

DENTSPLY

AUSTENAL[®]

ELECTROMATIC - 4

INDUCTION CASTING MACHINE

Operations Manual

DENTSPLY Austenal
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IMPORTANT WARNING

The Electromatic - 4 has been built to provide the safest possible operating conditions consistent with the ability to perform its intended casting functions. However, the high frequency and voltage produced require certain precautions to be taken.

THIS MACHINE IS DESIGNED WITH SAFETY FEATURES TO PROTECT THE OPERATOR AND MUST NOT BE MODIFIED IN ANY FORM. ONLY A QUALIFIED PERSON SHOULD MAKE ANY REPAIRS OR ADJUSTMENTS. CALL DENTSPLY PROSTHETICS' TECHNICAL SUPPORT FOR REPAIR RECOMMENDATIONS. FAILURE TO OBSERVE THIS PRECAUTION MAY RESULT IN SEVERE RADIO FREQUENCY BURNS OR ELECTRICAL SHOCK.

PERSONS WEARING PACEMAKERS SHOULD NOT BE ALLOWED TO OPERATE THE UNIT AND IT IS ADVISABLE THAT SUCH INDIVIDUALS MAINTAIN A DISTANCE OF 10 FEET FROM THE OPERATING AREA.

Failure to observe this precaution may result in malfunction of the pacemaker while in the vicinity of the machine and critical injury. Individuals who wear pacemakers should be restricted from the designated working vicinity of the machine. The Electromatic - 4 should not be operated in their presence.

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INTRODUCTION

The ELECTROMATIC - 4 has been designed and built to consistently produce metallurgical sound precision castings through a series of rigidly controlled operations, automatically or manually performed. Casting with the Electromatic - 4 consists of four basic operations:

1. Placing preheated crucible and mold in their appropriate holders
2. Induction melting of the alloy
3. Centrifugal casting of the molten alloy into the mold
4. Removal of the crucible and mold

Phases 2 and 3 are accomplished through a complex electro-mechanical system. Induction melting is accomplished by creating a rapidly alternating magnetic field, which causes the alloy in the crucible to absorb energy and melt. The high frequency field is developed in a water-cooled coil, which surrounds the crucible and is produced by a generator, which oscillates at approximately 500 kHz (thousands of cycles per second).

The START and STOP push buttons, the ON indicator and the circuit breaker form a circuit that will provide power to the Generator if the Melt Coil is in the UP and LOCK position, and to the Centrifuge Motor if the Melt Coil is in the DOWN position. Pressing the START push button will latch the circuit, which will be indicated by the ON indicator, if all the interlocks are operating normally. The circuit will automatically unlatch in the event of a power failure. This minimizes the possibility of an accident if the power is suddenly restored. If an overload occurs within the Melt Circuit during the melting cycle, the overload circuit will turn off and unlatch the operation. Pressing the STOP push button will unlatch the circuit during Melting or Centrifuging and discontinue power to the generator or the centrifuge motor correspondingly. During the centrifuge operation the cover is locked and can not be opened until the arm comes to a complete stop. With the unit in the Automatic mode, control of the casting temperature is maintained by the Optical Radiation Pyrometer. This detector senses both visible light and infrared radiation coming directly from the alloy, or carbon insert. Its signal is fed to a solid state Temperature Controller. When the molten alloy reaches a preset temperature, the power to the Melt Coil is cycled ON and OFF, automatically maintaining the alloy at the selected temperature prior to casting. This holding cycle is called "soaking". Soaking times can be set from 0 to 60 seconds, and is engaged by momentarily pressing the SOAK TIMER ENGAGE push button during melting or after the alloy has reached temperature. When the Soak Timer completes the cycle and the Centrifuge Cover is closed, the Melt Coil drops, the casting arm revolves clock-wise and the molten alloy will be centrifugally cast into the mold. The centrifuge will spin for 30 seconds and automatically stop. When the unit is used in the Manual mode, control of the casting operation is dependent on the operator observing the alloy in the crucible and manually cycling the Start and Stop push buttons maintains proper temperature. When the alloy is ready to cast, place the investment ring in the cradle and close the Centrifuge Cover. Continue to cycle the Start and Stop push buttons to maintain the desired casting temperature. With the Start and Stop circuit latched, activate the Coil Release switch. This will drop the Melt Coil, the casting arm will revolve and the molten alloy will be centrifugally cast into the mold. The centrifuge will spin for 30 seconds. When the centrifuge is in operation, in either Automatic or Manual mode, the Coil Release Switch will be inoperative until power to the centrifuge motor has been discontinued.

INSTALLATION: PREPARATION

The following outline has been arranged to provide pertinent information relating to the installation, adjustments and testing of the Electromatic - 4. Strict adherence to these requirements will insure maximum dependable service.

CAUTION: *Protect the unit from nearby furnace heat with a shield, if necessary.*

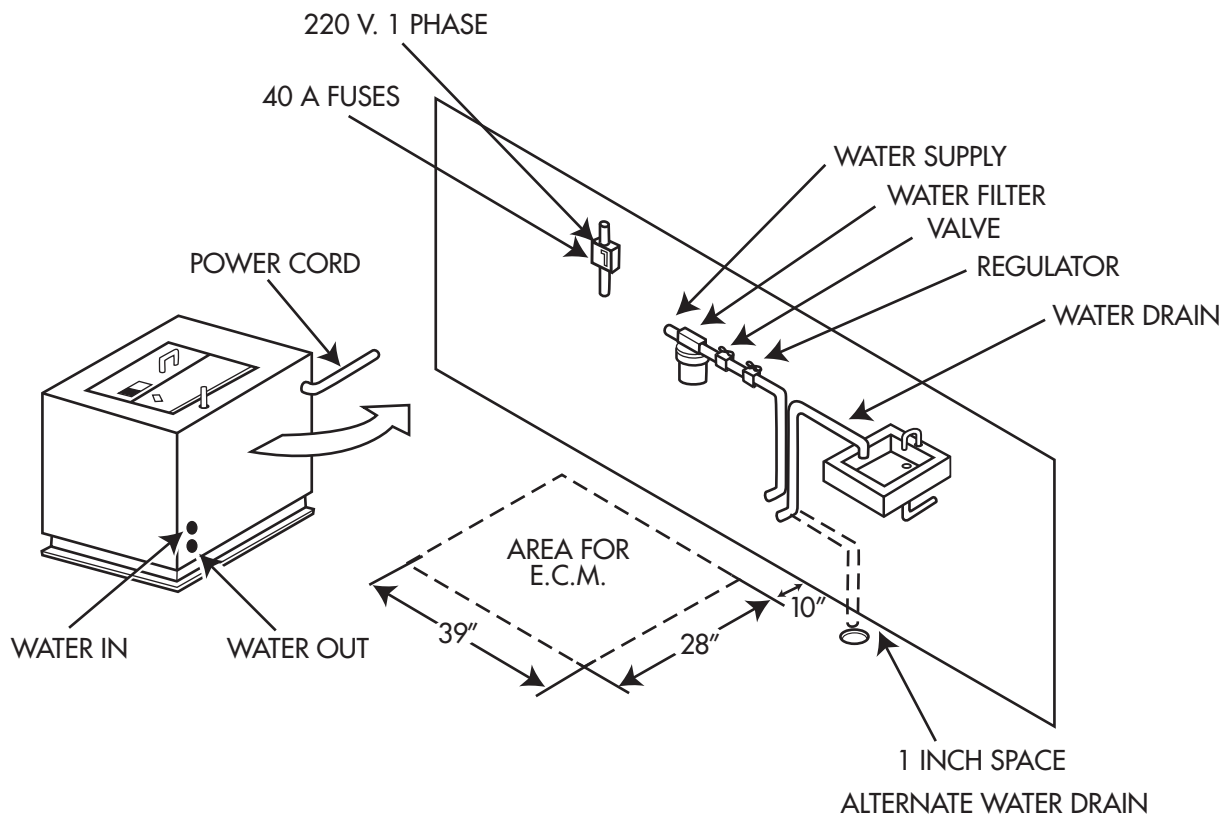


FIG. 1

1. Customer will provide essential electrical and water service for the unit.
 - A. See installation diagram.
 - B. Place unit where room temperature will never exceed 122°F (50°C).
 - C. Unit shall not be exposed to corrosive vapors or abrasive dust.
 - D. The drawing and following information will serve as a guide for installation.
Installation of required utilities to comply with local codes.

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2. SPACE REQUIREMENTS

- A. Floor: 49" (124 cm) wide by 38" (97 cm) deep from wall.

NOTE: The machine base measures 38 1/2" (98cm) by 27 1/2" (70 cm).
Additional clearances of 10" (25 cm) behind and 5" (13 cm) on each side are required.

- B. Height: Adequate overhead clearance of 6 feet (183 cm) from the floor must be allowed for sighting the pyrometer.

3. ELECTRICAL SERVICE REQUIRED

220 Volts A.C., 40 Amps., fused, 50/60 Hz., single phase.

NOTE: For convenience, it is suggested that the switch be located on the wall behind the unit, approximately 50" (127 cm) from the floor.

DENTSPLY PROSTHETICS		570 College Ave., York, PA 17405-0872	
ELECTROMATIC - 4			
MODEL	N155700	VOLTS	220
AMP.	30	HZ.	50/60
SER#			
MADE IN U.S.A.			

