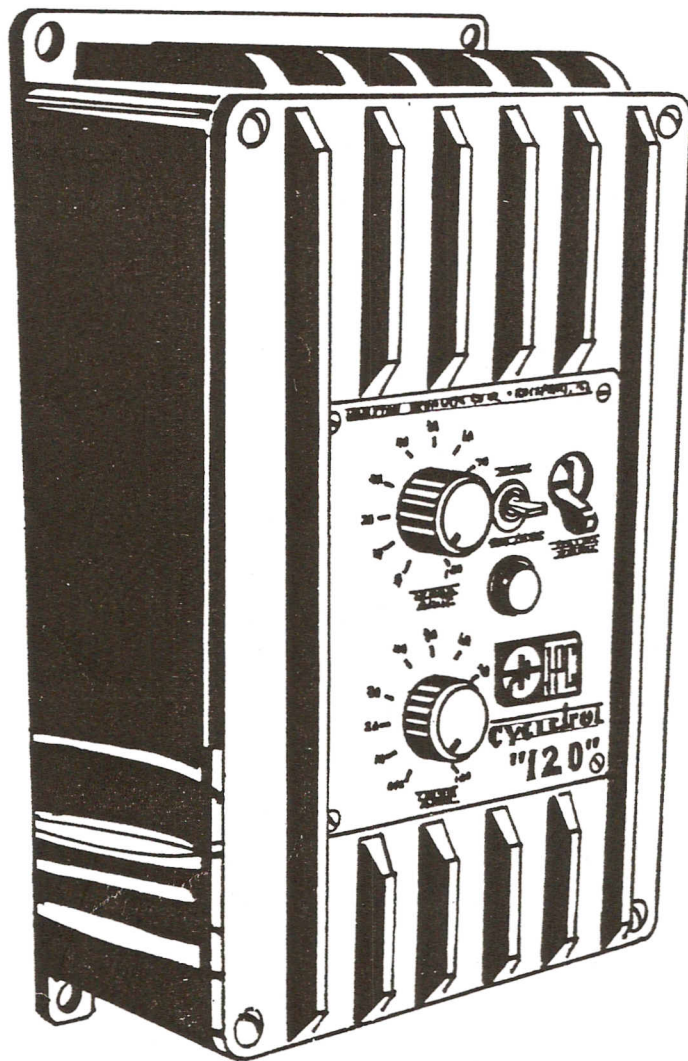


# CYCLEtrol "120"

## Instruction Manual



1163178

## 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 125° F.
6. All Electronic Controls are subject to Line Spikes and noise generated by equipment such as Arc Welders, Solenoids, Dielectric Heaters, etc. HPC has provided all of the latest devices for protection against such environments. However, it is suggested as an additional protection from line noise and spikes, that shielded wire be used for all connections into controller. Also, whenever possible, isolate the AC line to the controller from such line noise 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 16.
9. When remote mounting speed adjust potentiometer, keep in mind that terminals are at line potential to ground and accidental grounding could cause control failure.
10. Grounding- It is imperative that the controller, motor 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. Use only isolated contact closures for all connections as shown in wiring information. If voltages are applied permanent damage may occur.



## WIRING DESCRIPTION OF CONTROLLER

- A.C. INPUT                    Connect 115 V AC, Single Phase, 50/60 HZ, to Terminals 1 and 2. (Neutral to Terminal 1 - Hot to 2) Be sure to ground control to circuit board mounting lug just below barrier strip.
- START                        Connect a "Normally Open" Limit Switch or Push Button or Both, in parallel across "Start": Terminals 3 and 4. 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. \*
- STOP                         Connect a "Normally Open" Limit Switch or Push Button or Both, in parallel across stop Terminals 5 and 6. 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 up position.) (Motor will coast to stop when selector switch is down.) Note: If immediate stop is desired upon contact closure, this may be accomplished by clipping out diode D3 from Circuit Board. (See Illustration on Page 16 for location of D3) \*
- BRAKE/COAST  
SELECTOR  
SWITCH                    See Illustration on Page 16 for switch location. When Selector Switch is up, motor will brake after stop signal. With switch down, 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 Terminals 9 and 10. The normally open contacts in parallel across 8 and 9. When the contact is activated, the control will dynamically brake the motor to a stop. (Even with selector switch on circuit board in coast to stop position down.) The motor can not be restarted by start signal or timer until override stop has been deactivated and reset switch has been opened. 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.) \*
- 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 Closed" contact across reset Terminals 7 and 8. 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 one set of normally open contacts and one set of normally closed. \* (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 start up" for minimum/maximum settings.

\* Contact Rating- A maximum of 5 volts DC and 50 milliamps will be across contacts. (Use contacts that are reliable at the above power levels.)

MOTOR  
ARMATURE

Connect terminals 11 marked (DC +) to A 1 or terminal marked + for clockwise rotation of motor viewing output shaft end. Connect Terminal 12 marked (DC-) to other motor terminal. Be sure solid connection is made. If counter clockwise rotation is desired, reverse these two leads. For reversing during operation, use D.P.D.T. contacts, or HPC "Bi Directional Option".

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. Therefore, this switch can be used to Jog motor.

CIRCUIT  
BREAKER

The breaker 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.)

TIMER

The timer circuit is an integral part of the Cycletrol "120". It can be utilized by adding a two meg ohm potentiometer ( approximate timer range from  $\frac{1}{2}$  second to 40 seconds.) wired as a variable resistor. (C.W. Rotation increases resistance) By adding a single pole single throw switch in series with one of the leads from the potentiometer, the timer can be turned On or Off. 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)

TIMER  
OPERATION

When the timer is wired to Terminals 21 and 22 and On/Off Switch is closed, the timer circuit will begin to time out. After preset time has elapsed, the circuit will internally turn On the motor just as if the start button had been pushed. Motor will continue to run until a stop signal is given. The stop signal will restart the timer circuit and timer will restart motor after preset time has elapsed. Therefore, an automatic cycle has been established. To increase or decrease time, adjust setting of potentiometer.

