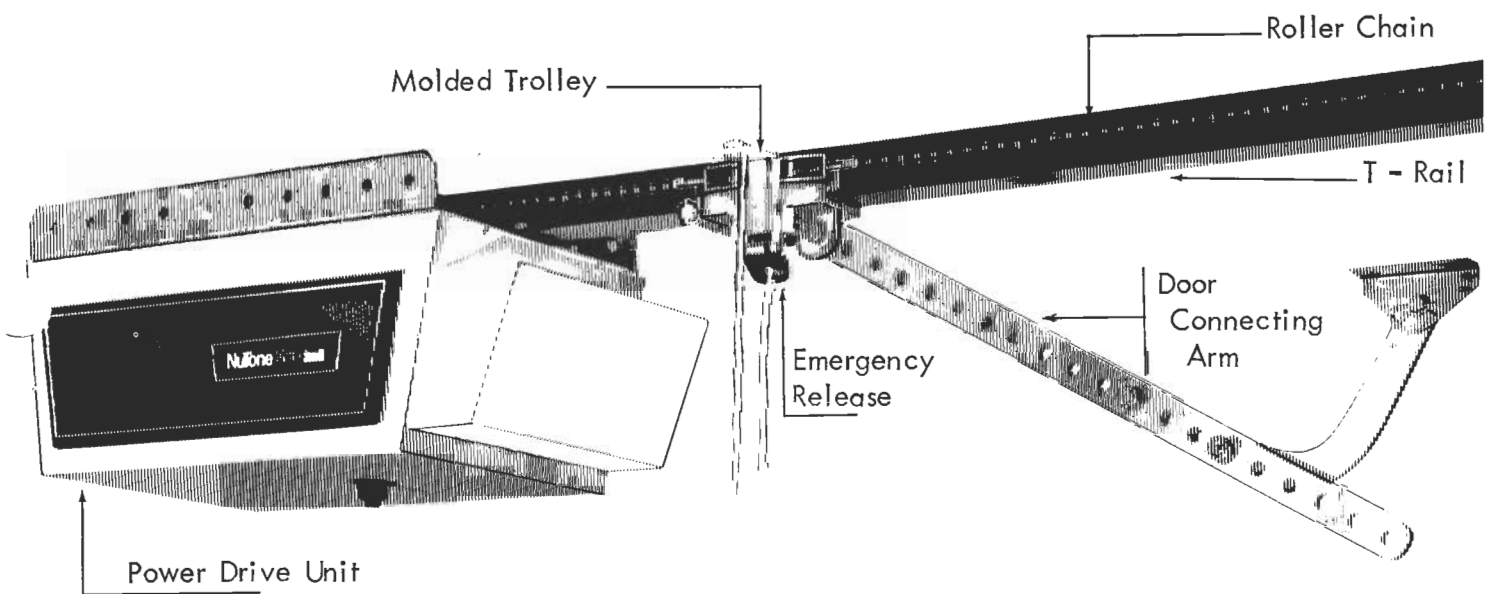
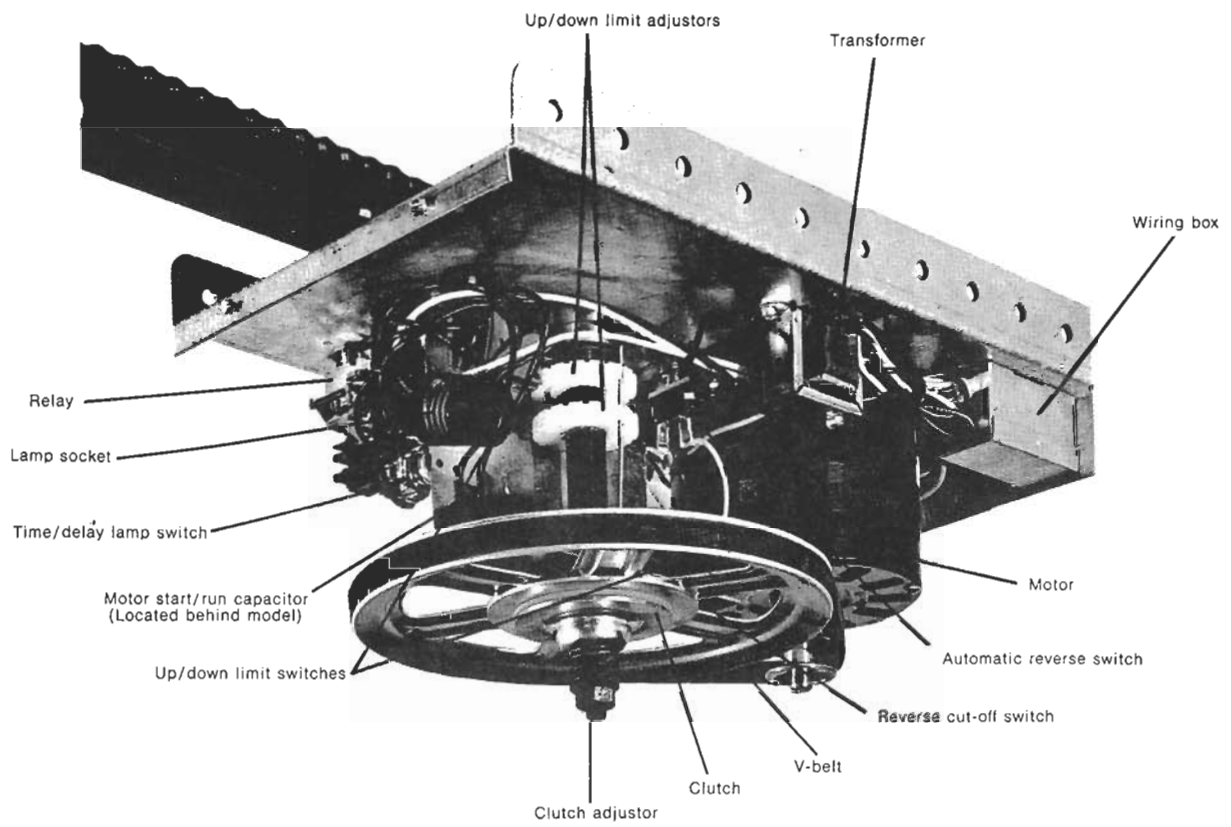


NUTONE SERVICE MANUAL

GARAGE DOOR OPERATOR MODEL C-75

REMOTE RADIO CONTROLS MODEL C-90





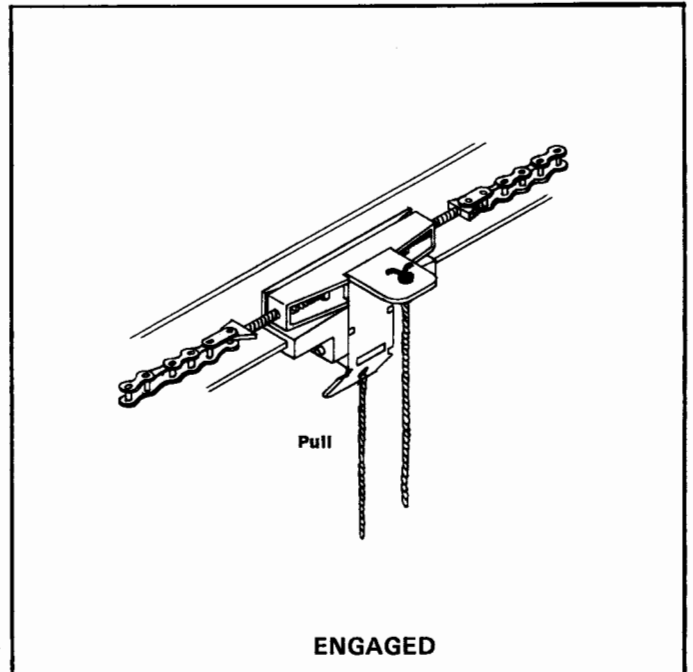
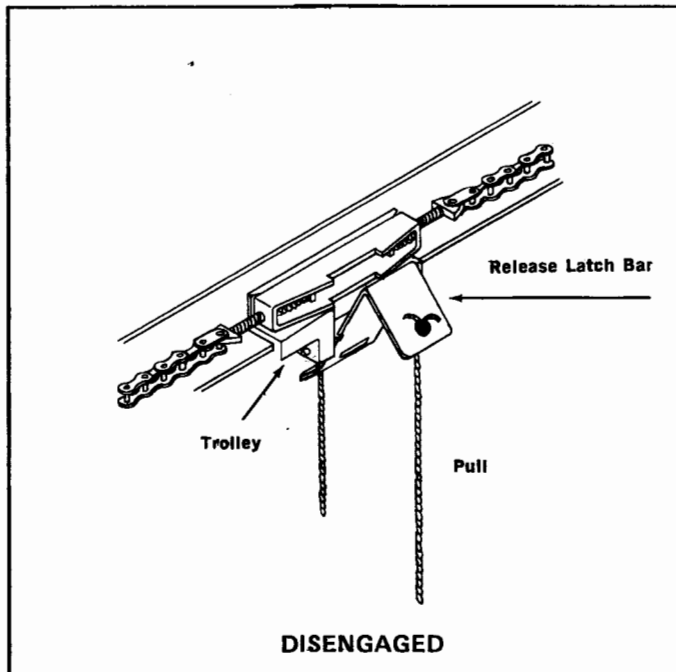
OPERATOR CONTROL ACTION

Press button while closed.	Door will open.
Press button while open.	Door will close.
Press button while closing.	Door will instantly reverse to open.
Press button while opening.	Door will instantly reverse to close.
Door strikes object while closing.	Door will instantly reverse to open.
Door strikes object while opening.	Clutch will slip momentarily and door will stop.
Self-contained courtesy light.	"On" for approximately 1½ minutes after completion of each open or close cycle.
Sequence of door action when the button is pressed repeatedly.	Closing —Reverse to open—Reverse to close—reverse to open—

EMERGENCY MANUAL OPERATION

The operator is equipped with a release to permit manual operation of the door in case of electrical

power failure or in the event the operator should become non-functional.



