

# **ROCKLABS**

## **MANUAL**

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# **IMPORTANT SAFETY INFORMATION.**

Please read these note carefully. They concern possible electrical faults in YOUR laboratory equipment. These faults could cause electrocution of your laboratory staff.

## **1. Ring Mill (all brands, including ROCKLABS) motor cable wear.**

In all brands of Ring Mill (also called ring and puck mill, vibratory mill, Tema mill, etc), the motor vibrates when the machine is operating. The electric cable connected to the motor also vibrates. This vibration can cause the copper wires inside the cable to break. If a phase wire breaks, the motor may not rotate or it may burn out.

**IF THE EARTH WIRE BREAKS THE MACHINE MAY NOT BE EARTHED, BUT THE MOTOR WILL STILL OPERATE.**

If the motor cable is allowed to rub on the machine body, the plastic or rubber insulation on the cable may wear through. A phase wire could touch the machine body and if the earth wire had broken, the machine would become alive. When the operator touches the machine, **THE OPERATOR COULD BE HURT OR EVEN KILLED.**

There is only a small chance that this problem can occur. It has never been reported to us but **IT CAN EASILY BE PREVENTED.** You must **PREVENT A POSSIBLE FATALITY.**

To prevent this problem from happening, connect a new earth wire from the Mill body (NOT the parts that vibrate) to the earth terminal in your control box, switch, etc. Do not rely solely on the motor cable for earthing the machine. The earth wire (colour coded green or green/yellow) will ensure that your operator cannot be electrocuted because of a failure of the motor cable.

## **2. Electrical faults in Ring Mill control box.**

Some manufacturers, including ROCKLABS, have made Ring Mill cabinets from fibreglass or plastic. These materials are strong and light but they are not electrical conductors, like steel or aluminium. This means that components mounted on fibreglass or plastic e.g. switches, pneumatic controls, etc. are not inter-connected electrically or earthed.

Ring Mills create vibration. Vibration can cause screws to undo and allow electrical wires to come loose. If a wire from a switch came loose and touched a metal

pneumatic valve, that valve could become alive and electrocute an operator who operated or touched that valve.

This problem has NOT been reported to Rocklabs but it could happen. Please inspect your control boxes, switches, etc, especially if they are mounted on the cabinet, not on the wall. Ring Mills are often used for 10 or 20 years. A small amount of vibration over a long time can cause problems.

With existing machines:

1. Inspect all electrical components and wires NOW.  
Check for any loose screws and wires. Replace any faulty switches, etc.  
Check motor cable for wear.
2. Insulate any metal components in the control box with tape or inter-connect with an earth wire to prevent an operator being electrocuted in the future.

What is ROCKLABS doing to improve the safety features of all Ring Mills in future?

1. All future cabinets and control boxes will be made from powder coated or painted sheet metal. This will be steel unless the weight of the cabinet is of concern, when aluminium may be used.
2. Using metal means that all electrical and mechanised components can be easily earthed.
3. A steel cabinet is stronger (for shipment).
4. There is a greater reduction in noise compared to fibreglass. With extra sound proof foam inside, noise levels are reduced to below 80 dBA
5. Cabinet lids are supported by airstays to make opening easier for operators.
6. Electrical switches used in the past will be replaced by ON/OFF push button devices.

If you are concerned about the safety of ANY BRAND of Ring Mill that you are using, please Fax us immediately. We are here to help. We can provide new components or control boxes. We want to help you have a safe and healthy working environment.

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SPECIFICATIONS.

<u>Model</u>	<u>Phases</u>	<u>Voltage</u>	<u>Hz</u>	<u>Maximum Line Current, amps</u>
1A	3 Phase	380-440v	50	4
1B	1 Phase	220-240v	50	8
1H	3 Phase	220-240v	50	6
2C	3 Phase	380-440v	50	4
2D	1 Phase	220-240v	50	8
3E	3 Phase	210-240v	60	4
3F	1 Phase	200-220v	60	6
3J	1 Phase	110-115v	60	10
4G	3 Phase	560-600v	60	4

Ring Mill Serial No..... Model.....

Date of Purchase/Despatch .....

Customer Name.....

Customer Address .....

.....

.....

.....

Telephone No.....

Telex No. ....

Agents Name (if sold by agent) .....

## INSTALLATION

ROCKLABS Ring Mills are shipped in a special cabinet which should be used in the laboratory as a 'sound proof' enclosure. Take care, therefore, to open the cabinet without damaging it. Remove any strapping, remove the two marked screws on the side of the lid and discard. Always stand the box near a wall or provide a suitable back-stop for the lid, to prevent damage to the hinges or lid. Remove the holding down strap and discard, as well as any wooden packing blocks around the springs.

Check that the rubber feet are in their recessed positions. Ensure that the support springs are over their bosses, top and bottom. The working platform should now be level.

To help prevent wear on the motor cable, it is protected by an outer sheath. The sheath and cable are clamped into the motor junction box. The cable MUST lie on the base of the cabinet and be free to vibrate or it will break at the junction box clamp.

Pull the cable and sheath through the hole in the rear of the cabinet until the sheath is protruding and stops when the clamp touches the inside of the cabinet. It is vital that the cable does not rub on the machine body, or it will quickly wear through during operation. The cable in the cabinet should be checked daily to ensure that it is not rubbing. DO NOT attach the cable to the machine or cabinet or it will tend to break at that point. Never remove the cable from the motor junction box. It is permanently attached to prevent it working loose during operation. Before permanently wiring the cable to a plug or STOP/START push button starter, ensure that the platform motion is ANTI-CLOCKWISE when viewed from the top of the machine. Reversing the direction can be achieved by swapping any two phase lines. When the platform is vibrating anti-clockwise, the head and clamp handle will tend to turn clockwise, maintaining the clamp tension if an Autospin clamp is fitted.

The cabinet may tend to move when the Mill is operating and may require retaining in position. Depending on the height of the Mill operating personnel, it may be preferable to mount the cabinet on a small concrete or wooden platform.

DO NOT allow anything to fall into the cabinet or it could damage the motor. Keep the cabinet clean.

If your laboratory is equipped with a dust extraction system, we recommend that you connect some ducting from the rear of the cabinet to the dust extraction system. This will help cool the Mill motor and keep the cabinet free of dust.



## OPERATION

The material to be pulverised is placed between the rings, in the head, with the head standing on the bench. Do not fill the head on the machine or material will fall into the cabinet if there is a spillage.

With the lid correctly in position on the head, place the head on the machine, ensuring that the base is properly positioned inside the holding ring on the machine platform. If the head is not properly positioned it could fly off during operation and injure the operator. Always ensure that all operators are instructed how to position the head inside the holding ring, and also the lid to the bowl.

With head properly in position, engage the clamp ensuring a firm pressure on the lid.

Before starting up, check that the clamp is in the fully clamped position and close the cabinet lid. Operating the machine only with the lid closed, is a recommended operating rule, for safety reasons as well as for noise reduction.

Pulverising will take from a few seconds to several minutes depending on sample type and size. The larger the sample, the longer the time to reach a stated fineness. Pulverising can be wet or dry, the former being only required for clayey materials or when very fine material is required. Wet pulverising is often carried out under acetone or alcohol. One to three millilitres of alcohol or acetone will reduce caking which may occur with some samples.

After emptying, the head can be cleaned by blowing with compressed air, brushing, washing or by wiping with a cloth, etc. as appropriate.

As noted in the Installation instructions, check daily to see that the cable is not rubbing on the Mill body and remove anything that falls into the cabinet to prevent damage to the motor.

Note: Refer Pages 9 and 10 for notes on the Care of Ring Mill Heads.

#### ADDITIONAL OPERATING INSTRUCTIONS FOR SINGLE PHASE MODELS.

ALL single phase models are fitted with three phase motors because there is no single phase motor that is suitable for mounting in a Ring Mill. Hence, all single phase models require an external, phase splitting circuit or, they could be operated from a variable frequency, three phase generator that is powered from a single phase source. The latter are available in most countries, are solid-state design and cost about \$US 800.00. They can be supplied as an extra by ROCKLABS.

