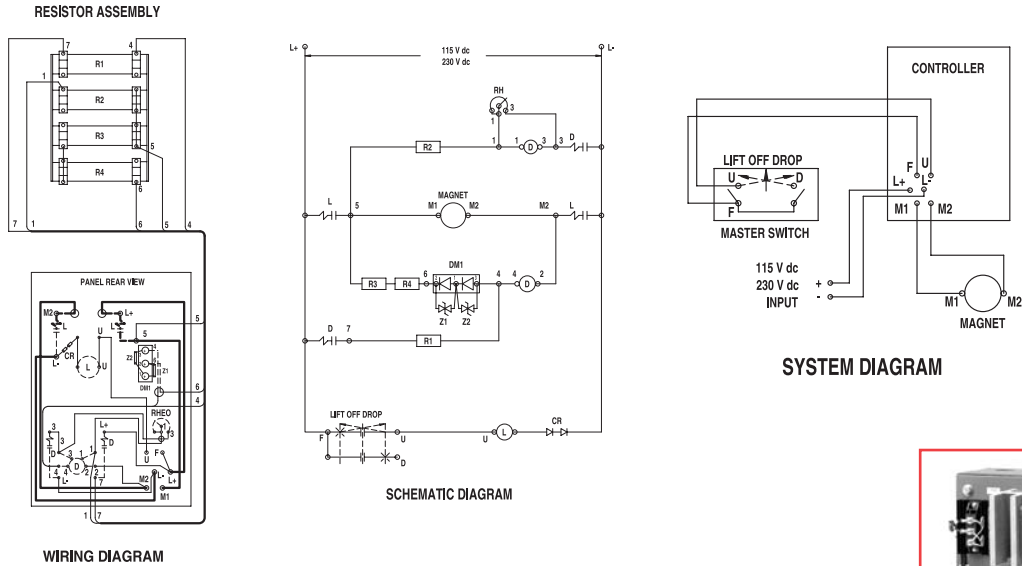
MC-1A HARDWARE PARTS LIST

ITEM	PART NUMBER	REQ A230	REQ M230	REQ 0-230	REQ A115	REQ M115	REQ 0-115	DESCRIPTION	ITEM	PART NUMBER	REQ A230	REQ M230	REQ 0-230	REQ A115	REQ M115	REQ 0-115	DESCRIPTION	ITEM	PART NUMBER	REQ A230	REQ M230	REQ 0-230	REQ A115	REQ M115	REQ 0-115	DESCRIPTION			
1	A-900118-21	4	4	4	4	4	4	FLATWASHER: 3/8	31f	018A2625X	2	2	2	2	2	2	REVERSE ARM SHAFT	65	A-900025-17	4	4	4	4	4	4	SCR RH SLOTTED: 1/4-20 x 0.50 UNC	BRASS		
2	A-900215-02	4	4	4	4	4	4	CABLE CONNECTOR: #2 - #8	31g	018A2631X	2	2	2	2	2	2	CONTACT SPRING	67	A-900025-22	4	4	4	4	4	4	SCR RH SLOTTED: 1/4-20 x 1.75 UNC	BRASS		
3	A-900228-01	1	1	1	1	1	1	RHEOSTAT DIAL	31h	018B2596C	1	1	1	1	1	1	SPACER WASHER	70	A-900106-38	3	3	3	3	3	3	NUT HEX: M4 x 0.7	STEEL		
4	A-900229-01	1	1	1	1	1	1	RHEOSTAT MOUNTING KIT	31k	018B2618D	1	1	1	1	1	1	REVERSE ARM SHAFT	71	A-900106-03	2	2	2	2	2	2	NUT HEX: #10-32 UNF	STEEL		
5	A-900232-12	1	1	1	1	1	1	RHEOSTAT: 1.0 Ω; 50 W	31m	018B5645B	1	1	1	1	1	1	INTERLOCK ARM	72	A-900106-05	4	4	4	4	4	4	NUT HEX: 1/4-20 UNC	STEEL		
6	A-900233-02	1	1	1	1	1	1	RHEOSTAT KNOB	32	018B6185A	1	1	1	1	1	1	REVERSE SWITCH COIL: AUTOMATIC	74	A-900108-11	21	17	21	21	17	21	NUT HEX JAM: 1/4-20 NC	BRASS		
7	018A0123X	2	2	2	2	2	2	BLOWOUT BOLT WITH STUD	32	018A1508J	1						REVERSE SWITCH COIL: MANUAL 230 V	75	A-900108-12	1	1	1	1	1	1	NUT HEX JAM: 5/16-18 NC	BRASS		
8	018A0124X	2	2	2	2	2	2	BLOWOUT BOLT	32	018A1508C					1		REVERSE SWITCH COIL: MANUAL 115 V	76	A-900112-07	22	24	22	22	24	22	NUT HEX JAM: 3/8-16 NC	BRASS		
9	018A0140C	1	1	1	1	1	1	ARM PIN: Ø0.5 in 12 mm	33	018C0216X	2	2	2	2	2	2	ARC SHIELD ASSEMBLY: MAIN	77	A-900116-11	3	3	3	3	3	3	LOCKWASHER INTERNAL TOOTH: M4	STEEL		
10	018A0151F	1	1	1				MAIN COIL: 230 V	33a	018A0120X	4	4	4	4	4	4	BLOWOUT EAR	78	A-900115-03	15	14	15	15	14	15	LOCKWASHER SPLIT: #10	STEEL		