1. Pull the rope which is attached to the top of the release latch bar. This will disconnect the trolley from the chain and allow manual operation of the door.

2. To re-engage pull the rope attached to the bottom of the release latch bar. Move the trolley—by moving the door— or activate the operator. The chain and trolley will automatically re-engage.

THE FOLLOWING IS A PRELIMINARY TROUBLESHOOTING AND CORRECTION GUIDE.

***Warning — Door counterbalance springs can cause serious injury. Do not attempt adjustment unless you have the proper tools and training.**

SYMPTOM	CHECK THIS ITEM	HOW TO CHECK
Press Wall Push Button — Operator does not run.	120 Volt Power Source.	Plug drill motor, lamp or other electrical device into receptacle used for operator. If test device operates the voltage is O.K.
	Push Button Circuit.	Place momentary jumper across terminals (1) and (2) on the 24 Volt terminal strip, Fig. A. If the operator starts the push button is defective or the wire to the push button is broken.
Door starts down — reverses.	Manual operation of the door*.	Disconnect the trolley from the chain and operate the door manually. Correct any binding, drag or severe out of balance conditions of the door.
	Sensitivity Adjustment.	Turn adjustment toward "increase", Fig. A.
Door starts up and stops before it is completely open.	Manual operation of the door*.	Disconnect the trolley from the chain and operate the door manually. Correct any binding, drag or severe out of balance conditions of the door.
	Clutch Adjustment.	Turn clutch adjustment toward "increase", Fig. A.
Press the wall push-button and the motor starts, but the door does not move or moves erratically.	Manual operation of the door*.	Disconnect the trolley from the chain and operate the door manually. Correct any binding, drag or severe out of balance conditions of the door.
	Loose drive belt.	Remove the cover from the power head. If the belt is loose the motor pulley will slip inside the belt. Tighten the belt by loosening the motor mounting bolts and sliding the motor in the slots.
	Loose motor pulley set screw.	If the motor pulley set screw becomes loose the motor shaft will turn inside the pulley when the motor is running. Tighten the set screw on the flat side of the motor shaft.
	Clutch is slipping.	Turn the clutch nut toward "increase", Fig. A. Turn the nut a partial turn each time and check operation of door and operator.
The door goes down until it touches the floor and then reverses.	Limit switch re-alignment.	Press the wall push button and hold continuously until the door is fully closed and the operator shuts off. If repeated re-alignment is necessary turn the clutch nut toward "increase" Fig. A. Turn the nut a partial turn each time and check operation of door and operator.
Operator actuates from the wall push button, but not from the transmitter.	Transmitter Battery.	Remove the battery from the transmitter case and replace with a new battery. Fig. B —

If the Operator or Radio Controls are still inoperative after the above checks — see the NUTONE WARRANTY for service instruction.
The WARRANTY does not include adjustments or repair to the garage door.

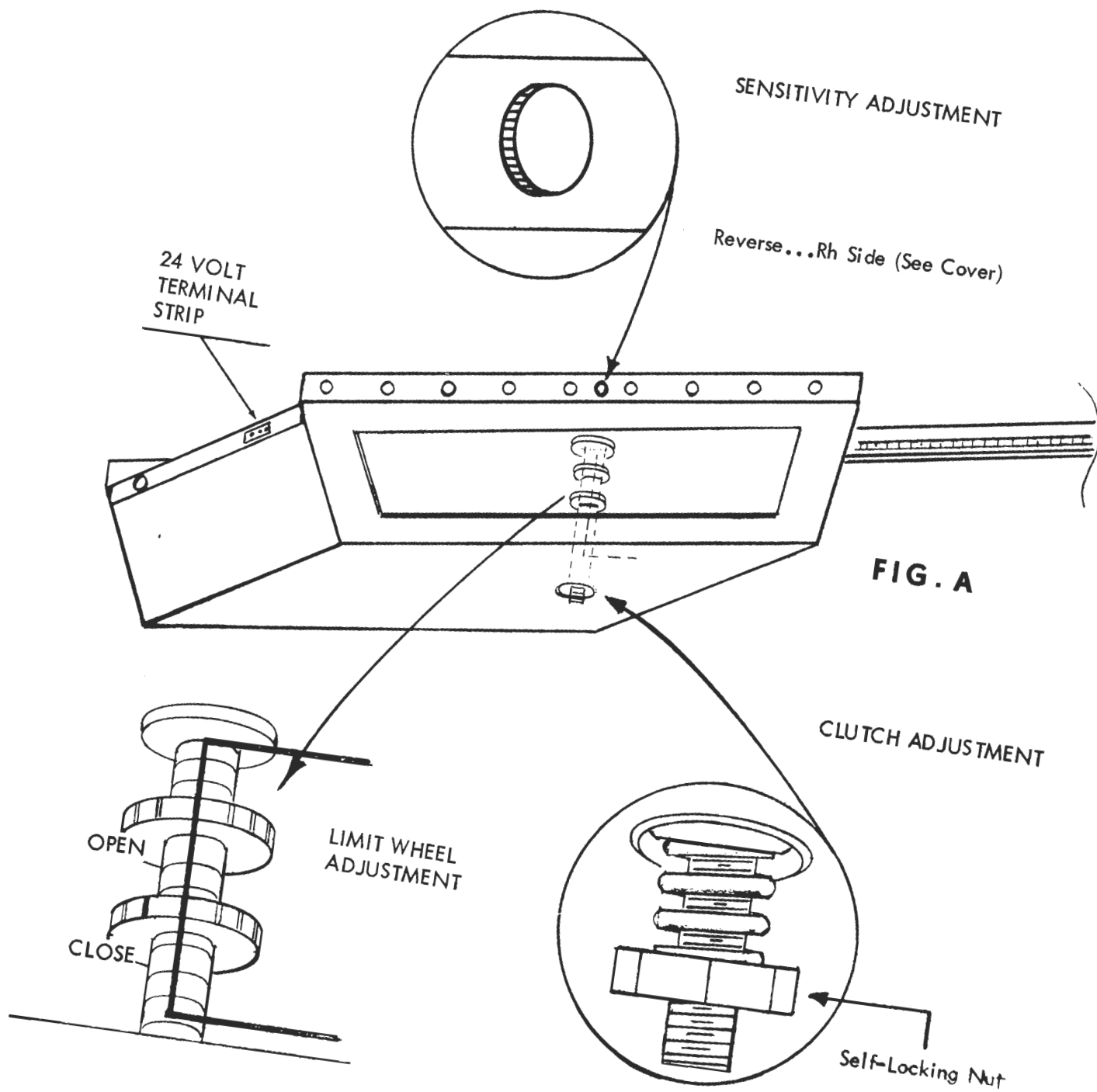


FIG. A

ADJUSTMENTS FOR OPERATION

1. Upon completion of the installation, re-engage the trolley in the chain latch bracket.
2. In the interest of maximum safety, the preliminary sensitivity adjustments are set to apply minimum pressure. In some installations it will be necessary to increase these settings to achieve the initial full open and close cycles. Do not confuse this with limit wheel adjustments which will still need to be made to allow full cycles. See Sensitivity Adjustments —
3. Note the number of inches the door must travel to reach the full open position (measure between the trolley and rear tee-bar clamp). This information will be used later when adjusting the limit wheels — one full turn equals approximately (3) inches of door travel.
4. Remove the cover from the power head to gain access to the limit wheels. (Fig. A).
5. Press the wall pushbutton to start the door down. Hold the button in continuously until the operator shuts off. This is necessary in order to override the reverse circuit.
6. The trolley will strike the preset front tee bar clamp, the clutch will slip, and the operator will shut off. This will automatically set the down limit switch.
7. If the front tee bar clamp has been properly set, the door will be fully closed, with the door arm in a vertical position. Re-adjust the clamp or door arm length if required.
8. While the door is still fully closed, adjust the upper limit wheel the number of turns required to bring the door to full open. Mark the limit wheel to determine full turn. Pull the limit wheel guide spring out of the notch in the limit wheel to permit the wheel to turn.

$$\text{TURNS OF THE WHEEL REQUIRED} = \frac{\text{INCHES OF TRAVEL REQUIRED}}{3}$$

Turn the upper wheel from right to left to increase door travel.

Pull the electrical plug while making adjustments.
9. Press the wall pushbutton to start the door up. If the upper limit wheel is properly set the operator will shut off when the up limit switch actuates.
10. If necessary close the door and re-adjust the upper limit wheel as required.
11. When properly set the trolley will stop against the rear tee bar clamp with the door in the full open position.