WARNING

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

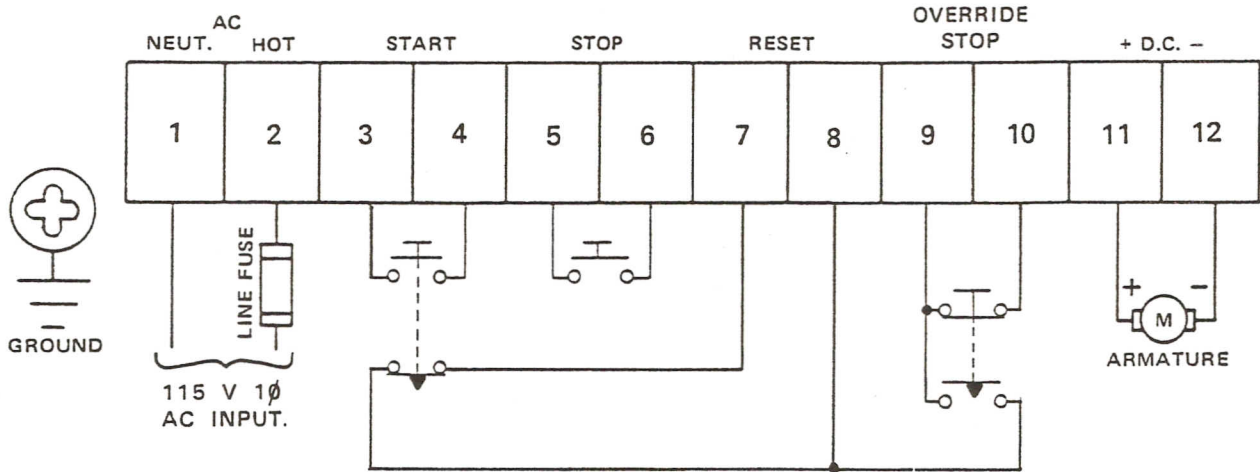
- 1.) Override Stop Contact is deactivated.
- 2.) Reset is opened and reclosed. (If timer has timed out during this shutdown, timer may restart controller immediately after reset or controller may be restarted with closure across start terminals.

After these two functions are completed, motor can be restarted by controller if start contact is closed or by HPC Timer operation.



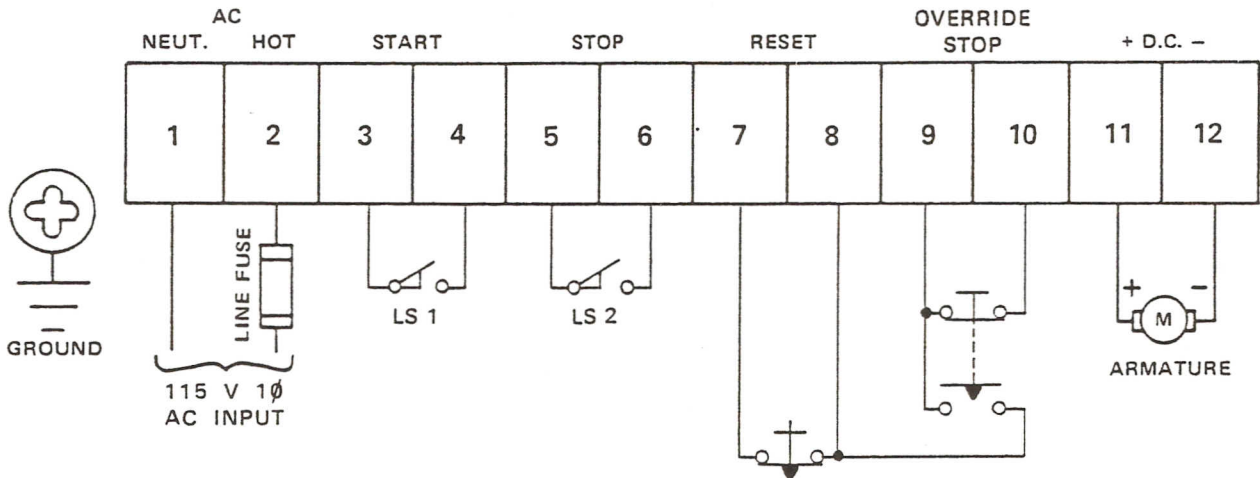
# CYCLETROL "120" WIRING INFORMATION

## 1. CONTINUOUS RUNNING



- 1.) Start closure begins motor operation.
- 2.) Stop closure stops motor operation.
- 3.) See notes on Page 6.

