VC-50 Precision Diamond Saw

VC-50 Instruction Manual

U.S. Patent 3935677
Other patents are pending in
the U.S.A. and other countries.

Minor revisions may not be reflected
in this manual.

Part Number 200-019

November 2001

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Table of Contents

Illustrations List

Warranty

Equipment manufactured by LECO Corporation, St. Joseph, Michigan is warranted free from defect in material and workmanship for a period of six months from the date of installation. Equipment not manufactured by LECO is covered to the extent of warranty provided by the original manufacturer and this warranty does not cover any equipment, new or used, purchased from anyone other than LECO Corporation. All replacement parts shall be covered under warranty for a period of thirty days from date of purchase. **LECO makes no other representation or warranty of any other kind, expressed or implied, with respect to the goods sold hereunder, whether as to merchantability, fitness for purpose, or otherwise.**

Expendable items such as crucibles, combustion tubes, chemicals, and items of like nature are not covered by this warranty.

LECO's sole obligation under this warranty shall be to repair or replace any part or parts which, to our satisfaction, prove to be defective upon return prepaid to LECO Corporation, St. Joseph, Michigan. This obligation does not include labor to install replacement parts, nor does it cover any failure due to accident, abuse, neglect, or use in disregard of instructions furnished by LECO. In no event shall damages for defective goods exceed the purchase price of the goods, and **LECO shall not be liable for incidental or consequential damages whatsoever.**

All claims in regard to the parts or equipment must be made within ten (10) days after Purchaser learns of the facts upon which the claim is based. Authorization must be obtained from LECO prior to returning any other parts. This warranty is voided by failure to comply with these notice requirements.

Notice

The warranty on LECO equipment remains valid only when genuine LECO replacement parts are employed. Since LECO has no control over the quality or purity of consumable products not manufactured by LECO, the specifications for accuracy of results using LECO instruments are not guaranteed unless genuine LECO consumables are employed in conjunction with LECO instruments. If purchaser defaults in making payment for any parts or equipment, this warranty shall be void and shall not apply to such parts and equipment. No late payment or cure of default in payment shall extend the warranty period provided herein.

LECO Corporation is not responsible for damage to any associated instruments, equipment, or apparatus nor will LECO be held liable for loss of profit or other special damages resulting from abuse, neglect, or use in disregard of instructions. The Buyer, their employees, agents, and successors in interest assume all risks and liabilities for the operation, use, and/or misuse of the product(s) described herein and agree to indemnify, hold harmless, and defend the seller from any and all claims and actions arising from any cause whatsoever, including seller's negligence for personal injury incurred in connection with the use of said product(s) and any and all damages proximately resulting therefrom.

Caution

The instrument should be operated only by technically qualified individuals who have fully read and understand these instructions. The instrument should be operated only in accordance with these instructions.

The operator should follow all of the warnings and cautions set forth in the manual and the operator should follow and employ all applicable standard laboratory safety procedures.

Warning and Caution Symbols

The following symbols may be found on LECO equipment or their components. These symbols indicate the use of specific safety guidelines. Important safety information is highlighted in this manual by one of the following symbols as well as WARNING and CAUTION statements. Operator and service personnel must follow these instructions for personal safety and to prevent damage to the equipment.

WARNING

This symbol indicates a risk of electrical shock. Refer to the manual for specific instructions.

WARNING

This symbol indicates a high temperature surface. Refer to the manual for specific instructions.

CAUTION

This symbol indicates a caution. Refer to the manual for specific instructions.

LECO equipment should be operated only by technically qualified individuals who have fully read and understand the instructions detailed in this manual. The equipment should be operated only in accordance with these instructions.

The operator should follow all of the warnings and cautions set forth in this manual and the operator should follow and employ all applicable standard laboratory safety procedures.

Interference to Other Devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and Regulations. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Declaration of Conformity

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name:	LECO Corporation
Manufacturer's Address:	3000 Lakeview Avenue St. Joseph, MI 49085 USA INT 1-616-982-0308 INT 1-616-982-8964 fax

Declares that the product:

Product Name:	VC-50 series
Description:	Cut-Off saw
Product Option(s):	This Declaration covers all options of the above product.

Conforms to the following Product Specifications:

EMC: AS/NZS 2064:1997, IEC/CISPR 11:1996 Measurements of Radio Disturbances

Supplementary Information:

The product herewith displaying the C-Tic marking complies with the requirements listed above.

St. Joseph, MI
Location

4 April, 2001
Date

Brian K. Kunde
Brian K. Kunde
Group Leader, Compliance Engineering

European contact:

Your local LECO Sales and Service Office or LECO Europe B.V., Vouersweg 118, 6161 AG Geleen, The Netherlands, +31 46 4747333 tel, +31 46 4747473 fax.

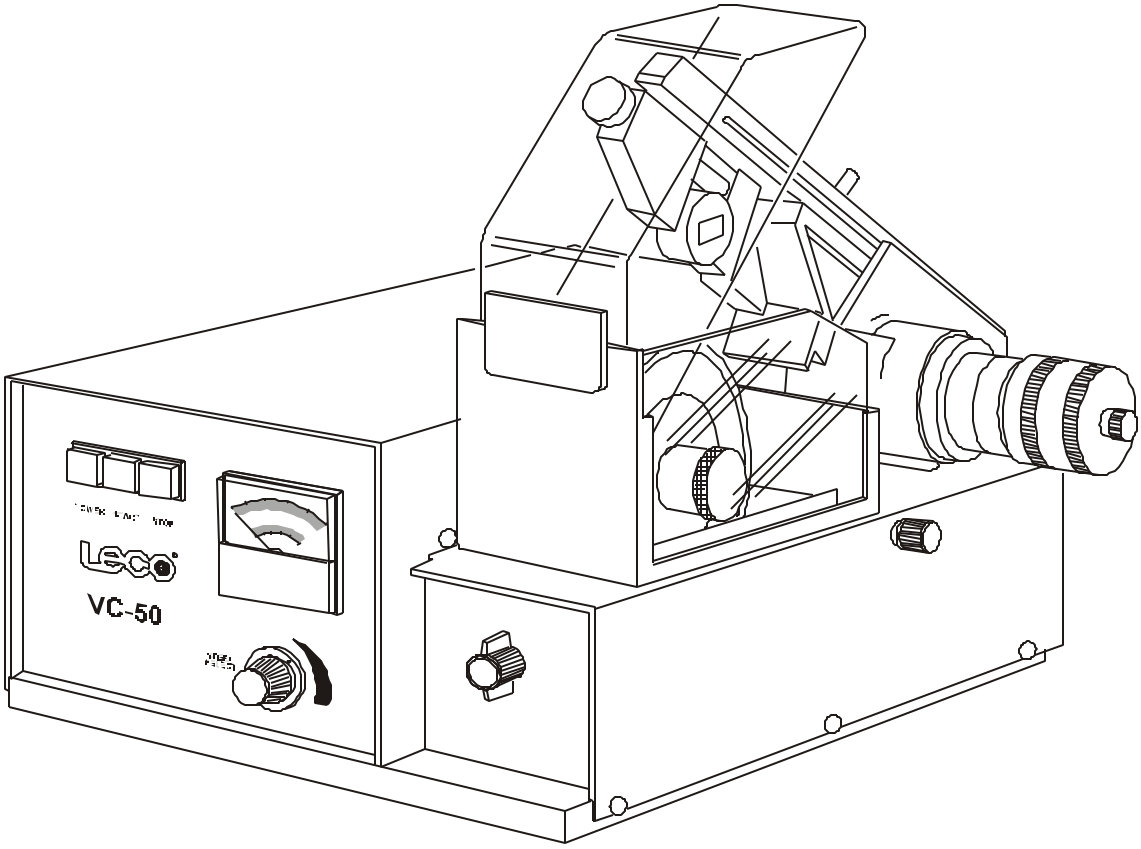

Figure 1
VC-50 Precision Diamond Saw

Major Equipment and Accessories List

The LECO VC-50 is a variable speed diamond saw designed for precision sectioning of metals, ceramics, electronic components, and geological samples of up to $1^{1}/_{2}$-inch diameter.