4. WATER SERVICE REQUIRED (20 psi at 1.5 gpm)

3/8" water line with a shut-off valve and a water filter.

NOTE: If area pressure is low at times, a water pump may be installed in the incoming line to provide sufficient pressure.

5. WATER DRAIN

- A. Install drain facilities behind the unit

- B. If drainage runs are longer than five feet (152.4 cm), the inside diameter of the drain must be increased to 3/8" (9.5mm) to avoid possible backpressure into the unit.

NOTE: The level of the drain line should not exceed the height of the machine (36" or 91 cm).

INSTALLATION

1. POSITION THE UNIT

Locate according to installation preparation plans

2. WATER CONNECTIONS (Fig 2)

- A. Install WATER FILTER ASSEMBLY (N155554 and N155555) and WATER PRESSURE REGULATOR (N115282) between water valve and the machine
- B. Attach 3/8" N.P.T. hose barb to WATER FILTER and also to the machine WATER IN.
- C. Attach 1/4" I.D. rubber hose between the filter and the machine and secure with clamps.
- D. Attach 3/8" N.P.T. hose barb to the machine (WATER OUT) connection.
- E. Attach 1/4" I. D. (6mm) rubber hose to barb and secure with hose clamp.
- F. Run the hose directly to drain.



FIG. 2

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3. ELECTRICAL CONNECTIONS

- A. Connect the cable to the power junction box on the wall according to the local wiring codes. Leave enough slack so the unit can be moved away from the wall for service. The power cable has three wires, Brown and blue will provide the 220 V, and Yellow/green which is GROUND. This unit must be grounded at all times.

4. OPTICAL RADIATION PYROMETER

A. Pyrometer Assembly (Fig 3)

- a. Raise pyrometer support arm and lightly tighten setscrew (A)
- b. Assemble pyrometer and bracket assembly to support arm, and lightly tighten setscrew (B).
- c. Connect cord assembly (C) to pyrometer



FIG. 3

B. Pyrometer Alignment

- a. Pyrometer adjustments should be made with a sighting crucible in the crucible holder, and the Melt Coil raised into the Melt position. The sighting crucible has two small sighting spots, one towards the side and one on bottom center. These are used as targets when sighting in the pyrometer.
- b. Adjust height of pyrometer support arm to achieve 19 1/2" (49.5 cm) from the lens barrel to the inside bottom of the crucible
- c. Look into the eye-piece, a circular reticle will appear in view. Adjustments are made to focus and center the sighting spots in the reticle.

(1) Right or Left Alignment (Fig. 3)

- (a) Loosen setscrew (A) at base of support arm and rotate unit, or
- (b) Loosen setscrew (B) on horizontal part of support arm and rotate pyrometer.
- (c) With the pyrometer tilted back (bottom set screw contacting Stop) sight the reticle on the bottom spot of the crucible. (Fig. 4)

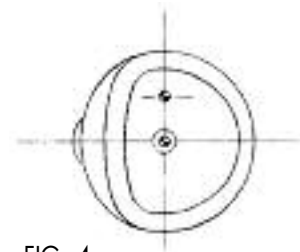


FIG. 4

NOTE: The bottom spot should have different marking from the spot on the side. For identification (see Figure 4.)

- (d) Tighten all setscrews

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- (2) Back Alignment (Fig 5)
Adjust top setscrew (B) up or down to center bottom spot in the reticle. Tighten lock nut.
- (3) Forward Alignment Adjust top setscrew (A) up or down to center side spot in the reticle when pyrometer is tilted forward. Tighten lock nut.
- (4) Focusing the Pyrometer
 - (a) Loosen recessed setscrew (C) until lens tube slides freely.
 - (b) Sight through sighting lens (D) to bottom center spot in sighting crucible.
 - (c) Raise or lower lens tube (E) until spot comes into sharp focus.
 - (d) Move your head slightly from side to side; adjust lens so spot does not move in relation to reticle.
 - (e) Tighten setscrew (C), which will lock in the lens tube in position.

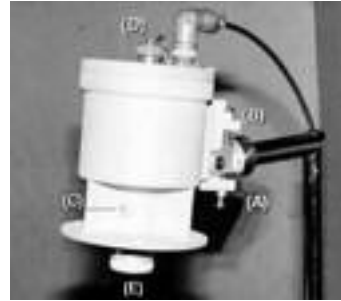


FIG. 5

NOTE: *Pyrometer readings are taken only from the area within the reticle.*

- C. Forward and back positions of pyrometer.
 - a. Forward position (sighted on carbon) for noble and precious alloys
 - b. Back position (sighted on alloy) for chrome based alloys

5. MOLD HOLDER (Fig 6) (Various sizes available)

Adjustments:

- A. Lower coil and let crucible support cradle (A) come forward against the front guide
- B. Select two correctly sized Mold Holders and place one in the front holder support (D) and the other in the back holder support (E).
- C. Locate the back holder support (E) in the appropriate groove (F) that will position the mold ring face even or almost even with the front face of the Mold Holder.

NOTE: *Correct Mold Holders should be determined before burnout.*



FIG. 6

A - Cradle
D - Front Mold Holder Support
E - Back Mold Holder Support
F - Flask Length Adjust. Spacer

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6. TUBE INSTALLATION (Fig. 7)

When installing a new tube, turn the Main power switch OFF.
(Fig. 11-2)

- A. The tube should be installed in the vertical position with the anode end down. Insert the tube inside strap (A) and with the fittings (B) facing right, tighten strap (A) around the tube body.
- B. Connect the longer water hose from the water choke to the top fitting of the tube anode; the shorter water hose to the bottom fitting
- C. Connect the white wire (C) from the flange of the tube to the resistors above.
- D. Using bolts and washers fasten securely to terminal connector (D)

- a. Connect the white wire of the tube to the center terminal screw.
- b. Connect the black wires from the tube to the outer terminal screws.

NOTE: Arrange leads with ample space between them so they do not touch one another and tighten nuts securely.

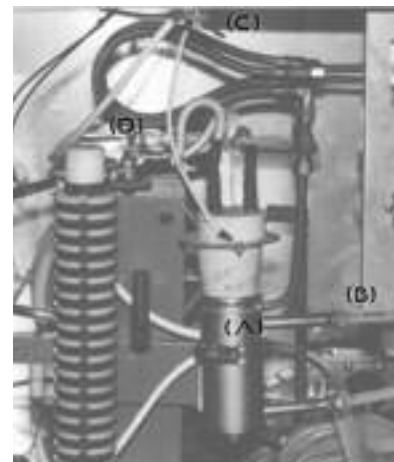


FIG. 7

NEW TUBE BREAK IN

New tubes should be operated for 30 minutes with only the filament ON. Do not operate the machine for that period of time. After the 30 minutes have elapsed, the unit can be used in Normal operation. This procedure should be performed only for the first operation of the tube and is not necessary every time the unit is turned on. If the unit was inoperative for a period of two months or more, the above procedure should be followed.

7. WATER & ELECTRICAL CALIBRATION

Read *INSTRUMENTS AND CONTROLS DESCRIPTION* for reference:

- A. Turn on main water valve and check for leaks on interior and exterior connections.
Check water flow from outlet hose of drain.
- B. Turn the main POWER switch to the ON position. (Fig. 11-2)
- C. Adjust the water pressure regulator to 20 psi. The temperature controller will illuminate if the following conditions are met: The unit is receiving water, fuses (F1 & F2) are not blown, and circuit breaker (Fig. 11-1) is in the ON position.
- D. Transformer tap selection
 - a. With a voltmeter, measure the voltage at the fuse box on the wall.
 - b. Follow the table below and connect wire # 7 to the appropriate voltage tap at the control transformer (Fig - 8)

CAUTION:

WHEN WORKING ON THE INSIDE OF THE UNIT, ALWAYS HAVE THE MAIN POWER SWITCH "OFF"

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E. Connect wire # 7 as follows:

VOLTAGE AT FUSE BOX	CONNECT WIRE # 7 TO:
195-205 V	200
206-215 V	210
216-225 V	220
226-235 V	230
236-245 V	240
246-255 V	250

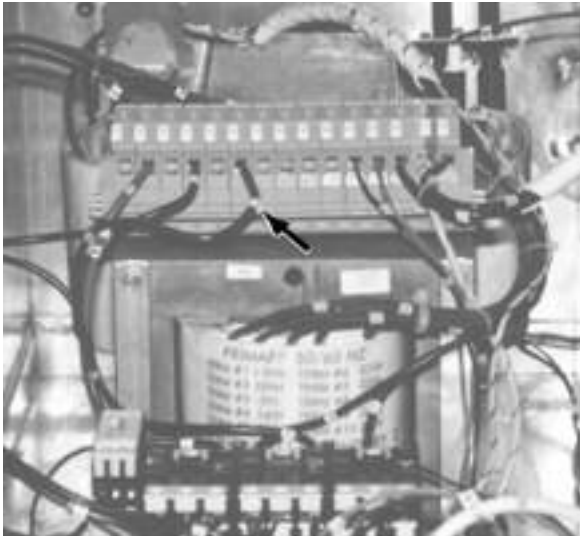


FIG. 8

- F. Filament Voltage Adjustments Replace the front panel.
- a. Momentarily operate the generator and observe Filament Voltage Meter.
 - b. Filament voltage should read between 12.3 and 12.9 VAC (Fig 9). If lower than this range, place wire 6 at the transformer, to "L". If higher than this range, place wire 6, to "H".
- G. Grid Coil Adjustments (Fig 9)
- a. Place 2 ingots of Vitallium in a new crucible.
 - b. Switch the power level switch (Fig 12-3) to position 3.
 - c. Operate generator for 3 seconds and record on a piece of paper the grid current

WARNING:

Before any grid coil adjustments are made, press the Stop button to avoid melting the two test ingots.