10	018A0151D				1	1	1	MAIN COIL: 115 V	33b	018A0126X	4	4	4	4	4	4	SPACER WASHER	79	A-900115-05	23	21	23	23	21	23	LOCKWASHER SPLIT: 1/4	STEEL		
11	018A0152X	2	2	2	2	2	2	INSULATING WASHER	33c	018A0130X	4	4	4	4	4	4	BLOWOUT SHIELD	80	A-900115-06	14	14	14	14	14	14	LOCKWASHER SPLIT: 5/16	STEEL		
12	018A0154A	1	1	1	1	1	1	CORE ASSEMBLY	33d	018A0139X	4	4	4	4	4	4	STUD: Ø3.13 in 80 mm	81	A-900115-07	9	10	9	9	10	9	LOCKWASHER SPLIT: 3/8	STEEL		
13	018A0317D	2	2	2	2	2	2	SHUNT ASSEMBLY	33e	018A1362X	16	16	16	16	16	16	WASHER	82	A-900115-09	1	1	1	1	1	1	LOCKWASHER SPLIT: 1/2	STEEL		
14	018A1442A	1	1	1	1	1	1	REVERSE FRAME ASSEMBLY	34	018C5184X	1	1	1	1	1	1	PANEL	83	A-900118-03	4	4	4	4	4	4	FLATWASHER: #10	STEEL		
16	018A2623A	1	1	1	1	1	1	ARM PIN	35	018D3090C	1	1	1	1	1	1	ARM ASSEMBLY	84	A-900118-05	19	17	19	19	17	19	FLATWASHER: 1/4	STEEL		
17	018A2637X	1	1	1	1	1	1	SPRING WASHER	35a	A-900221-05	2	2	2	2	2	2	HAIR PIN CLIP: Ø0.38 in 10 mm	85	A-900118-06	6	6	6	6	6	6	FLATWASHER: 5/16	STEEL		
18	018A2720A	2	2	2	2	2	2	SHUNT ASSEMBLY	35b	018A0104X	1	1	1	1	1	1	SPRING : LEFT	86	A-900118-07	9	10	9	9	10	9	FLATWASHER: 3/8	STEEL		
19	018A2866X	1	1	1	1	1	1	CLAMP WASHER	35c	018A0118X	2	2	2	2	2	2	CONTACT ARM: MACHINED	87	A-900118-09	3	3	3	3	3	3	FLATWASHER: 1/2	STEEL		
20	018A2977X	3	3	3	3	3	3	SEPERATOR WASHER	35d	018A0121X	1	1	1	1	1	1	SPRING: RIGHT	88	A-900118-18	12	10	12	12	10	12	FLATWASHER: #10	BRASS		
21	018A3010X	10	8	10	10	8	10	TERMINAL STUD	35e	018A0125X	2	2	2	2	2	2	CONTACT TIP	89	A-900118-26	2	3	2	2	3	2	FLATWASHER: 1/4	BRASS		
22	018A2673A	1						REVERSE SWITCH CORE	35f	018A0128A	2	2	2	2	2	2	ARM INSULATION	90	A-900021-23	2	2	2	2	2	2	SCR RH SLOTTED: #8-32 x 0.75 UNF	BRASS		