Notes

- *Items listed below are repeated throughout this manual are subject to revision. Please consult the packing slip received with the instrument.*
- *For a complete listing of kits and packages, refer to* *Components and Accessories List, beginning on page 13.*

800-900 VC-50 Saw with English Micrometer (115V)

1	800-900-020	VC-50 Saw
1	200-019	Instruction Manual
1	808-908	Component Pack

800-900-200 VC-50 Saw with English Micrometer (230V)

1	800-900-020	VC-50 Saw
1	200-019	Instruction Manual
1	808-907	Component Pack

801-900 VC-50 Saw with Metric Micrometer (115V)

1	800-900-020	VC-50 Saw
1	200-019	Instruction Manual
1	808-908	Component Pack

801-900-200 VC-50 Saw with Metric Micrometer (230V)

1	800-900-020	VC-50 Saw
1	200-019	Instruction Manual
1	808-907	Component Pack

Options

Note

- *For kit contents, refer to Components and Accessories List, beginning on page 13.*

801-136	Diamond Wheel (5-inch x 0.014") (1/pkg)
801-137	Diamond Wheel (4-inch x 0.012") (1/pkg)
801-563	Thin Section Slide Holder
801-567	Specimen Holder (Irregular Shape)
802-439	Diamond Wheel (5-inch x 0.025") (1/pkg)
807-425	RV-50 Rotating Vise Package
807-956-110	Speed Controller Kit (115V)
807-957-110	Speed Controller Kit (230V)
811-022	Cutting Oil (1 Pint)
811-023	Cutting Oil (1 Quart)
811-024	Cutting Oil (1 Gallon)
811-146	Abrasive Wheel (4-inch x 0.010"/Aluminum Oxide) (10/pkg)

Service Parts

190-875	Screw (10-32x0.75)
767-376	Contact
801-040	Motor Control Card Assembly
801-045	Base Motor
801-066	Belt Gear (#150xl037)
801-099	Wheel Coolant
802-318	Ring Retaining Ext (0.75" shaft)
802-344	Flanges (For 4-inch Blades — 2 Required)
804-570-110	Shock Absorber Replacement Kit

Components and Accessories List

808-907 Component Pack (230V)

1	760-568	Wrench Allen (0.078 Hex)
1	801-136	Diamond Wheel (5-inch)
1	801-552	Removable Splash Shield
1	801-563	Slide Holder
1	801-567	Specimen Holder (Irregular)
1	801-724	Dressing Stick
1	802-367	Space Spindle Handle
1	803-082	Wheel Dresser
1	803-578	Splash Guard
1	808-906	Power Cord
1	811-023	Cutting Oil (1 Quart)

808-908 Component Pack (115V)

1	760-568	Wrench Allen (0.078 Hex)
1	776-997	Power Cord
1	801-136	Diamond Wheel (5-inch)
1	801-552	Removable Splash Shield
1	801-563	Slide Holder
1	801-567	Specimen Holder (Irregular)
1	801-724	Stick Dressing
1	802-367	Space Spindle Handle
1	803-082	Wheel Dresser
1	803-578	Splash Guard
1	811-023	Cutting Oil (1 Quart)

807-956-110 Speed Controller Kit (115V)

1	776-997	Power Cord
1	807-956-901	Speed Controller Kit Bulletin
1	808-904	Speed Controller

807-957-110 Speed Controller Kit (230V)

1	807-957-901	Speed Controller Kit Bulletin
1	808-905	Speed Controller
1	808-906	Power Cord

Specifications

Diamond Wheel Speed

5-inch Wheel (standard).....50 to 650 sfm

4-inch Wheel (optional) .....50 to 525 sfm

Spindle Speed .....0 to 500 rpm

Drive Motor.....1/15 HP

Operating Temperature Range.....35°F to 110°F (2°C to 43°C)

Electrical Power Requirements .....115 V~ (±10%), 50/60 Hz, 1 phase, 200 watts
230 V~ (±10%), 50/60 Hz, 1 phase, 200 watts

Dimensions

Height.....11.5 inches (29 cm)

Width.....13.5 inches (34 cm)

Depth .....21.5 inches (55 cm)

Weight .....52 pounds (24 kg)

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Installation

WARNING

ELECTRICAL SHOCK HAZARD
This equipment operates from either 115V~ or 230V~. Contact with this voltage can be lethal. During installation, do not apply power until instructed to do so.

Steps

1. Place the VC-50 on a solid and level work surface with convenient electrical power supply. Refer to Specifications, page 15, for power requirements.
2. Check the speed control for proper operation.
   A. Locate the cutting arm control valve on the back of the unit and turn the valve counter-clockwise (towards 6) until it comes to a complete stop (figure 3, page 21).
   B. Holding on to the vise, raise the cutting arm to its up-most position (figure 5, page 22).
   C. Turn the cutting arm locking device clockwise to the locked position. The cutting arm may drop slightly but should remain in the raised position (figure 2, page 20).
   D. Insert the spindle spacer handle to keep the spindle from rotating (figure 4, page 22).
   E. Remove the vise locking screw (figure 5, page 22), short spindle spacer, two spindle flanges, and long spindle spacer from the spindle (figure 4, page 22).
   F. Check the serial ID tag on the back of the unit for the required power supply and then connect the unit to the proper facility power (figure 3, page 21).
   G. Turn the power on by pressing the power button. Only the power button indicator should be lighted (figure 2, page 20).
   H. Turn the speed select knob fully counter-clockwise and then press the start button (figure 2, page 20). The start button indicator light should be lit.

I. Slowly turn the speed select knob clockwise until it hits the clockwise stop. The unit should increase its speed smoothly and the meter needle should stop near the extreme right of the meter scale.

J. Turn the speed select knob counter-clockwise until the meter reads mid-scale and then press the stop button (figure 2, page 20).

K. Press the start button. The unit should accelerate smoothly and return to the previous speed as indicated on the meter.

L. With the motor running at mid-speed, unlock the cutting arm by turning the cutting arm locking device counter-clockwise. The cutting arm will lower slowly and the motor will stop when the cutting arm is almost completely down.

Notes

- *The automatic motor shut-off is controlled by the thumbscrew adjustment located on the bottom of the cutting arm. Refer to Setting Automatic Shut-off, page 26, for additional information.*
- *Restart the motor by raising the cutting arm and then pressing the start button.*

3. Install the cut-off wheel as follows.

A. Turn off the power by pressing the power button so the power indicator is not lit (figure 2, page 20).

B. Disconnect power cord from facility power.

WARNING

Disconnect from facility power before continuing with this procedure.

C. Install the long spindle spacer on the spindle.

1) Slide long spindle spacer onto the spindle shaft.

2) Make sure the two o-rings are on the spacer (figure 4, page 22).

D. Slide the flange onto the spindle shaft (figure 4, page 22).

1) For 5-inch diameter cut-off wheel: Install an 801-063 flange on the spindle with the grooved side of the flange toward the free end of the spindle.

2) For 4-inch diameter cut-off wheel: Install an 802-344 flange on the spindle with the grooved side of the flange toward the free end of the spindle.