As a cheaper but adequate alternative, we supply a phase splitter, based on capacitors. We have referred to this as a "Starter". Connect the cable from the Ring Mill to the "Starter" where marked and connect the "Starter" cable to a suitable plug or switch.

#### MODEL 1B, 2D.

To operate the Ring Mill, check that the Starter switch is OFF, and connect the plug into the wall socket. Turn the wall plug on and leave on.

ALL SWITCHING MUST BE DONE WITH THE STARTER, NOT THE WALL SWITCH.

To start the Ring Mill, refer to instructions on the Starter.

The Starter circuit includes an internal timer which switches from a START configuration to a RUN configuration after 5 seconds. NOTE: This timer cannot be used to time the complete run. A second timer is required for this.

The Starter box contains capacitors, starting switch, start/run timer and safety cut-out. If the Ring Mill will not start, check the cut-out switch. If the Mill starts slowly and possibly does not reach full speed, a capacitor may need to be replaced but this is not a common problem.

We suggest that spare capacitors be kept in the laboratory. No manufacturer will guarantee the life of a capacitor. Any brand of similar specifications could be used. If you have difficulty obtaining spare capacitors locally, we will gladly supply you.

#### MODEL 3F

To start the Ring Mill, turn the Starter switch OFF and plug into the wall socket. Turn the wall switch ON. Turn the Ring Mill ON and OFF with the Starter switch, NOT the wall socket switch. This starter does not require an internal timer, nor separate START and RUN circuits.



## THE AUTOPSPIN<sup>R</sup> CLAMP

Over the period 1969 to 1983, ROCKLABS Ring Mills incorporated various clamp designs, all based on an over-centre eccentric tensioning device. This concept was utilised by several brands of Ring Mill during this period. It was easy to use and could be clamped and unclamped quickly, without too much physical effort and was not too expensive to manufacture. One of the most successful designs was that known as the Gilco clamp, used on our Mills from early 1981, named after our engineer, Ian Gillies.

The over-centre clamp always suffered from two major defects. It incorporated many moving parts, all of which could wear away from vibration during operation and it required tensioning devices such as springs or pads. Better designs, such as the Gilco clamp could be adjusted for wear but this added to the expense and different heights of head could not be used alternatively, with ease.

After much thought and experimentation, Ian Gillies and David Healey developed an entirely new design of clamp, named the Autospin. It has less components, is faster to clamp and unclamp and the tension is provided by pressure on a steel plate. The clamp pad is moved up and down by turning the handle or by using the small demountable knob that is placed into the hole in the handle shaft. The knob is REMOVED during operation to prevent any vibration damage.

When clamping a head in position, wind the clamp pad down until it presses firmly on the lid, preventing any dust from escaping. Ensure that the Ring Mill platform vibrates in an anti-clockwise motion, not a clockwise motion, so that the clamp does not move during operation, releasing the tension. When the platform vibrates in an anti-clockwise direction, the head and clamp handle tend to move in a clockwise direction, maintaining the tension without the need for any locking or 'safety' device.

### Long Term Maintenance.

Keep the clamp pad clean, and the shaft above the pad, to prevent dust getting onto the internal screw thread and causing wear. Experience has shown that it is not practical to replace individual components of the clamp. If the clamp is worn, replace the whole clamp. Return the old clamp to us by surface post and we will refurbish it for a spare, if this is practical.

## PNEUMATIC CLAMP (Mark 2)

The pneumatic clamp option was introduced in 1985 after many months of experimentation and testing and helpful comments from Chemex Labs. Ltd. in Vancouver, who quite independently were developing a similar concept for their own ROCKLABS Ring Mills.

The original design of clamps incorporated a pneumatic piston and was suitable for fitting to the same mounting bracket as the Autopsin clamp. The Mark 2 design incorporates an airbag instead of the piston to minimise longterm maintenance, but this required a change to the mounting bracket. The airbag is mounted under the bracket, the piston on top. The new mounting bracket is taller so the Mark 2 clamp CANNOT be fitted to an Autospin machine.

To provide sufficient force to hold the larger heads, such as our Jumbo or Chrome 1 (European 250 ml), the air supply should be 100 to 120 psi (700 - 800 Kpa). If ONLY small heads are used, such as our Chrome 2 (European 100 ml) a pressure of 65 to 80 psi (450 - 600 Kpa) may be sufficient. Always use a FILTERED air supply, otherwise the clamp valve will be damaged by grit, water, etc.

To prevent damage to the airbag, every machine is supplied with a pressure control valve, permanently set at 100 psi (700 Kpa). Do not attempt to alter the pressure setting or the airbag could rupture. The pressure control valve is also a water extractor. Water may occasionally drip from the valve into the Ring Mill box.

The two way air control valve has a lever protruding through the rear of the dust cover. It is either in the UP or DOWN position. There is no 'neutral' or 'off' position.

### HEADS LEAKING DUST :

With a mechanical clamp, leakage can often be overcome by some adjustment of the clamp leading to a greater force being applied to the lid. This will overcome small imperfections in the lid or bowl or the clamp itself. This is not the case with a pneumatic clamp, the maximum force applied to the lid depends only on the air pressure.

Heads that do not leak in a mechanical clamp may leak in a pneumatic clamp. There are two main causes: The lid may not be truly flat or the top edge of the bowl wall may not be flat. The problems caused by imperfections in the lid or bowl can be overcome by careful grinding, unless they are badly warped or worn through use. If so, discard them.



### Maintenance.

The clamp is designed to have the minimum of moving parts and hence the least maintenance requirement.

If the flexible air line should ever develop a leak or crack, it will almost certainly be where it joins the clamp or the cabinet fitting. Just cut the tubing at the crack and rejoin it at the clamp or fitting. It could be repaired several times before needing replacing.

### Air Leakage Noise.

To ensure that the airbag retracts fully in the UP position, the clamp is fitted with a venturi to suck air out of the bag. The venturi requires a small flow of air to maintain its sucking action. This sounds like a small air leak. This is normal in the UP position but stops in the DOWN position. If the air supply is turned off, the venturi will stop working and the airbag will fall to its rest position.

### Safety Features.

When clamping a head in position be careful not to have your fingers on top of the lid. The airflow into the clamp is restricted, so it takes a few seconds to build up to the maximum pressure, enabling fingers to be withdrawn if the clamp descends on them. The clamp is fitted with a non-return valve so if the air line breaks or the pressure falls, the clamp remains clamped.

## CARE OF RING MILL HEADS

While some heads are harder or tougher than others, depending on the material of construction, there are some practices that should be observed for all heads.

When hard samples are crushed, prior to pulverising, some pieces will have sharp corners or edges that will tend to gouge or scratch the head. Most damage to the head, and hence contamination of the sample occurs in the first few seconds of pulverising, before large individual pieces are broken and rounded. To minimise head damage and sample contamination, crush the sample as finely as possible before pulverising.

Washing is recommended if the head has sample material sticking to it. Brushing or air blowing may not always clean a head properly and scraping with a knife or metal object should be avoided if at all possible to avoid contamination of the head by metal from the knife. If any head is washed it must be dried thoroughly before putting it away or the metal components will rust or corrode.

### PREVENTING DAMAGE TO HEADS.

As a general rule, Ring Mill heads should not be run empty, although steel heads are normally tough enough to cope with being run empty or with very small samples. With agate it is essential to have a reasonable amount of sample between the ring and/or puck and bowl, before starting the machine or there may be damage from agate striking agate. A Ring Mill motor starts very quickly and this initial motion can throw a ring or puck against the bowl before it starts rotating around inside the bowl.