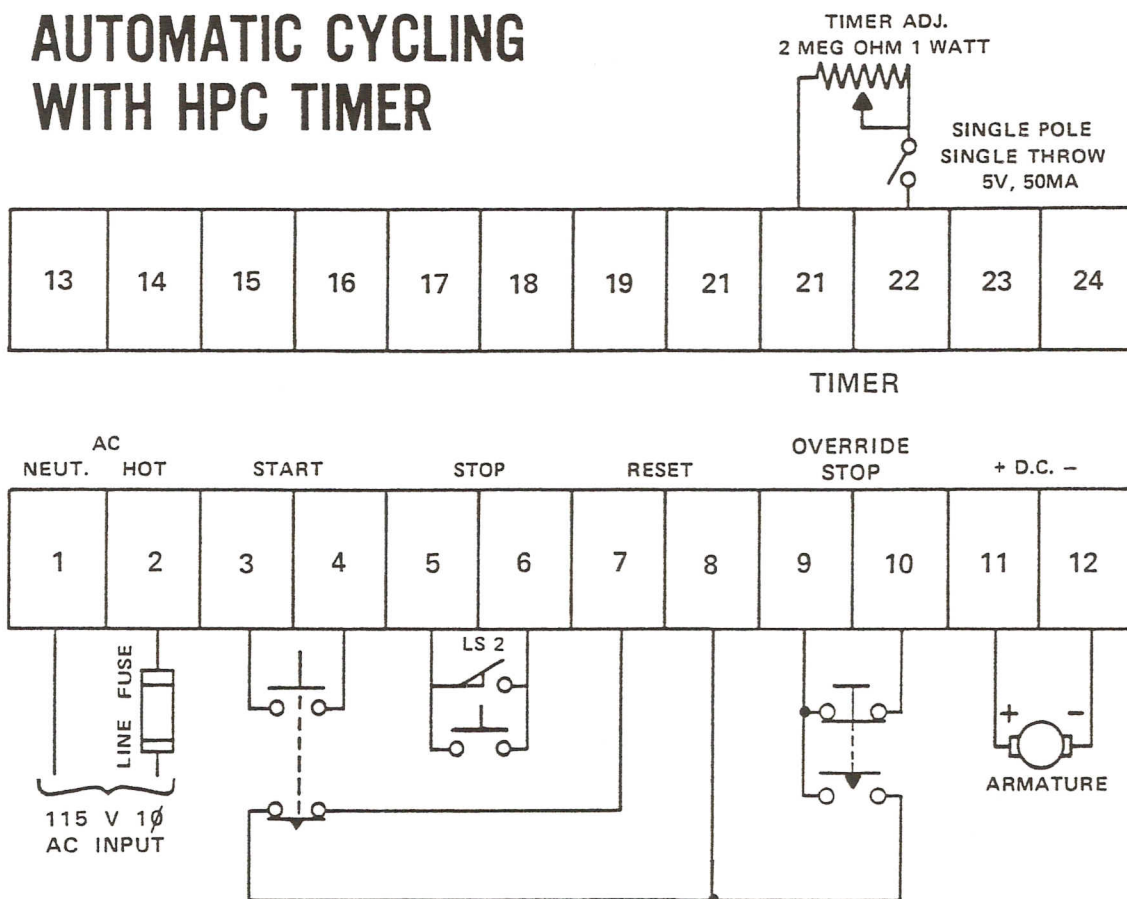
## 2. CYCLE ON DEMAND USING LIMIT SWITCHES



- 1.) LS1 closure starts the control.
- 2.) LS2 closure stops the control.
- 3.) See notes on Page 6.

# CYCLETROL "120" WIRING INFORMATION

## 3. AUTOMATIC CYCLING WITH HPC TIMER



- 1.) Closure across start terminals will begin cycle.
- 2.) Closure of S.P.S.T. Switch in timer circuit will begin cycle.
- 3.) Closure of LS2 will stop motor on position and begin timer operation. ( See Page 4 on Timer Operation.)
- 4.) See notes below.