NOTE:

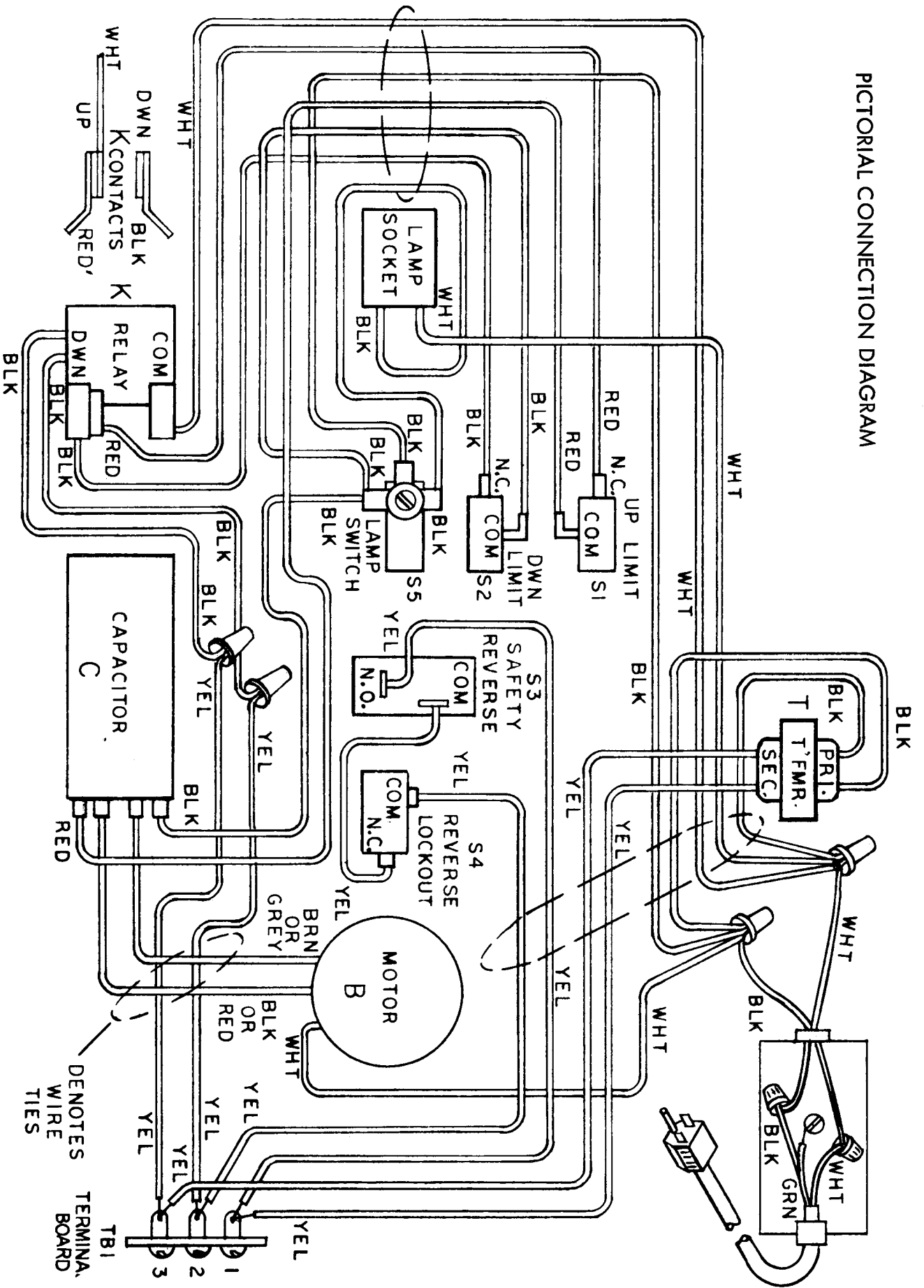
The open and close travel of the door is controlled by internal limit switches. The tee bar clamps serve only to re-align the limit switches to the door travel should the clutch slip in operation.

SENSITIVITY ADJUSTMENT

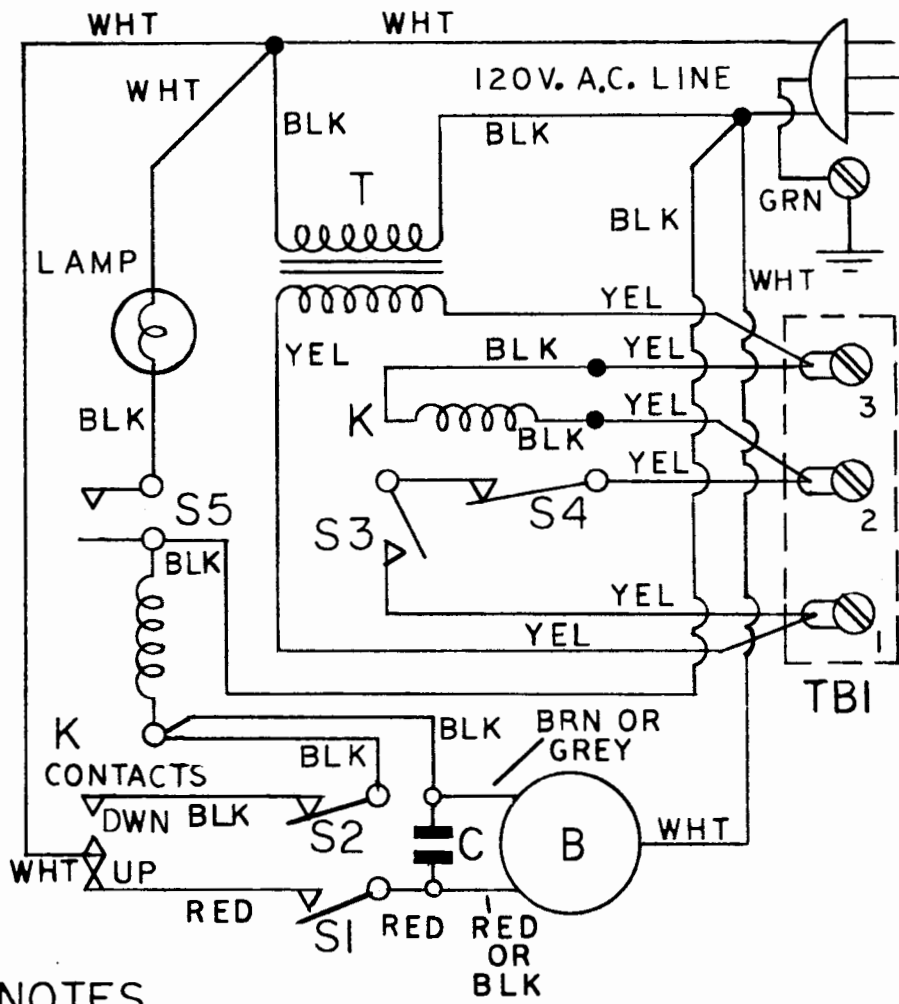
1. The sensitivity adjustments set the level of pressure required to perform the safety functions of the operator.
2. A preliminary factory adjustment has been made, however the final adjustment must be made to correspond with the operating characteristics of each door. "Increase" or "decrease" as required.
3. There are adjustments required. They are the CLUTCH and the AUTOMATIC REVERSE sensitivity. Make the clutch adjustment first.
4. The CLUTCH adjustment is made by turning the large hexagon shaped nut exposed on the bottom of the power head. (Fig. A).
5. Set for the pressure that will allow the operator to completely open and close the door.
6. If the setting is too light (minimum) the operator will start to run and the clutch will slip. The result will be that the door will not move or move erratically until the operator shuts off with the door partially open or closed.
7. To correct turn the nut in the direction marked increase. Marking on cover.
8. The AUTOMATIC REVERSE adjustment is made by turning the hexagon shaped nut exposed on the right side of the operator frame. (Fig. A).
9. Set for the minimum pressure that will allow the operator to fully close the door without reversing. Marking on cover.
10. To check the sensitivity setting catch the door by hand as it is closing. It should reverse with minimum force applied. Should the clutch slip before the door reverses it will be necessary to either increase the clutch pressure setting or decrease the reverse pressure setting.
11. The AUTOMATIC REVERSE circuit is automatically cut out when the door is approximately (2") above the floor. Beyond this point the clutch will slip and allow the limit wheel to actuate the down limit switch.
12. If the clutch should slip in the open cycle on the next close cycle the door will reverse and the operator will shut off with the door partially open. In this case re-alignment of the door to the down limit switch will be necessary. To achieve re-alignment it will be necessary to hold the wall push button in continuously until the door is fully closed and the operator shuts off. This will override the reversing function which would normally happen when the trolley strikes the front tee bar clamp.

