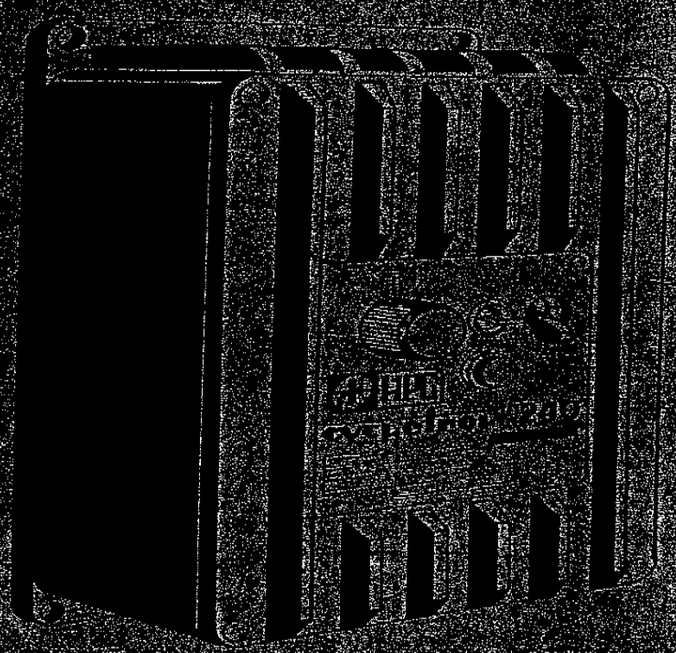
CYCLETROL "240" Instruction Manual



ION INSTRUCTIONS FOR CYCLETROL "240"

RONIC CYCLING AND SPEED CONTROL

CONTROLLER FUNCTION

The Cycletrol "240" is a Solid State Control for the purpose of variable speed and starting and braking to a stop, a D.C. Permanent Magnet Motor. This is accomplished by using simple low current switches to trigger the functions. All power is switched thru Semiconductors, thus eliminating more limited life components, such as clutch/brake and contactors.

SPECIFICATIONS

Input Power	120V versions 90-130 VAC, 1Ø, 50/60 HZ 240V versions 195-260 VAC, 1Ø, 50/60 HZ
Horsepower Rating	Fractional to 3
Drive Service Factor	1.0
Cycle Rate	30 per minute maximum *
Enclosure	NEMA 12 (Consult Factory for other NEMA Enclosures)
Ambient Temperature	10°/40°C (50° to 104° F)
Mounting	Vertical Wall Mounting
Operator Controls	ON/OFF Circuit Breaker, Run/Stop/Jog Switch, Speed Adjust.
Internal Controls (Factory Adjusted)	Minimum Speed, Maximum Speed, Acceleration Rate, and Current Limit potentiometers. Brake/Coast Selector Switch.

* Dependent on horsepower, acceleration times, and masses. (motor is intended to be stopped before restarting)

SUGGESTIONS BEFORE WIRING

Wire Size and Type: #12 ga. or larger should be used for AC & DC lines. #22 ga. wire is recommended for all other connections. Class A insulation is suggested. (Use shielded wire for best results.)

Code Requirements: 1.) A separate fused disconnect or circuit breaker must be supplied, by user, on the incoming AC power to the controller. (The circuit breaker on the control does not eliminate this requirement). Suggested fuse size: - 1/3 HP 120V-5A Slo Blo, 2/3 HP 120V-10A Slo Blo, 1 HP 120V-15A Slo Blo, 1 HP 240V-7A Slo Blo, 1-1/2 HP 240V-10A Slo Blo, 2 HP 240V-13A Slo Blo, 3 HP 240V-20A Slo Blo.
2.) Be sure to ground the control as specified in wiring instructions.

Mounting Suggestions: For best performance of your Cycletrol "240", mount in a vertical position with free air flow around the controller. This is to allow the heat generated by the control to dissipate into the atmosphere.

CAUTION

1. Improper installation of motor and controller may cause personal injury or equipment failure. Follow instruction manual, local, state, and national safety codes for proper installation.

2. Always disconnect power to controller before making any wiring changes or inspection of internal control.

3. Run/Jog switch is operable anytime AC is applied to controller. (See Override Stop for exception.)

4. Controls with timer: When AC is applied and timer is turned on, motor will start after timed period elapses. (See Timer Instructions.)

5. During peak operation, the controller may reach temperatures HOT to the touch. This is normal and expected. However, under the most extreme conditions, the surface of the controller should never exceed 80° C.

6. All electronic controls are subject to line spikes and noise generated by equipment such as arc welders, solenoids, dielectric heaters, etc. H.P.C. has provided all of the latest devices for protection against such an environment. However, it is suggested as an additional protection that shielded wire be used for all connections into controller. Also, whenever possible, isolate the AC line to the controller with an isolation transformer.

7. To insure avoiding personal injury, use separate disconnect or controller circuit breaker to insure positive shutdown of controller and motor should semiconductors fail in the conducting mode. (Override Stop will not serve as a positive stop in this mode of failure.)

8. When making internal adjustments, (e.g. min./max. speed) remount cover upside down as shown in illustration on Page 19.

9. When remote mounting speed adjust potentiometer and function switches, keep in mind that all terminals are at line potential to ground and accidental grounding could cause failure.

10. Grounding - It is imperative that the controller enclosure, motor frame and remote operators stations, (when used), be connected to building ground for the safety of the operating personnel.

11. Do not apply voltage to any terminals except 1 and 2 on AC/DC terminal strip. If voltages are applied to any other terminals, permanent damage may occur. Use only isolated contact closures for all other connections as shown in wiring information.

12. All terminals may be Hot to ground.

A.C. INPUT Connect 230 VAC, (115 VAC to 115 volt version), single phase, 50/60 HZ, to terminals 1 and 2 on power in terminal strip. Be sure to ground control to circuit board mounting lug just below barrier strip on circuit board.

START Connect a "Normally Open" limit switch, or push button, or both, in parallel across the Run and Common, (Com.), terminals. A momentary closure of 50 milliseconds minimum duration will start motor. Motor will then continue to run until a stop signal is given. Notes: A.) Start overrides stop. B.) Before completion of start wiring, see reset wiring. * C.) The motor must be allowed to stop completely before restarting if the dynamic brake was used to stop the motor.

STOP Connect a "Normally Open" Limit Switch or Push Button or Both, in paralled across stop and common terminals. A Momentary closure of 50 milliseconds minimum duration and then release of closure, will trigger Dynamic Brake of Motor to Stop. (When selector switch is in DOWN position.) (Motor will coast to Stop when selector switch is UP) Note: If immediate stop is desired upon contact closure, this may be accomplished by clipping out Jumper J1 from Circuit Board. (See Illustration on Page 19 for location of J1) *

BRAKE/COAST SELECTOR SWITCH See Illustration on Page 19 for switch location. When selector switch is down, motor will brake after stop signal. With switch up, motor will coast to stop. (See override stop for exception)

OVERRIDE STOP Wire an override stop button, or limit switch, or both, with the normally closed contacts in series across the O stop and V+ terminal. When any contact is opened, the control will dynamically brake the motor to stop. (Even with selector switch on circuit board in coast to stop position.) The motor can not be restarted by start signal or timer until override stop has reclosed and a closure is made across reset and common. After these two functions have been completed, the control will restart the motor by: 1.) Pushing start contact, or, 2.) Internal timer operation. (See reset before completion of override wiring.) * If override stop is not used, strap O stop to V+.

WARNING If timer circuit is being used, it is important to use the override stop feature. If only a regular stop signal is given, the timer will restart the motor after a preset time has elapsed on the timer. See "Timer Operation" for additional information.