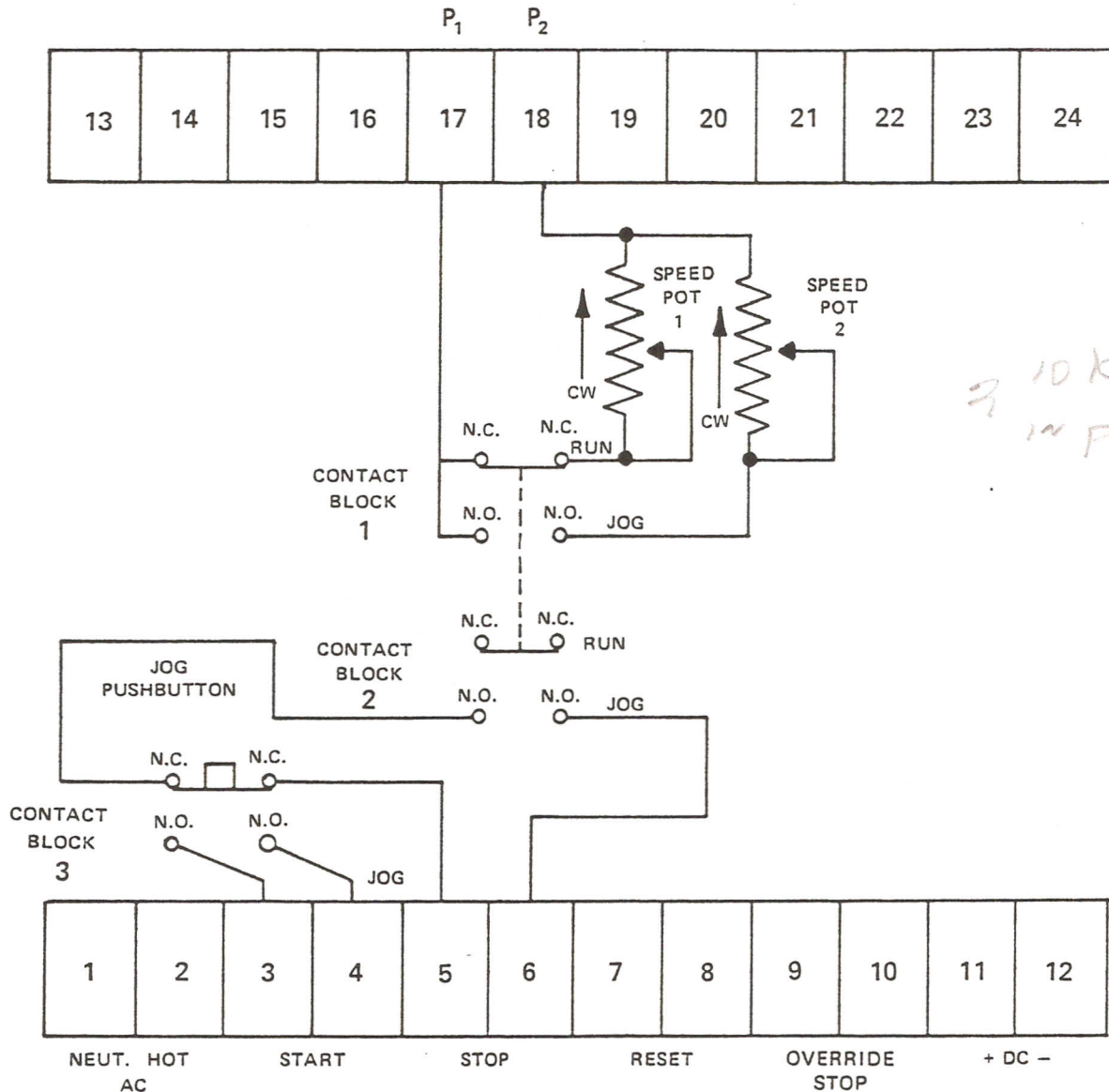
### NOTES

- A. If override stop is not used, make no connections to 7, 8, 9, and 10.
- B. Stop signal requires closure and release. (unless diode D3 is clipped out of circuit. See illustration on Page 16.)
- C. Start signal overrides stop.
- D. Override stop disables all other functions when activated. When used, it must be deactivated and reset to resume operation. (Caution: Use power disconnect to controller for emergency stop conditions where operator or equipment safety is imperative.)
- E. A form "C" contact can be used to signal start and stop by wiring common to terminals 4 or 5 and N.O. to 3 and N.C. to 6. (Diode D3 must be clipped out of circuit. See illustration on Page 16.)

# CYCLETROL "120" WIRING INFORMATION

## RUN/JOG CONNECTIONS

### 4. WITH REMOTE PUSHBUTTON/SELECTOR SWITCH AND JOG SPEED POTENTIOMETER



- 1.) Diode D3 must be clipped out. (See stop on Page 3.)
- 2.) Speed Potentiometers 1 and 2 are 1 Meg Ohm, 1 Watt.
- 3.) Motor is dynamically braked to Stop while Jogging. (See Coast/Brake Switch on Page 3.)
- 4.) Caution: Jog rate should not exceed 1 cycle per second.
- 5.) See notes on Page 6.
- 6.) See Cycletrol "120" Chassis Mount wiring information on Page 17.

## START UP PROCEDURE

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

- 1.) Make sure line disconnect is turned OFF and No Power is supplied to controller.
- 2.) Remount cover upside down as shown in Illustration on Page 16.
- 3.) Recheck to see that all connections are properly made according to Instruction Manual, State, Local and National safety codes.
- 4.) Speed Adjust set "0".
- 5.) Switch OFF Timer. (If Installed)
- 6.) Switch Coast/Brake Selector Switch to Up (Brake) position.
- 7.) Line disconnect turned "ON".
- 8.) Circuit Breaker "ON".
  - a.) Only the Red light (LED) on circuit board should be ON.
- 9.) Momentarily push Run/Stop Switch to the Run position.
  - a.) Green light (LED) on circuit board should be ON and Red should be OFF.
- 10.) Manually trip circuit breaker OFF and then ON again. ( Green (LED) should be OFF and Red (LED) ON)
- 11.) Switch on Timer (if installed) and watch for green LED to light after preset time has elapsed. Momentarily push Run/Stop Switch and release. Red LED should go ON and Green OFF. Watch for timer to restart again. Turn OFF timer and Stop again.
- 12.) Switch Coast/Brake Selector Switch to DOWN (coast) position. Red LED should go OFF and Green LED should be OFF.
- 13.) Check Override Stop (if used) and watch for Red LED to light. (Then reset) Red LED should go OFF. Green LED will come on only if reset and start functions are combined.
- 14.) When using External start and stop functions repeat above procedure to insure proper operation of external switches.
- 15.) Select the desired Coast/Brake switch position for your application results.
- 16.) Initiate start signal and slowly increase speed adjust to maximum speed and back to "0". Check for smooth operation.
- 17.) Set speed to desired setting after running thru range.
- 18.) Initiate stop function and check for correct stopping action.
- 19.) Cycle controller and motor with limit Switches and push buttons to insure all connections are functioning and make necessary adjustments to achieve desired operation.



### Maximum Speed Adjustment (If required)

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

- 1.) Connect motor to fully loaded conditions and allow 30 minute warm up. (Motor will increase in speed as it warms up.)
- 2.) With motor running and front panel speed adjustment turned to 100%, turn maximum speed adjust (located on Printed circuit board) up or down until desired maximum speed is achieved.

### Minimum Speed Adjustment (If required)

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

- 1.) Repeat Step 1 under Maximum Speed Adjustment.
- 2.) With motor running and front panel speed adjustment turned to "0", turn Minimum Speed Adjust (located on printed circuit board) UP or DOWN until desired setting is achieved.

### Switch Reversing Motor

A double pole double throw switch or relay can be used to reverse motor rotation.

Caution: Always be sure motor has come to complete stop before reversing rotation. Motor can be permanently damaged if reversed while rotating.

Note: Ask for H.P.C. "Bi Directional Option" Literature

### 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. suggest if the controller is found to be faulty, to 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.) F.E.T. V.O.M. Simpson 313 or Equivalent or a V.T.V.M. (with greater than 1 meg ohm input impedance set on the 1 VAC scale) and a VOM.
- 2.) Hand tools including insulated screw driver.
- 3.) Good safety practices as line voltage will be present during part of the test.