E. Slide the cut-off wheel onto the spindle shaft.

F. Slide the outer flange onto the spindle shaft.

Note

- *Make sure the outer flange grooves are to the inside.*

G. Slide the short spindle spacer on the spindle shaft (figure 4, page 22).

H. Secure all spindle parts to the spindle shaft with the lock screw (figure 4, page 22).

I. Insert and hold the spindle spacer handle in the hole of the long spindle spacer to prevent rotation of the spindle when tightening the lock screw (figure 4, page 22).

4. Fill the tank with lubricant (figure 2, page 20).

A. Grasping the lubricator control, pull the tank assembly out of the unit and lift off the splash cover.

B. Raise the rubber roller to the highest position by turning the lubricator control knob.

C. Fill the reservoir with lubricant to where it comes in contact with the roller. Refer to page 30, Guidelines for Sectioning Various Materials, for applicable lubricant.

D. Return the rubber roller to the lower position, reinstall the splash shield, and place the tank assembly back into the unit.

E. Raise the rubber roller until it contacts the cut-off wheel.

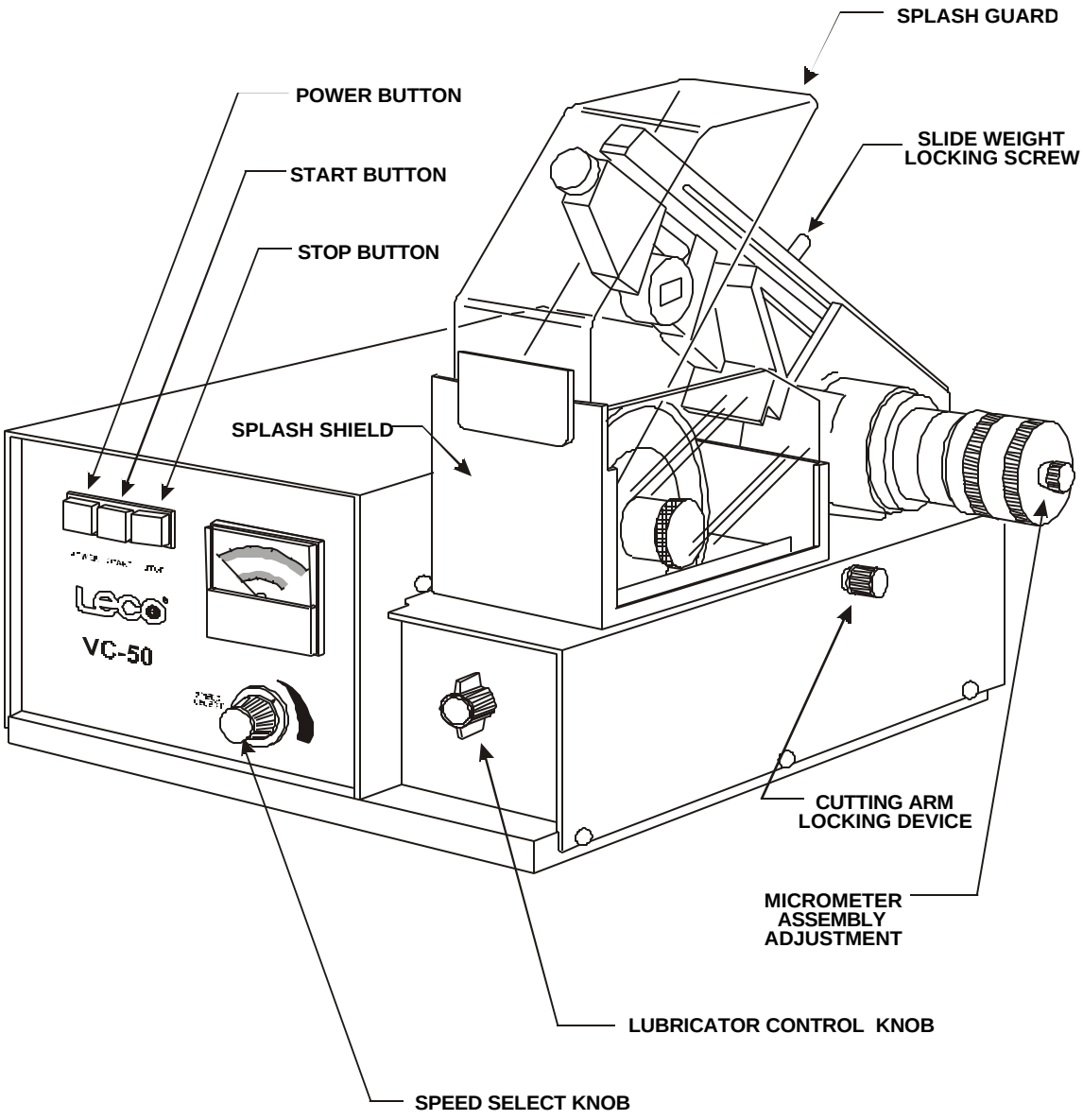

Figure 2
VC-50 Front View

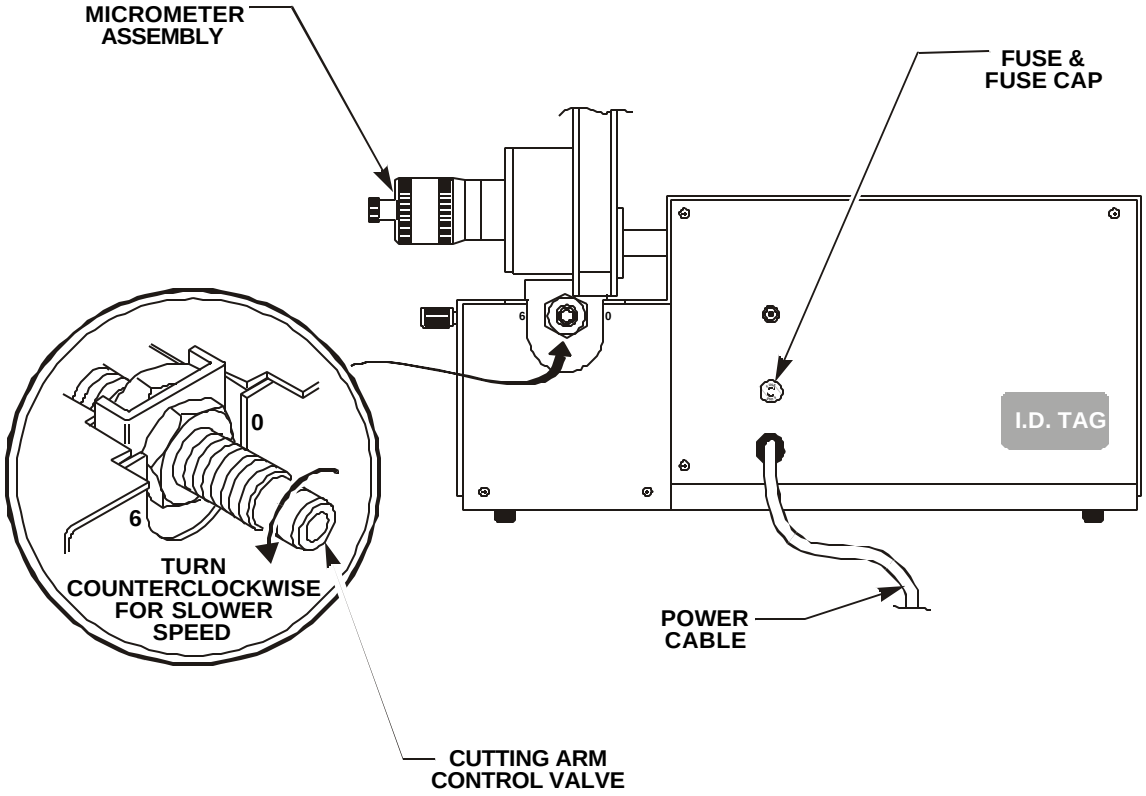

Figure 3
VC-50 Rear View

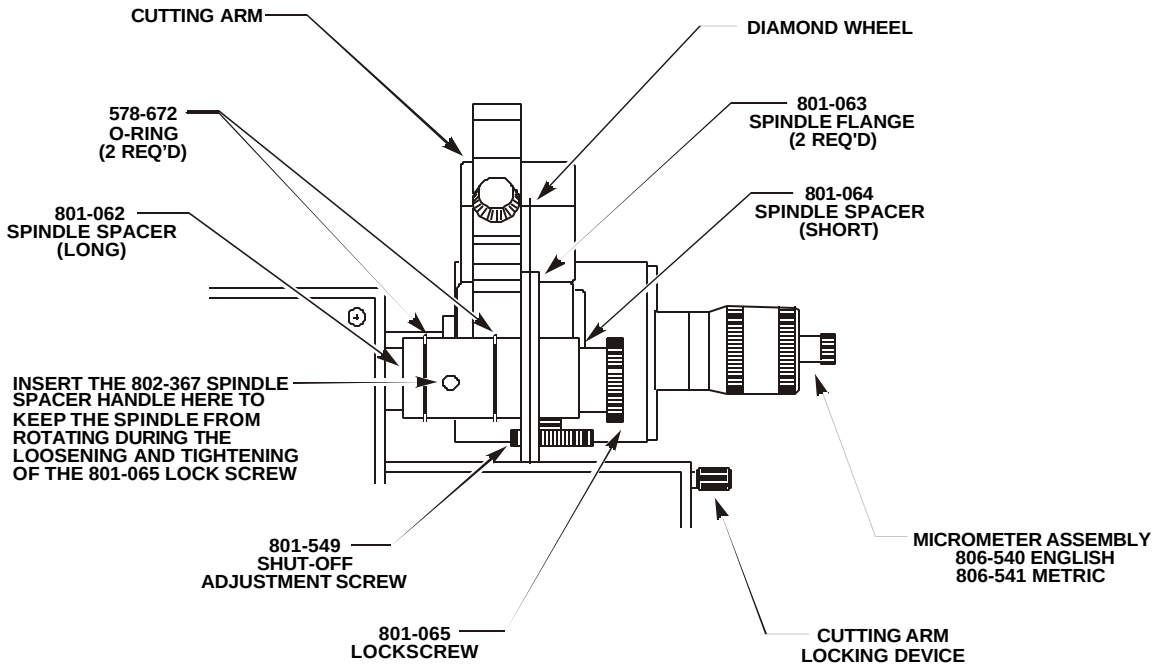

Figure 4
Cutting Area—Front View

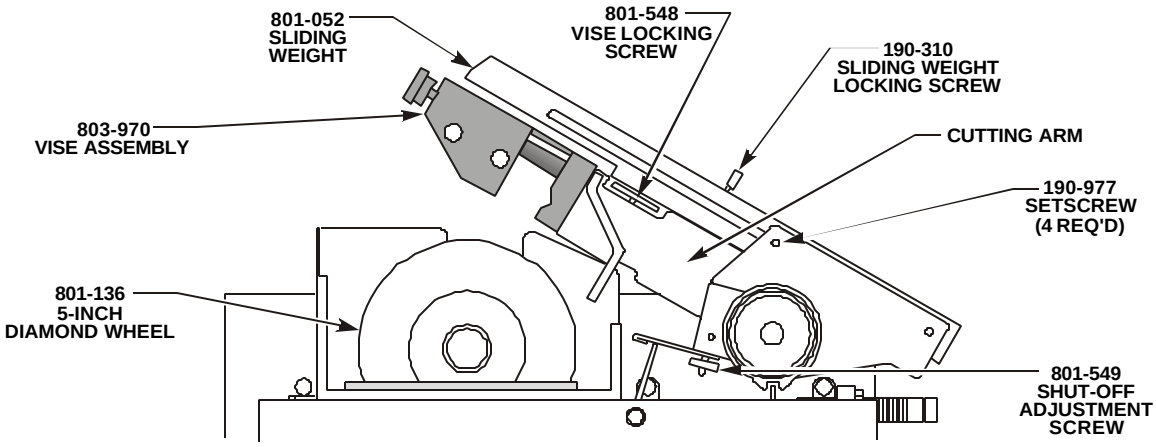

Figure 5
Cutting Area—Side View

Operation

Overview

The VC-50 was designed primarily for sectioning small parts of extremely hard materials such as metal carbides, metal borides, metal nitrides, ceramics, cermets, and hardened tool steels, using a diamond cut-off wheel with an oil coolant at slow speeds.

Small sections of softer alloys (carbon steel alloys and nonferrous alloys) can be sectioned using the diamond wheel; however, the interstices between the diamonds will clog very quickly, and the effectiveness of the diamond wheel is soon lost. If softer alloys are being sectioned, it is recommended that the diamond wheel be dressed frequently. Refer to Diamond Wheel Dressing, page 28, for additional information.

Note

- *When softer alloys are being sectioned on a regular basis, the aluminum oxide abrasive cut-off wheel is recommended with a water coolant. Refer to Options, page 12, for ordering information.*

Steps

1. Place the material to be sectioned into the vise and tighten securely (figure 5, page 22).

Notes

- *Irregular shaped mineralogical samples should be secured in the irregular specimen holder and then secured in the vise (figure 6, page 25).*