RESET Wire a "Normally Open" contact across reset and common. If a separate push button is not desirable, it would be most convenient to use the same push button as start. If you wish to use the same button, use a contact block or switch with two sets of normally open contacts. If reset is not used, strap reset to common. (See "Suggested Wiring Diagrams") *

SPEED ADJUST By rotating this knob, (located on the front cover of controller), a clockwise rotation will increase speed. "0" will be minimum speed, "100" will be maximum. See "Adjustments After Startup", for minimum/maximum settings.

* Contact Rating - A maximum of 15 volts DC and 5 milliamps will be across contacts. (Use contacts that are reliable at the above power levels).

WIRING DESCRIPTION (CONTINUED)

MOTOR ARMATURE Connect terminal 3 (DC+) to A 1 or terminal marked + for clockwise rotation of motor viewing output shaft end. Connect terminal 4 (DC-) to other motor terminal. Be sure solid connection is made. If counterclockwise rotation is desired, reverse these two leads. For reversing during operation, use D.P.D.T. contacts. WARNING: 1.) It is imperative that motor is at ZERO speed before reversing direction. Permanent motor damage will occur if reversed during motor rotation. 2.) Always ground motor case to insure the safety of operating personnel.

RUN/STOP JOG SWITCH Upward pressure will start motor and downward pressure and release will cause the motor to stop. This switch can be used to jog motor by pressing down for run and release to stop.

CIRCUIT BREAKER The breaker, when provided, acts as an ON/OFF switch to the controller as well as overload and short circuit protection. The circuit breaker has been carefully selected for instantaneous tripping under extreme overload and short circuit conditions. However, under momentary high loads, such as starting the motor, there will be no nuisance tripping. If the circuit breaker trips, something is wrong, do not attempt to reset breaker and hold in position. (If breaker trips, refer to Trouble Shooting Section). Always wait at least five minutes before resetting circuit breaker.

TIMER The timer circuit is an integral part of the Cycletrol "240". It can be utilized by cutting the timer jumper and adding a resistor or potentiometer. By adding a single pole, single throw switch and another 10K resistor, the timer can be turned ON and OFF. (See diagram on Page 7). The standard timer function is basically to accomplish a preset OFF time with automatic restart cycling. The timer is optionally available to supply a stop signal for timed run applications. (Consult Factory). The timer jumper is shown on Page 18.

TIMER OPERATION When a resistor and a switch are wired in series between the timer and V+ terminals, the timer will begin to time out when the switch is closed and will start the motor after the preset time. A stop signal will then stop the motor and reset the timer. The approximate value of resistance may be found from: $R = \frac{T-.42}{.015}$ where R = Resistance in K ohms and T = Time in seconds. (Maximum R = 2 meg ohms).

WARNING When using the timer, be sure to wire the override stop feature. If Override Stop is activated, all start functions are disabled until:

1.) Override Stop contact is closed.
2.) Reset is closed. (If timer has timed out during this shutdown, timer will restart controller immediately after resetting.)

After these two functions are completed, motor can be restarted by controller if start contact is closed, or by H.P.C. Timer Operation.

OPERATIONAL CHARACTERISTICS

LOGIC: The Cycletrol "240" has designed in most of the common switching functions that in the past have been performed by banks of relays. In most applications, there are substantial savings possible in relay cost.

The run function latches the control "on", and a maintained closure on run overrides all commands except override stop.

The jog function causes the control to run when a closure is made and stop when reopened.

The stop function latches the control into the stop condition when a contact closure is first made and then released, or if jumper J1 is clipped out, it latches into the stop mode as soon as the stop closure is made. (NOTE: The stop function will not work if a closure is maintained across run or jog.)

Override stop will cause the control to latch into the brake to stop mode and the control will ignore all start signals until the switch from 0 STOP to V+ is closed and the latch is reset by a closure from RESET to COM.

Also built into the Cycletrol "240" is a timer which when activated will cause the control to restart itself after a predetermined length of time. The start command initiated by the timer will start the control if it is latched into the normal stop mode, but not if it is latched in the override stop mode. However, if the timer has timed out while the control is latched in override stop, the control will start immediately upon reset of the override stop latch.

The coast/brake selector switch selects whether the motor is braked to a stop or allowed to coast to a stop when the control is given a normal stop or jog signal. The control will always brake to a stop with an override stop or upon loss of power or if the over temperature thermostat is above 85°C. If the control is given a signal that requires a brake to stop the start inhibit circuit will allow the control to ignore a start signal until the motor has stopped.

SPEED CONTROL: The Cycletrol "240" provides for infinitely variable speed control of a P.M. D.C. Motor and uses a full wave bridge. (S.C.R. and diode configuration.) There is compensation for line voltage variation and variations in motor loading. At a given speed potentiometer setting and with a constant load, the motor speed will vary only about 1% with an input voltage change from 195 VAC to 245 VAC. The no load to full load variations will be on the order of ±5%, unless tachometer feedback is used, in which case the speed variations will be less than 1% regardless of motor temperature or load. A major design parameter on the Cycletrol "240" was to limit overshoot, undershoot and settling time. These characteristics are more than adequate for almost all applications.

CURRENT LIMIT: The Cycletrol "240" is provided with an adjustable current limit circuit which can be set to limit the torque output of the motor over a range of about 1 to 25 amps. This circuit will not affect the motor speed until motor current (loading), increases to the set point. At the set point, the red L.E.D. comes on and the control will supply no more than 5% additional current (torque).

CONTROLLED ACCELERATION: The linear ramp for controlling acceleration is adjustable. The time required for the motor to accelerate from zero speed to set speed can be adjusted from .1 sec. to 5 sec. as supplied. (Other ranges can be supplied. Consult Factory)

PROCESS CONTROL SIGNALS: A control signal input is provided by connecting process signal (+) to SP2 and process (-) to SP3. With tachometer feedback, the motor speed will track the process voltage to within 3% of linearity. The input voltage required is 0-10 V.D.C. The input impedance is approx. 1 MEG OHMS shunted by a .47 microfarad capacitor. A 0-5 MA. signal can be accomodated by shunting SP2 and SP3 with a 2K ohm, 1/2 watt resistor, 0-20 MA. use a 500 ohm, 1/2 watt, 0-50 MA. use a 200 ohm, 1 watt.
Caution: SP2 and SP3 are at line potential to ground, and the process control signal must be isolated.

CONTROL PROTECTION AND FILTERING: The Cycletrol "240" when provided with a special circuit breaker will protect both motor and control from most kinds of overload without nuisance tripping on high speed acceleration or short term overload. The control is thermally protected and will shut down if the heat sink area exceeds approximately 85°C. Additionally, the motor and drive are protected by a fast acting electronic current limit that prevents current from exceeding the desired maximum, as long as the overload condition lasts.

TACHOMETER FEEDBACK, TACHOMETER FOLLOWER AND PROCESS SIGNAL INPUT

The Cycletrol "240" is equipped to accept tachometer feedback and process signal inputs. The process input can be used to follow another tachometer generator to track speed changes originating elsewhere.

Tach. feedback is accomplished by: 1.) Wiring the positive output of the tachometer generator to the tach. + input and the negative output of the generator to SP3. (If these wires are transposed, the motor will run wide open regardless of speed setting.) 2.) Clip out a resistor RA on circuit board. (See illustration for positive identification.)