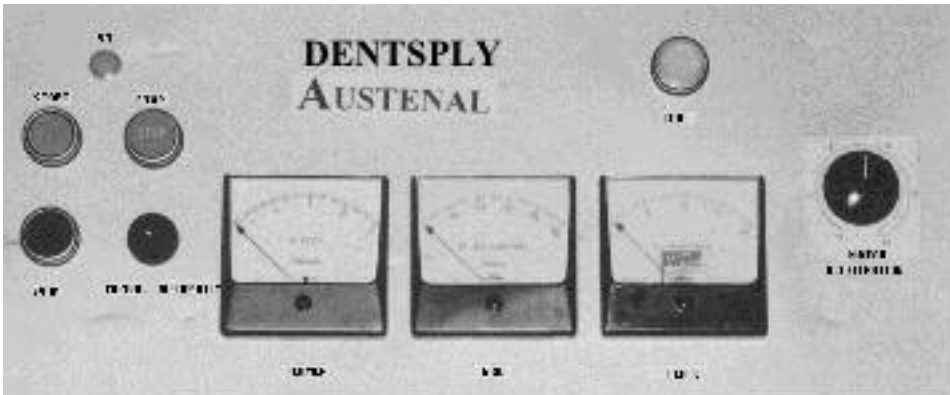


FIG. 9

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- (1) The grid current meter should read 400 ma.
NOTE: *before making any adjustments, always push the STOP button.
For more accurate calibration, do not melt the two metal ingots.*
- (2) If the current is higher, using a small screwdriver turn the calibration screw (Fig. 14-4) 1/4 turn CCW.
- (3) If the current is lower, than 400 ma., turn the calibration screw 1/4 turn CW.
- (4) Repeat steps 2 and 3 if necessary.

8. CENTRIFUGE COUNTER-BALANCE (Fig.10)

The Centrifuge counter-balance weight should be positioned along the centrifuge arm to balance the combined weight of investment ring, crucible and the alloy.

A. Adjust counter weight position for vibration-free operation as follows:

- a. Place a ring of appropriate size in the casting arm.
- b. Place a crucible in the crucible carriage.
- c. Load crucible with approximate alloy weight to be used.
- d. With the Melt Coil in the Down position, spin the casting arm by pressing the green START push-button and close the centrifuge cover.



FIG. 10

B. Adjustments

Loosen the arm's center knob and counterweight. When the arm is loose and not balanced, the heaviest side will be lower. Slide the counterweight until the arm is leveled and at equal height. Tighten the center knob and counterweight.

TESTING THE UNIT

Preparing the Unit for Operation

1. Verify that water is flowing through unit by checking water flow from outlet hose at drain.
2. Turn Main Power Circuit Breaker and Mains disconnect switch "ON".
3. The temperature controller should light if the unit is receiving power.
4. The start push-button should light if the following conditions are met:
 - A. Unit is receiving water pressure of 20 psi
 - B. Fuses (F1 or F2) are not blown
 - C. Circuit breaker (Fig. 11) is in the "ON" position
 - D. Front and rear panels are closed.

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OPERATING INSTRUCTIONS

To test the operation of the unit, apply the following procedure:

- (a) Use dummy carbon mold
- (b) Place approximately 30 grams (1 oz) chrome-cobalt alloy in the crucible
- (c) Adjust counter-weight to balance centrifuge
- (d) Set temperature for 2820°F (1549°C)
- (e) Set Automatic/Manual key switch to Automatic
- (f) Set soak Timer for 10 seconds
- (g) Set Centrifuge Acceleration Reducer to 50%
- (h) Set Melt Power Selector to position 3
- (i) Raise the Melt coil to the Up and locked position
- (j) Place the optical pyrometer to the back sighting position.
- (k) Close the centrifuge cover
- (l) Press the Start Button. The alloy should melt within 40 seconds
- (m) Press Soak Timer Engage Button when melt reaches temperature
- (n) When soaking time has expired, Melt Coil will drop, centrifuge arm will spin and cast the molten alloy into the dummy mold; spin for 30 seconds and stop.
- (o) Open centrifuge cover
- (p) Remove crucible with tongs and clean out slag on tray provided.

NOTE: Do not clean or de-slag crucible while in crucible holder.

ELECTROMATIC - 4 SETTINGS

The following is a general guide to Electromatic - 4 settings and crucible selection when operating the machine. For specific instructions when casting a particular alloy, please consult the appropriate technique manual.

	Chrome Cobalt Alloys	Gold Alloys	Non-precious Alloys
Melt Power Selector	3	2	3
Centrifuge Acceleration Reducer	25-75	25-50 over 1 oz 10-25 1 oz or less	25-50 over 1 oz 10-25 1 oz or less
Pyrometer Position	Back focused on alloy	Forward focused on carbon insert	Back focused on alloy

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CRUCIBLE SELECTION:

The Induction Casting Crucible, Catalog #N031106, should be used for Chrome-Cobalt, Palladium Based, and non-precious alloy castings. When melting gold based alloys, a carbon insert, Catalog #N242903 should be used.

CAUTION:

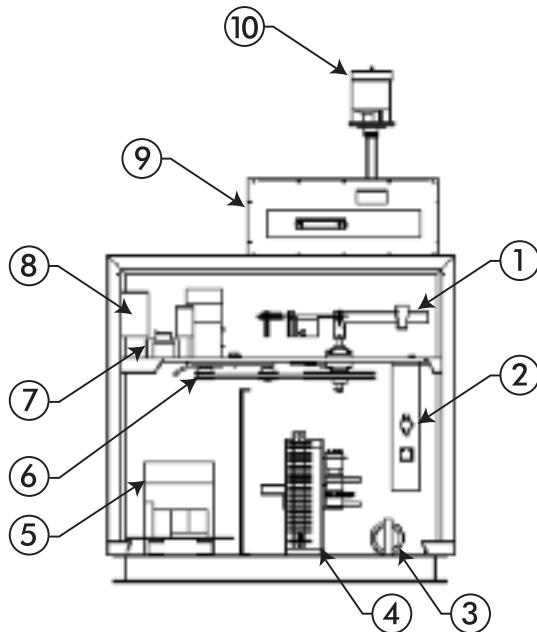
A separate crucible and carbon insert should be identified and maintained for each of the alloys used. Care should be taken to avoid contamination through mix-ups.

MANUAL MODE OPERATION

- (a) Adjust the centrifuge counter-balance for smooth spin.
- (b) Set the Automatic/Manual mode selector to Manual.
- (c) Set the centrifuge acceleration reducer.
- (d) Align casting arm with slot on coil guide assembly, then raise the Melt Coil.
- (e) Select the appropriate power setting with the Melt Power Level Switch
- (f) Place pre-heated crucible in crucible holder.
- (g) Load crucible with alloy.
NOTE: Do not use flux at any time during melting.
- (h) Press the Start button
- (i) Place preheated mold ring into cradle. Check crucible alignment with sprue hole.
NOTE: The centrifuge turns clockwise. A slight lead angle (clockwise) of the crucible spout is advised.
- (j) Directly observe melt readiness
- (k) Cycle the Start and Stop push buttons to regulate temperature
- (l) When ready to centrifuge, close the centrifuge cover. With the Start-Stop circuit latched, press the Coil Release Switch. The Melt Coil will drop, the casting arm will revolve, and the molten alloy will centrifugally cast into the mold.
- (m) Press the Stop button or open the Centrifuge Cover to stop the centrifuge
- (n) Remove flask ring and place on cooling rack.
- (o) Remove crucible to clean out slag on tray provided. Do not clean or de-slag crucible while in the crucible holder.

NOTE: During the Manual operation, the Temperature Controller, Pyrometer, and soak Timer, will be out of the circuit.3. SOAK TIMER - (Fig. 12-15)

INSTRUMENTS AND CONTROLS DESCRIPTION



ELECTROMATIC - 4

- 1 CENTRIFUGE ARM
- 2 DROP MECHANISM
- 3 WATER COOLING ASSEMBLY
- 4 OSCILLATOR ASSEMBLY
- 5 POWER MODULE
- 6 CENTRIFUGE ASSEMBLY
- 7 RELAY LOGIC ASSEMBLY
- 8 POWER FILTER
- 9 CENTRIFUGE COVER
- 10 PYROMETER ASSEMBLY

1. MAIN POWER CIRCUIT BREAKER

This switch is an overload circuit breaker for the whole unit. It will turn off automatically if an overload occurs within the unit. MAIN POWER CIRCUIT BREAKER MUST BE TURNED OFF IMMEDIATELY AFTER ANY POWER FAILURE.



FIG. 11

2. MAIN POWER SWITCH (Fig. 11-2)

This switch is used to provide power to the machine. To prevent any unauthorized usage of the machine, up to three locks could be used when in the OFF position. In the event of an emergency, turn this switch OFF.