THE ELECTRICAL CIRCUITS

PICTORIAL CONNECTION DIAGRAM



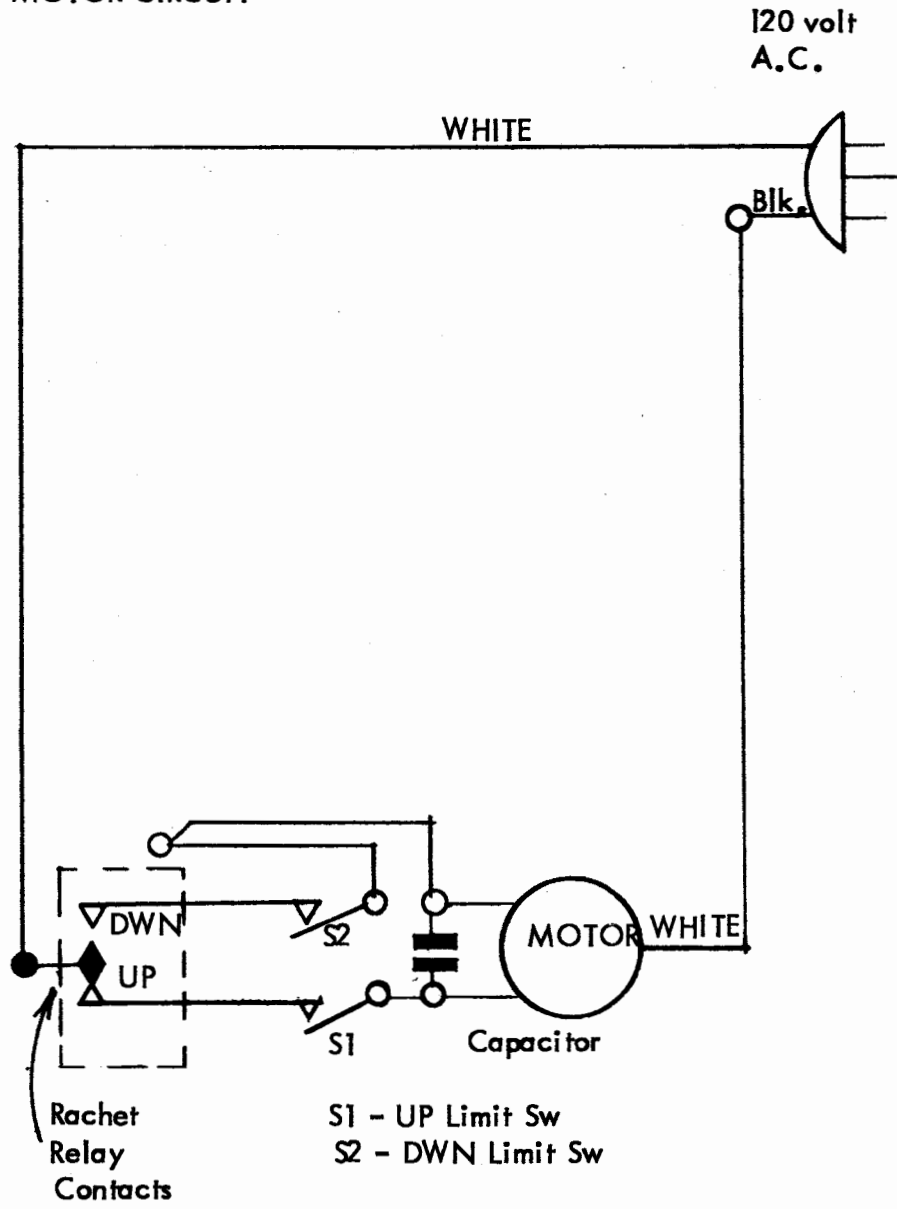
COMPLETE ELECTRICAL SCHEMATIC



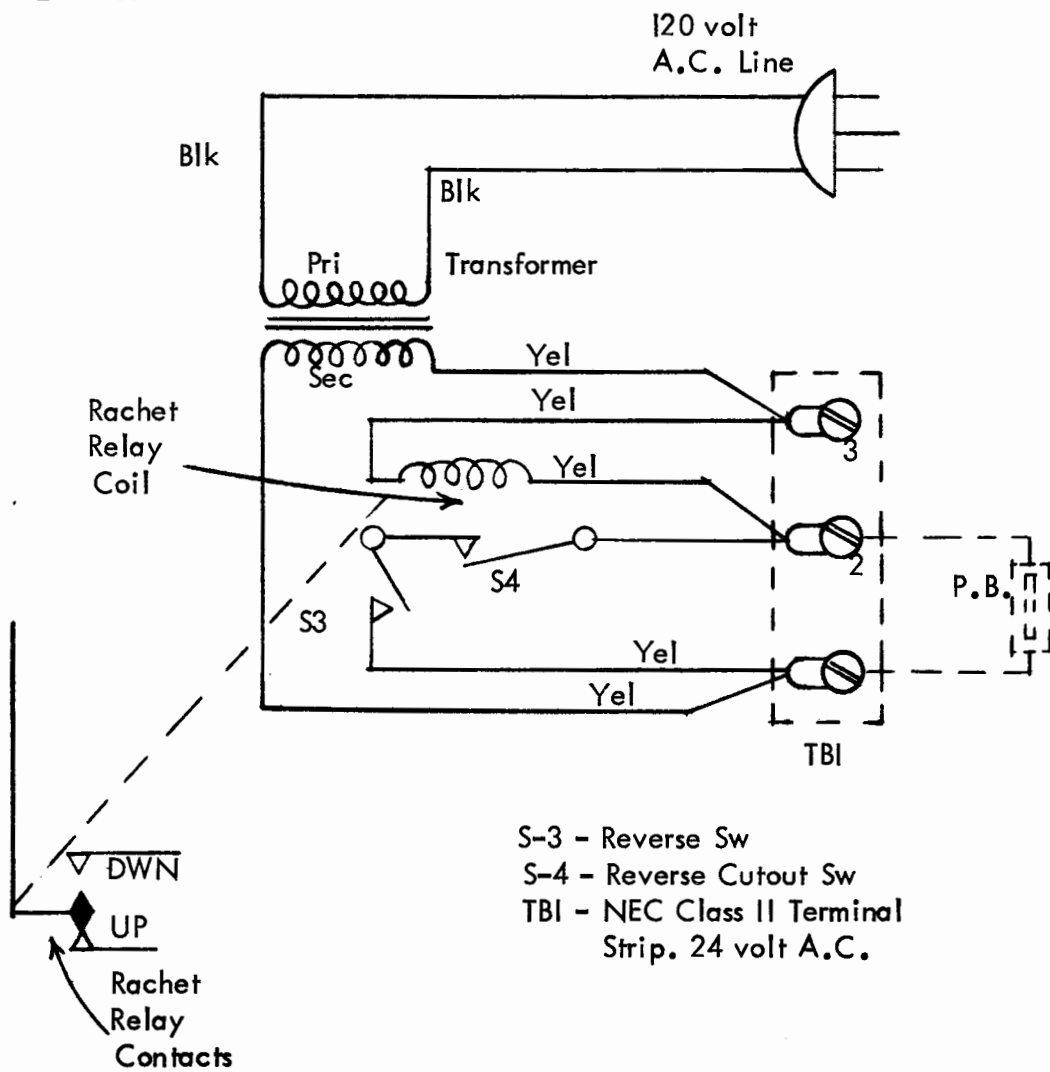
NOTES

1. ● DENOTES END CONNECTORS
2. CIRCUIT SHOWN IN UP CONDITION

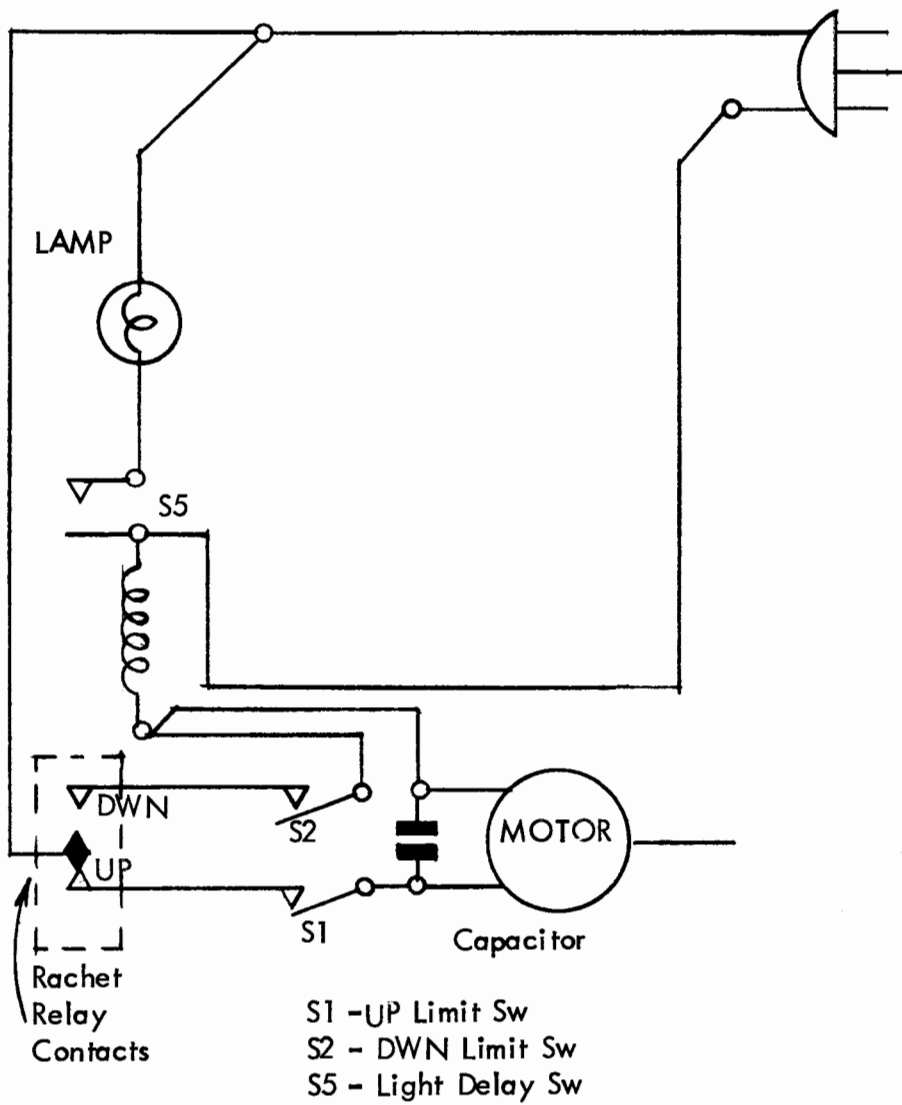
MOTOR CIRCUIT



24 Volt Control Circuit with Automatic Reverse and Reverse Lockout Switches



Automatic Timed Delay Light Circuit



THE ELECTRICAL COMPONENTS

MOTOR

1. TYPE: Permanent Split Capacitor -- 900
RPM -- 6 Pole -- 1/3 HP
120 Volt -

2. AMPS:

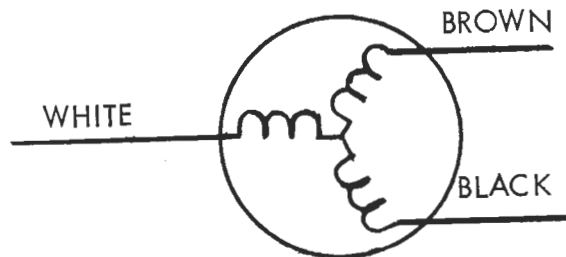
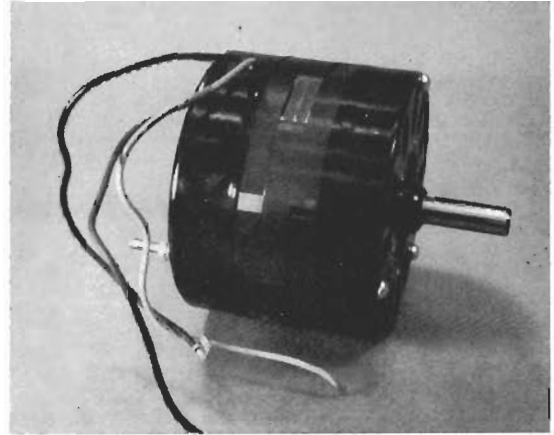
1/3 HP 4.50

3. THERMAL PROTECTION: Integral part of
the motor winding -- Automatic Cutout -

Automatic Reset. Allow 10-15 minutes for cooling.