The tachometer generators supplied with H.P.C. motors are very low inertia, precision, Servo type generators, with an output of 7 volts D.C. per 1000 RPM. The Cycletrol "240" accepts this feedback with no alterations. By clipping out a resistor on the right hand edge of the circuit board, (see illustration for positive identification), the tach. input can be altered to accept 20.8 V.D.C. per 1000 RPM generators if necessary. Nearly any direct current tachometer generator can be accomodated by the Cycletrol "240". (Consult Factory)

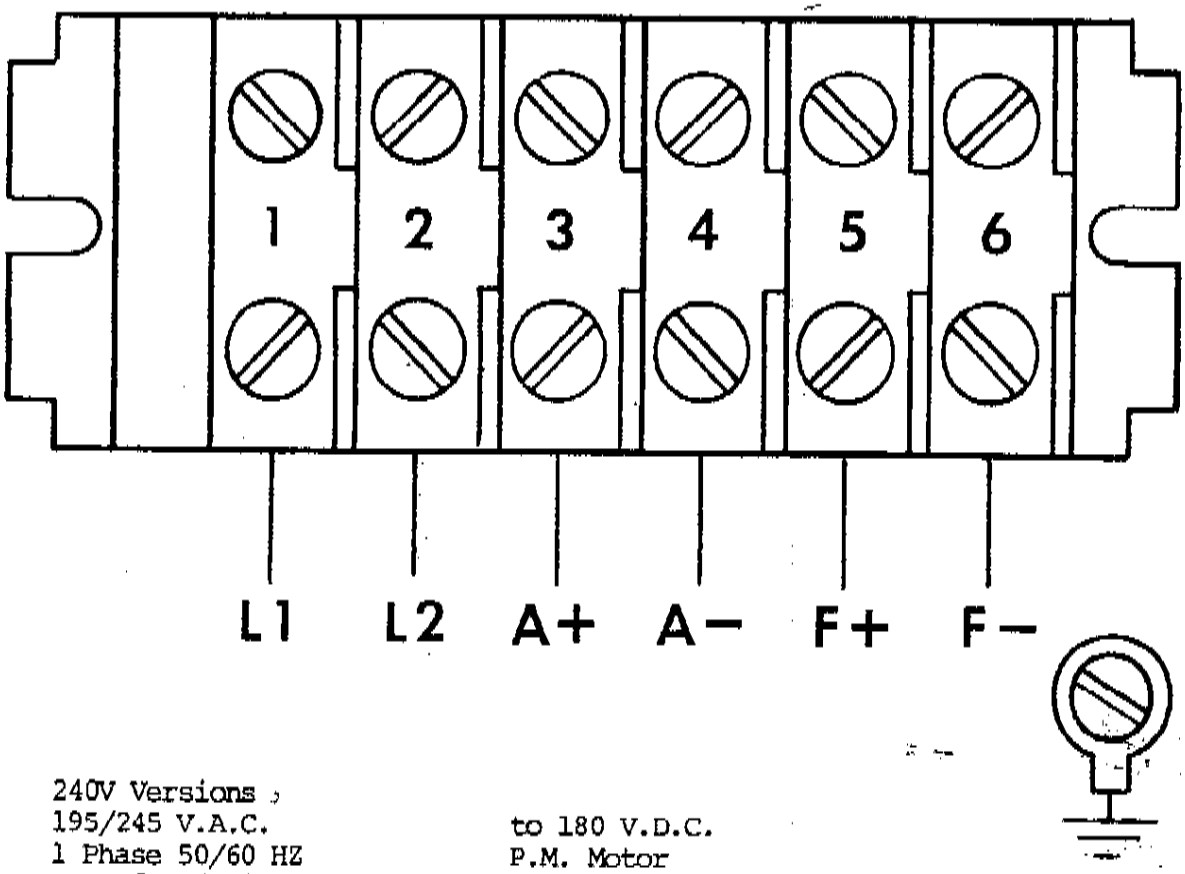
To use a process input, wire the process signal positive to the SP2 terminal and the signal negative to the SP3 terminal. The Cycletrol "240" is directly compatible with a 0 to 10 volt D.C. input signal. By using the minimum speed trimpot, the process voltage required to turn on the motor can be adjusted from 0 volts to approximately .7 volts. The maximum speed trimpot can be used to adjust the maximum speed of the motor regardless of the process input voltage. This process input is very versatile and can be used to track most common transducer signal outputs. By using external shunting resistors it will work with 0-5 MA, 4-20 MA, and 10-50 MA outputs, or almost any D.C. tachometer generator. The input voltage requirements again are 0-10 VDC and the input impedance is approximately 1 MEG OHMS shunted by .47 MFD. For best results, the voltage source should have a source impedance of less than 1K ohms. We must caution you again that the process input terminals are at line potential so that the process signal source must have a high degree of isolation. If you have any questions regarding using the Cycletrol "240" on your application, please call us at: 815/398-2770.

The control is also protected from electronic noise and line spikes and has filters to substantially reduce this kind of interference from passing into the control or out of it. The motor may occasionally jump slightly when power is first applied. If this is a problem on your application, Consult Factory.

BRAKING: Braking is accomplished on the Cycletrol "240" by switching a resistor across the motor armature causing the motor to brake quickly to a stop. This type of braking is smooth, fast, and the long term deceleration rate change is insignificant. In the past, use of this type of braking has been more limited due to severe contactor arcing. H.P.C. pioneered the use of solid state switching for this application. The solid state switches used in H.P.C. controls will outlast their mechanical counterparts by several orders of magnitude and have allowed us to handle applications that no D.C. control could before. Using the Cycletrol "240", the motor will act as a drag brake anytime the control is in the braking mode, or upon loss of power to the control. This braking force is present in both the forward and reverse directions and increases directly proportional to the speed. Because the braking force is a function of speed, this type of brake is not a good holding brake and if the application requires a holding brake, please Consult the Factory.

POWER CONNECTIONS

Field Supply, (F+, F-), Chassis Mount Only



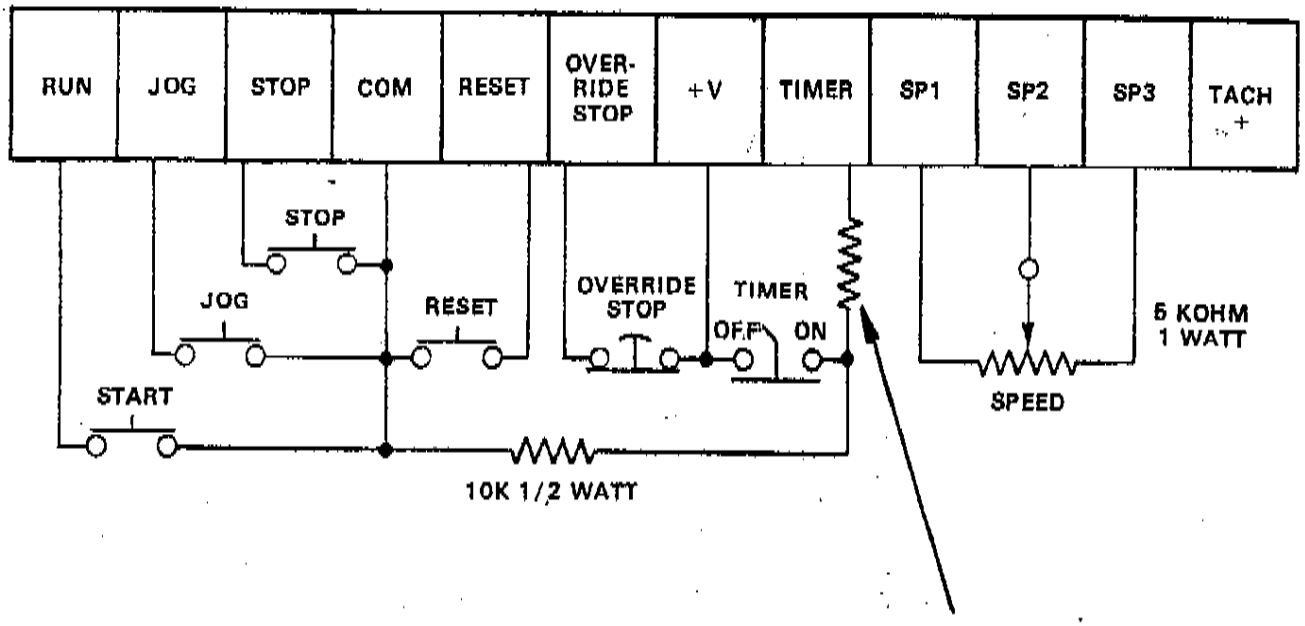
240V Versions
195/245 V.A.C.
1 Phase 50/60 HZ
From fused disconnect

to 180 V.D.C.
P.M. Motor

120V Versions
95/125 V.A.C.
1 Phase 50/60 HZ
From fused disconnect

to 90 V.D.C.
P.M. Motor

Connect Building Ground Between Cover & Box At Cover Mounting Screw



The external timing resistor can be a fixed resistor, or a potentiometer, or a combination of both. The resistance required can be approximated from the formula $R = \frac{T - .42}{.015}$

R = Resistance in K ohms

T = Time in seconds

Maximum R = 2 Meg ohms

Notes:

1.) Because of the control versatility possible with the Cycletrol "240", the above diagram is only representative of the possibilities. The push buttons shown could be limit switches, relays, etc. It is not necessary to use all the functions. If you have any questions, please Contact the Factory.