A tungsten carbide head is normally tough enough to take a lot of punishment but a customer reported that they had been using a Carbide 1 head i.e. one ring and one puck, to pulverise single small pieces of rock and the ring had broken. The best way to prevent this damage would be to use a small head for small samples, i.e. Carbide 2, but not everyone can afford to have every type of head available. If you are using only small samples, ensure that the ring and/or puck are sitting centrally in the bowl when the head is clamped on the machine. This minimises the distance that the ring and puck will be thrown.

No matter how small the sample is, divide it into several pieces and start with sample between all the faces of ring, puck and bowl. The act of crushing absorbs energy and prevents breakages in the same way that modern cars are designed to crunch up in an accident to lessen passenger injury.

### Steel Heads:

These heads are the most versatile and will take a lot of punishment. As the rings wear away, the head's performance declines and we recommend replacing the rings and puck. Eventually, the bottom of the bowl will wear through or crack.

### Tungsten Carbide Heads:

Because of the high density of tungsten carbide, these heads are the most efficient and should have a long life. The most likely cause of damage is dropping or overheating the bowl which can lead to the bowl liner cracking near the bottom corner. If the bowl gets hot, through a lot of use, do not cool off by plunging in cold water or it may crack. It should be air cooled.



If any component is damaged, say chipped, smooth any sharp corner before using again. If a sharp corner is left, it may scratch another component. Smoothing will require a diamond lap or diamond paste. If damage is severe, replace that component immediately or the whole head may be damaged.

#### Agate Heads:

These are the most fragile and must not be dropped. They should be used only on slow revving machines (700 rpm). Never operate without some sample in the head or the ring and/or puck will be damaged by banging against the bowl liner. Sample material acts as a cushion.

Only use these heads for special samples that need special care. Even if not damaged their life is limited because of their low hardness, but in most cases their life will be determined by damage rather than gradual wear.

#### Zirconia Heads:

These heads are harder and tougher than agate and can be used on a normal speed machine, but their use should be restricted to special samples or soft material to minimise wear. Zirconia has a slippery surface and this makes cleaning easy, but if necessary it can be cleaned with diluted acid.

To ensure that any possible metal contamination is kept to a minimum, e.g. from operators hands or gloves, the Zirconia adaptor plate is made from ultra high molecular weight polythene, which is very tough. If the plate is ever damaged or worn you could make another yourself or obtain one from ROCKLABS. To minimise any chance of intersample contamination the Zirconia heads have no O rings or O ring grooves. They rely for dust sealing on wide polished flat surfaces on the lid and the bowl rim. Should the head ever leak sample through scratching or damage to the flat surface, use a soft flat rubber gasket.

#### REMEMBER:

If any component of a head is damaged, repair or replace it immediately or it may damage other components. ROCKLABS will supply any component for any head. For steel heads, ring(s) and puck are regarded as one component. In all heads, except Zirconia and Agate, new components are interchangeable with old ones, so you do not need to return the old component. In Zirconia and Agate heads, to minimise the production costs of grinding, components may vary a little from head to head, e.g. to ensure that the lid fits snugly in the bowl. Therefore to ensure that a new component will replace an old one, send the old one to us. If you are in doubt, or the head is in general worn, send us the whole head.

#### HANDY TIP:

When working with agate or zirconia heads have a sponge rubber mat on the floor, in case a component is dropped.

## MAINTENANCE - REGULAR

As with any machine, good standards of cleanliness will extend its life. Clean the machine top with compressed air or a rag, particularly the clamp pad shaft to minimise dust getting into the clamp mechanism.

Ensure good standards of cleanliness around the machine and remove anything that falls into the box. The motor air vent has been sealed to prevent dusty air passing into the motor. Clean the box regularly with a vacuum cleaner.

All Mills are powered by ASEA motors built to international standards. All motors have considerable power reserves beyond that required under full load. Should the motor overheat or the Mill prove difficult to start, switch off immediately. Check all input phases at switch and motor junction box.

Because of the basic design of all Ring Mills, the motors are not easy to lubricate, so motor bearings are packed carefully with grease. Some Mills have operated for many years without any subsequent lubrication but we **STRONGLY RECOMMEND** that motor bearings be lubricated every 1000 hours (approximately six months normal use) or once per year with light use, to ensure a long life.

To lubricate the front end (eccentric weight end) bearing, follow this procedure:

1. Disconnect the compressed air line from the pneumatic clamp - if fitted.
2. Lift the platform off the support springs (two people required, one on each side of the box) and place on a bench.
3. Remove the motor by unscrewing the 5 mounting bolts - retain the spring washers.
4. Two greasing holes are drilled into the bearing chamber from the upper surface of the mounting plate, close to the shaft. Wipe these clean and put in one or two shots of grease, using a needle jet not a nipple fitting. There is no space to fit a grease nipple.
5. To grease the fan end bearing, remove the fan cover plate. When replacing the plate, apply epoxy resin to the screw holes to ensure that they do not unscrew from vibration during operation.
6. Re-assemble, by reversing steps 1 to 3.



### MAINTENANCE - LONG TERM

The most vital part of any Ring Mill is the motor. Because of the design requirements of the machine, the motor bearings cannot easily be lubricated, so they are packed fully with high quality SKF bearing grease, on assembly. Should the bearing fail in service, the motor will burn out, so an examination of the bearings is strongly recommended once per year; repacking with grease or replacement depending on the state of the bearings.

To check the bearings, lift the whole platform and motor off the support springs, place on a bench and remove the motor from the platform by removing the mounting bolts entirely. Keep the spring washers. To test the bearing, move the shaft and eccentric weight from side-to-side, to check for wear in the main bearing. The main bearing (front end) carries most of the weight and if it is in good condition, the fan end bearing should be okay.

To repack or replace the main bearing, remove the eccentric weight and unscrew the long steel bolts that attach the steel mounting/end bell to the motor. The bearing can then be serviced.

If a motor should burn out, do NOT ever attempt to replace it with any other motor, except an identical one from ROCKLABS, as no other motor can be mounted properly in the machine. Have the burnt out motor rewired and use again, or keep it as a spare if you replace it with a new one from ROCKLABS.

Before the introduction of the Autospin and Pneumatic clamps, ROCKLABS Ring Mills were fitted with eccentric clamps. These had many parts and it was our policy to sell individual parts or complete clamps as required. We still stock parts for the earlier Gilco Clamp.

The newer clamps have very few components. All are available as separate replacement parts for cases of breakage but where a clamp is generally worn, we strongly recommend replacement with a completely new clamp, rather than trying to upgrade by replacing one or two components. Please return the old clamp to us for re-furbishing to new condition, for use on the next clamp change. Refurbishing may of course not be possible if the clamp is badly worn or damaged. We will advise you of the cost of re-furbishing for your approval, before carrying out the work.

## SOME COMMENTS ON THE STEEL USED IN OUR CHROME STEEL HEADS

Ever since the first ROCKLABS Ring Mill was made in 1969, we have purchased high quality steel for our chrome steel heads. So that our heads can be used to pulverise a wide variety of materials for trace analysis, the finished head must be tough and very hard, to minimise wear, and hence contamination of the sample and the steel should contain as few elements as possible to allow analysis for nearly all elements.

In common with other manufacturers of Ring Mills, we chose a high chromium, high carbon steel (type AISI, D3) to give the necessary hardness and toughness. Unfortunately, some brands of this type of steel also contain other alloying elements, for metallurgists are always striving to improve the physical properties of steel. Elements added include nickel, molybdenum, vanadium, tungsten and others, as well as the small amounts of manganese and silicon (0.2 to 0.4%) found in nearly all steels. These more complex steels are automatically ruled out.

Also, it is unfortunate that most special steels are made from scrap, melted in electric furnaces. The use of scrap means that unwanted metals invariably get in as well. These are called tramp metals and commonly are copper, nickel and molybdenum. Most steel mills do not specify the levels of tramp metals but we have analysed many steels and the levels are normally 0.15 to 0.30%. These are too high for an ideal head and the levels can vary greatly from one batch to another.