4. BEARINGS: Sleeve type bearings -- Permanent Lubrication.

5. DUTY CYCLE: Intermittant



PROBLEMS-SYMPTOMS-SOLUTIONS

1. WINDINGS -- The windings of the motor can become "open" or "shorted".

The indication of either of these conditions could be:

Reduced Torque or Power

Not self starting

Fast heat build up

Completely inoperative

The "open" condition can be determined by using the ohmmeter to check for continuity

2. THERMAL PROTECTOR -- The thermal protector is a mechanical device which is buried in the windings of the motor. It can fail or "open" which will make the motor completely inoperative.

If this condition exists an ohmmeter connected from the motor common lead to either of the two winding leads would show an open circuit.

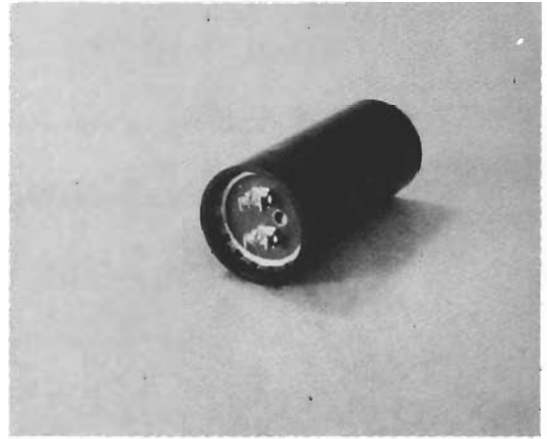
3. BEARINGS -- When the bearings fail the armature will begin to drag on the laminations causing fast heat build up and reducing power because of additional friction. This condition can become so severe that the motor can be turned by hand, but will lock up when energized electrically.

4. CAPACITOR -- See Capacitor Section. Page 29

NO FIELD REPAIR IS ADVISABLE---REPLACE WITH A NEW MOTOR

CAPACITOR

1. TYPE--Motor Starting
2. VALUE-- 1/3 HP 53-64 MFD 330 VAC



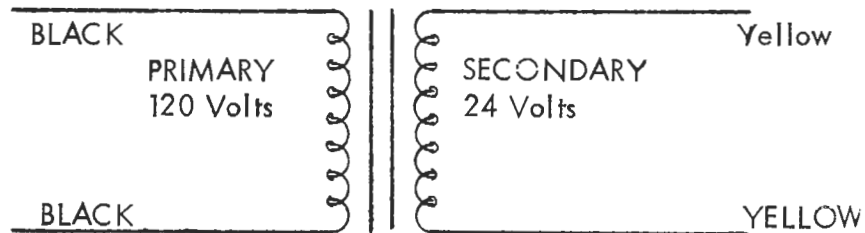
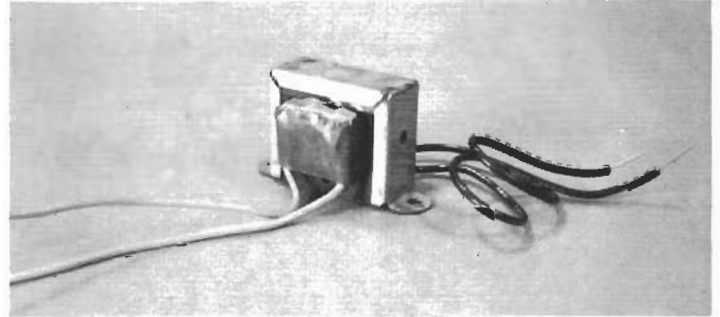
PROBLEMS-SYMPTOMS-SOLUTIONS

1. OPEN---The motor will not be self starting.
2. SHORTED--The motor will not be self starting.
3. CHANGED VALUE---The motor could run but with reduced power.
4. BLOW OUT---This is caused by overheating. It is indicated by a residue around the relief port.

NO FIELD REPAIR IS ADVISED---REPLACE WITH A NEW CAPACITOR

TRANSFORMER

1. TYPE---120/24 Volt
2. RATING---24 Volt @ .5 amp



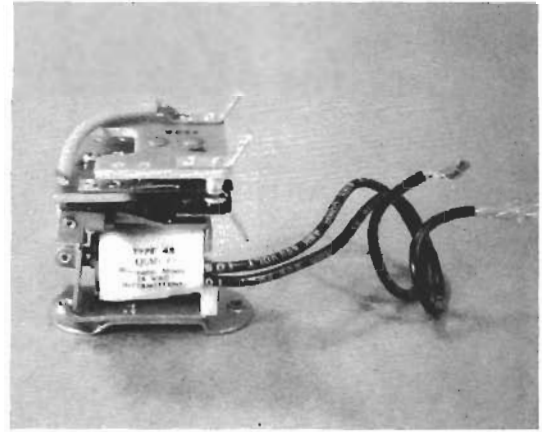
PROBLEMS-SYMPTOMS-SOLUTIONS

1. PRIMARY---The primary can and will open due to voltage surges. An ohmmeter check for continuity will indicate this defect.
2. SECONDARY---The secondary can and will open due to prolonged short circuit conditions in the control circuit. An ohmmeter check for continuity will indicate this defect. An open secondary is usually the result of a defect in some other component of the control circuit. In this event check the control circuit out thoroughly.
3. HUM---This is usually due to loose laminations or winding core. It is not harmful to the transformer function.

NO FIELD REPAIR IS ADVISED---REPLACE WITH NEW TRANSFORMER

RELAY

1. TYPE---SPDT Electro-Mechanical Latching
2. VALUE---24 Volt Coil---25 Amp Contact Rating.



PROBLEMS-SYMPTOMS-SOLUTIONS

1. CONTACTS---The contact pressure is not always equal in both directions. This will result in pitting, burning, and finally an open contact. If this condition exists the contacts can be cleaned and adjusted to make the relay operative.
2. MECHANICAL LATCH---The pivot points of the mechanical linkage will sometimes require lubrication to keep the relay from sticking and binding. A light oil or tuner cleaner will work well.
3. OPEN COIL---An open coil is very rare, but does happen. The relay would be inoperative electrically. An ohmmeter check for continuity would point out this defect. If the coil is open no repair is advised--Replace with a new relay.
4. NOISE---Some latching relays will buzz when operated electrically. This is usually more pronounced in one direction than the other. It is not harmful to the relay operation.

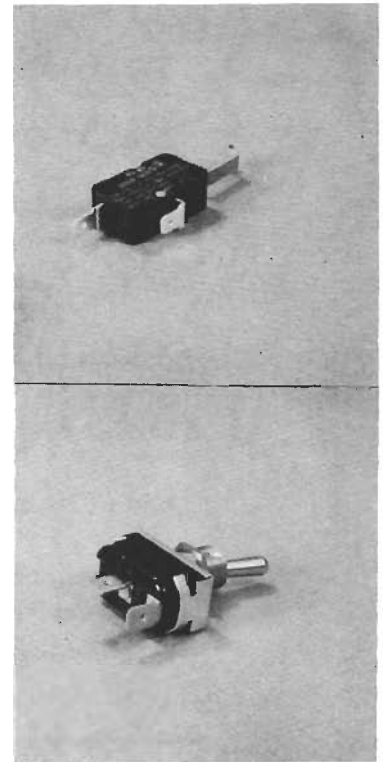
LIMIT SWITCH

1. TYPE---Lever Actuated---SPST

Used as open and close limit and reverse cutout switch.

Toggle Actuated---SPST

Spring return to off---used as reverse switch.



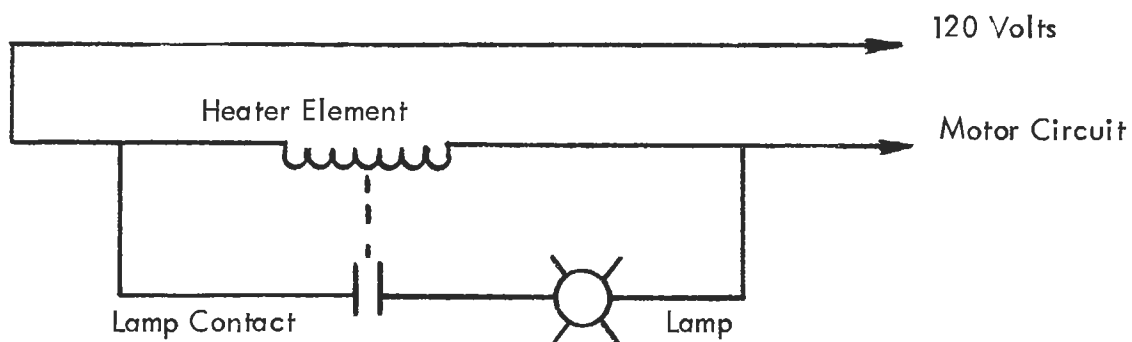
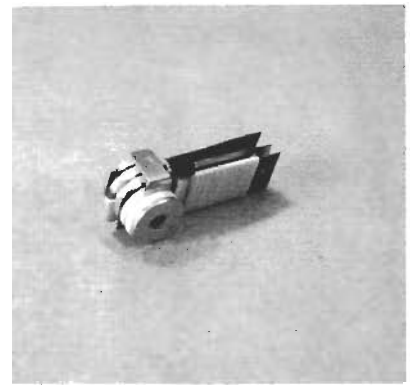
PROBLEMS-SYMPTOMS-SOLUTIONS

1. CONTACTS---The Contacts in a micro switch can stick in either the open or closed position. An ohmmeter check for continuity will indicate if the switch is defective.