2.) If tach. gen. or process signal input are used, see Pages 5 and 6.

3.) If override stop is not used, Jumper 0, stop to V+ and reset to com.

4.) Read manual, Pages 1-11, before installation.

CAUTION: When making internal adjustments, use extreme caution to avoid electric shock.

1.) Turn to illustration on Page 19 and become familiar with components and light functions.

2.) Make sure line disconnect is turned OFF and No Power is supplied to controller.

3.) Remount cover upside down as shown in illustration on Page 19.

4.) Recheck to see that all connections are properly made according to instruction manual, state, local, and national safety codes.

5.) Speed adjust set "0".

6.) Switch OFF Timer. (If installed)

7.) Switch Coast/Brake selector switch to the BRAKE position, (down).

8.) Line disconnect turned "ON".

9.) Circuit Breaker "ON". (When Provided)
a.) Only the Green ON and Red BRAKE lights on circuit board should be on.
Note: Green ON light will remain on whenever power is on.

10.) Momentarily push Run/Stop switch to the Run position.
a.) Green RUN light on circuit board should be on and Red BRAKE light should be off.

11.) Manually trip circuit breaker, when provided, OFF and then ON again. (Green RUN light should be OFF and Red BRAKE light should be ON.

12.) Switch on timer, (if installed), and watch for Green RUN light after preset time has elapsed. Momentarily push Run/Stop switch and release. Red BRAKE light should go ON and Green RUN light OFF. Watch for timer to restart again. Turn OFF timer and Stop again.

13.) Switch Coast/Brake selector switch to COAST, (up), position. Red BRAKE light should go OFF and Yellow COAST light should be ON.

14.) Check Override Stop, (if used), and watch for Red BRAKE light. (Then reset.) Red BRAKE light should go OFF. Green RUN light will come on only if reset and start functions are combined.

15.) When using external start and stop functions, repeat above procedure to insure proper operation of external switches.

16.) Select the desired Coast/Brake switch position for your application results.

17.) Initiate start signal and slowly increase speed adjust to maximum speed and back to "0". Check for smooth operation.

18.) Set speed to desired setting after running through range.

19.) Initiate Stop function and check for correct stopping action.

20.) Cycle controller and motor with switches and push buttons to insure all connections are functioning and make necessary adjustments to achieve desired operation.

ADJUSTMENTS AFTER START-UP

MAXIMUM SPEED ADJUSTMENT

This setting has been factory adjusted. However, if a higher or lower setting is required:

1.) Start motor and allow it to warm up at least 30 minutes, fully loaded. (Motor speed will increase with a rise in motor temp. unless using tach. feedback.)

2.) With motor driving a full load and the speed pot turned all the way up, adjust the max. speed trimpot until desired speed is set.

3.) Go on to the minimum speed adjustment, as there may be some interaction.

MINIMUM SPEED ADJUSTMENT

1.) Turn speed adjustment potentiometer to minimum.

2.) Start control and adjust trimpot on board until desired minimum speed is set. If desired minimum speed is zero, adjust trimpot so that motor just barely stops turning. This setting will give the best speed setting to motor speed linearity.

3.) Recheck max. speed adjustment, as some interaction is probable.

CURRENT LIMIT

The current limit trimpot is located near the max. and min. speed trimpots. The point at which the control starts current limit is identified by the red L.E.D. turning on.

Method

1.) Lock up motor shaft in such a way that no damage will occur. Place a D.C. amp. meter in series with the motor armature. Turn the current limit trimpot fully counter-clockwise. Turn speed pot up. Start control and adjust for the percentage of full load current required.

Method

2.) Start control and load machine to maximum. Set the current limit so that it is beyond the point that the red L.E.D. comes on under the worst loading conditions you expect.

CONTROLLED ACCELERATION

This adjusts the rate of motor acceleration to set speed. The more clockwise the trimpot is set, the slower the acceleration.

TROUBLE SHOOTING

Note: It is suggested that the following procedures be performed to determine component failure within the controller itself, or eliminate the possibility of miswiring. H.P.C. suggests if the controller is found to be faulty, return it to the factory for determination of cause and repair. H.P.C. will honor its warranty in all cases when handled in this manner. H.P.C. cannot assume responsibility due to miswiring or improper test procedures. We welcome your call to answer any questions: 815/398-2770.

Equipment Required:

1.) Simpson 260, or equivalent.
2.) Hand tools, including insulated screw driver.
3.) Good safety practices, as line voltage will be present during part of the test.

TROUBLE SHOOTING

SYMPTOM	SOLUTION
Motor will not run	1.) Make sure circuit breaker, when provided, and line disconnects are turned on. 2.) Check line fuses to see if they are good. 3.) Make sure override stop is closed and reset. 4.) Set speed adjust to 50%. 5.) With power OFF and motor leads disconnected, check for worn or improperly seated motor brushes. (Brushes should be replaced when overall length is .575"). 6.) Faulty circuit board. (See logic test on Page 14).
Circuit Breaker Tripping	1.) Improper wiring - recheck wiring for misrouting, shorts, and shorts to ground. 2.) Motor brushes worn or improperly seated. 3.) Motor load is too heavy. Check for "jam-up", or excessive load. 4.) Power module failure. (See test - Page 15).
No Speed Control	1.) Speed adjust potentiometer defective. 2.) Minimum speed adjust potentiometer, (located on circuit board). 3.) Faulty circuit board. (See logic test on Page 14).
Motor will not run at 1725 RPM	1.) Improper setting of maximum speed potentiometer. (Located on printed circuit board.) Turn clockwise to increase speed. 2.) Motor may be overloaded. (Motor horsepower is less than required for load.) 3.) Low line voltage. Input line voltage should be 195 volts to achieve maximum speed.
Motor stops running and control will not work, then starts working in a few minutes	1.) "Thermal Overload". If this is accompanied by circuit breaker tripping, check H.P. requirement. 2.) Exceeding cycle rate, Consult Factory.

Motor Coast to Stop (No Dynamic Braking)	1.) Coast/Brake switch position. See Brake/Coast selector switch, Page 3. 2.) Brake resistor failure. (See test on Page 15.) 3.) Circuit board failure. (Consult Factory)
Motor Jumps After Stop And Before Start Signal	1.) A.C. line spikes or line noise. (Use shielded wire and isolation transformer for your environment.)
Motor Speed Erratic	1.) Worn brushes. (Inspect and replace if length is .575" or less.) 2.) Speed adjust potentiometer or associated circuit may be defective. 3.) Erratic load changes. 4.) Defective circuit board. (Consult Factory)
Motor Will Not Shut Off With Stop Command	1.) Faulty wiring in control circuit. 2.) Faulty circuit board. (See test on Page 14.)
Motor Will Not Stay On After Start Command	1.) Check wiring of Stop functions. 2.) Faulty circuit board. (See test on Page 14.)