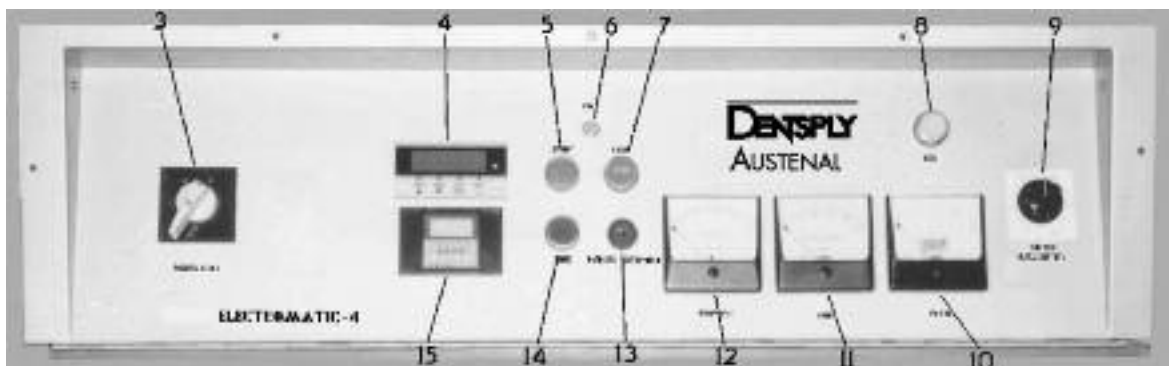


FIG. 12

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3. MELT POWER SELECTOR SWITCH (Fig. 12-3)

The switch setting determines the amount of power delivered to the Melt coil. Three (3) different power settings are provided: 1, 2, and 3 (LOW to HIGH).

4. TEMPERATURE CONTROLLER - (Fig. 13)

To change the setpoint, (SP_1) press and hold the "Prog" key and the ∇ at the same time. Display Flashes. To change the value, use the Δ ∇ keys. Push "Prog" once (SP_2) appears use the Δ ∇ keys to change value. After changes are done continue to press the "Prog" key to store changes in memory and return to the operational display screen. (< 1700)



FIG. 13

To view the setpoint press the "Prog" and the ∇ key both at once. The display will flash and indicate the SL_1 setpoint. Push the "Prog" again to view the SP_2 set point...etc. Continue to push the "Prog" button to return to normal operational mode or Push "Prog" and ∇ at the same time

Caution: Do Not Change the SPC_1 thru SPC_6 set point numbers, they will change the meters operation.

If by chance they do get changed, set them as follows:

SPC_1=100, SPC_2=000, SPC_3=000, SPC_4=000, SPC_5=000, SPC_6=000

5. START PUSH BUTTON (Fig. 12-5)

This switch illuminates when the machine is ready for operation and will provide power to the generator or the centrifuge motor. Pressing the Start push button will latch the circuit and illuminate the ON Indicator (Fig. 12-6).

6. ON INDICATOR (Fig. 12-6)

The white light indicates that the melt or the centrifuge cycles are on operation.

7. STOP PUSH BUTTON (Fig. 12-7)

The stop push-button stops the melt cycle or the centrifuge cycle.

8. COIL RELEASE SWITCH (Fig. 12-8)

The coil release switch illuminates when the MELT COIL is ready to be lifted or dropped. This switch will not operate during the centrifuge cycle.

9. CENTRIFUGE ACCELERATION (Fig. 12-9)

This rheostat controls the "take-off" speed of the centrifuge.

A. Maximum acceleration occurs at the "0" setting with the pointer in the fully clockwise position.

B. Minimum acceleration occurs at the "10" setting, with the pointer in the fully counter-clockwise position.

NOTE: The final centrifuge speed is pre-set at the factory at 400 rpm.

10. PLATE CURRENT METER (Fig. 12-10)

This meter indicates the tube's plate current during the melt cycle, which should not exceed 1.5 amp.

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11. GRID CURRENT METER (Fig. 12-11)

The grid current meter indicates the current provided to the tube's grid during the melt cycle. The meter's indicator will fluctuate when the oscillator is on, but should not exceed 450 Ma.

12. FILAMENT VOLTAGE METER (Fig. 12-12)

This meter indicates the voltage across the filament of the tube. This voltage should be 12.6 VAC .

13. AUTOMATIC/MANUAL MODE KEY SWITCH (Fig. 12-13)

This switch selects the mode of operation of the unit, Automatic or Manual. In the Automatic mode, the alloy melt temperature, soak time and the casting operation will be controlled automatically. When the unit is operated in the manual mode, the alloy temperature and casting operation are controlled by the operator.

WARNING:

To avoid any damage to the unit, only Authorized personnel should operate this machine on the MANUAL mode.

14. MELT COIL LIFT LEVER (Fig. 14-1)

Located in the front panel, this lever raises the MELT COIL into position around the crucible. A bearing on the crucible carriage fits into a slot in the coil guide assembly.

To raise the melt coil,

- A. Align bearing with slot.
- B. Push coil release switch (Fig. 12-8) with your left hand
- C. Raise the melt coil by pushing down on the melt coil lift lever (1) with your right hand. Do not force the lever down. If any resistance is felt, recheck guide alignment.
- D. While pushing the lever down, release the COIL RELEASE SWITCH in your left hand.
- E. To drop the MELT COIL, press the COIL RELEASE SWITCH (Fig. 12-8). In case of emergency, or when the coil release switch is out of operation, push in the MANUAL COIL RELEASE, (Fig. 14-3).

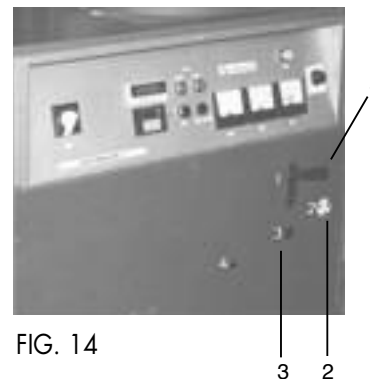


FIG. 14

15. SOAK TIMER - (Fig. 12-15)

A 0-60 second solid state timing device provides a controlled amount of soak time to the melt while at temperature. The timing cycle is initiated only when the push button above the timer is engaged by the operator. If engaged during the melting cycle, the timing sequence will start once the melt reaches temperature. The timer will operate only in the automatic mode.

- A. Soak time from 0 - 60 seconds can be pre-set with the use of the push buttons (FIG. 12-14) located at the right side of the soak timer.
- B. If the centrifuge cover is open, automatic casting will not occur at the end of the soak time. Centrifuge casting will only occur when the cover is closed.
- C. The bar graph indicates the amount of time remaining during the soak cycle.

16. WATER PRESSURE GAUGE (Fig. 14-2)

This gauge indicates the water pressure provided to the unit.

TROUBLE SHOOTING OF CASTINGS

1. **Excessive "fins"**

- A. Check initial setting time of refractory models and molds. (It should be no less than 15 minutes).
- B. Raise centrifuge acceleration setting; this decreases take-off speed.
- C. Decrease casting temperature 25°F (14°C).

2. **Short Castings**

- A. Lower centrifuge acceleration setting; this increases take-off speed.
- B. Raise casting temperature 25°F (14°C).
- C. Check burnout furnace temperature and soak time.

3. **Alloy Spillage**

- A. Too much alloy.
- B. Crucible not properly aligned with mold sprue former.
- C. Sprue former is too shallow.
- D. Mold Holder too large for the mold.
- E. Acceleration reducer setting too low.

4. **Too much slag left in crucible**

- A. Alloy temperature too low.
- B. Alloy soak timer extended excessively.
- C. Crucible not properly pre-heated prior to usage.
- D. Crucible holder worn permitting bottom of crucible to swing out during acceleration.

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SPECIFICATIONS

ELECTROMATIC - 4 CASTING MACHINE

ITEM # N155700

SIZE OF MACHINE

Dimensions

Weight	597 lb. (270.44 kg)
Overall Height	57" (144.78 cm)*
Cabinet Height	35 3/4" (90.805 cm)
Width	38 1/2" (97.79 cm)
Depth	27 1/2" (69.85 cm)

*Includes Optical Radiation Pyrometer and Bracket

ELECTRICAL SPECIFICATIONS

1. Input 200-250 volts AC, 50/60 Hz, 30 amps. Single phase.
2. Output 4.4 kW at 500 kHz.
3. Main Power, Circuit Breaker Protection.
4. Melt, Circuit Breaker Protection.

WATER AND DRAIN REQUIREMENTS

1. 3/8" water line with shut-off valve, 20 psi, 1.5gpm minimum.
2. Drainage facilities within five (5) feet (152.4 cm) of unit and not above the cabinet height of the unit (36" or 91.4 cm).

WATER COOLED

1. Tube
2. Melting Coil
3. Tank Coil

MELTING TIME

30 grams of new chrome-cobalt alloy in 40 seconds.

SAFETY

1. Centrifuge Cover electrically interlocked.
2. Front panel access electrically interlocked.
3. Five second delay to lift the Melt Coil (with Coil Release Switch) after the centrifuge motor has been de-energized.
4. Melt Coil and Lift Lever inoperative (with Coil Release Switch) during centrifuging cycle.
5. Start-Stop latching circuit that will unlatch in the event a power failure or overload occurs within the Melt Circuit.

MODE OF OPERATION

Automatic or operator controlled.