NO FIELD REPAIR IS ADVISED---REPLACE WITH NEW SWITCH

LIGHT DELAY SWITCH

1. TYPE---Bi-metallic blade---thermally activated.
2. OPERATION AND FUNCTION---When the motor starts to run the current starts to flow thru the heating coil of the switch. As the bi-metallic blade is heated it begins to deflect until it touches a second contact, closing the circuit to the light. When the motor shuts off at the end of its cycle, the current stops flowing thru heating element and the bi-metallic blade starts to cool. As it cools it returns to its original position, opening the contact in the light circuit, turning the light off.



PROBLEMS-SYMPTOMS-SOLUTIONS

1. NO LIGHT---Burned out heating coil---An ohmmeter check for continuity will indicate an open coil.
Blades too far apart when cold---If the blades are too far apart when cold they will not have time to be heated sufficiently to close before the motor completes its cycle.
2. LIGHT STAYS ON CONTINUOUSLY---Blade spacing too close when cold---
If the blades are still in contact after the delay has cooled the light will stay on.

3. LIGHT ON TIME TOO SHORT---The blade spacing is too far apart when cold---With this condition the blades will make contact just as the motor shuts off. Only a slight amount of cooling time is required for the blades to separate and turn the light off.

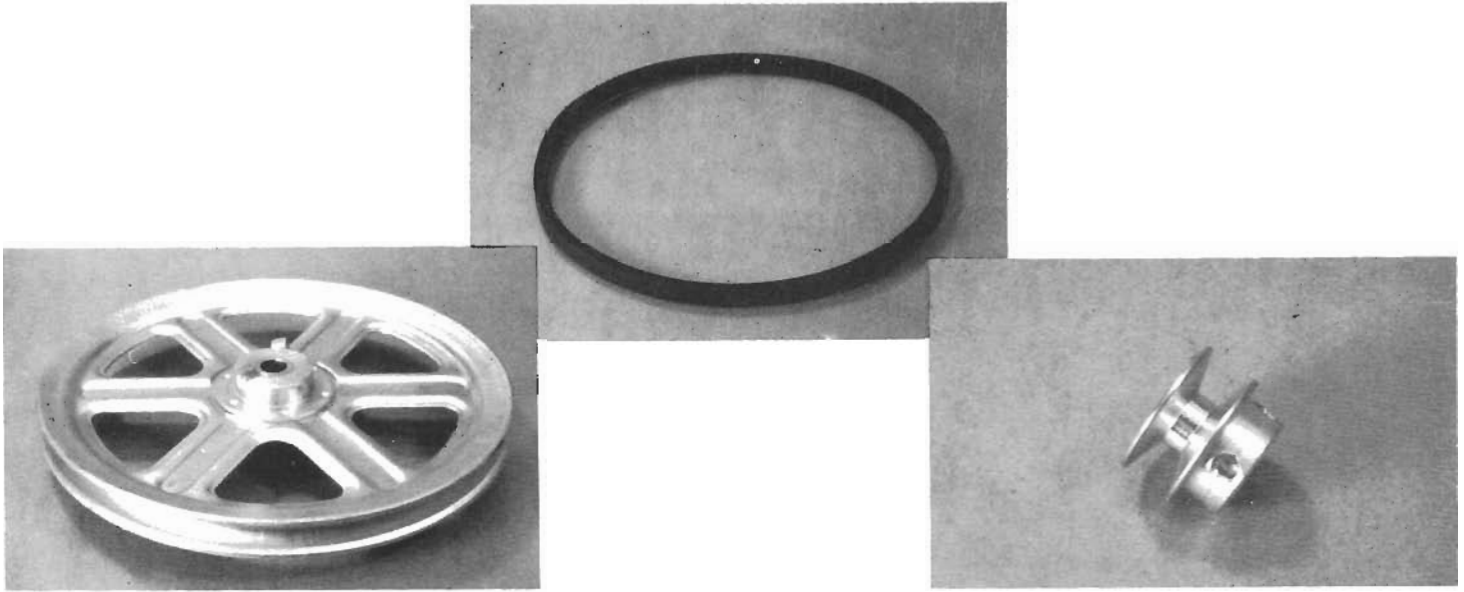
If the blade spacing is incorrect it can be altered using the adjustment screw provided for this purpose. It is mounted on a third blade above the light contacts. Turning the screw will move the center blade nearer or further from the first blade. Correct contact spacing should be approximately .010 inch when cold.

There is no repair for a burned out heating element. Replace the complete light delay switch.

THE MECHANICAL COMPONENTS

BELT AND PULLEY REDUCTION

1. SIZE---6 to 1 reduction
2. BELT---1/2" wide x 32" long---standard size, available locally for replacement.
3. OPERATION AND FUNCTION---Reduces the motor RPM from 900 RPM to 150 RPM, necessary to achieve a good door operating speed of approximately 7" per second.



PROBLEMS-SYMPTOMS-SOLUTIONS

1. The reduction within itself is not a source of problems. However, because of the size of the reduction and the close shaft centerline distance, there is minimal belt contact area on the smaller motor pulley. This could lead to the motor pulley slipping on the belt. If this happens the motor will run but will not lift the door. If the belt slips for any length of time the heat build up, due to the friction, would probably damage the belt to the point it would have to be replaced.

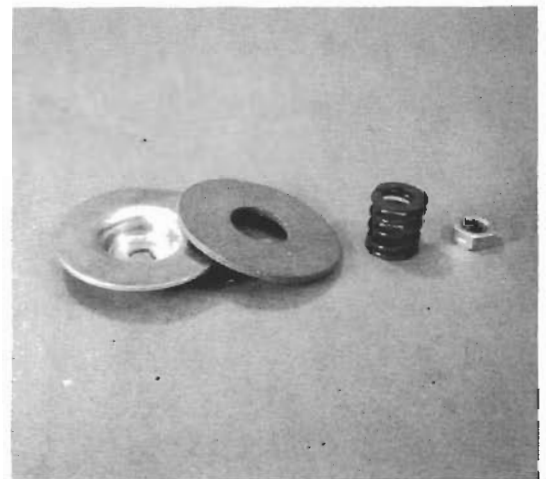
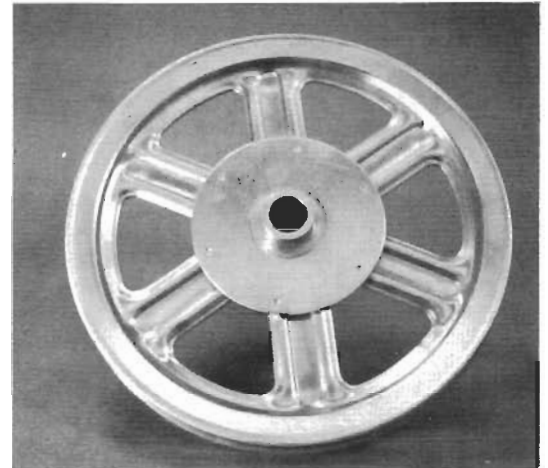
Provisions are made to tighten the belt by moving the motor, in slots provided in the operator base. This should be done if necessary to prevent slippage.

2. The set screw in the motor pulley could become loose and allow the motor shaft to turn inside the pulley. If this should happen the motor would run, but would not lift the door. Tightening the set screw on the flat side of the motor shaft will correct this problem.

CLUTCH

1. TYPE--Three piece-Adjustable-Spring loaded.
2. FUNCTION AND OPERATION--One side of the clutch disc is permanently attached to the 9" pulley, which is in turn driven by the motor. The second side is keyed to the drive shaft which in turn drives the roller chain which raises and lowers the door. Should the door hit an obstruction and prohibit the drive shaft from turning, the motor would continue to turn by slipping the clutch. The fiber disc between the metal clutch plates provides the necessary friction and cushioning required for proper operation.

The adjusting nut and spring provide a convenient and dependable means of adjusting the pressure required to permit the clutch to slip.



PROBLEMS-SYMPOMS-SOLUTIONS

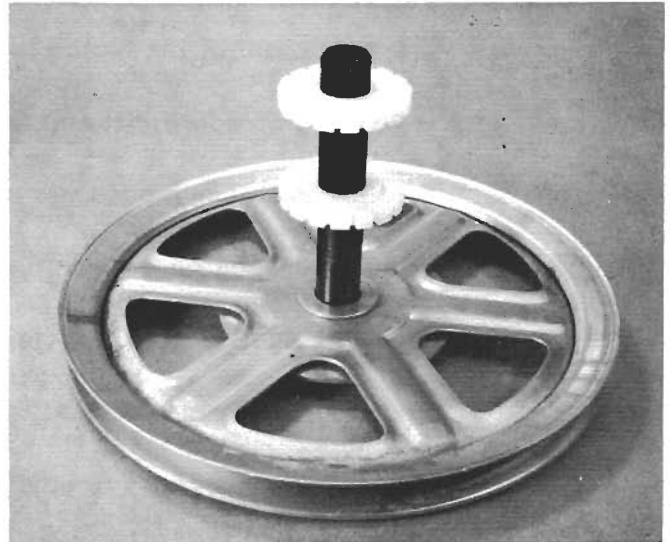
1. The clutch is not required to slip in normal operation. Its purpose is to slip, and allow the operator to shut off, should an obstruction be encountered in the normal path of the door. Due to the very limited usage, none of the components of the clutch should ever require replacement due to wearing out.