PLEASE FEEL FREE TO CALL OUR FACTORY FOR ASSISTANCE: 815/398-2770

TEST PROCEDURE FOR CIRCUIT BOARD LOGIC

NOTE: The following tests are to conclude that the circuit board is good or bad.

Preparation Before Logic Test

1.) Turn OFF line disconnect and remount cover as shown in illustration on Page 17.
2.) Place Brake/Coast switch in Brake position. (DOWN)
3.) Place speed pot to ZERO speed.
4.) Remove all connections to barrier strip terminals on circuit board.
5.) Place circuit breaker on control cover, when provided, in "ON" position.
6.) Turn ON line disconnect.
7.) Green ON light is ON and BRAKE to stop Red light is ON.

CAUTION: Line voltage present on circuit board terminals.

LOGIC TEST

Coast/Brake Switch	Move Coast/Brake switch up. Yellow COAST light should come ON. No other changes.
Override Stop and Reset	Place jumper from 0-Stop to V+. Momentarily short reset to common, (com.). This should cause BRAKE Red light to go OFF. No other changes.
Run	Momentarily short run to common, (com.). This should cause Run light, (Green), to come ON and COAST to stop, (Yellow light), to go OFF.
Stop	Momentarily short stop common, (com.). Run light should go OFF and Yellow light should come ON as closure is reopened, unless Jumper J1 has been clipped, in which case Yellow light will come ON as soon as closure is made.
Jog	A closure from Jog to common, (com.), will cause Green RUN light to come ON and reopening will cause Yellow COAST light to come ON.
Timer (only if used)	Do not perform this test if timer is not used. Add a jumper from timer to V+. Make quick closure from Stop to common. Green RUN light will go OFF and Yellow COAST light will come ON, and in about 1/2 second, Yellow will go OFF and Green RUN will come back ON.

Note: If test results agree with above procedure, check external wiring for malfunction or Consult Factory.

H.P.C. Service: 815/398-2770

TEST PROCEDURE FOR POWER COMPONENTS

Note: The following tests are to conclude that the components are good or bad.

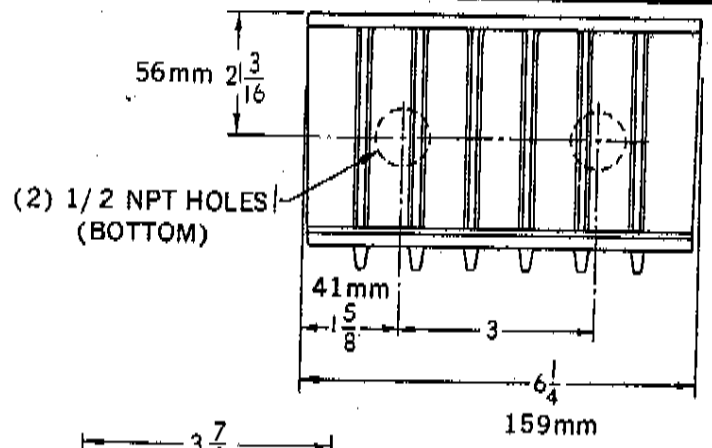
CAUTION: Turn OFF all power for the following tests!

Power Module	1.)	Pull off all "fast on" connections. Set. V.O.M. to R X 10K scale.
	2.)	Check resistance from both A.C. terminals to (+) terminal. Both directions resistance should be greater than 1 Meg ohm.
	3.)	Check resistance from both A.C. terminals to (-) terminal. Resistance should be greater than 1 Meg ohm in one direction and less than 50K in the other direction.
	4.)	Check resistance from (+) terminal to (-) terminal. Resistance should be greater than 1 Meg ohm in one direction and less than 50K in the other direction.
SCR	1.)	Remove "fast on" connections from SCR to circuit board. Set V.O.M. to R X 10K scale.
	2.)	Check resistance across the two largest terminals on SCR. Resistance should be greater than 1 Meg ohm in either direction.
Brake Resistor		Remove "fast on" connections to resistor, set V.O.M. to R X 1 scale. Resistance should be approximately 4 ohms.

NOTE: If test results agree with above procedure and your problem is not solved, PLEASE FEEL FREE TO CALL OUR FACTORY FOR ASSISTANCE: 815/398-2770.

CYCLETROL "240" REPLACEMENT PARTS LIST

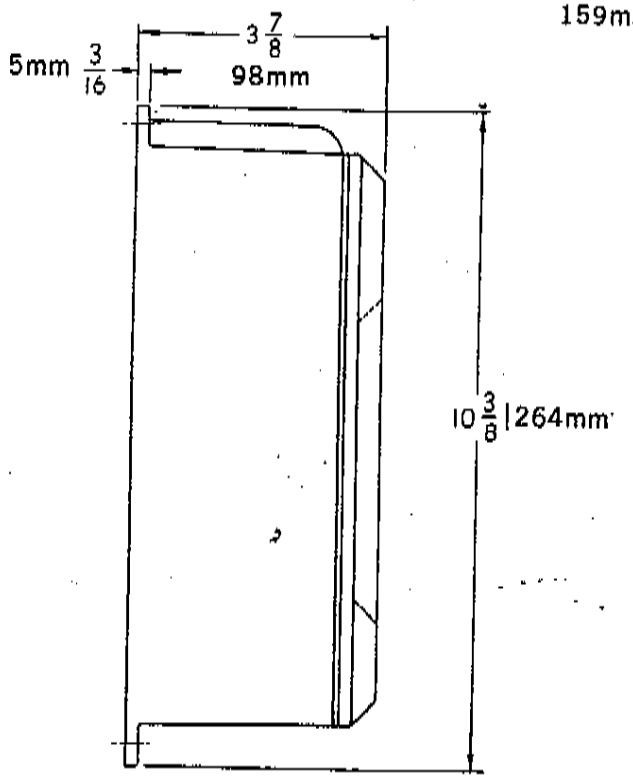
Part Description	Part Number
Power Module for 240 VAC, Input Power	02306
Power Module for 120 VAC, Input Power	02319 + 02320
Brake SCR	02302
Brake Resistor	00934
Speed Potentiometer	00943
Circuit Breaker to 1 H.P., 240V Unit	02010
Circuit Breaker to 2 H.P., 240V Unit	02011
Circuit Breaker to 3 H.P., 240V Unit	02012
Circuit Breaker to 1/3 H.P., 120V Unit	02208
Circuit Breaker to 2/3 H.P., 120V Unit	02007
Circuit Breaker to 1 H.P., 120V Unit	02006
Run/Jog Switch	02211