# TROUBLE SHOOTING

<p><u>Motor Will Not Run</u></p>	<ol style="list-style-type: none"><li>1.) Make sure Circuit Breaker and Line disconnects are turned on.</li><li>2.) Check Line Fuses to see if they are good.</li><li>3.) Make sure override Stop ( if used) is closed and reset.</li><li>4.) Set speed adjust to 50%.</li><li>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")</li><li>6.) Faulty Circuit Board. (See Logic Test on Page 12.)</li></ol>
<p><u>Circuit Breaker Tripping</u></p>	<ol style="list-style-type: none"><li>1.) Improper wiring-recheck wiring for misrouting, shorts, and shorts to ground.</li><li>2.) Diode Bridge failure (See test on Page 13.)</li><li>3.) SCR failure (See test on Page 13.)</li><li>4.) Triac failure (See test on Page 13.)</li><li>5.) Motor Brushes worn or improperly seated.</li><li>6.) Motor load is too heavy. Check for jamb up or excessive load.</li></ol>
<p><u>No Speed Control</u></p>	<ol style="list-style-type: none"><li>1.) If motor goes to full speed with no speed control, this is usually caused by Triac failure.</li><li>2.) Speed adjust Potentiometer defective.</li><li>3.) Minimum speed adjust Potentiometer (located on circuit board) misadjusted. Turn counterclockwise to correct.</li><li>4.) Faulty circuit board ( See logic test on Page 12.)</li></ol>

Motor Will Not Run at 1800 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 115 volts to achieve maximum speed.

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 13.)
- 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.) If this is accompanied by loss of speed control and running at full speed you have Triac Failure.
- 2.) Faulty circuit board. (See test on Page 12.)

Motor Will Not Stay On  
After Start Command

- 1.) Check wiring of Stop functions.
- 2.) Faulty circuit board. (See test on Page 12.)

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



Preparation before Logic Test

- 1.) Turn off line disconnect and remount cover as shown in Illustration on Page 16.
- 2.) Place Brake/Coast switch in Brake Position (UP).
- 3.) Place Speed Pot to zero speed.
- 4.) Remove all connections to terminals 3-4-5-6-7-8-9-10-21+ 22
- 5.) Place Circuit Breaker on control cover in ON position.
- 6.) Turn on line disconnect.

LOGIC TEST

Coast/Brake Switch Red LED is now on move coast/brake switch to down (coast) position, Red LED should go off coast brake circuit is working move switch back to up.

Start Supply a momentary switch closure across terminals 3 + 4, Red LED turns Off and Green LED turns On. Start circuit is working.

Stop Supply a switch closure to terminals 5 + 6 if diode D3 (See Illustration) has been clipped out Red LED turns on and Green turns off. If diode D3 has not been clipped out the control will go into the stop mode as the switch reopens.

Override Stop Supply a continuous switch closure across terminals 7 + 8 and another continuous closure across terminals 9 + 10 and a jumper across terminals 3 + 4 momentarily open switch across 9 + 10 and reclose, Red LED is on move coast/brake switch to down (coast) position Red LED stays on. Override stop is working.

Reset Momentarily open switch across terminals 7 + 8. Green LED turns on Red LED turns off. Reset is working.

Timer Remove all connections from terminals 3-4-7-8-9-10 place jumper across terminals 21 + 22. Supply a very quick momentary closure across terminals 5 + 6 Red LED will come on and then Green LED will come back on in about ½ second. Timer is working.

CAUTION: Be sure power is OFF for the following tests.

---

Triac

Check the Triac by disconnecting leads from Triac to Terminals 13, 16 and 19 and the Triac Lead to the Diode Bridge. Use an OHM Meter set on the R x 100 scale and check the resistance between the leads that were connected to Terminals 13 and 16. Look for Negligible resistance between these leads with both polarity combinations. If resistance is less than 10 K Ohms, Triac or M.O.V. is faulty and both should be replaced. See Parts List Page 14. Use Thermal Grease and be careful not to mechanically stress terminals.

Note: Triac failure is often accompanied by Diode Bridge failure. Therefore, check Diode Bridge before reapplying power.

---

SCR

Remove leads going from SCR to Terminals 20, 23, and Brake Resistor. Perform test (described as Triac Check above) between leads that went to Terminals 23 and Brake Resistor. Replace if necessary. Use Thermal Grease and be careful not to stress terminals. (See Page 14 for Part #)

Note: Brake resistor failure often accompanies SCR failure. Therefore, check Brake Resistor before reapplying power.

---

Brake Resistor

Remove two connections from resistor. Test with Ohm meter on R x 1 scale and look for (4) four Ohms. If open replace with part # P-2004 and use Silicone Thermal Grease.

Note: Resistor failure is often accompanied by SCR failure. Therefore, test SCR before reapplying power.

---

Diode Bridge

Remove all four wires from Bridge. (Make sure to mark wires for reconnection.) Check each adjacent pair of Terminals with Ohm Meter set on R x 1 scale. Look for conduction in one direction and open the other way. If Bridge fails this test, replace it with Part # P-2001 and reinstall new part using Silicone Thermal Grease.