2. The adjustment of the clutch is important. If the initial adjustment is correct, no additional adjustments should be necessary unless the door becomes unbalanced and more power is required for operation. In this event the clutch would slip, and the door would not move or move erratically. The first step in the correction of this problem is to correct the door condition so that it can be operated manually.
3. If it becomes necessary to adjust the clutch, the clutch adjusting nut should be turned a partial turn and the operation of the door checked. This is to prevent over tightening the clutch to the point it would lock up and stall the motor rather than slipping as intended.
4. The clutch is designed into the operator to perform very definite, severe duty, and safety functions. Overtightening the clutch will take away the capability of the operator to perform these functions.

LIMIT SHAFT AND LIMIT WHEELS

1. DESCRIPTION---The limit shaft is threaded and pressed into the hub of the 9" diameter pulley, so that it turns as the pulley turns.

The limit wheels are a molded nylon material. They are threaded internally to match the threads on the limit shaft.



They operate on the shaft much as a nut on a bolt.

2. OPERATION AND FUNCTION---In operation the 9" diameter pulley and attached limit switch shaft turn as the door is in motion. The limit wheels are prevented from turning by a guide wire retained in notches in the wheel. The result is that the wheels move up and down the limit shaft as the door opens and closes. When properly adjusted each wheel will actuate a micro switch at the proper time to shut the operator off when the door is fully open and fully closed. See Adjustments For Operation - Page 6

PROBLEMS-SYMPTOMS-SOLUTIONS

1. If the initial adjustment of the limit wheel is correct, no future adjustment should be necessary.
2. In the event an adjustment should be required the wheel can be released to turn by pulling the guide wire out of the notch in the wheel. In the installed position the top wheel controls the up travel of the door, and the bottom wheel controls the down travel of the door.

3. Turn the appropriate wheel toward the switch it actuates to reduce door travel, and away from the switch to increase door travel.
4. When properly adjusted the door will stop, when the limit switch actuates, with the door in the full open and the full closed position. The trolley should be against or very close to the clamps on the tee bar. See Tee-Bar Clamps - Page 43

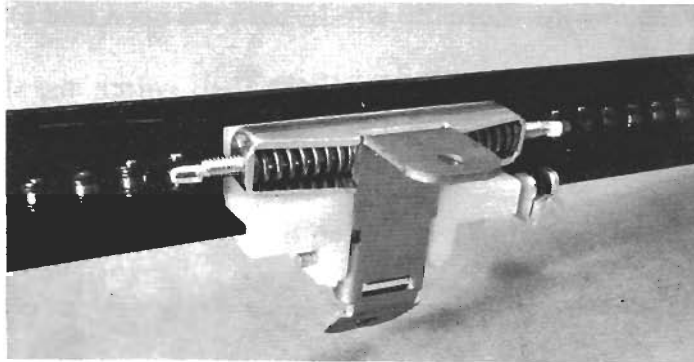
TEE-BAR CLAMPS

1. DESCRIPTION--The Tee-Bar clamps are formed metal parts which are held together with a 1/4" diameter bolt. When the bolt is tightened the clamps are held securely in position on the Tee-Bar. One is mounted toward the front of the track--in front of the trolley--and one toward the rear of the track--behind the trolley.
2. OPERATION & FUNCTIONS--The Tee-Bar clamps are adjusted on the track at the time of the operation installation. They are placed at the location on the track that the trolley stops when the door is full open and full closed.

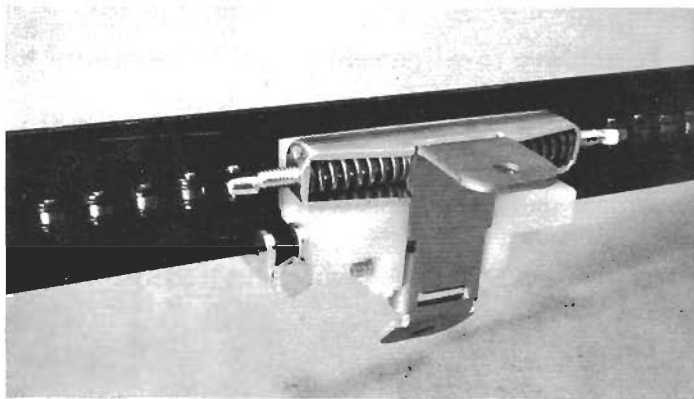
The design of the operation allows the clutch to slip--should the door become obstructed--while the limit wheels continue to move on the limit shaft, until the appropriate limit switch is actuated, which shuts the operator off. At this point the door would be partly open or closed--as the case may be--while the limit wheel has completed its travel. The limit switches would in fact be out of alignment with the door.

On the next cycle the trolley would move along the Tee-Bar until it came against the Tee-Bar clamp--either front or rear--at which

point it would stop. The clutch would slip again allowing the limit wheels to continue to move on the limit shaft until the appropriate limit switch is actuated. The limit switches are now re-aligned to the door.



Front T-Bar Clamp in position



Rear T-Bar Clamp in position

PROBLEMS - SYMPTONS - SOLUTIONS

1. The clamps on the track should not be moved at any time after the limit wheel adjustment is final.
2. Moving either of the clamps in a direction that would bring them closer together would require the clutch to slip in both the open and close cycle to allow the limit wheels to actuate the limit switch and shut the operator off.
3. Moving either of the clamps in a direction that would make them farther apart would cause the door to remain partially open at any time after the limit wheels were re-aligned to the new clamp position. The distance the door remains open would be approximately equal to the distance the clamps were moved.
4. If the clutch should slip in the open cycle on the next close cycle the door will reverse and the operator will shut off with the door partially open. To achieve re-alignment it will be necessary to hold the wall push button in continuously until the door is fully closed and the operator shuts off. This will override the reversing function which would normally happen when the trolley strikes the front tee bar clamp.

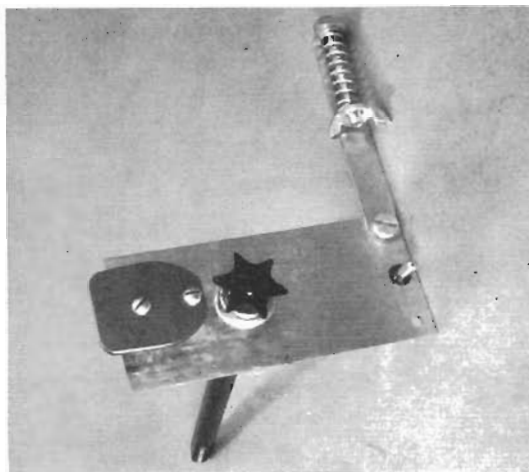
ACTUATOR PLATE & SENSITIVITY ADJUSTMENTS

1. DESCRIPTION---The plate, along with the attached slide is used to actuate the reversing safety switch.
2. OPERATION AND FUNCTION---The slide is mounted on the actuator plate so that the drive chain is deflected from a straight line as it passes by the slide. The plate is mounted so that it can pivot around the drive shaft. It extends back of the drive shaft to where the actuator of a toggle switch passes thru a hole in the plate.

In normal operation the plate is held in a neutral position by adjustable spring tension.

As the chain comes under a higher than normal load, it wants to pull into a straight line around the actuator slide. This causes the actuator plate to move or pivot around the drive shaft. This movement is reflected to the back of the plate where the toggle switch actuator is positioned.

When the force from the drive chain tension is great enough to overcome the pre-adjusted spring pressure (SENSITIVITY ADJUSTMENT) and the plate movement is far enough the toggle switch will actuate.



Instant Reverse
With Sensitivity Adjustments

The toggle switch is in the 24 volt control circuit. When it is actuated, it momentarily closes the control circuit, causing the relay to transfer its contacts, calling for the motor to change direction. The result is that the door instantly reverses and returns to the open position.

PROBLEMS-SYMP TOMS-SOLUTIONS

If the initial sensitivity adjustments are correct---See SENSITIVITY ADJUSTMENTS ----- no future adjustments should be necessary, unless the door should become harder to operate and more force required from the operator.

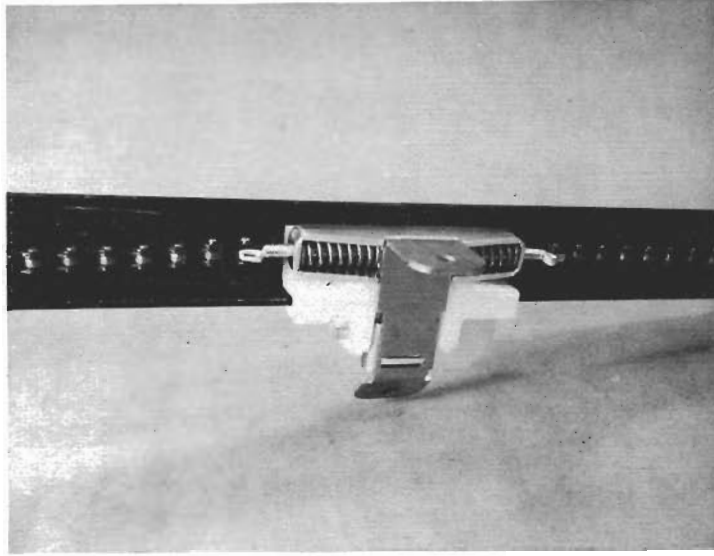
A door that stops either partially open, or reverses repeatably, would be an indication that the sensitivity adjustment may be incorrect.