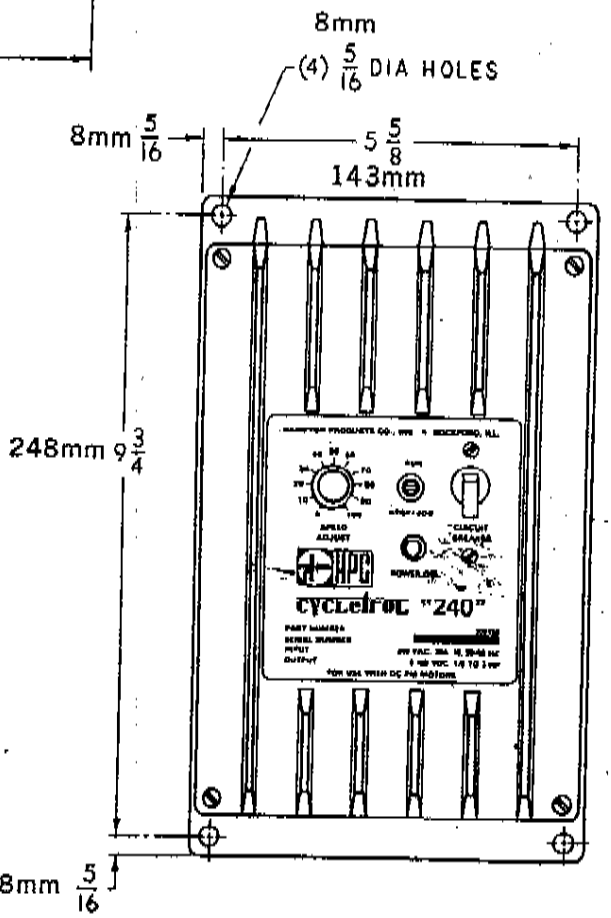


CYCLETROL "240" DIMENSIONS

WEIGHT 7#

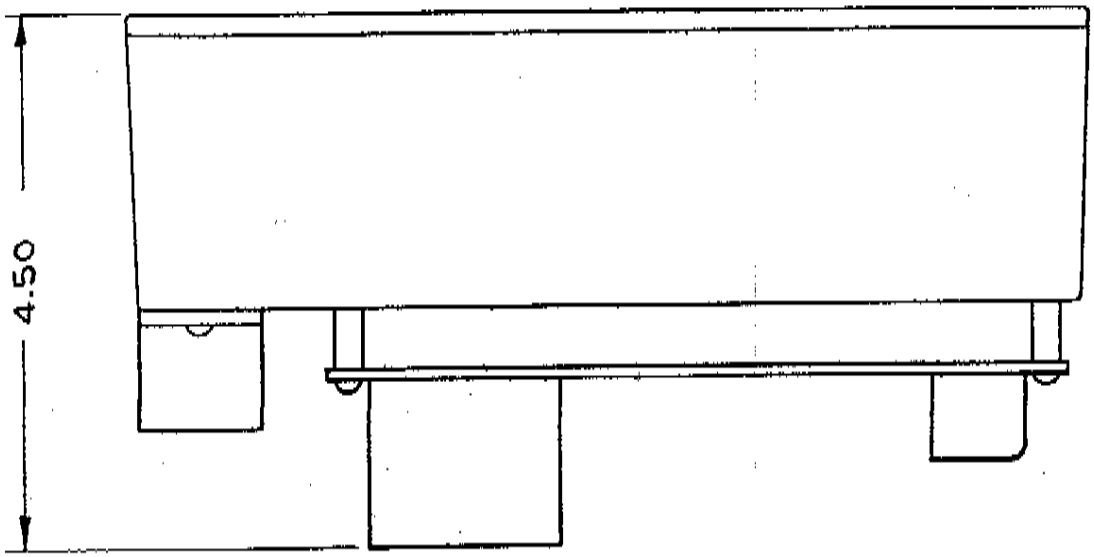
MATERIAL Aluminum

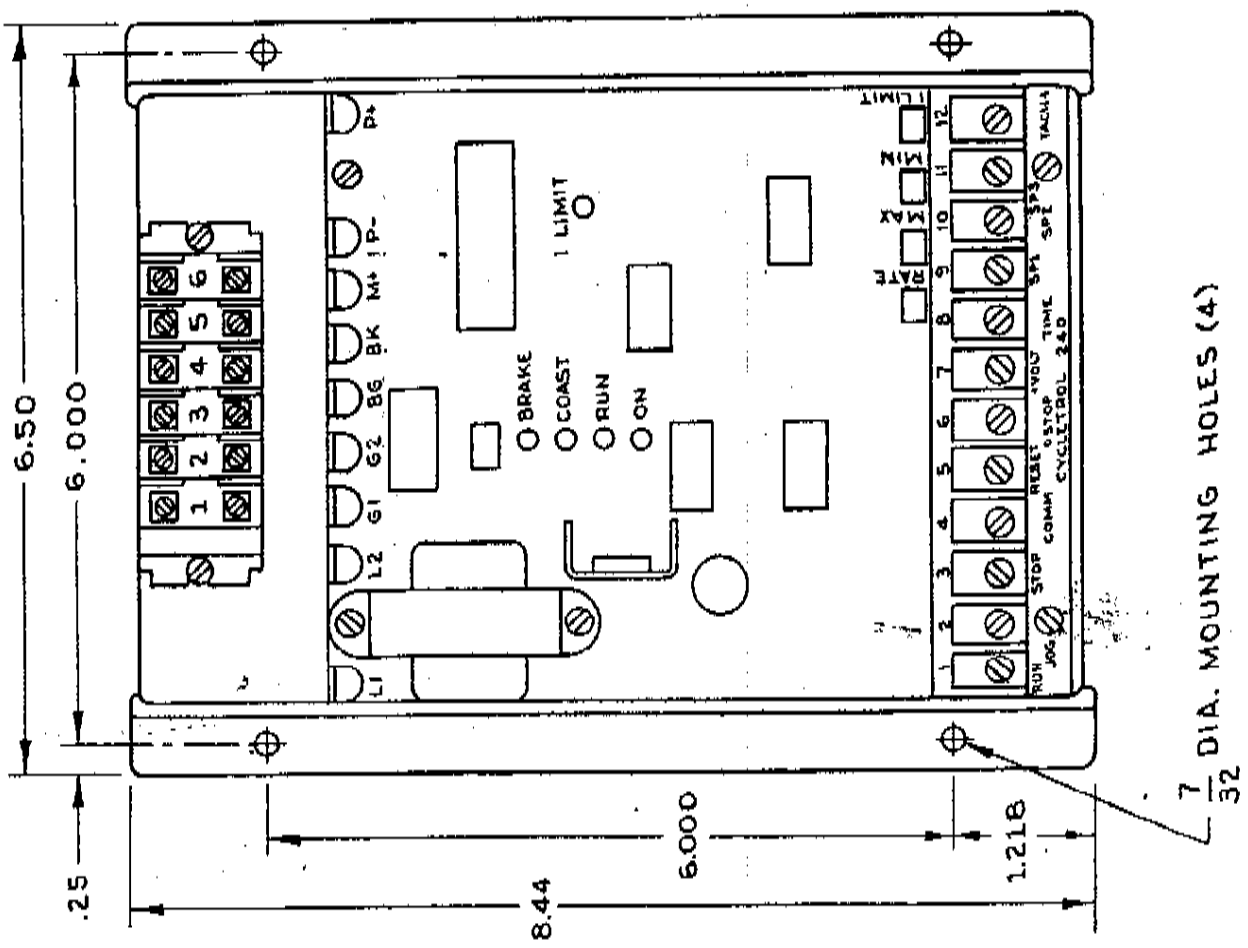




cycletrol "240"