- *For samples glued on glass slides, use the slide holder and glue the back of the glass slide to the front of the holder before securing the slide holder into the vise (figure 7, page 25).*

2. Hold the front end (vise) of the cutting arm at the uppermost position and disengage the cutting arm locking device by turning the knob fully clockwise to zero (figure 3, page 21).

Note

- *The vise should be located to the left of the cut-off wheel.*

3. While holding the cutting arm, open the cutting arm control valve to the 2.5 position (approximately middle) of its rotational range (figure 4, page 22).

CAUTION

Hold the cutting arm when setting the cutting arm control valve to the 2.5 position. If the cutting arm is not held, it may strike and damage the cut-off wheel.

4. Lower the loading arm to just above the cut-off wheel and position the sectioning path by turning the micrometer adjustment (figure 4, page 22).

5. Raise the cutting arm and return the cutting arm control valve to the counter-clockwise stop position. Release the cutting arm.

Note

- *The cutting arm will drop slightly then descend slowly.*

6. Loosen the locking knob and move the sliding weight forward. The sliding weight acts as a counterbalance to the control valve; the farther forward the sliding weight is positioned, the more weight is added to the material being sectioned (figure 5, page 22).

Note

- *It is recommended that the cutting arm control valve be left in the counter-clockwise stop position during sectioning operations. Open the cutting arm control valve only when positioning the vise to the cut-off wheel or adjusting the automatic shut-off adjustment screw (figure 5, page 22).*

7. Install the splash guard by clipping it on the front splash shield (figure 2, page 20).

8. Connect the power cord to facility power and press the power button.

9. Press the start button.

10. Adjust the speed select knob.

    A. For the 5-inch diameter cut off wheel: adjust to 26 feet/minute (8 meters/minute).

    B. For the 4-inch diameter cut-off wheel: adjust to 21 feet/minute (6.4 meters/minute).

Note

- *Refer to Relationship between RPM and Feet/Minute, page 29, for additional information.*

11. After a small groove has been established in the material being sectioned, the sliding weight can be adjusted for heavier weight and the speed of the cutting arm can be increased. For additional information, refer to page 30, Guidelines for Sectioning Various Material.