Until the world recession in the 1970's began to effect the steel industry, a few steel mills in the world made special steels from virgin iron, i.e. iron made entirely from ores, not scrap. We initially imported a steel of this type from Europe, with tramp levels below 0.05%. In 1977 we noted that the tramp levels were rising and the mill confirmed that the recession was forcing them to use more scrap. By 1978, samples supplied had tramp levels of 0.10% and higher, well above our target of 0.05% maximum and we could find no mill in the world still making a high purity chrome steel as a standard line.

Fortunately, increasing sales of Ring Mills had led to increasing requirements for steel and so in 1978, for the first time, we purchased a complete melt. We are now having melts made specifically for us, from high quality materials. If you would like to go even further and analyse our steel for an element you are particularly concerned about, we will send you some turnings, without charge.



COMPOSITION OF MATERIALS USED IN HEAD MANUFACTURE

Typical Analysis of AISI D3 type, Tool Steel used to manufacture  
ROCKLABS Chrome Steel Heads.

	<u>Results in %</u>
Carbon	2.0
Silicon	0.45
Manganese	0.34
Phosphorus	0.014
Sulphur	0.001
Chromium	13.4
Nickel	0.08
Molybdenum	0.007
Tungsten	0.03
Vanadium	0.02
Copper	0.03
Titanium	< 0.01
Tin	< 0.01
Lead	< 0.01
Niobium	< 0.05
Aluminium	0.03
Zirconium	< 0.01
Cobalt	0.02
Iron	85% approximately

Typical Analysis of cemented tungsten carbide used to manufacture  
ROCKLABS tungsten carbide Heads.

Tungsten carbide	90.5 $\pm$	0.5%
Cobalt	9.5 $\pm$	0.5%

<u>Trace Elements</u>	<u>Typical %</u>
Mo	.005
Fe	0.10
Si	0.005
Al	0.003
Cr	0.003
P	n.d.
S	n.d.
Ni	0.005
Mn	0.005
Mg	0.001
Ca	0.003
Na	0.005
K	0.002
Cu	0.002
Zn	0.002
Pb	0.002
As	n.d.
Sb	n.d.
Ta	0.001
Nb	0.001
Ti	0.001
B	n.d.
V	0.001
Ba	n.d.
Zr	n.d.

n.d. not detected, less than 0.001%



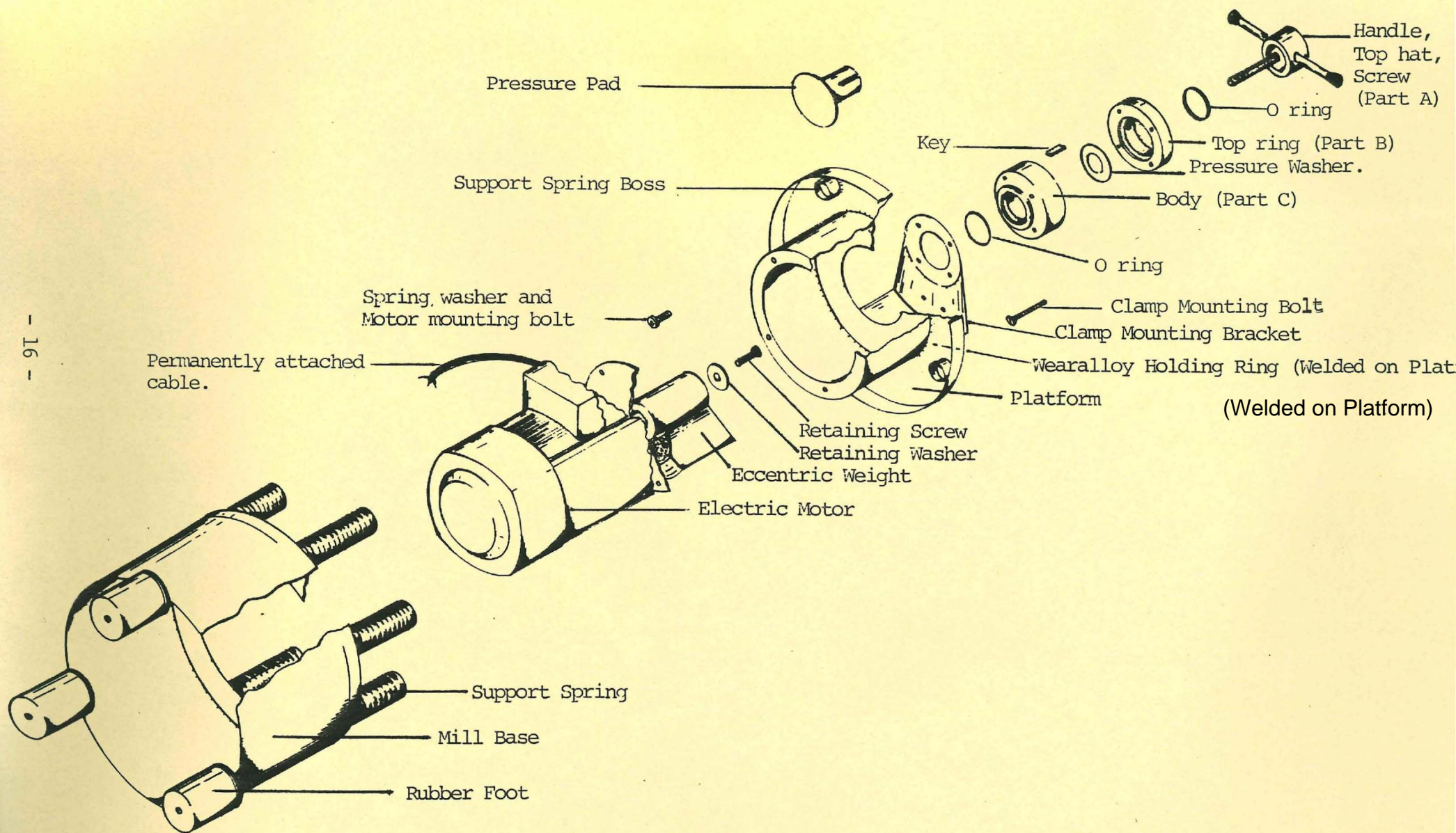
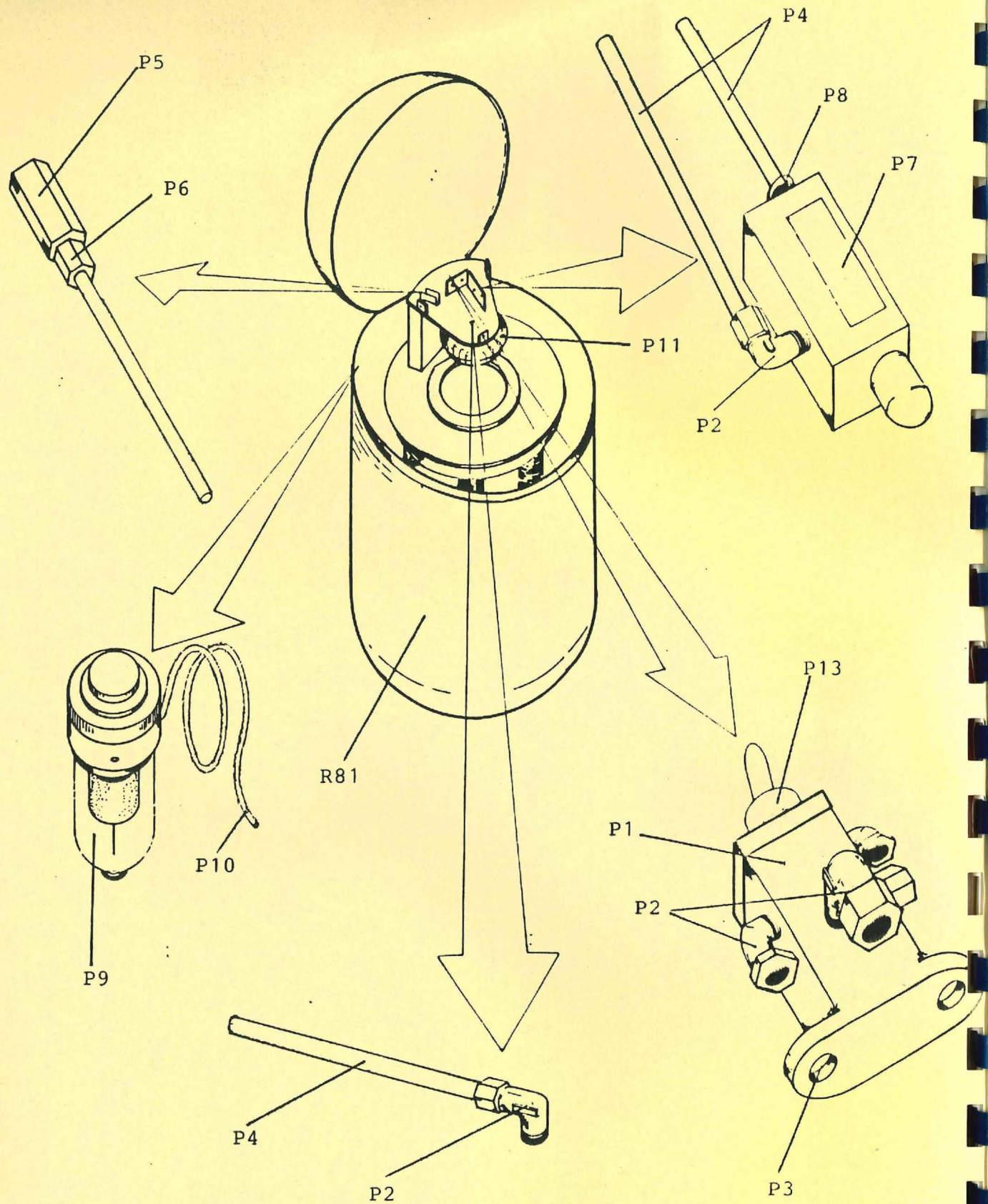