CHASSIS MOUNT





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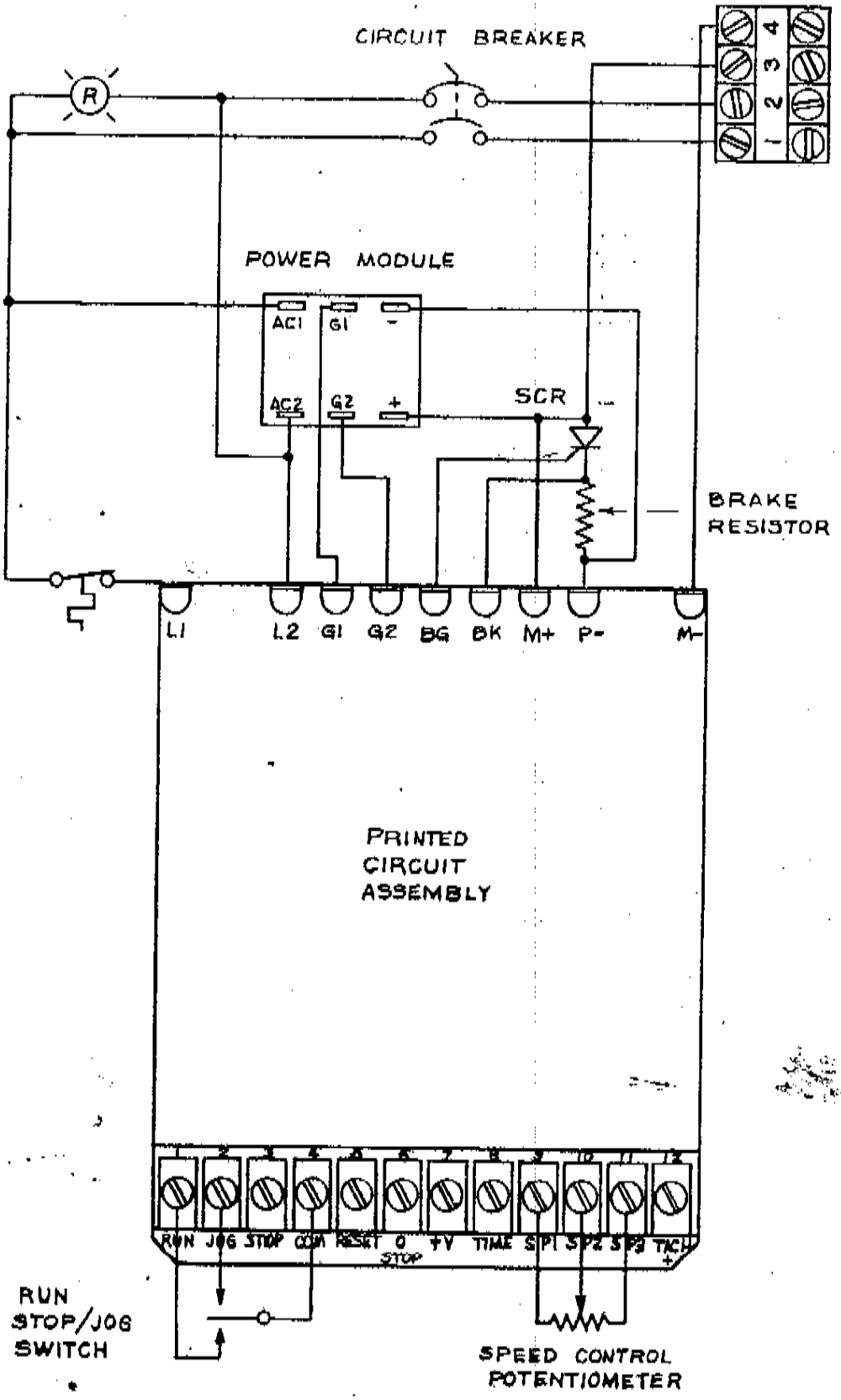
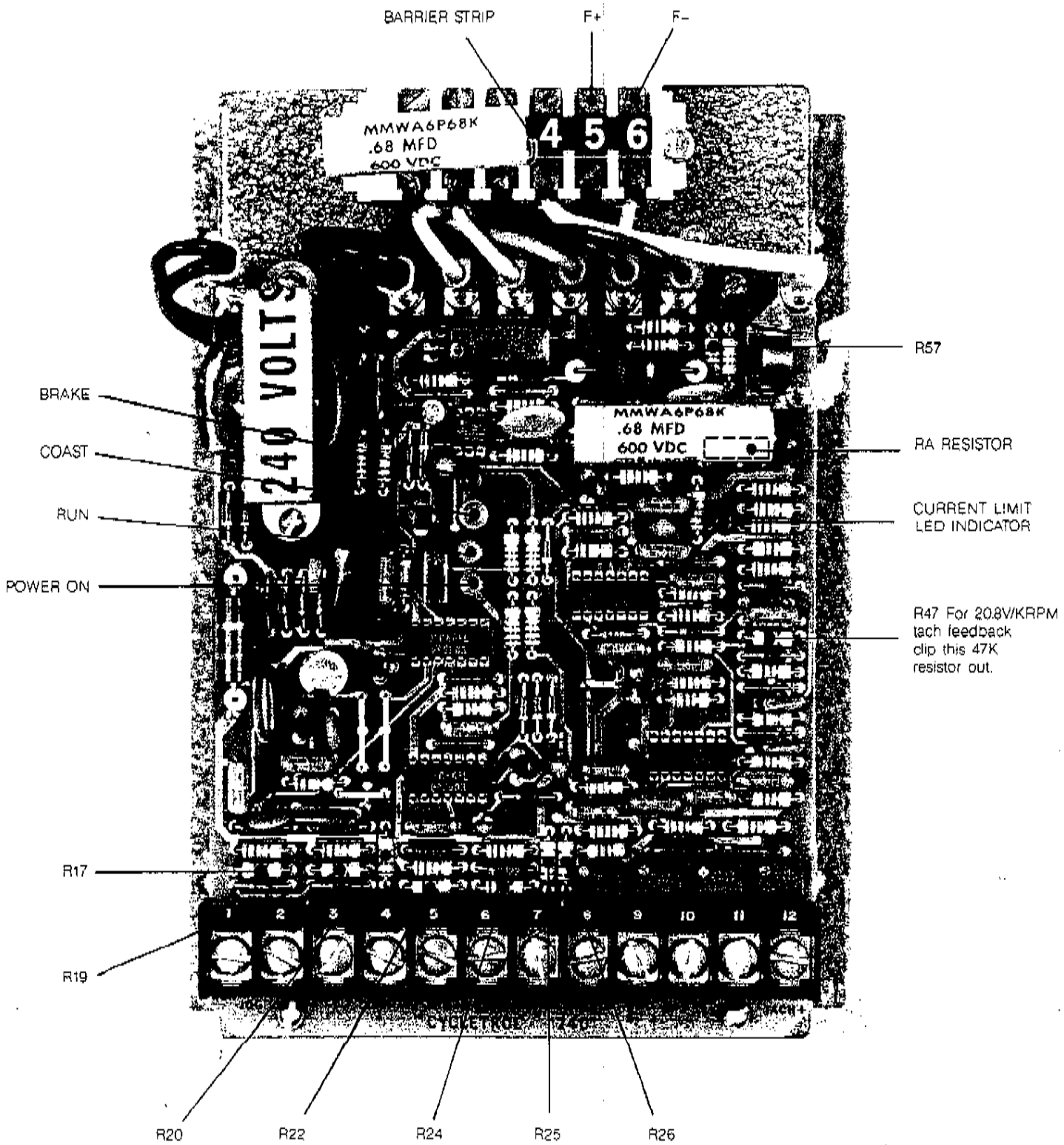
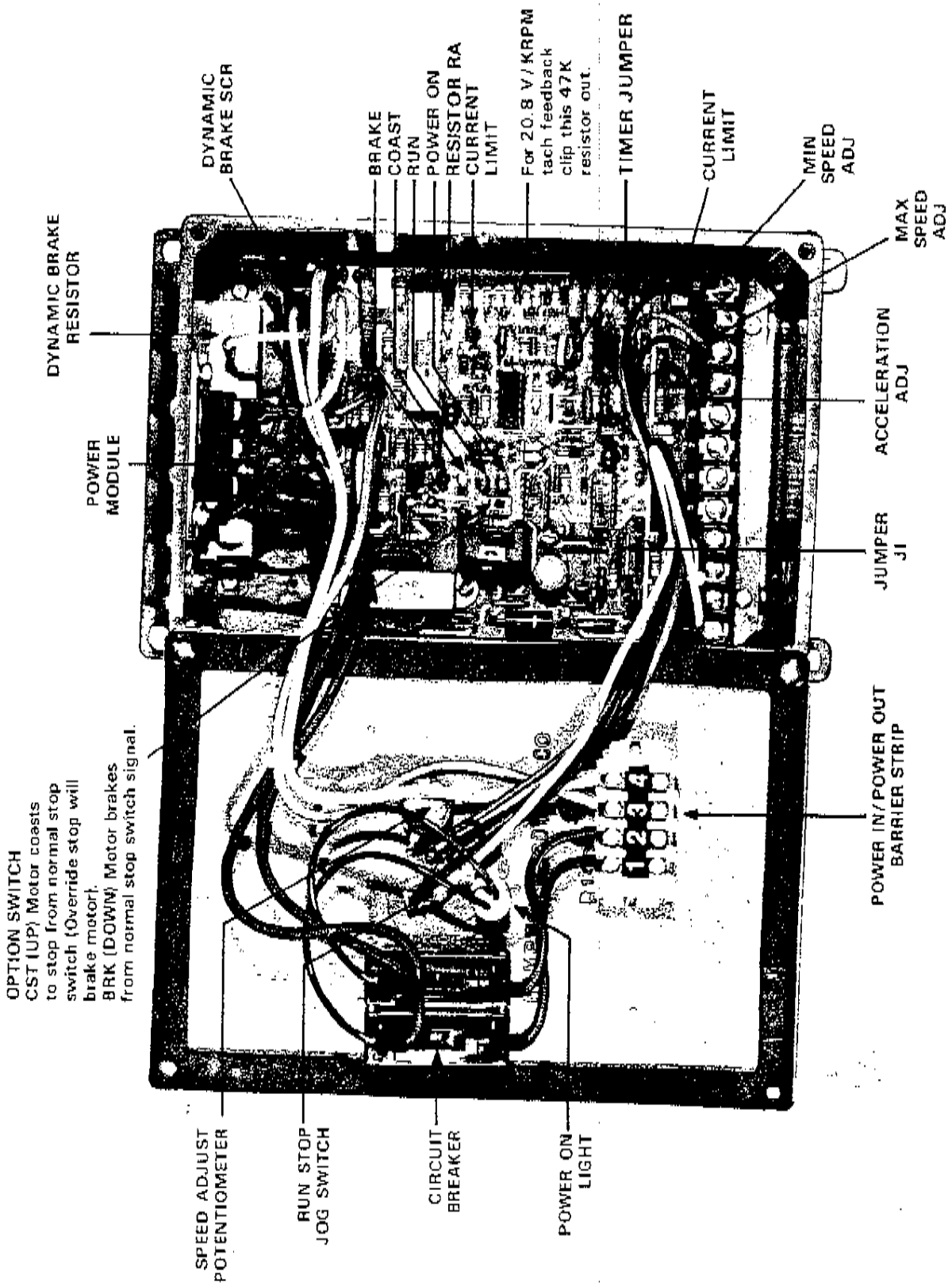
FUNCTIONAL DIAGRAM