22	018A3000X	1	1	1				REVERSE SWITCH CORE	35g	018A0129X	2	2	2	2	2	2	STOP WASHER	91	A-900219-06	2	2	2	2	2	2	EXTERNAL RETAINER RING: SHAFT 3/8	STEEL		
23	018A3878A	4	4	4	4	4	4	TERMINAL STUD: 2.5 in 65 mm	35h	018A0135X	2	2	2	2	2	2	SPRING PIN	94	A-900219-09	2	2	2	2	2	2	EXTERNAL RETAINER RING: SHAFT 1/2	STEEL		
24	018A3878X	2	2	2	2	2	2	TERMINAL STUD: 2.75 in 70 mm	35k	018A0138X	1	1	1	1	1	1	STOP	95	A-900413-08	3	3	3	3	3	3	SCREW ASSEMBLY: M5 x 0.8 x 16 mm	STEEL		
25	018A3882X	2	3	2	2	3	2	TERMINAL STUD	35p	A-900298-02	2	2	2	2	2	2	BEARING: SELF LUBRICATIONG	100	A-900115-28	2	2	2	2	2	2	LOCKWASER SPLIT: M4			
26	018B0116A	1	1	1	1	1	1	MAIN FRAME	35q	018A5645A	1	1	1	1	1	1	THREADED ROD	106	900C30B45	1	1	1	1	1	1	INTERCONNECTION WIRE: M1			
27	018B0217X	2	2	2	2	2	2	BLOWOUT COIL ASSEMBLY: MAIN	35r	018B0131X	1	1	1	1	1	1	ARM SHAFT	107	900C30B46	1	1	1	1	1	1	INTERCONNECTION WIRE: L-			
27a	018A0125X	2	2	2	2	2	2	CONTACT TIP	35s	018B0219A	2	2	2	2	2	2	CONTACT ARM ASSEMBLY	108	900C30B47	1	1	1	1	1	1	INTERCONNECTION WIRE: L+			
28	018B1478X	2	2	2	2	2	2	BLOWOUT COIL ASSEMBLY: DROP	35t	018C2992A	1	1	1	1	1	1	MAIN ARM MACHINED	109	900C30B48	1	1	1	1	1	1	INTERCONNECTION WIRE: M2			
28a	018A0803X	4	4	4	4	4	4	ARC SHIELD SIDE	35u	A-900298-03	2	2	2	2	2	2	BEARING: SELF LUBRICATIONG	111	900C55A20	1		1	1	1	1	INTERCONNECTION WIRE: M2-2			
28b	018A1443X	2	2	2	2	2	2	CONTACT TIP	36	100A01381	1	1	1	1	1	1	NAME PLATE	112	900C55A21	1		1	1	1	1	INTERCONNECTION WIRE: L-			
28c	018A1503X	2	2	2	2	2	2	ARC SHIELD SPACER	44	A-900007-02	4	4	4	4	4	4	SCR HEX HEAD: 5/16-18 x 0.75 UNC	STEEL	112	900C55A36	1	1	1	1	1	1	INTERCONNECTION WIRE: L-		
28d	018A1523X	2	2	2	2	2	2	DOWEL	46	A-900007-05	4	4	4	4	4	4	SCR HEX HEAD: 5/16-18 x 1.25 UNC	STEEL	113	900C55A32	1	1	1	1	1	1	INTERCONNECTION WIRE: L+		
28e	018B2727X	2	2	2	2	2	2	BLOWOUT COIL ASSEMBLY	47	A-900007-06	4	4	4	4	4	4	SCR HEX HEAD: 5/16-18 x 1.5 UNC	STEEL	114	900C55A31	1		1	1	1	1	INTERCONNECTION WIRE: 3		