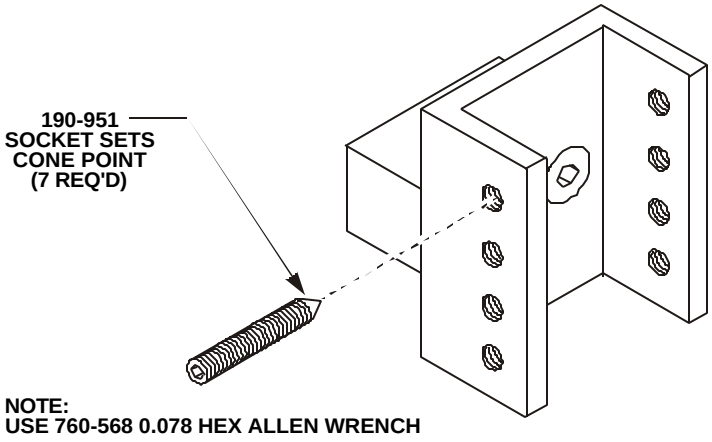

Figure 6
Irregular Specimen Holder

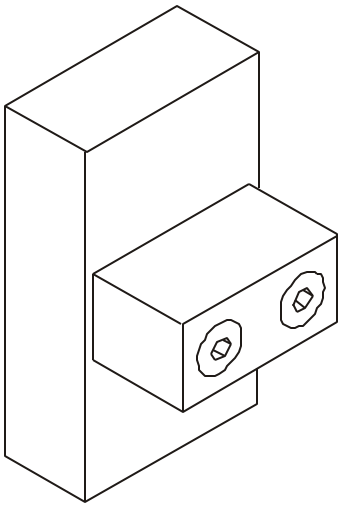

Figure 7
Slide Holder

Setting Automatic Shut-Off

Overview

The automatic shut-off adjustment screw can be adjusted to shut-off the unit after sectioning has been completed (figure 5, page 22).

Steps

1. Press the power button to turn the unit on.
2. Adjust the speed select knob for medium speed.

Note

- *The vise should be to the left of the cut-off wheel when the cutting arm is lowered.*

3. Open the cutting arm control valve to approximately the 2.5 position.

CAUTION

POSSIBLE INSTRUMENT DAMAGE
Hold the cutting arm when setting the cutting arm control valve to the 2.5 position. If the cutting arm is not held, it may strike and damage the cut-off wheel.

4. Lower the cutting arm until the vise is positioned where the sectioning would be completed and hold the cutting arm at this position.
5. Turn the knurled shut-off adjustment screw clockwise until the unit shuts off (figure 5, page 22).
6. Raise the cutting arm and return the cutting arm control valve to the 0 position by turning the knob counter-clockwise.
7. Engage the cutting arm locking device and the unit is ready for operation (figure 2, page 20).

Wafer Cutting

Note

- *Wafer cutting should be done at medium speeds and with the sliding weight in the halfway position.*

Steps

1. Secure the sample in the vise (figure 5, page 22).
2. Position the vise for the first cut by adjusting the micrometer adjustment to an arbitrary position but making sure a line on the drum coincides with the horizontal line on the barrel (figure 4, page 22).

Note

- *Turning the micrometer adjustment counter-clockwise moves the vise toward the cut-off wheel. Turning the micrometer adjustment clockwise moves the vise away from the cut-off wheel.*

3. Make the first cut which serves to true the sample to the cutoff wheel.
4. Set the micrometer to the desired wafer thickness.

Note

- *Add the wheel thickness to the desired wafer thickness to determine the proper micrometer setting.*

  English Units Micrometer—Each division on the drum equals 0.001 inch. One complete drum revolution equals 0.025 inch. One increment on the barrel equals 0.025 inch.

  Metric Units Micrometer—Each division on the drum equals 0.02 mm. One complete drum revolution equals 1.0 mm. One full increment on the barrel equals 1.0 mm. Barrel increments are divided into 0.5 mm.

Diamond Wheel Dressing

Overview

The diamond cut-off wheel requires periodic dressing to maintain cutting capabilities and to increase cutting life.

Steps

1. Raise the cutting arm to the uppermost position and engage the loading arm locking device.
2. Press the power button to turn the unit on.
3. Press the start button.
4. Adjust the speed select knob for maximum speed.

CAUTION

POSSIBLE OPERATOR INJURY
Do not dress the diamond wheel by using your hand to hold the dressing stick against the wheel. A bind can be created which can chip the wheel or cause the wheel can grab the dressing stick and pull it from your hand.

5. Place the diamond wheel dresser assembly (supplied in the component pack, page 13) over the front splash guard. The dressing stick will touch the diamond cut-off wheel (figure 2, page 20).
6. Push the front edge of the diamond wheel dresser assembly to keep the dressing stick in contact with the wheel.
7. Allow the diamond cut-off wheel to cut into the dressing stick approximately $^{3}/_{16}$-inch (5 mm). Repeat several times.

Note

- *When the dressing stick has been exhausted, remove it from the bracket and attach the spare dressing stick with glue.*

Relationship Between RPM And Feet/Minute

RPM	Feet/Minute	
	4-Inch Wheel	5-Inch Wheel
100	105	130
200	210	260
300	315	390
400	420	520
500	525	650

Guidelines for Sectioning Various Materials

Note

- *Refer to Guideline Reference Table, page 31, for additional information.*

Material	Cut-Off Wheel	Lubricant	Weight	Cutting Speed (RPM)
Ta and Alloys	Al_2O_3	H_20	Full	400
Ti and Alloys				
Zr and Zr Alloys				
Cb and Cb Alloys				
Cr and Cr Alloys				
Cr-Ni Alloys				
Cr-Ni-Fe Alloys				
Low Carbon Steels	Al_2O_3	H_2O	Full	400
Stainless Steels				
Cast Iron				
Al and Alloys	Al_2O_3	H_2O	Full	400
Cu and Alloys				
Tool Steels	Diamond	H_2O or Oil	$^3/_4$ Full	300
Ceramics	Diamond	Oil	$^1/_2$ Full/Light	300
IC/NC Boards	Diamond	Oil	Full	400
Cemented Tungsten				
Carbide				
Metal Carbide	Diamond	Oil	Light/Full	400/500
Metal Nitrides				
Metal Borides				

Guideline Reference Table

Wheels			
Al_2O_3	811-146	Cut-off Wheel	(10/pkg)
Diamond	801-137	4-inch diameter Diamond Wheel	(1/pkg)
	801-136	5-inch diameter Diamond Wheel	(1/pkg)
Lubricant			
H_20		Water	
Oil	811-023	Cutting Oil	(1 Quart)
Weight			
Full Weight	When the sliding weight is fully forward.		
Light/Full	Light load is initially applied until a groove is established then adjust to full weight. This eliminates a chopping effect that can break the diamond blade or fracture the sample.		