Electromatic - 4

CENTRIFUGE

1. One quarter (1/4) horsepower, 180 volts DC electric motor.
2. Ball bearing supported casting arm.
3. Belt driven pulley factory set at 400 rpm.
4. Continuously variable centrifuge acceleration control.
5. Casting arm balance controlled by adjustable counterweight.
6. 30 seconds automatic centrifuge shut-off.

SOAK TIMER

Variable solid state timer 0-60 seconds for automatic soaking. Plug in instrument for easy repair access.

DIGITAL TEMPERATURE CONTROLLER

Automatic Mode

1. Optical Radiation Pyrometer with solid state temperature controller.
 - A. Target size: 3/8" (9.53mm) diameter.
 - B. Response time: 1 second.
2. Temperature range: 1900°F - 2900°F (1038°C - 1593°C).

Manual Mode

1. The operator controls readiness of the alloy and casting.

NOISE LEVEL

Under 70 dB at one meter.

MAINTENANCE

1. **Daily Care**

- A. Clean casting well.
- B. Remove all alloy splash with emphasis particularly on Melt Coil.
- C. Check optical radiation pyrometer adjustments.

2. **Weekly Care**

- A. Clean guide rods along with the crucible holder slides.
- B. Establish a free movement of crucible carriage.

3. **Monthly Care**

- A. Remove front panel and vacuum accumulated dust and dirt inside of the unit.

CAUTION: *Be sure Main POWER SWITCH is OFF*

- B. Check H.F. flexible leads for parallelism and proper separation.
- C. Inspect for water leaks and cleanliness of water filter cartridge.
- D. Check for water leaks.

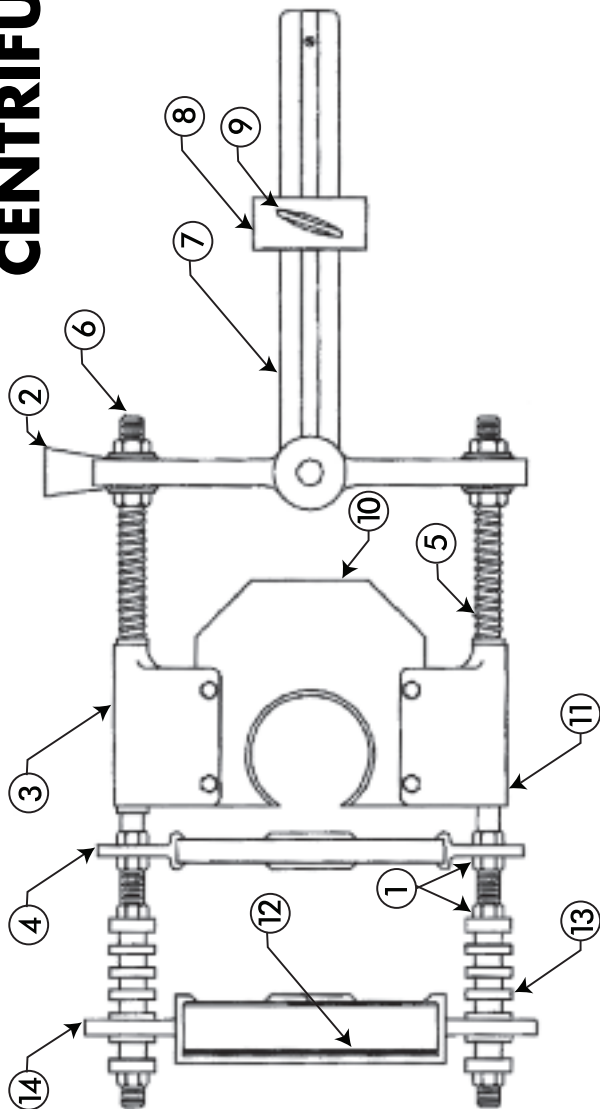
4. **Every 60 to 90 days**

- A. Adjust H.F. flexible leads for parallelism and proper separation.
- B. Check calibration of grid current.

REPLACEMENT PARTS

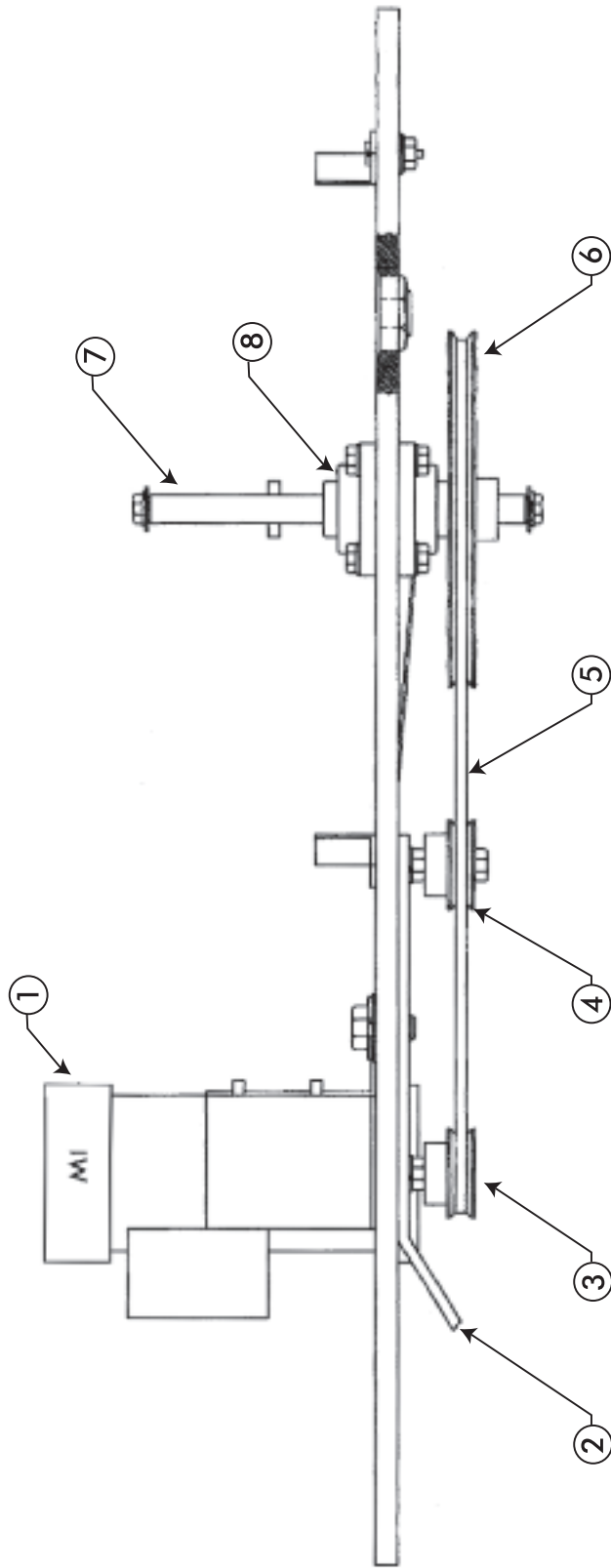
CATALOG #	DESCRIPTION
N031106	Crucible.
N154501	Quartz Rod.
N154535	Sighting Crucible.
N154553	Crucible Tongs.
N154801	Carbon Dummy Mold.
N154861	No. 1, 1 1/4 Ring Holder.
N154862	No. 2, 1 1/2 Ring Holder.
N154863	No. 3, 1 3/4 Ring Holder.
N154864	No. 4, 2 1/4 Ring Holder.
N154865	No. 5, 2 3/4 Ring Holder.
N154866	No. 6, 3" Ring Holder.
N154867	No. 7, 3 1/4 Ring Holder.
N154868	No. 8, 3 1/2 Ring Holder.
N242903	Carbon Crucible Insert.