29	018B2966Y	1	1	1	1	1	1	DIODE/HEATSINK ASSEMBLY	49	A-900007-08	1	1	1	1	1	1	SCR HEX HEAD: 5/16-18 x 2.0 UNC	STEEL	115	900C55A30	1		1	1	1	1	INTERCONNECTION WIRE: 4		
29a	A-900565-18	1	1	1	1	1	1	HEAT SINK: DRILLED	50	A-900008-08	1	1	1	1	1	1	SCR HEX HEAD: 3/8-16 x 1.75 UNC	STEEL	116	900C55A25	1		1	1	1	1	LEAD ASSEMBLY - RHEOSTAT: 3		
29b	A-900550-26	1	1	1	1	1	1	DIODE MODULE	51	A-900010-09	1	1	1	1	1	1	SCR HEX HEAD: 1/2-13 x 2.5 UNC	STEEL	117	900C55A34	1		1	1	1	1	LEAD ASSEMBLY - RHEOSTAT: 1		
29c	018A2966Q	2	2	2	2	2	2	MOV SUPPRESSOR ASSEMBLY	52	A-900416-05	3		3	3	3	3	SCR PAN HEAD: M4 x 0.7 x 10 mm	STEEL	118	900C55A35	1	1	1	1	1	1	INTERCONNECTION WIRE: U		
30	018A2966Z	1	1	1	1	1	1	CONTROL DIODE ASSEMBLY	55	A-900023-07	4	4	4	4	4	4	SCR RH SLOTTED: 10-32 x 0.88 UNF	STEEL	119	900C55A37	1	1	1	1	1	1	INTERCONNECTION WIRE: L+		
31	018B6368E	1	1	1	1	1	1	REVERSE SWITCH ARM ASSEMBLY	56	A-900023-09	6	4	6	6	4	6	SCR RH SLOTTED: 10-32 x 1.25 UNF	STEEL	119	900C55A40			1	1	1	1	INTERCONNECTION WIRE: F-		
31a	018A1443X	2	2	2	2	2	2	CONTACT TIP	58	A-900023-13	2	2	2	2	2	2	SCR RH SLOTTED: 10-32 x 0.31 UNF	BRASS	120	900C55A29	1		1	1	1	1	INTERCONNECTION WIRE: 1		
31b	018A2604A	1	1	1	1	1	1	CONTACT BRACKET	59	A-900023-14	8	6	8	8	6	8	SCR RH SLOTTED: 10-32 x 0.38 UNF	BRASS	121	900C55A41	1		1	1	1	1	INTERCONNECTION WIRE: M2-4		
31c	018A2605A	1	1	1	1	1	1	CONTACT BRACKET	60	A-900023-15	2	2	2	2	2	2	SCR RH SLOTTED: 10-32 x 0.50 UNF	BRASS	122	900C55A39	1		1	1	1	1	INTERCONNECTION WIRE: D		
31d	018B5074B	2	2	2	2	2	2	CONTACT SHAFT ASSEMBLY	62	A-900023-25	2	2	2	2	2	2	SCR RH SLOTTED: 10-32 x 1.75 UNF	BRASS											
31e	018A2614X	2	2	2	2	2	2	CONTACT ARM ASSEMBLY	64	A-900025-16	2	3	2	2	3	2	SCR RH SLOTTED: 1/4-20 x 0.38 UNC	BRASS											