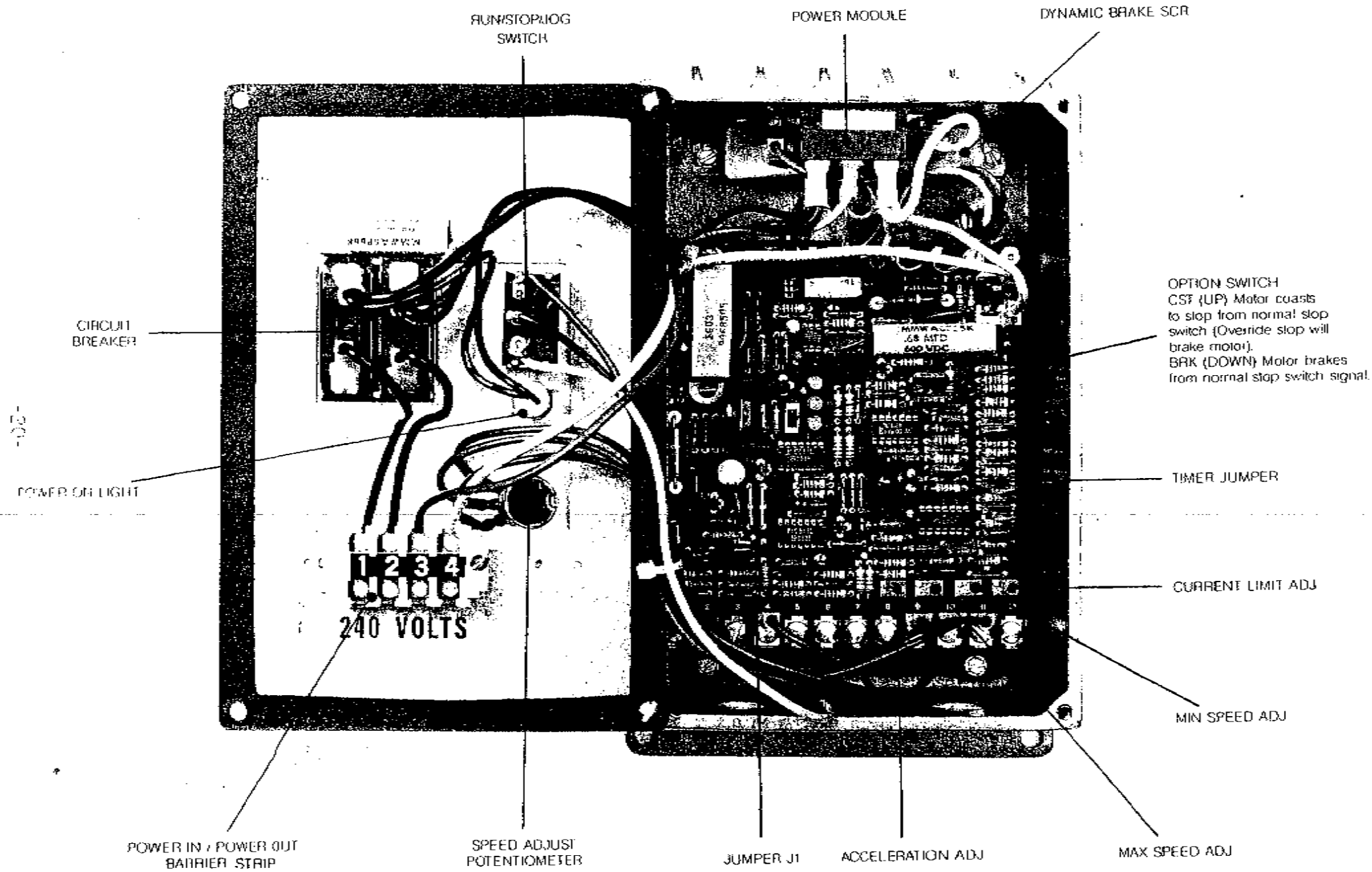



BARRIER STRIP
F+
F-
4 5 6
MMWA6P68K
.68 MFD
600 VDC
240 VOLTS
R57
BRAKE
COAST
RUN
POWER ON
MMWA6P68K
.68 MFD
600 VDC
RA RESISTOR
CURRENT LIMIT
LED INDICATOR
R47 For 20.8V/KRPM
tach feedback
clip this 47K
resistor out.
R17
R19
1 2 3 4 5 6 7 8 9 10 11 12
R20
R22
R24
R25
R26

cycletrol "240"

ILLUSTRATION




RUN/STOP/JOG SWITCH
POWER MODULE
DYNAMIC BRAKE SCR
CIRCUIT BREAKER
OPTION SWITCH
CST (UP) Motor coasts to stop from normal stop switch (Override stop will brake motor).
BRK (DOWN) Motor brakes from normal stop switch signal.
POWER ON LIGHT
TIMER JUMPER
CURRENT LIMIT ADJ
MIN SPEED ADJ
1 2 3 4
240 VOLTS
POWER IN / POWER OUT BARRIER STRIP
SPEED ADJUST POTENTIOMETER
JUMPER J1
ACCELERATION ADJ
MAX SPEED ADJ