CENTRIFUGE ARM



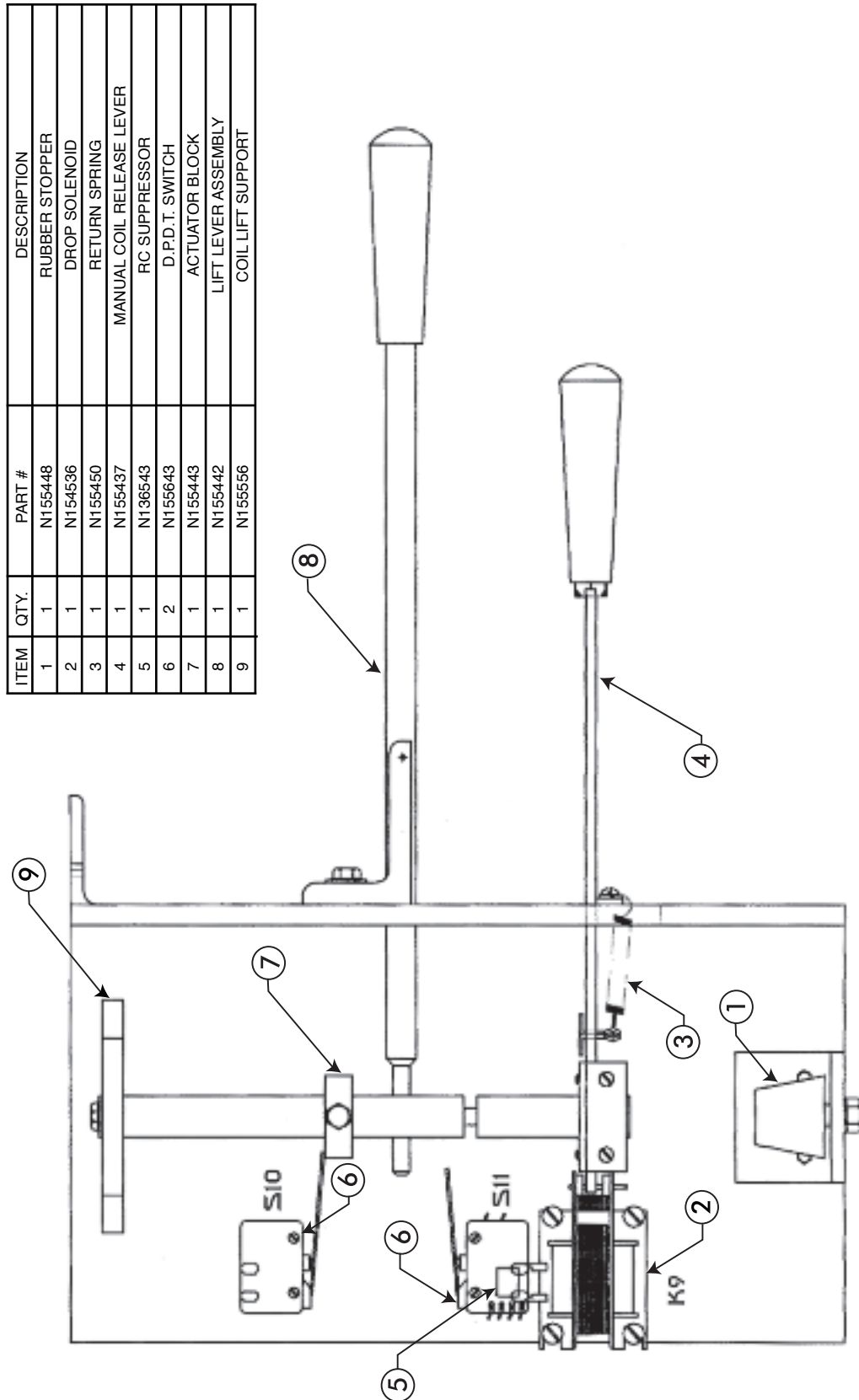
ITEM	QTY.	PART #	DESCRIPTION
1	12	NCRNUSS07	3/8-16 UNC HEX JAM NUT
2	1	N154515	INSULATION WASHERS SET
3	1	N155602	RIGHT HAND CARRIAGE ASSEMBLY
4	1	N154510	MOLD CRADLE FRONT
5	2	N155192	RETAINING SPRING
6	2	N154512	CRUCIBLE HOLDER ROD
7	1	N155901	CENTRIFUGE ARM
8	1	N155524	COUNTERWEIGHT FOR ARM
9	1	N155523	THUMB SCREW
10	1	N154509	TRANSITE CRUCIBLE HOLDER
11	1	N154599	CRUCIBLE CARRIAGE GUIDE (REAR)
12	1	N154508	MOLD HOLDER BACK PLATE
13	2	N154513	ADJUSTMENT SPACER
14	1	N154507	MOLD CRADLE (REAR)

CENTRIFUGE ASSEMBLY

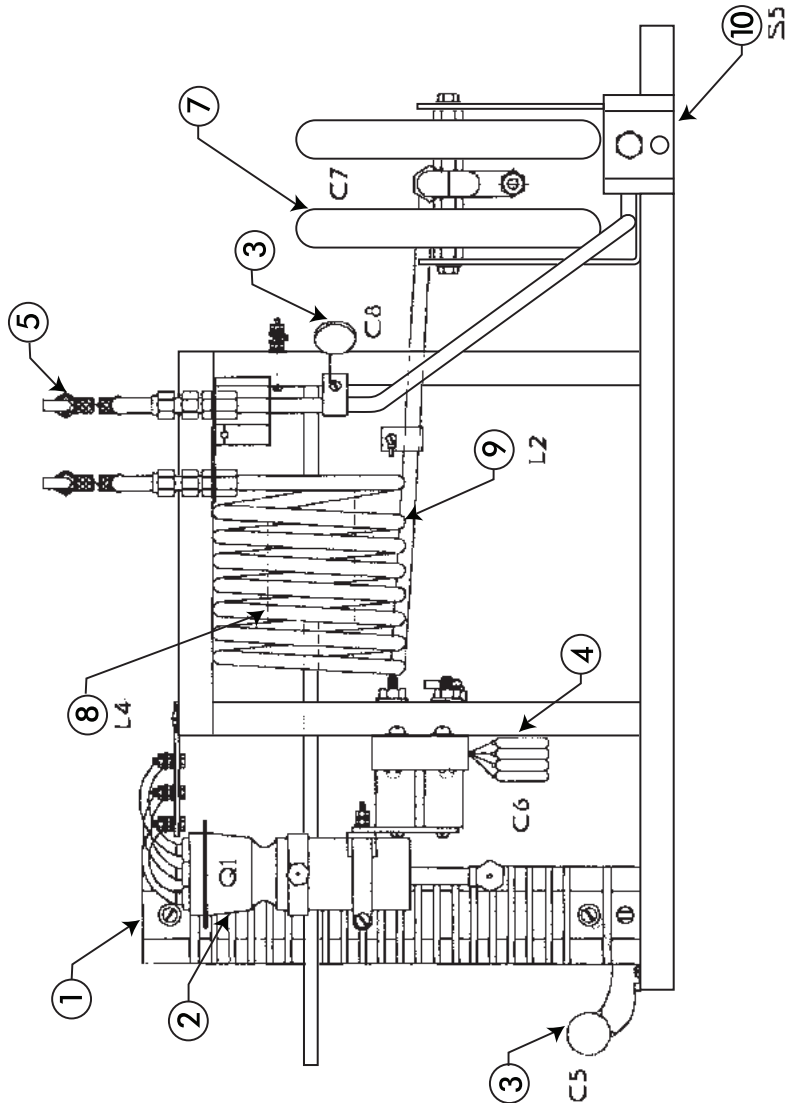


ITEM	QTY.	PART #	DESCRIPTION
1	1	N155934	DC MOTOR
2	1	N155464	BELT ADJUSTMENT BAR
3	1	N155936	PULLEY FOR MOTOR
4	1	N155161	IDLER PULLEY
5	1	N155163	BELT, CENTRIFUGE 3L - 45
6	1	N155162	8" PULLEY, CENTRIFUGE
7	1	N154596	SHAFT
8	2	N155154	BEARING