MC-1A WIRING DIAGRAMS

MC-1A AUTOMATIC CONTROLLER

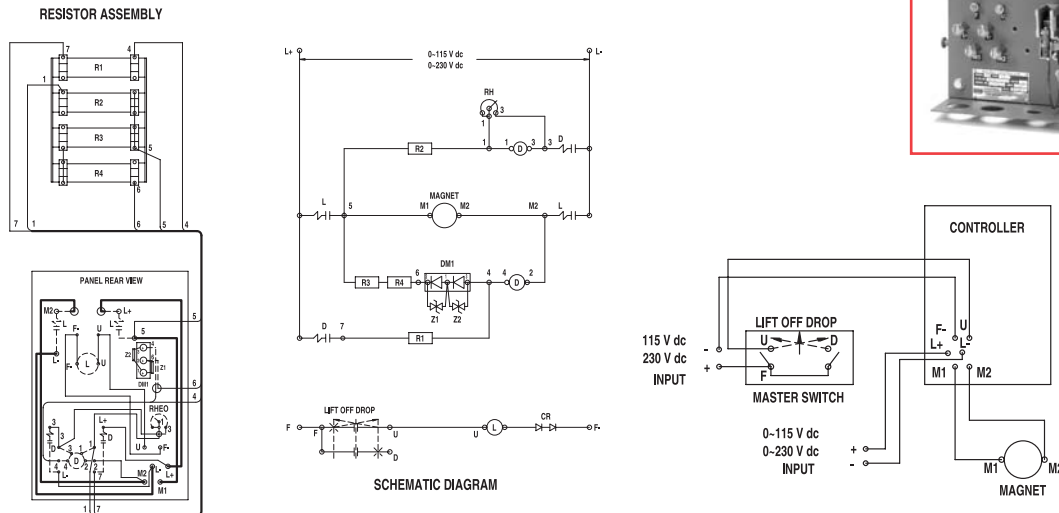
WIRE DIAGRAM P/N: 018B6170X (230 V-dc) • 018B6170C (115 V-dc)



WIRING DIAGRAM

MC-1A AUTOMATIC CONTROLLER (Variable Voltage)

WIRE DIAGRAM P/N: 018B6170B (0~230 V-dc) • 018B6170E (0~115 V-dc)

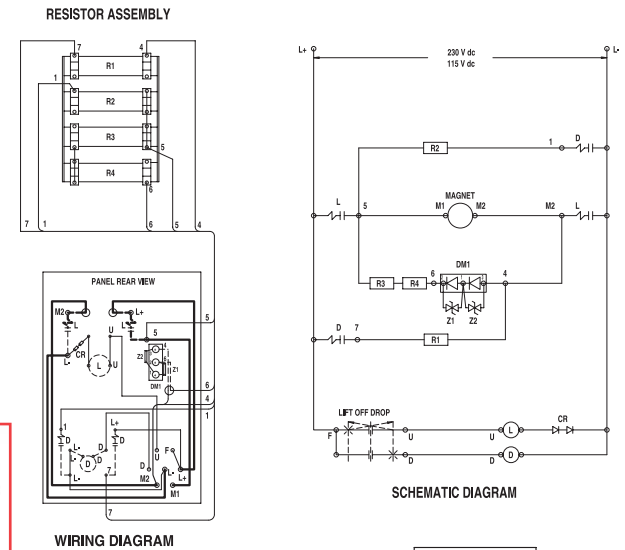


WIRING DIAGRAM

SYSTEM DIAGRAM

MC-1A MANUAL CONTROLLER

WIRE DIAGRAM P/N: 018B6170A (230 V-dc) • 018B6170D (115 V-dc)