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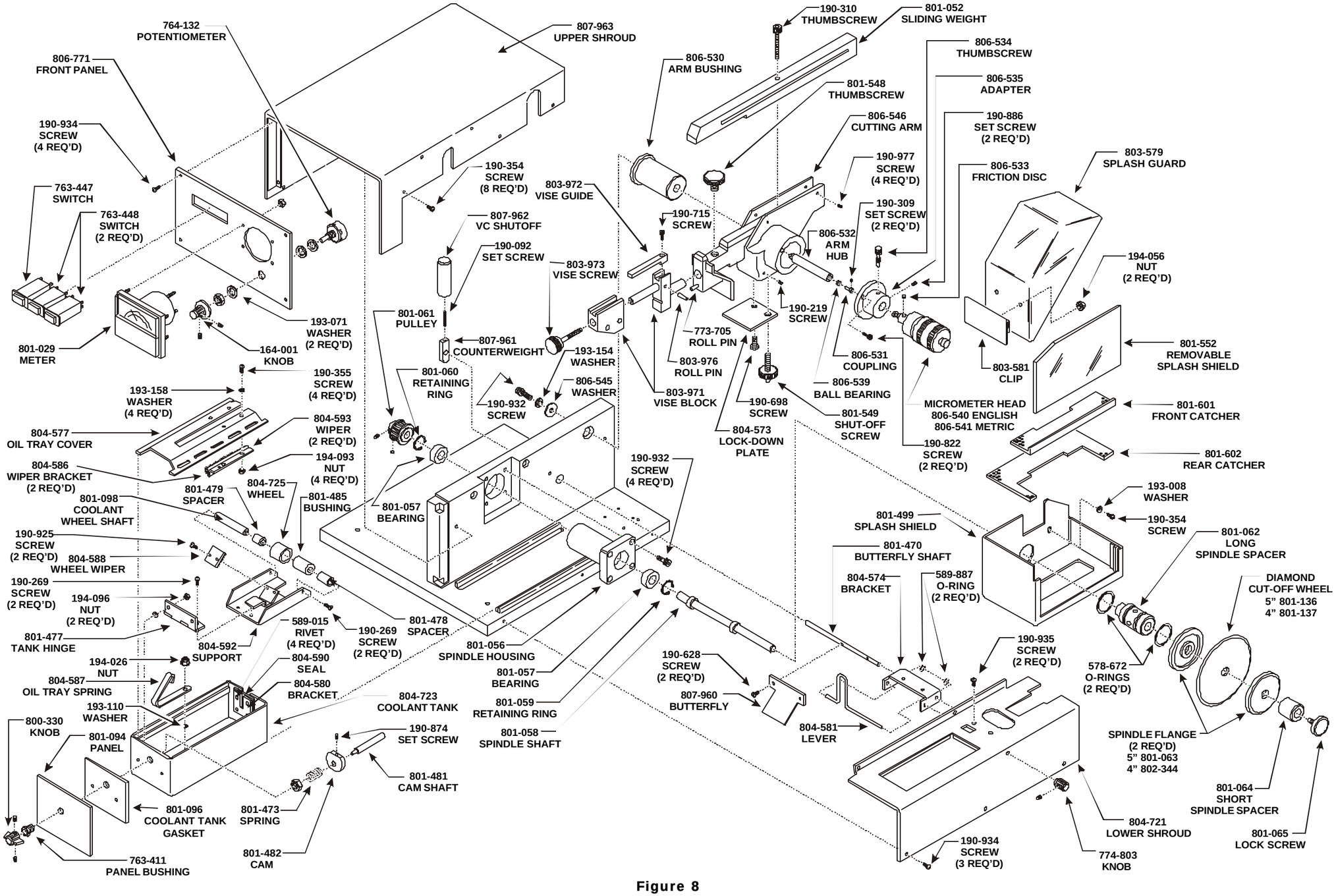