DROP MECHANISM

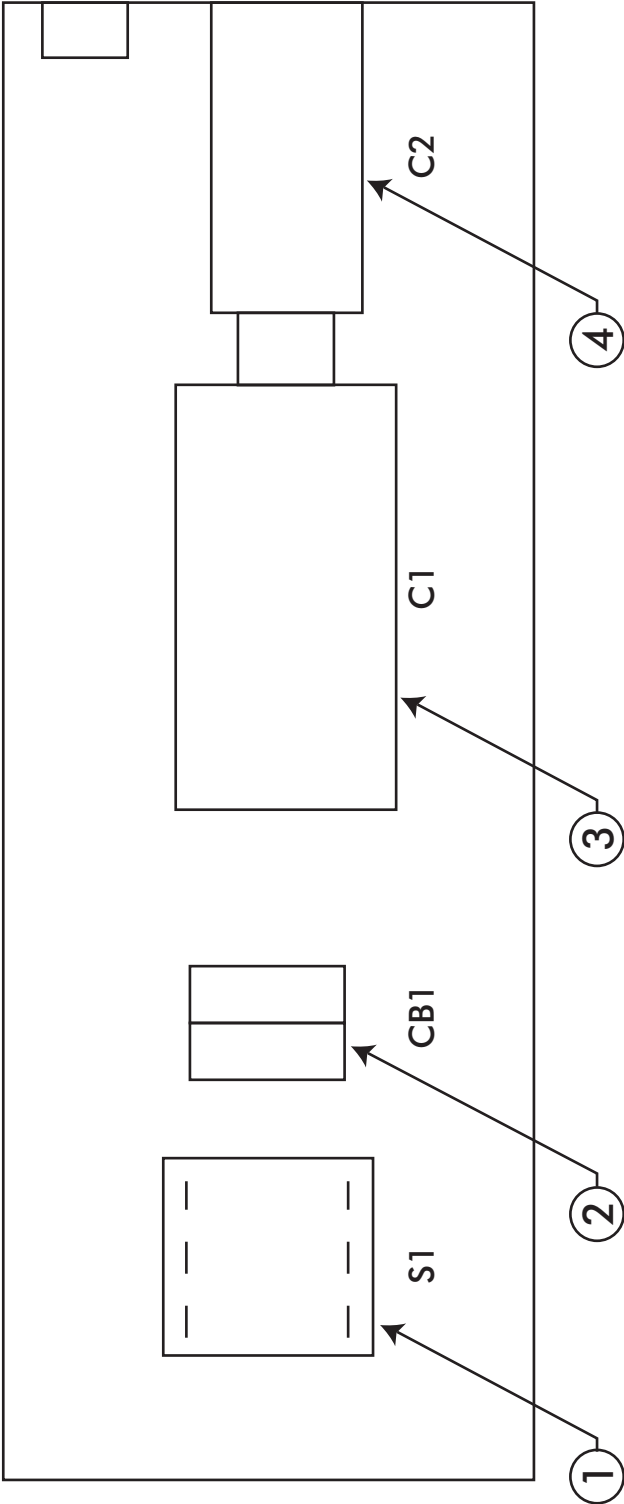


OSCILLATOR ASSEMBLY



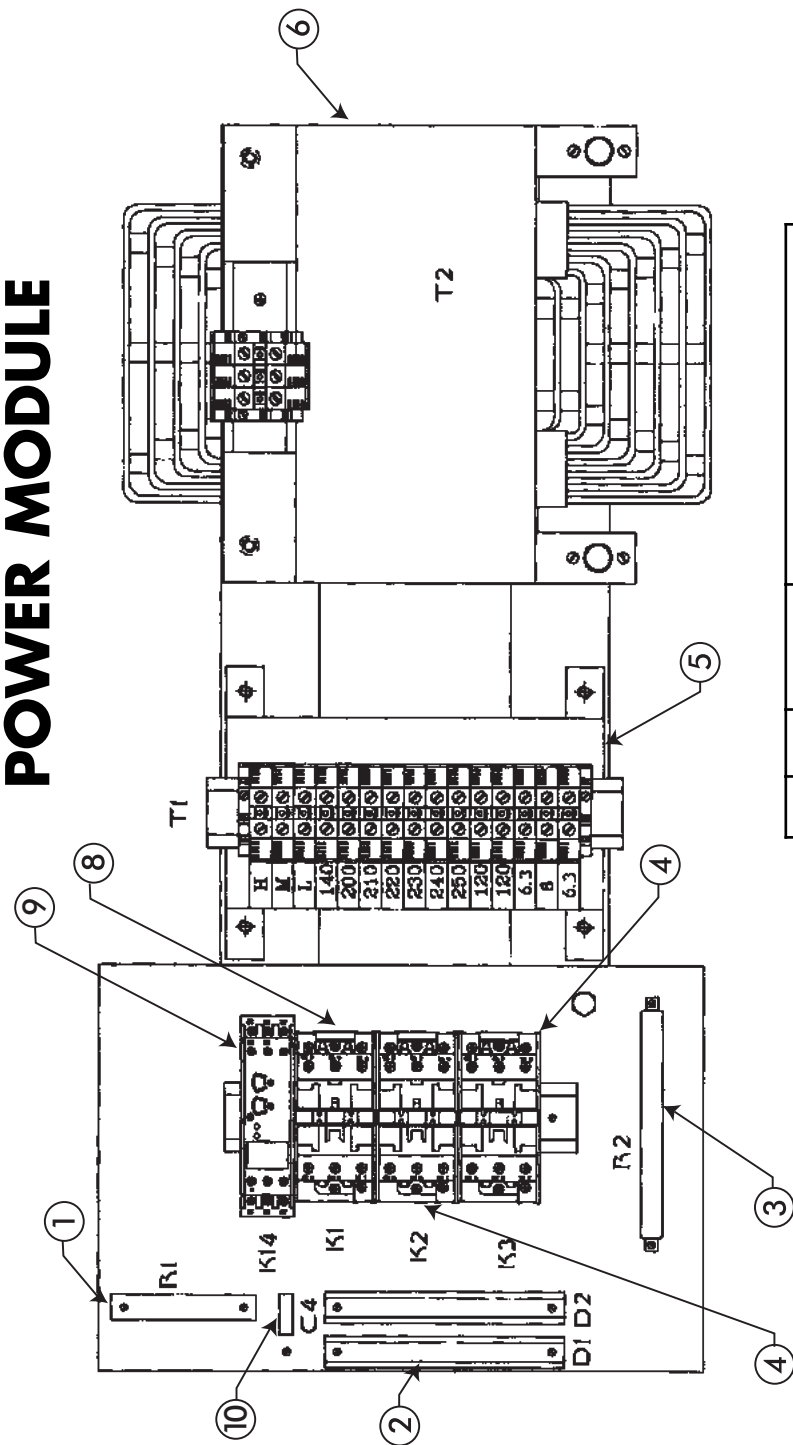
ITEM	QTY.	PART #	DESCRIPTION
1	1	N155509	RF CHOKE ASSEMBLY
2	1	N155770	OSCILLATOR TUBE
3	2	N155570	CAPACITOR 1.5 nf
4	1	N155516	CAPACITOR ASSEMBLY 6.0 nf
5	2	N155510	FLEXIBLE LEAD
7	2	N155517	TANK CAPACITOR 6000 pf
8	1	N155904	GRID COIL ASSEMBLY
9	1	N155513	TANK COIL ASSEMBLY
10	1	N155992	WATER FLOW SWITCH

POWER FILTER ASSEMBLY



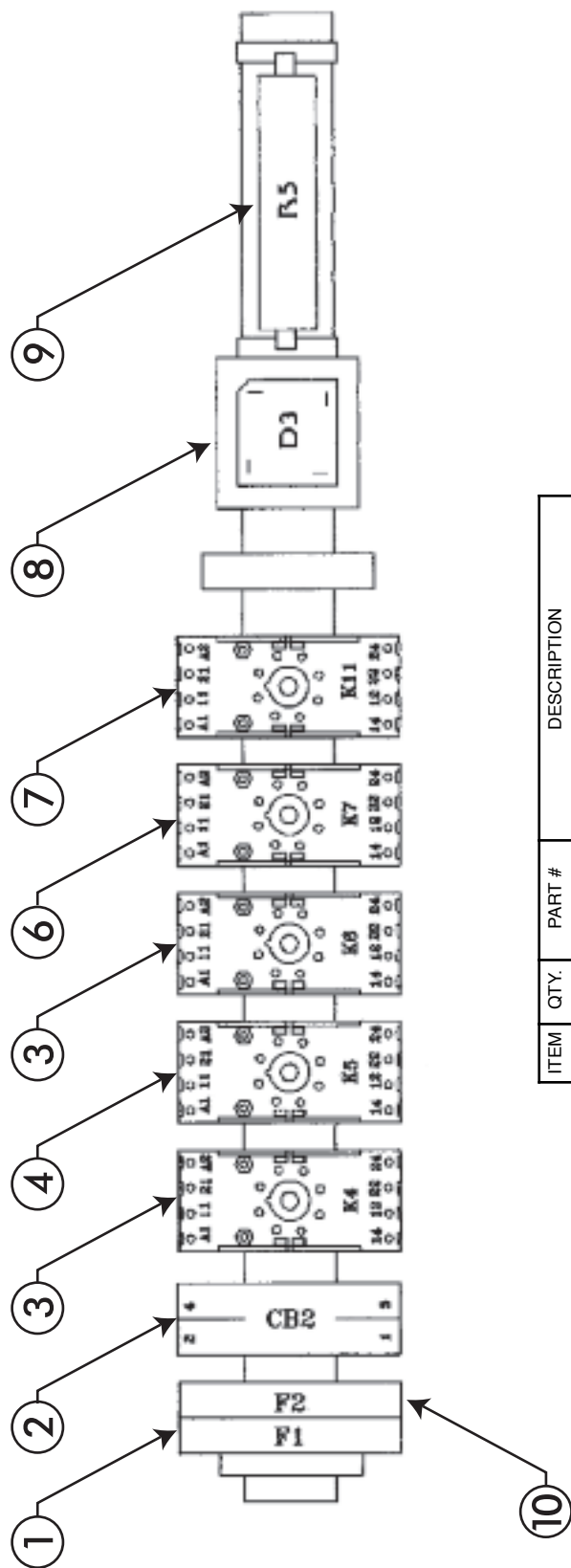
ITEM	QTY.	PART #	DESCRIPTION
1	1	N155971	MAIN POWER SWITCH
2	1	N155113	CIRCUIT BREAKER 40A
3	1	N155974	SF45 EMI FILTER, FILTER-CONCEPTS INC.
4	1	N155975	FN2010 RFI FILTER, SCHAFFNER

POWER MODULE

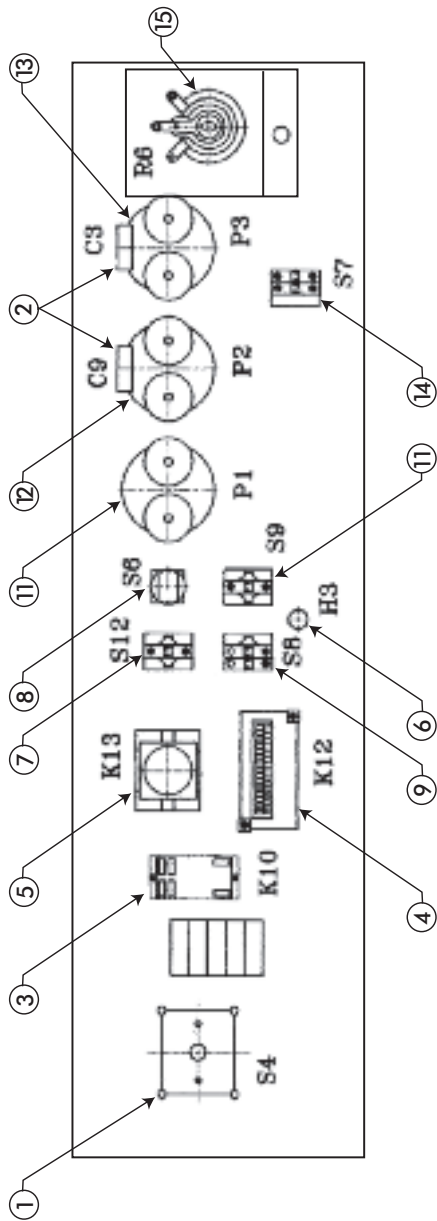


ITEM	QTY.	PART #	DESCRIPTION
1	1	N155244	RESISTOR 5 OHM
2	1	N155469	RECTIFIER HIGH VOLTAGE
3	1	N155518	RESISTOR 25 OHM
4	2	N155925	CONTACTOR 120V
5	1	N155923	HIGH VOLTAGE TRANSFORMER
6	1	N155921	AUTO TRANSFORMER
8	1	N155926	CONTACTOR 220V/240V
9	1	N155928	VOLTAGE MONITORING RELAY
10	1	N155526	CAPACITOR 0.1 MF, 600V