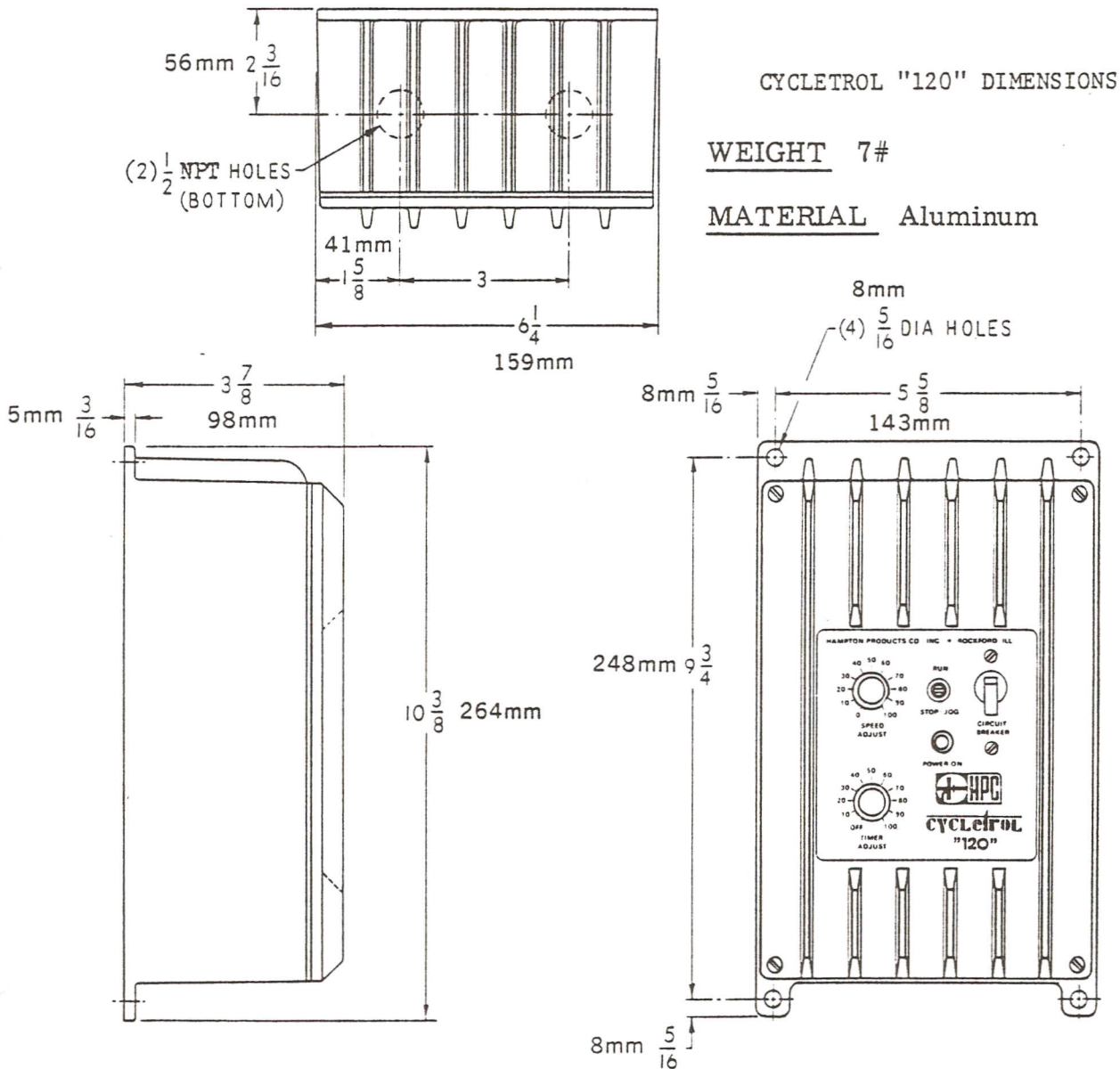
Note: If Bridge is bad be sure to test Triac. Triac failure will usually accompany Bridge failure.

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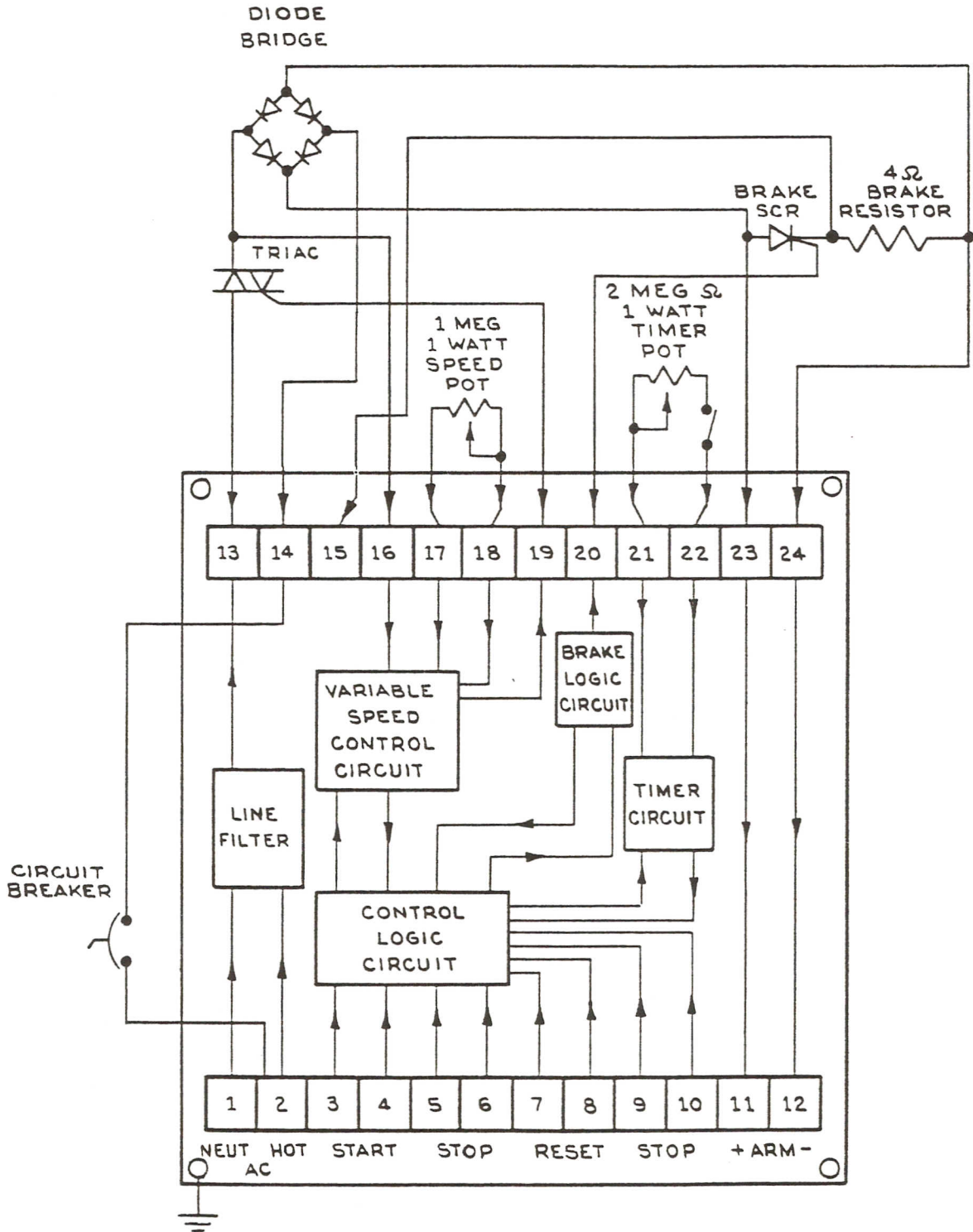
REPLACEMENT PARTS LIST CYCLETROL "120" CONTROLLER