WIRING DIAGRAM

SYSTEM DIAGRAM

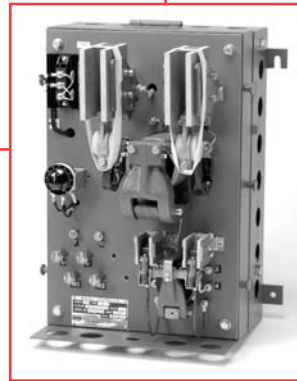


TABLE OF EQUIPMENT		
SYMBOL	DESCRIPTION	FUNCTION
D	REVERSE CONTACT	DROP
L	MAIN CONTACT	LIFT
RH	1.0 Ω RHEOSTAT	DROP CONTROL
R1-R2	12 Ω RESISTOR	DROP RESISTOR (230V-dc)
R1-R2	8 Ω RESISTORS	DROP RESISTOR (115V-dc)
R3-R4	8 Ω RESISTOR	DISCHARGE RESISTOR
DM1	DIODE MODULE	BLOCKING DIODE
Z1-Z2	MOV SUPPRESSOR	DIODE PROTECTION
CR	CONTROL DIODE	ANTI-REVERSE PROTECTION

MAINTENANCE AND TROUBLE SHOOTING

Check all contact tips for excess wear or burning. Replace if needed.

Check arc shields for burnt areas. Replace any that are badly burned.

Check for burned or damaged insulation on shunts or wires. Replace if found.

Check for carbon tracking on the base panel and insulating parts. If found, remove by filing or scraping. If carbon can not be removed, replace the part.

Check gap ($\frac{3}{4}$ " (20 mm) opening) between main contacts (#27a and #35e). Adjust by loosening screw (#46) on part (#35c) and turning the assembly.

All pin connections should move easily, and contact springs should provide force when contacts are closed. If springs do not provide contact force, replace them.

Check Power Diode Integrity (DM1) with a standard Digital Volt Meter (DVM), set to the diode check function. (See owner's manual for details.) Disconnect leads to the diode and remove suppressors MOV (Z1 and Z2) to isolate from the circuit. Place the red lead of meter on Terminal 1 of diode (number is stamped next to terminal) and the black lead on Terminal 2. Meter should read <1.0. Reverse leads and meter should read 1.(00). Repeat for Terminals 3 (red) and 1 (black). If the diode reads bad, replace. Reconnect wires and MOVs (Z1 and Z2).

NOTE: Z1 and Z2 are MOV suppressors to help limit voltage spikes applied to DM1 and causing damage.



EMERGENCY SPARE PARTS KITS AND/OR KITS

Automatic — #ESP-018M7020A1

- Contains the parts most likely to fail due to a system problem or a high voltage spike. It is recommended that one of these kits be kept on hand to avoid unnecessary down time.



OHIO MAGNETICS—PERFORMANCE ENGINEERED



OHIO MAGNETICS, INC.

SUBSIDIARY OF **HBD** INDUSTRIES, INC.

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Stearns

STEP BY STEP CONTROLLER OPERATION

AUTOMATIC CONTROLLER

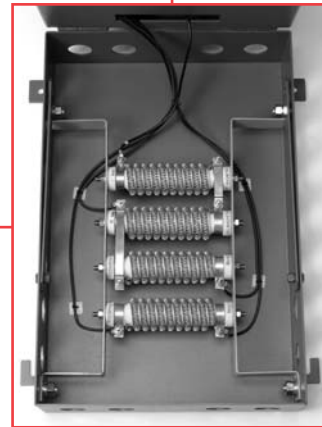
1. When a lift signal is given by closing the contacts between terminals “F” and “U”, the “L” coil is energized.
2. This closes the “L” contacts which supplies full power to the magnet.
3. When a drop signal is given the “F” to “U” contact is broken and the “L” coil is de-energized.
4. This opens the “L” contacts and at the same time allowing current to flow through blocking diode DM1.
5. A discharge circuit is set up through resistors “R3” & “R4” and the “4,” “2” winding of the “D” coil, (energizing the coil).