Figure 8
VC-50 Upper Section—Exploded View

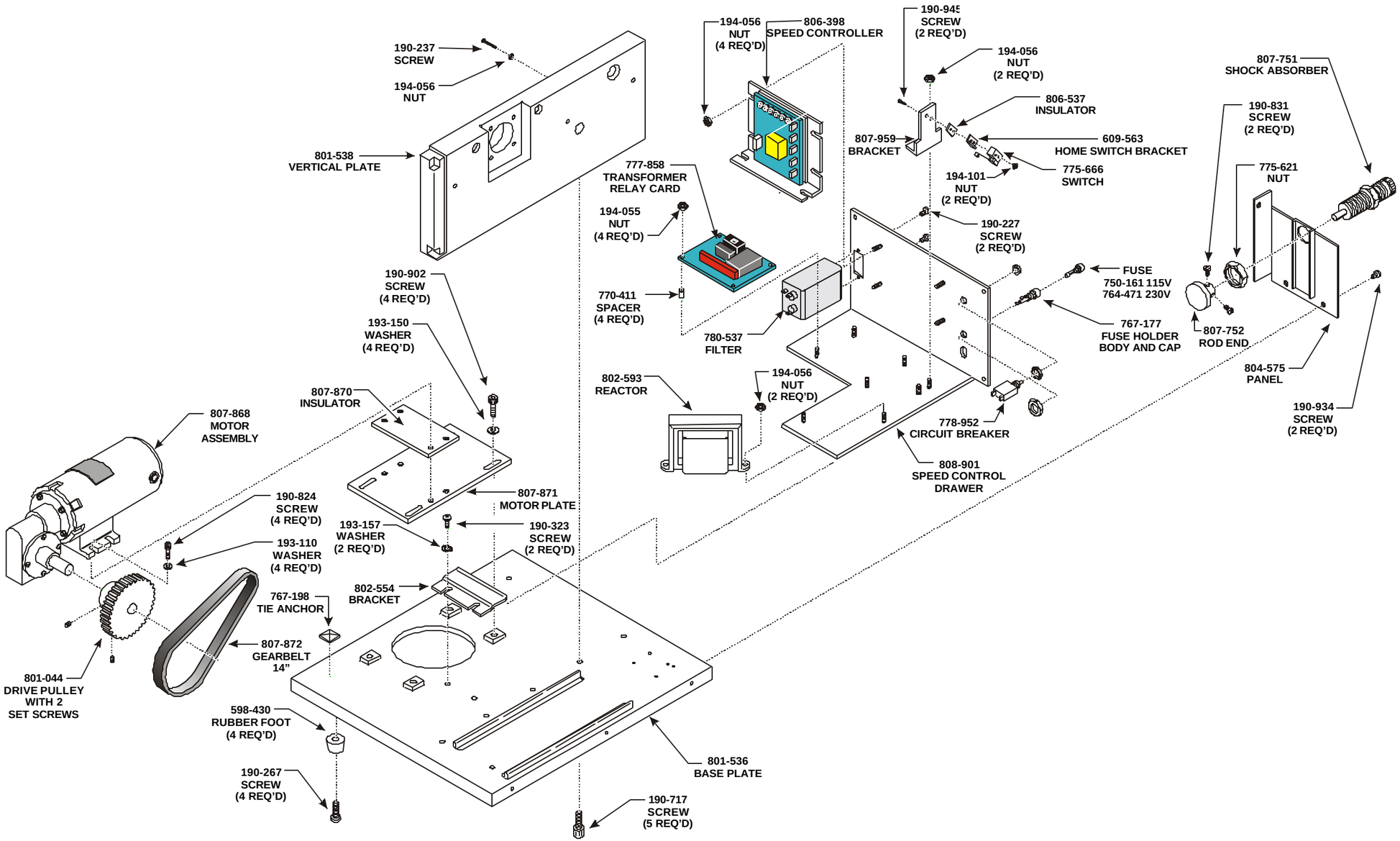


Figure 9
VC-50 Base and Lower Section—Exploded View

Schematics

150-741 Cabinet Schematic Parts List

Assemblies

A1 ..... Power Cord (115V) 776-997

A1 ..... Power Cord (230V) 808-906

A2 ..... Relay/Transformer Card 777-858

A3 ..... Speed Control Card 806-398

Circuit Breakers

CB1 ..... 1A, 250V 778-952

Fuses

F1 ..... 2A, 250V, 3AG (115V) 750-161

F1 ..... 1A, 250V, 3AG (230V) 764-471

Reactor

L1 ..... Inductor 802-593

Motors

M1 ..... 90V, 173 rpm, Gearhead 807-869

M2 ..... Meter, 0 to 1 mA 801-029

Resistors

R40 ..... 5K 101-115

Switches

S1 ..... DPDT, ALT 763-447

S2 ..... DPDT, MOM 763-448

S3 ..... DPDT, MOM 763-448

S4 ..... Micro 775-666

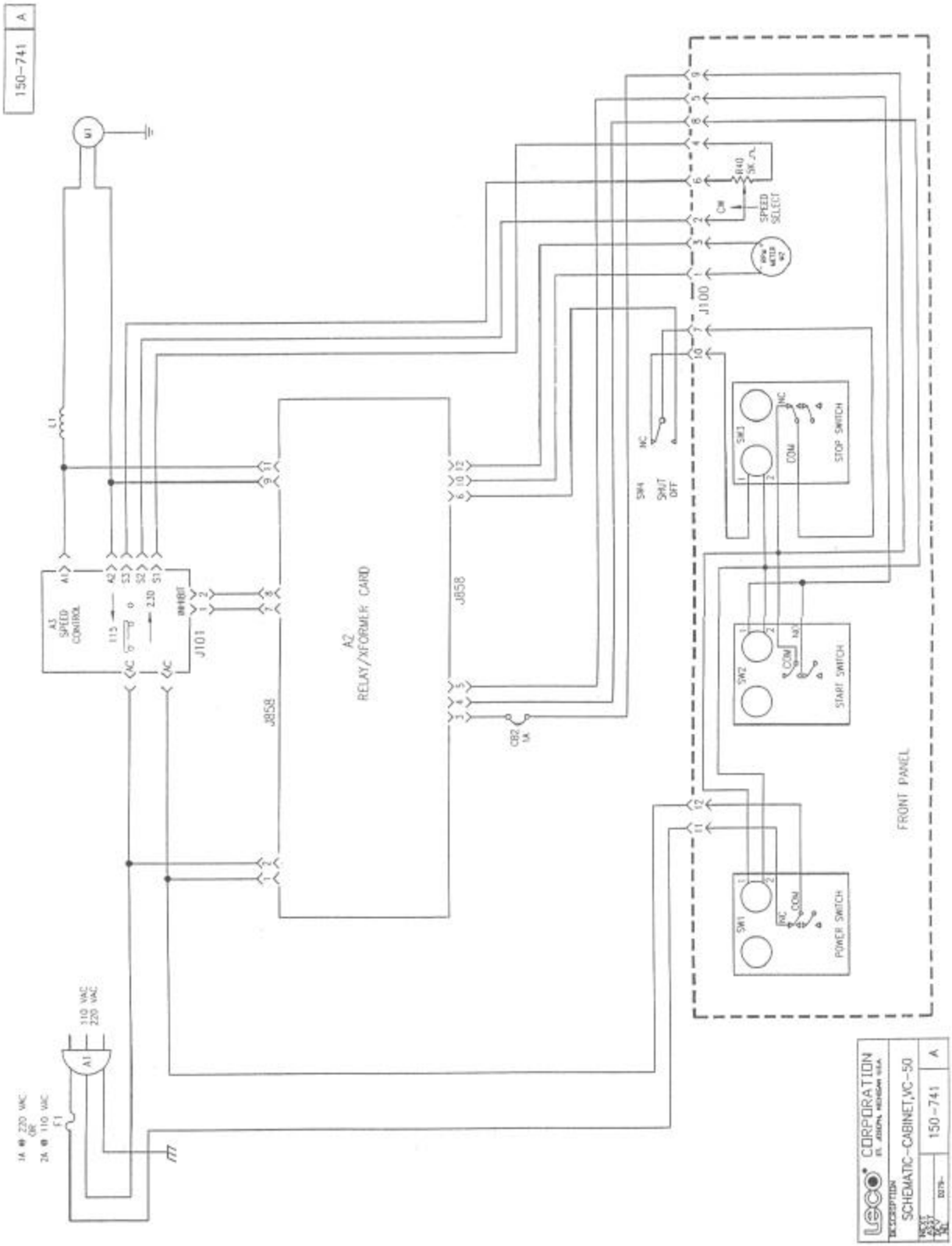
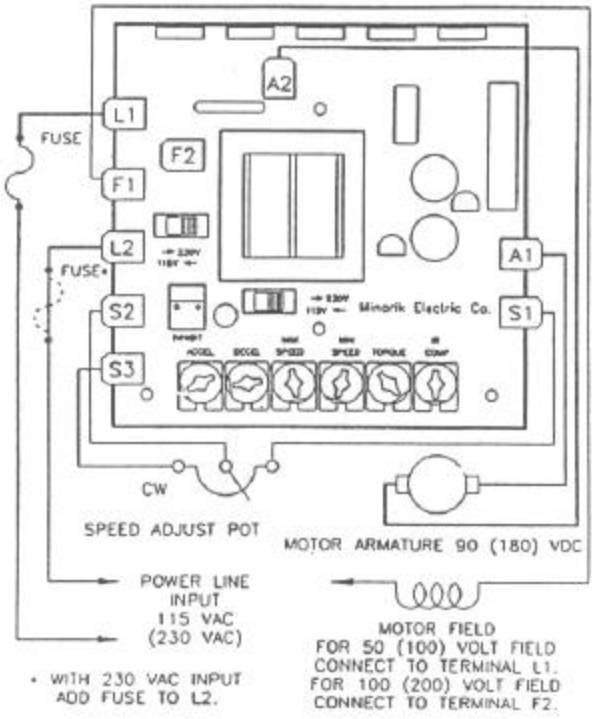


Figure 10
150-741 Cabinet Schematic



NOTE: FACTORY SETTING FOR INPUT VOLTAGE IS 230 VAC

SCOPE: SPEED CONTROLLER ASSY 115 VAC/230 VAC AND HEAT SINK

REQUIREMENTS:

Physical:

APPLICATION: FOR PERMANENT MAGNET DC MOTOR

ELECTRICAL:

INPUT VOLTAGE: 115/230 VAC, 50/60 Hz, SINGLE PHASE

ARMATURE VOLTAGE: 0-90 VDC (115 VAC INPUT)
0-180 VDC (230 VAC INPUT)

FORM FACTOR: 1.37 @ BASE SPEED

FIELD VOLTAGE: 50/100 VDC (115 VAC INPUT)
100/200 VDC (230 VAC INPUT)

FIELD CURRENT: 1 AMP DC MAX.