Part Description	Part Number
Full wave diode bridge assembly	(02301)
Triac	(02303)
SCR	(02302)
Brake resistor ( 4 Ohm 100 Watt)	(00926)
Circuit breaker	(02006)
Run/Stop switch	(02211)
Speed adjust potentiometer	(00922)
Circuit Board Assembly	(101100)
Integrated circuit	(00504)





# CYCLETROL "120" FUNCTIONAL DIAGRAM



# CYCLETROL "120" ILLUSTRATION

FULL WAVE DIODE BRIDGE

DYNAMIC BRAKE RESISTOR

DYNAMIC BRAKE SCR

MINIMUM SPEED ADJUST

MAXIMUM SPEED ADJUST

RED LED

GREEN LED

DIODE D3

OPTION SWITCH

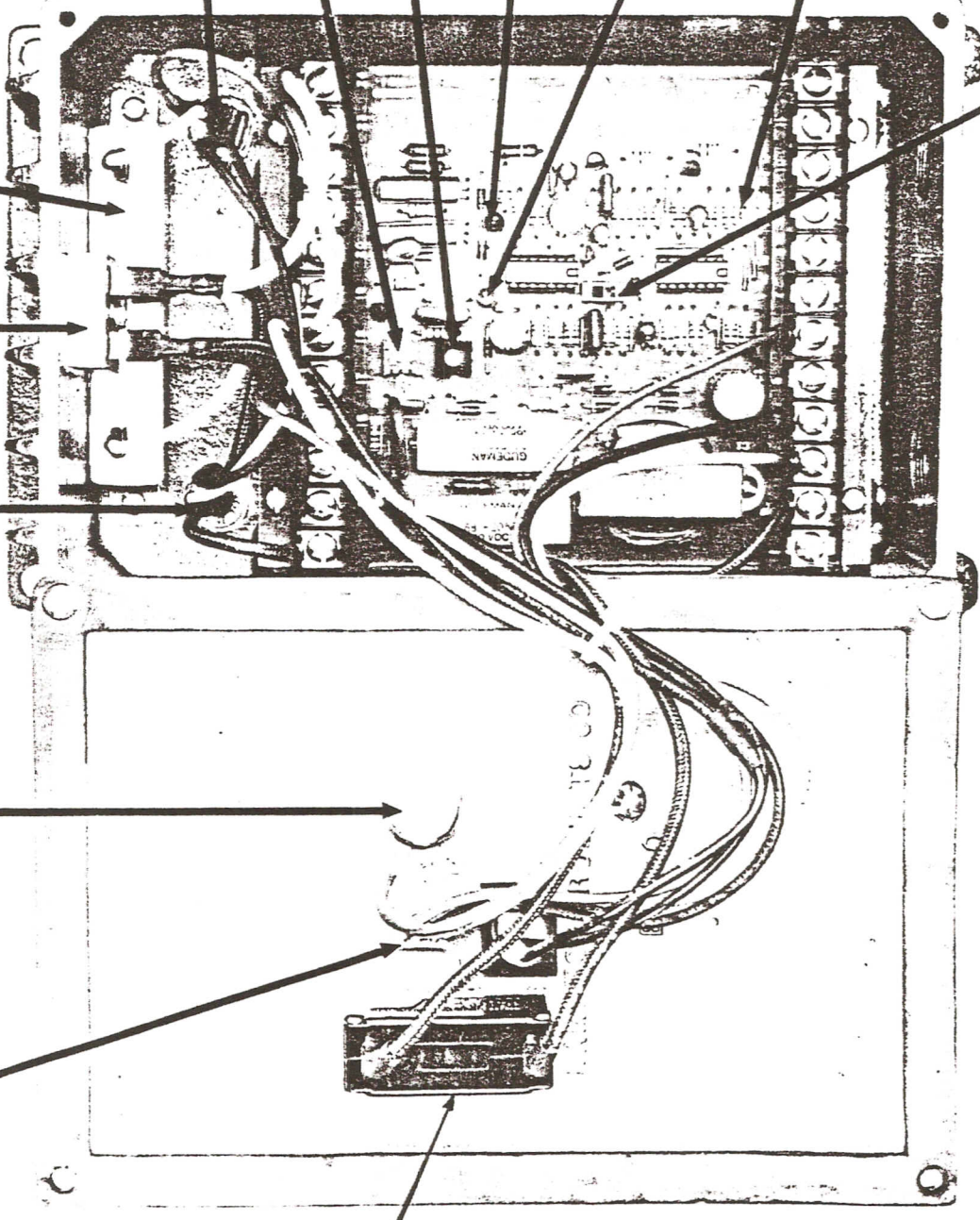
Switch Up — Motor brakes from normal stop signal  
 Switch Down — Motor coasts to stop from normal stop switch. (Override stop will brake motor)