DIAGRAM OF PNEUMATIC CLAMP SHOWING PART NUMBERS





AUTOSPIN CLAMP

<u>Part No.</u>	<u>Description.</u>
DH 1	Complete Clamp
DH 2	Handle, Top hat and screw (Part A)
DH 3	Teflon bronze pressure washer
DH 4	Top ring with O ring (Part B)
DH 5	Body and O ring (Part C)
DH 6	100 mm Key and pin
DH 7	Pressure Pad
DH 8	Clamp mounting bolts (set of 4)
DH 9	Spin Handle

(We strongly recommend that you purchase a complete clamp and return the worn or damaged one to us for reconditioning).

GILCO CLAMP

<u>Part No.</u>	<u>Description</u>
R 29	Gilco Clamp complete
R 34	Side plate pin & Circlip 3/4" - 19 mm
R 35	Front pillar, , eccentric, handle etc.
R 36P	Nut plain 1 1/4" - 32 mm
R 36C	Nut chromed 1 1/4" - 32 mm
R 37	Spring washer 1 1/4" - 32 mm
R 38	Clamp Arm
R 39	Pin & Circlip 1/2" - 12 mm
R 40	Pin & Circlip 3/4" - 19 mm
R 41	Pressure Pad
R 42	Pressure Pad rubber
R 43	Rear pillar

PNEUMATIC CLAMP

<u>Part No.</u>	<u>Description</u>
P 1	On/Off valve
P 2	Brass elbow, with nut & olive
P 3	8 mm socket head screws (2)
P 4	Nylon tubing, per metre
P 5	Non-return valve
P 6	Straight connector, nut & olive
P 7	Venturi generator
P 8	Push fit connector
P 9	Pressure regulator, with fittings
P 10	Coiled tube
P 11	Airbag
P 12	Pressure Pad, 2 socket screws
P 13	On/Off valve, rubber switch boot
P 14	Dust cover



## MACHINE COMPONENTS.

<u>Part No.</u>	<u>Description.</u>
R 44	Wearalloy holding ring
R 45	Complete Motor unit, includes motor, heavy duty bearings, mounting plate, cable. <u>Includes eccentric weight.</u>
R 46	Eccentric Weight
R 47	One set of 6 support springs
R 53	Rubber foot, (each)
R 81	Polythene enclosure

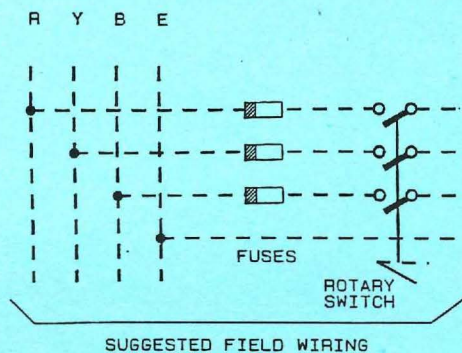
## HEAD COMPONENTS.

R 61	O ring for Jumbo Head
R 62	O ring for Chrome 1 Head
R 63	O ring for Chrome 2 Head
R 64	O ring for Chrome 3 Head
R 65	O ring for Chrome 4 Head
R 66	O ring for Carbide 1 Head
R 67	O ring for Carbide 2 Head
R 71	Strap-on handle for Jumbo Head
R 72	Strap-on handle for Chrome 1 Head

If ordering components of a head, use description, e.g. lid for Chrome 2 head.

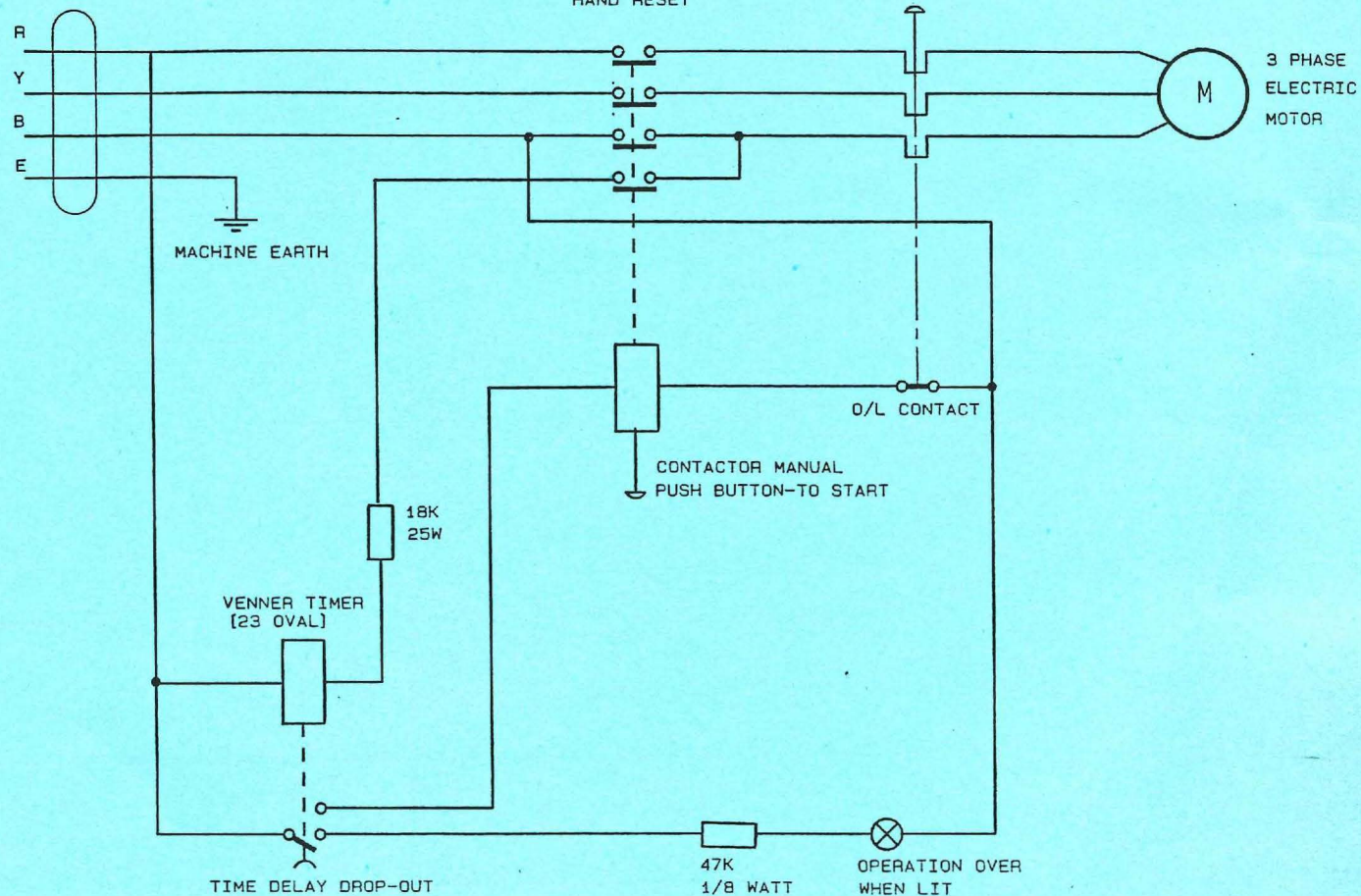
Head components are lid; bowl; ring(s) and puck. Ring(s) and puck of steel heads are made from one piece of steel, so are sold as one set, not individually.