LOAD REGULATION: 1% BASE SPEED OR BETTER

MAX INPUT CURRENT: 8 AMPS (WITHOUT HEATSINK)

MAX OUTPUT CURRENT: 5 AMPS (WITHOUT HEATSINK)

MAX HORSEPOWER: 1/2 (115 VAC INPUT) 1.0 (230 VAC INPUT)
(WITHOUT HEATSINK)

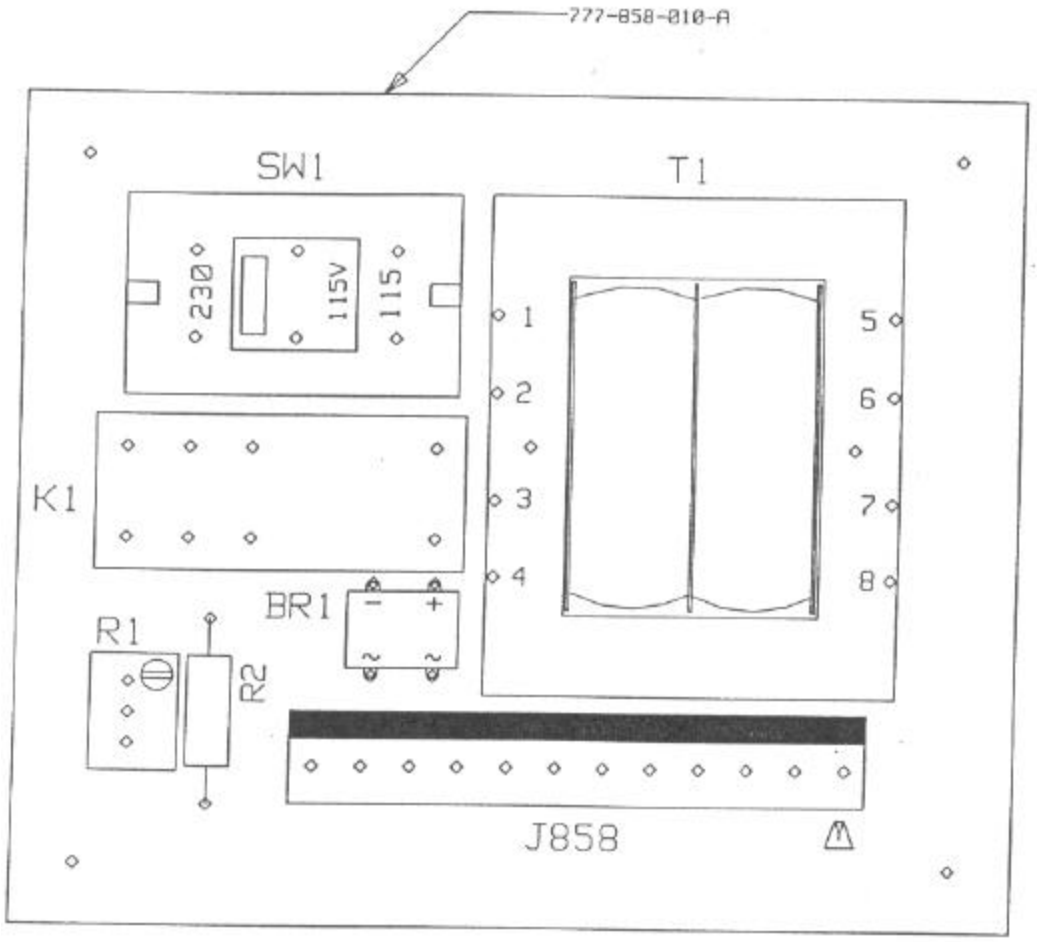
MAX INPUT CURRENT: 13 AMPS (WITH HEATSINK)

MAX OUTPUT CURRENT: 10 AMPS (WITH HEATSINK)

MAX HORSEPOWER: 1.0 (115 VAC INPUT) 2.0 (230 VAC INPUT)
(WITH HEATSINK)

AMBIENT TEMP. RANGE: 10° - 55° C

Figure 11
806-398 Speed Controller



DESCRIPTION	SPECIFICATION	PART NO.
RESISTORS		
R1	200K,POT	772-539
R2	51K,1/2W,5%	101-115
TRANSFORMERS		
T1	XFRM,8 PIN	806-408
DIODES		
BR1	BRIDGE RECT,DF02	780-160
RELAYS		
K1	RELAY DPDT	805-253
CONNECTORS		
J858	MTA-156, 12 PIN	807-221
SWITCHES		
SW1	SWITCH,115V/230V	775-033

NOTE: FOR SCHEMATIC SEE 777-858-011

Figure 12
777-858 Relay/Transformer Card

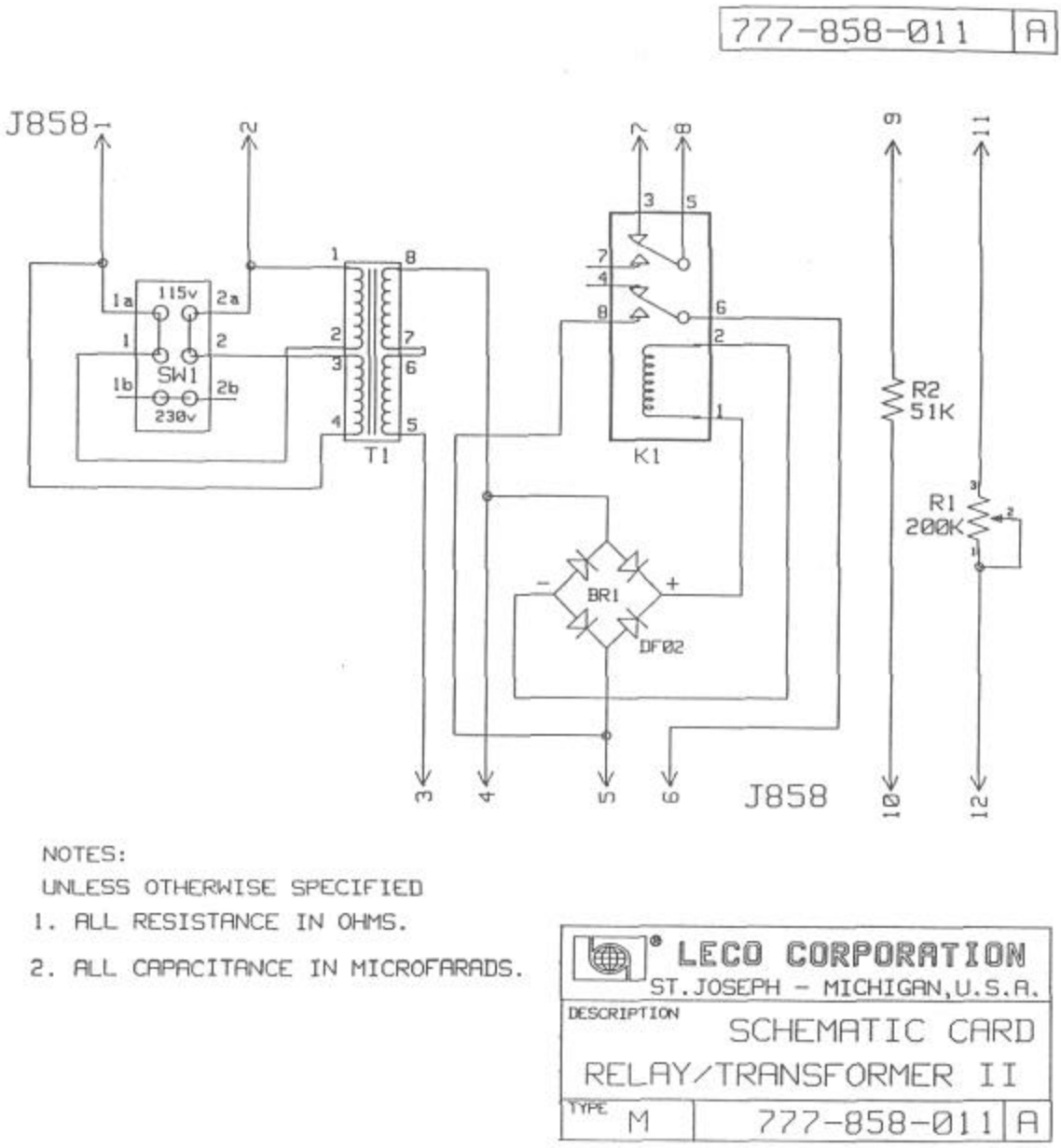


Figure 13
777-858-011 Relay/Transformer Card Schematic

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Index

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