6. This causes the energy in the magnet to be dissipated through the “R3” & “R4” resistors, and the “D” contacts to close.
7. Reverse voltage is then applied to the magnet through the “R1” and “R2” resistors.
8. When the proper amount of reverse current to the magnet, (as adjusted by the rheostat), is measured by the “4,” “2” winding of the “D” coil, it cancels the affect of the “1,” “3” winding of the “D” coil and the “D” contacts open.
9. This stops the flow of reverse current through the magnet.

MANUAL CONTROLLER

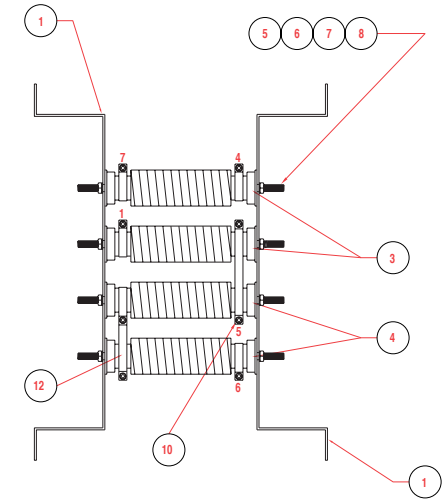
1. When a lift signal is given by closing the contacts between terminals “F” and “U”, the “L” coil is energized.
2. This closes the “L” contacts which supplies full power to the magnet.
3. When a drop signal is given the “F” to “U” contact is broken and the “L” coil is de-energized.
4. This opens the “L” contacts and allows current to flow through blocking diode DM1.
5. A discharge circuit is set up through resistors “R3” & “R4”.
6. Energy in the magnet is dissipated through the “R3” & “R4” resistors.

7. Moving the master switch to the drop position or pushing the drop button, closes the contact between terminals “F” and “D”, energizing the “D” coil.
8. This closes the “D” contacts and provides reverse voltage to the magnet, through resistors “R1” and “R2”.
9. To stop the build up of reverse current, release the master switch control and it will return to the off position, or release the drop push button.
10. This breaks the contact between the “F” and “D” terminals, de-energizes the “D” coil, (opening the “D” contacts), and stops the flow of reverse current through the magnet.

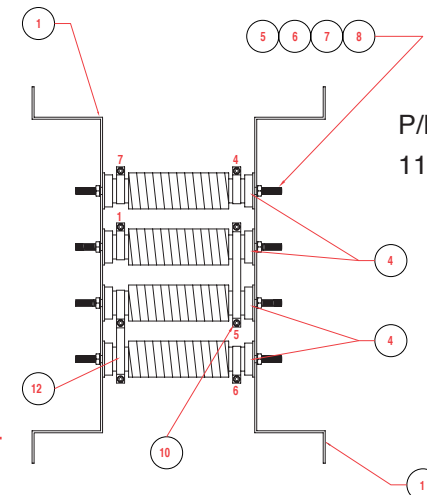


MC-1A RESISTOR ASSEMBLY CONTROLLER

P/N: 018A1541S
230 V-dc WITH DIODE



NO.	QTY	PART NUMBER	DESCRIPTION
1	2	018B8101R	MOUNTING BRACKET
3	2	018B1554G	RESISTOR: 12 Ω
4	2	018B1554A	RESISTOR: 8 Ω
4	4	018B1554A	RESISTOR: 8 Ω
5	4	1900A064003	THRD ROD: M8 x 1.25 x 225mm
6	8	018A1500X	WASHER
7	8	A-900115-31	LOCKWASHER: M8
8	8	A-900106-41	HEX NUT: M8 x 1.25
10	1	018A8114A	BUS BAR
11	1	018A8114B	BUS BAR



P/N: 018A1541T
115 V-dc WITH DIODE