Before making new adjustments disconnect the door from the operator--by pulling the release rope on the trolley--and operate the door manually.

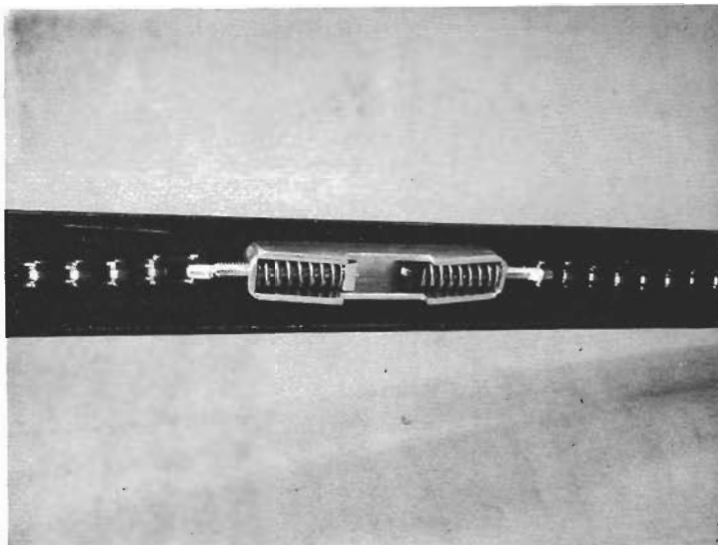
Correct any binding, drag or severe out of balance conditions of the door. If it is necessary to make adjustments follow the SENSITIVITY

ADJUSTMENTS Page 6 .

TROLLEY & CHAIN LATCHING MECHANISM



CHAIN TENSION ADJUSTMENT



REMOTE RADIO CONTROLS
MODEL C-90

RADIO CONTROLS GENERAL DESCRIPTION

The Radio Controls consist of a portable battery-powered transmitter and a companion receiver. This combination, operating as a Low Power Communication Device in the 26.97 - 27.27 MHz band, provides for the remote actuation of electrical apparatus at a normal distance of approximately 30 meters or 100 feet.

Manually pressing the transmitter button causes a coded radio signal to be sent to the receiver. A set of relay contacts in the receiver will close when the proper signal is received and this relay closure is used to activate the door operator motor relay circuit.

Operation of the Radio Control is limited to a particular transmitter and its correspondingly coded receiver. Both units are coded by the use of a specific radio frequency carrier, a specific audio frequency sub-carrier modulation, thereby preventing operation from radio signals not having the proper three codes.

RECEIVER SPECIFICATION

The Model C-90R Receiver is a compact, all solid state, super-hetrodyne remote control receiver responding only to a particular RF carrier, sub-carrier and sub-carrier modulation combination. A crystal controlled converter is used and the receiver response to a particular RF carrier is selected by plug-in crystals. The receiver intermediate frequency (IF) is 455 KHz and the local oscillator frequency is below the signal frequency. The audio frequency sub-carrier response of the receiver is continuously tunable in the 7 - 10 KHz range; the sub-carrier modulation response is fixed (not tunable) at 90 Hz.

The Receiver requires a 50 - 60 Hz alternating current power source with a nominal voltage of 115 volts, although proper operation will be obtained throughout the range from 90 volts to 140 volts. The power consumption of the Receiver is approximately 4 watts.

Upon receipt of a proper signal, the Receiver will close a set of relay contacts. These contacts, which are Form A (SPST-NO), are rated at 24VAC 1AMP.

The Receiver requires an external antenna. This should be either copper or aluminum wire, having a length up to 6 feet long, and may be positioned either horizontally or vertically.

The Receiver will function throughout the ambient temperature range from -25°C to $+65^{\circ}\text{C}$ (-13°F to $+149^{\circ}\text{F}$).

TRANSMITTER SPECIFICATION

The Model C-90T Transmitter is a portable battery-powered unit, which, upon actuation, emits a modulated radio frequency in the 26.97 - 27.27 MHz band. Selection of the specific RF carrier frequency is by plug-in crystal. The audio frequency sub-carrier is continuously tunable from 7 to 10 KHz. The sub-carrier modulation, is factory-adjusted to 90 Hz. The battery may be replaced without disassembling the transmitter case.

Transmitter power is furnished by a single standard 9 volt dry cell battery, N.E.D.A. type 1604.

The Transmitter will function throughout the ambient temperature range from -25°C to $+65^{\circ}\text{C}$ (-13°F to $+149^{\circ}\text{F}$).

The Transmitter is completely self-contained and may be operated either hand-held or mounted on any non-metallic surface.

FREQUENCY CHANNELS

Each Transmitter and its companion Receiver will be factory-adjusted to one combination of the following channels:

<u>RF Carrier</u>	<u>AF Sub-carrier</u>	<u>Sub-carrier Mod.</u>
26.995 MHz (A)	7 KHz	90Hz
27.045 MHz (B)	8 KHz	
27.095 MHz (C)	9 KHz	
27.145 MHz (E)	10 KHz	
27.195 MHz (F)		
27.255 MHz (G)		

For identification purposes, both the Transmitter and the Receiver are marked with a one letter - one digit code indicating the RF carrier frequency and the AF sub-carrier frequency to which the unit is factory adjusted. The letter indicates the RF carrier frequency in accordance with the above table, the digit indicates the AF sub-carrier frequency in KHz. For example, the designation "C9" indicates that the unit is set for 27.095 MHz and 9 KHz.

FIELD SERVICE INFORMATION

OPERATING DISTANCE

The Radio Controls are manufactured under a license issued by the Department of Communication. This license requires that the Radio Controls operate in the 27 MHz frequency band. Several other services also manufacture equipment operating in this band. The result is that there is sometimes interference caused by the concentration of emission at 27 MHz. This condition, however, should not cause complete failure of operation. The result will be short operating range which could vary from day to day.

TRANSMITTER

We have found through experience that the typical complaints of erratic operation or failure to function are basically related to a defective battery. The voltage for the transmitter should not be less than 8 volts DC, checked when the transmitter is transmitting.

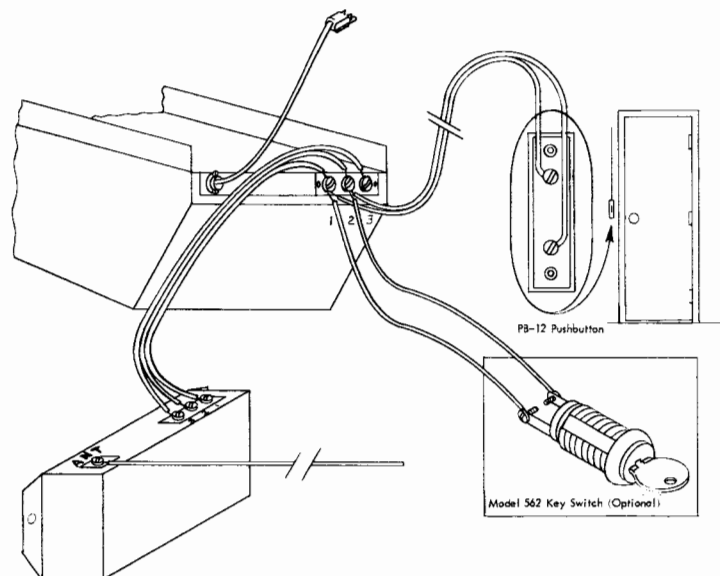
RECEIVER AND TRANSMITTER TUNING

No tuning is normally required for the receiver or transmitter, all adjustments are sealed to protect against shock or tampering.

ANTENNA INSTALLATION

The performance of the receiver may be improved by relocation of the 6 ft. antenna. Position the wire in the clear and away from metallic objects. Due to absorption and reflection of radio waves, a change in position of the antenna will very often show better results.

RADIO RECEIVER CONNECTIONS



Connect the (3) conductor wire (furnished with the radio controls) from the terminal strip on the receiver to the terminal strip on the operator. Connect terminals 1 to 1 — 2 to 2 — 3 to 3.



**CANADIAN
NUTONE GUARANTEE**

READ CAREFULLY — DO NOT DISCARD

Guarantee & Service Policy: NuTone Garage Door Operator and Remote Radio Controls are designed for residential use and have been carefully tested and inspected at the factory and are guaranteed to be free of material and workmanship defects for one year from original date of installation.

The motor in the operator is guaranteed for five years. This Guarantee does not include operator light bulbs — or transmitter batteries.

Our guarantee is void in cases of abuse, misuse, abnormal usage, faulty installation, improper maintenance — or any repairs attempted by persons other than an authorized NuTone Service Representative.

During the guarantee period — NuTone will replace — or repair — at our option — free of charge, any defective parts of the electric operator (including radio controls) — which must be returned prepaid, to our factory — at the following address: NuTone Electrical Mfg. Co. of Canada Ltd., 2 St. Lawrence Ave., Toronto, Ontario, Canada, Att: Parts Department.

Include a note as to the exact nature of difficulty being experienced — and name of installer and original date of installation.

There will be charges for services rendered — after the guarantee has expired.

NuTone's liability under this guarantee is limited to repair or replacement of any parts when it determines that they do not conform to these warranties.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED FOR MERCHANTABILITY OR FITNESS, AND THERE ARE NO OBLIGATIONS OR LIABILITIES ON THE PART OF NUTONE FOR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT.



NuTone Housing Products

Scovill

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