RELAY LOGIC ASSEMBLY

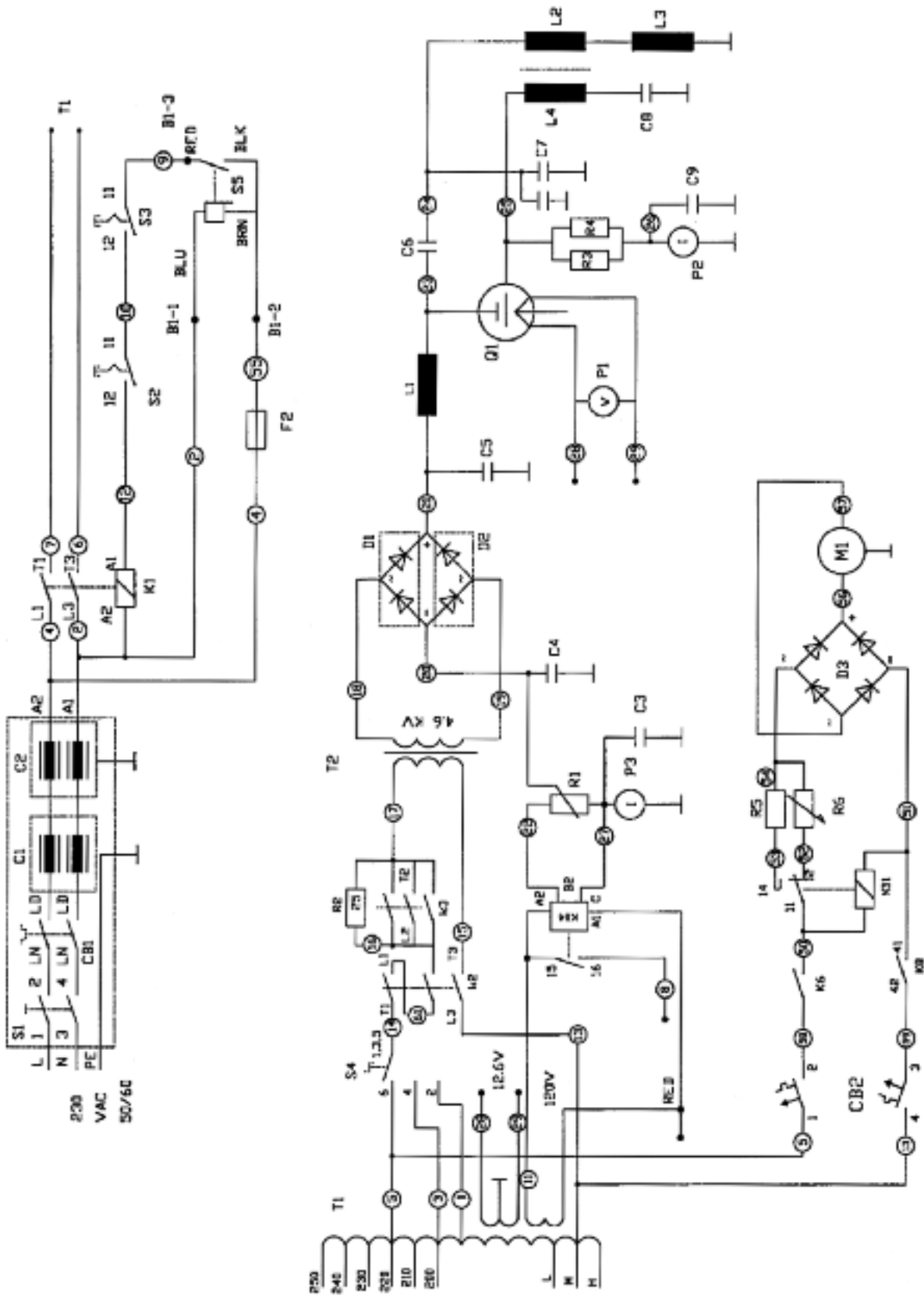


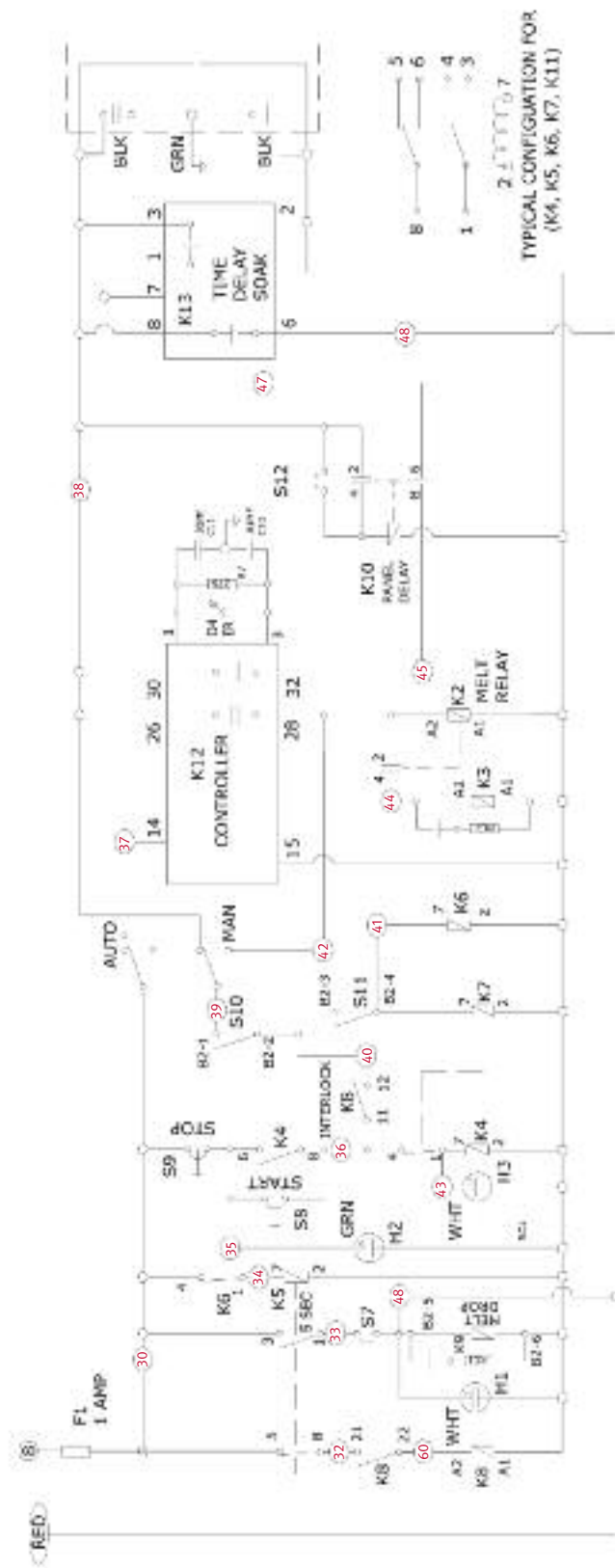
ITEM	QTY.	PART #	DESCRIPTION
1	1	N107633	FUSE 1A, 220V
2	2	N155942	CIRCUIT BREAKER 16A
3	2	N114244	RELAY 120V, PLUG-IN TYPE
4	1	N134475	TIME RELAY 120V
6	1	N155242	30 SECOND TIME RELAY 120V
7	1	N155961	TIME RELAY 220V
8	1	N160060	BRIDGE RECTIFIER
9	1	N155977	RESISTOR 100 OHM, 50W
10	1	N155966	FUSE 0.5A, 220V



INSTRUMENT PANEL

ITEM	QTY.	PART #	DESCRIPTION
1	1	N155951	POWER LEVEL SWITCH
2	2	N155526	CAPACITOR 0.1 MF 600V
3	1	N155953	RELAY 120V
4	1	N154330	DIGITAL PANEL METER
5	1	N155493	SOAK TIMER
6	1	N155662	NEON LAMP WHITE, 120V
7	1	N155957	PUSH BUTTON
8	1	N155958	KEY SWITCH
9	1	N155955	GREEN PUSH BUTTON 120V
10	1	N155956	RED PUSH BUTTON
11	1	N155494	FILAMENT METER 0-15 VAC
12	1	N155495	GRID METER 0-300 MA
13	1	N155496	PLATE METER 0-2 A
14	1	N155959	WHITE PUSH BUTTON 120V
15	1	N155969	RHEOSTAT 150 OHM





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(b) Covers all products manufactured by or for DENTSPLY Prosthetics as designated by an DENTSPLY Prosthetics nameplate or label affixed to the product or its container.

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