4 CORE MACHINE CABLE  
[SUPPLIED WITH MACHINE]

THERMAL O/L &  
HAND RESET



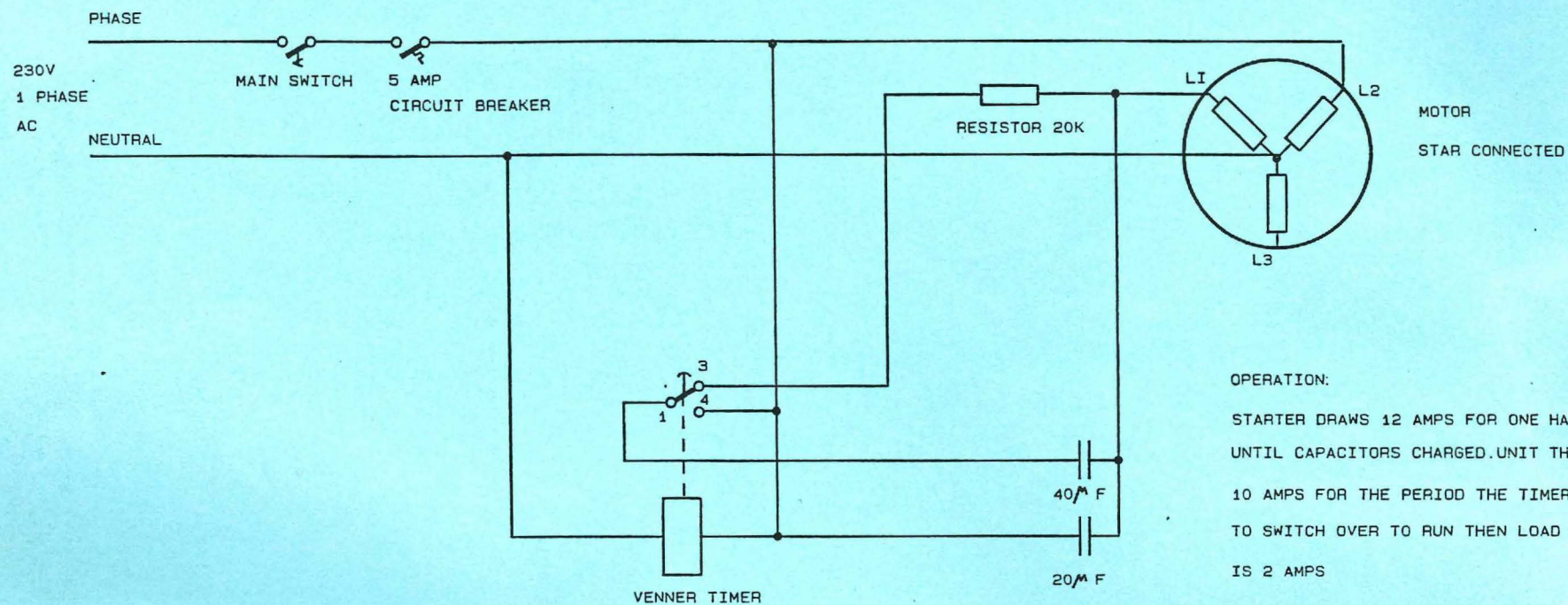
#### NOTES

- 1) 440/460 AC CONTROL CIRCUIT
- 2) VENNER TIMER 230V AC COIL C/W  
DROPPING RESISTOR
- 3) THERMAL OVERLOAD IS HAND RESET
- 4) SUPPLY IS IN 3 PHASES PLUS EARTH  
(NEUTRAL IS NOT REQUIRED)

Rev	Date	Description	Approved

ROCKLABS  
MODEL 1A  
TIMER





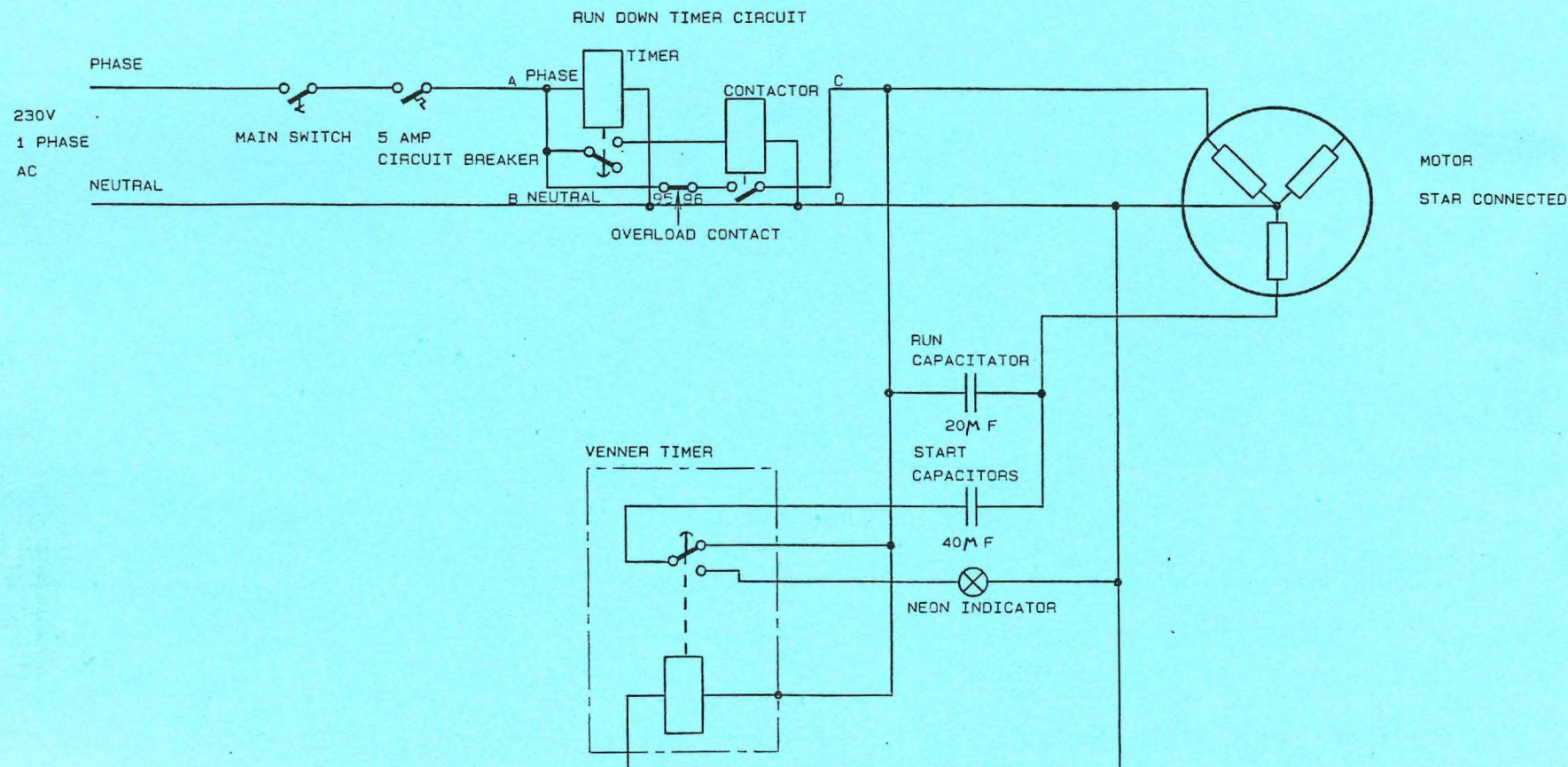
OPERATION:

STARTER DRAWS 12 AMPS FOR ONE HALF SECOND  
UNTIL CAPACITORS CHARGED. UNIT THEN DRAWS  
10 AMPS FOR THE PERIOD THE TIMER TAKES  
TO SWITCH OVER TO RUN THEN LOAD  
IS 2 AMPS

Rev	Date	Description	Approved

ROCKLABS  
MODEL 1B  
STARTER



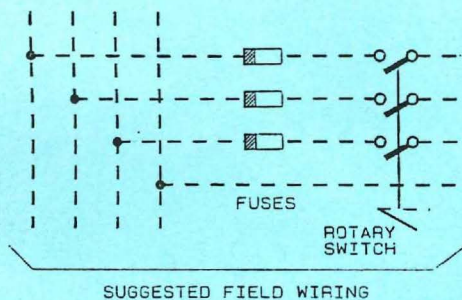


Rev.	Date	Description	Approved

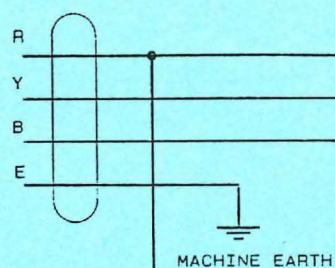
ROCKLABS  
MODEL 1B  
STARTER/TIMER



L1 L2 L3 E  
R Y B E

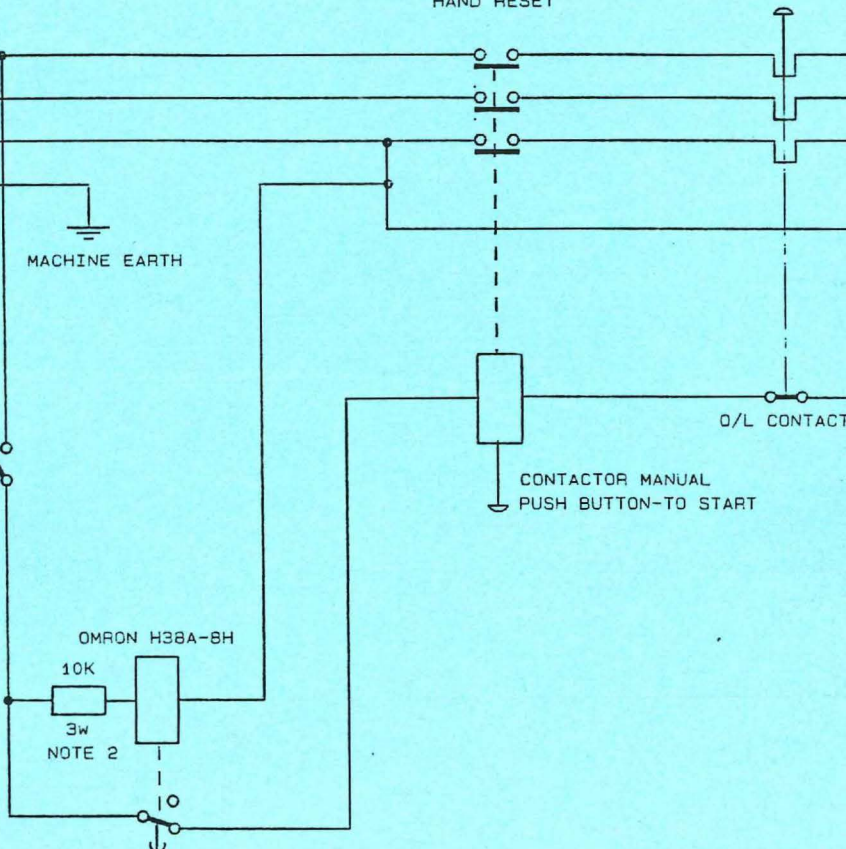


4 CORE MACHINE CABLE  
(SUPPLIED WITH MACHINE)



THERMAL O/L &  
HAND RESET

ARROW  
DPDT  
SWITCH



3 PHASE  
ELECTRIC  
MOTOR

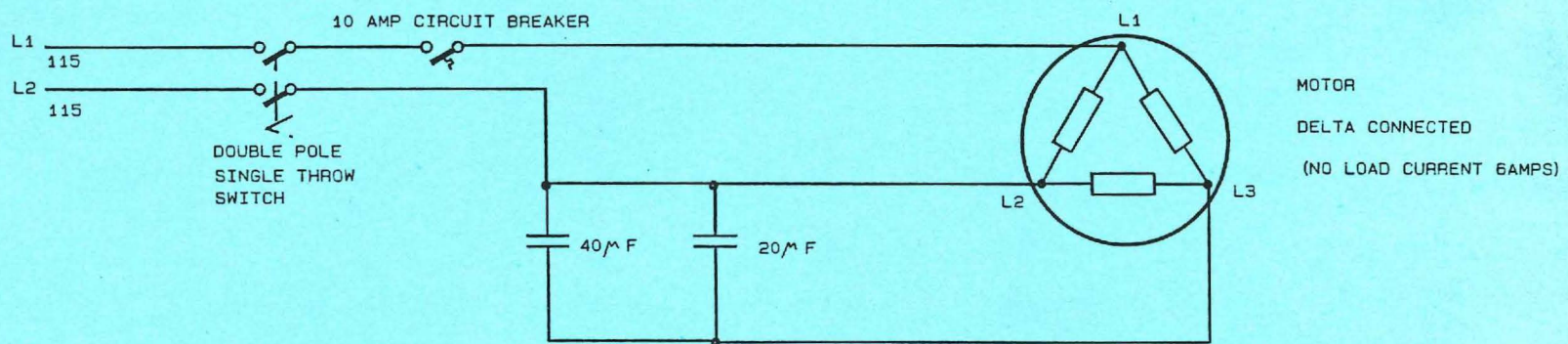
# NOTES

- 1) 440/460 AC CONTROL CIRCUIT
- 2) OMRON 230V AC COIL C/W  
DROPPING RESISTOR FOR 400V. FOR 230V SUPPLY  
LEAVE OUT RESISTOR
- 3) THERMAL OVERLOAD IS HAND RESET
- 4) SUPPLY IS IN 3 PHASES PLUS EARTH  
(NEUTRAL IS NOT REQUIRED)