TRIAC

SPEED ADJUST POTENTIOMETER

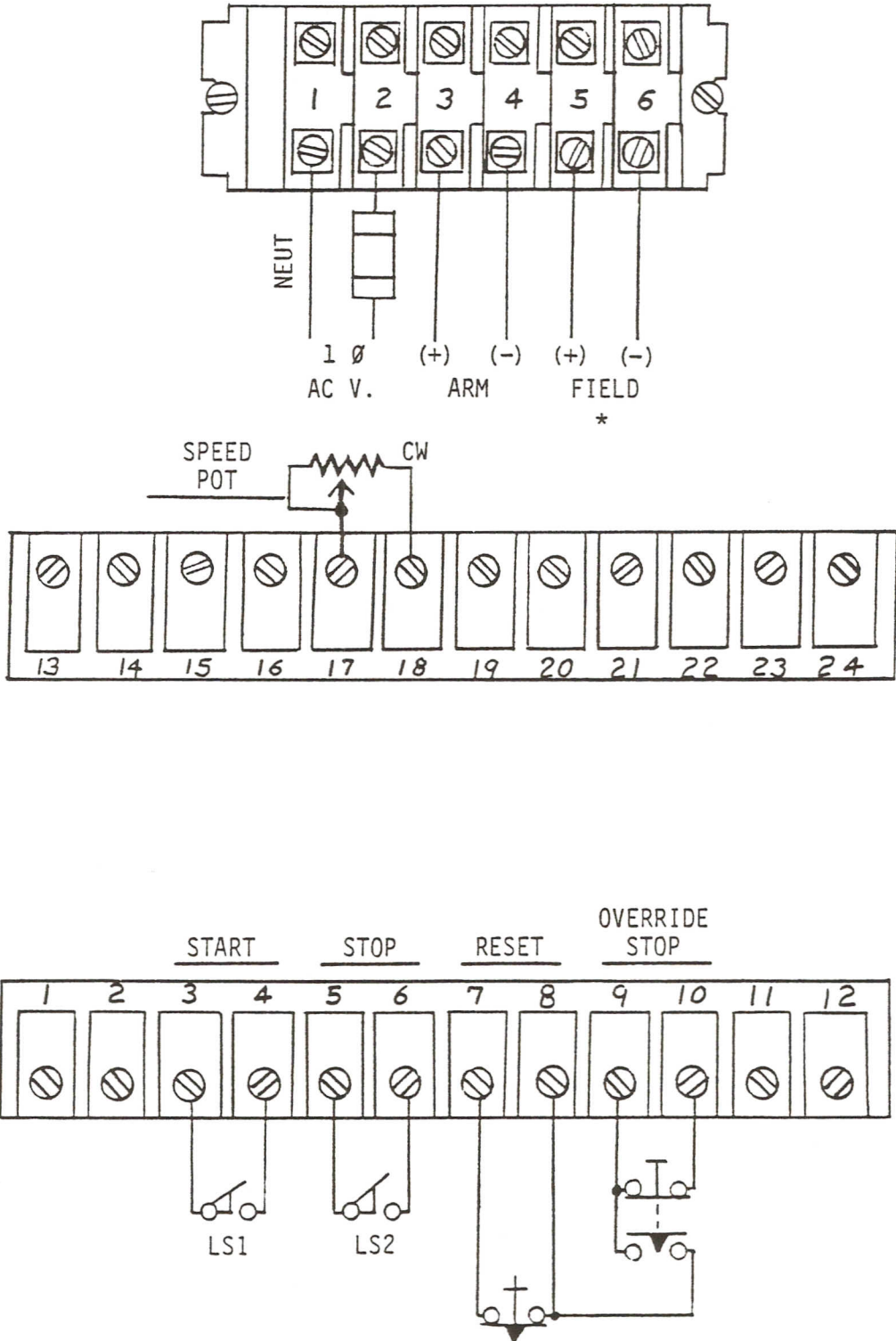
RUN/STOP JOG SWITCH

CIRCUIT BREAKER



# CYCLETROL "120"

## CHASSIS MOUNT WIRING INFORMATION



\*FIELD SUPPLY OPTIONAL



## GUARANTEE

HAMPTON PRODUCTS CO., INC. , is a manufacturer of Electronic Controls for D.C. Motors. The guarantee policy is as follows:

- A.) CONTROLS: We guarantee that H.P.C. controls are free from defective materials and workmanship, and are tested and inspected before leaving the factory to insure that the controls comply with the specifications as stated by H.P.C. The term of this guarantee is for a period of one (1) year from date of the invoice. Any control failing to meet those specifications will be repaired at the Rockford, Illinois factory, free of charge, if the following conditions are met:
- 1.) Buyer notifies HAMPTON PRODUCTS CO., INC. in writing, of the nature of defect or failure and the serial number of the control, within one (1) year of the date of invoice.
  - 2.) HAMPTON PRODUCTS CO., INC. gives Buyer shipping instructions for return of the defective control and Buyer returns it, with shipping charges prepaid, to HAMPTON PRODUCTS CO., INC. at Rockford, Illinois.
  - 3.) HAMPTON PRODUCTS CO., INC. approves of repair of defective controls after investigation at its Rockford factory. The correction of such defects by repair shall constitute the fulfillment of our obligation to the Buyer. We will not be liable for consequential damages, direct or indirect, resulting from defect or delay. Damaged H.P.C. controls resulting from improper installation, handling, storage or operation by the Buyer are specifically excluded from the guarantee. Under no circumstances will H.P.C. honor any invoices, or be held responsible, when Buyer elects to repair or rework any known defect found while still under the guarantee.
- B.) GENERAL: Replacement or repair on our controls no longer covered by the guarantee, will be performed at a nominal cost at our plant, when request is accompanied by a purchase order and shipped prepaid to HAMPTON PRODUCTS CO., INC. Return shipment of any such controls will be made F.O.B. Rockford (no freight allowed).
- C.) SERVICE: Qualified H.P.C. technical personnel are available to perform field service. Charges for these services are made on a "per diem" rate plus transportation and living expenses. Any request for field service must be accompanied by a purchase order.