Rev	Date	Description	Approved

ROCKLABS  
MODEL 3E  
TIMER

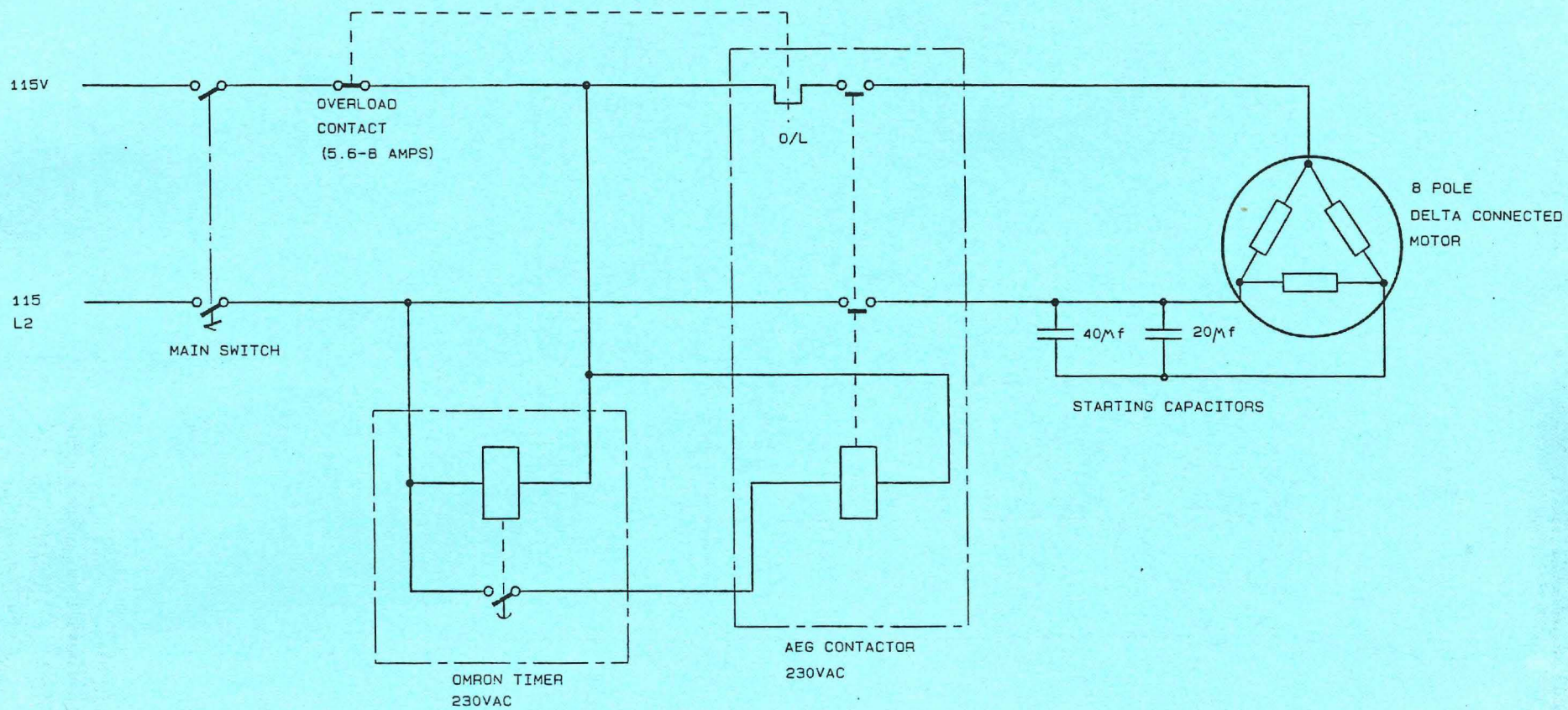




Rev.	Date	Description	Approved

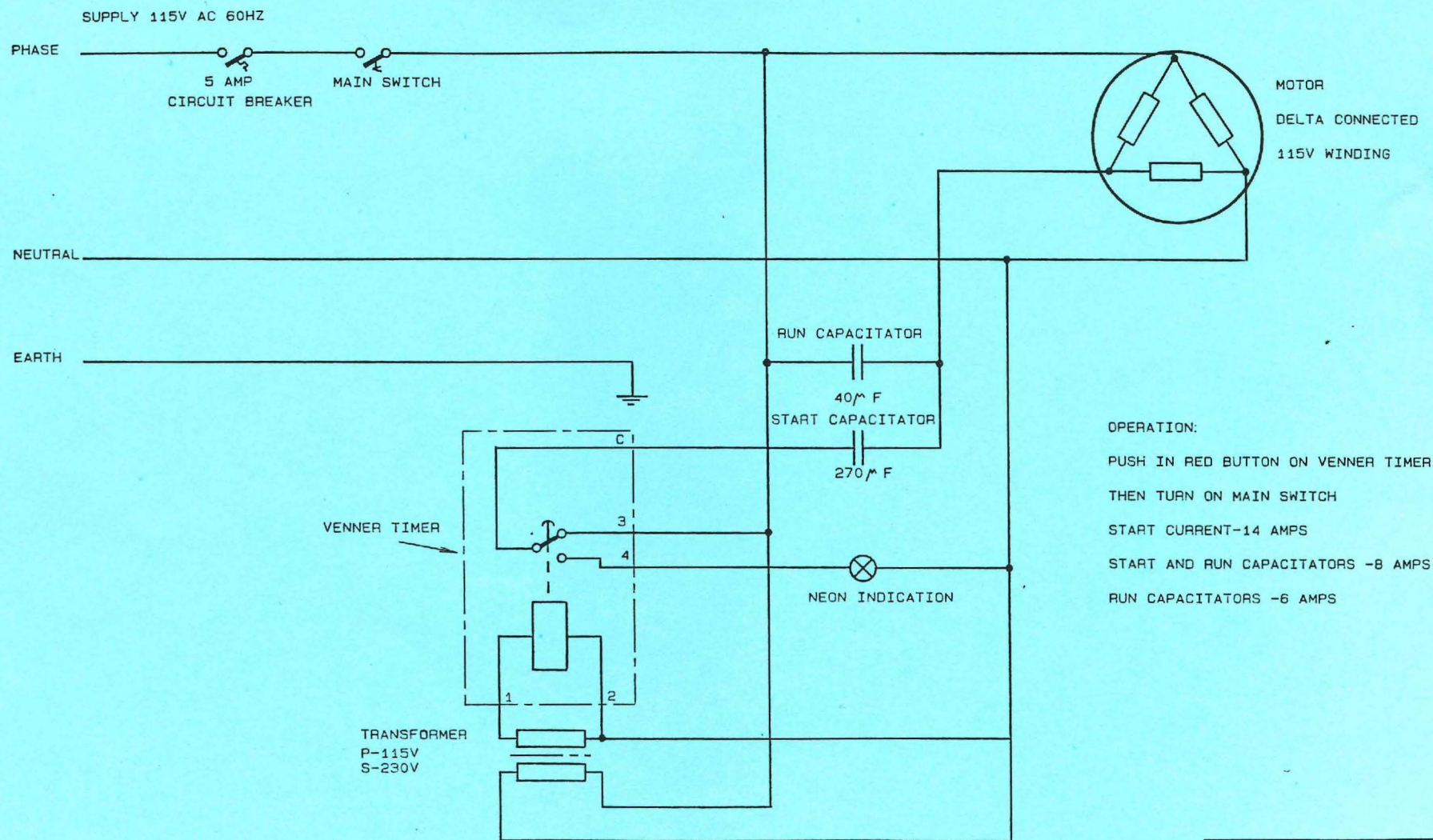
ROCKLABS  
MODEL 3F  
STARTER





Rev.	Date	Description	Approved





OPERATION:  
PUSH IN RED BUTTON ON VENNER TIMER  
THEN TURN ON MAIN SWITCH  
START CURRENT-14 AMPS  
START AND RUN CAPACITATORS -8 AMPS  
RUN CAPACITATORS -6 AMPS

ROCKLABS  
MODEL 3J  
STARTER

Rev	Date	Description	Approved