

SERVICE MANUAL

NUTONE MODEL CA-75 120VAC, 60 HZ. GARAGE DOOR OPERATOR



NuTone Housing Products

Scovill

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OPERATIONAL CHECKOUT

DOOR IS CLOSED; TO OPEN DOOR

ACTION	OPERATION	DESCRIPTION
1. Press inside Wall Push-button (NuTone Model PB-12); or, activate optional Outside Key Switch (NuTone Model 562); or, turn on remote-control Radio Transmitter	Door opens Light is turned on	Door should be raised (opened) until its bottom is even with the header, at which time its trolley should hit the rubber bumper at the rear T bar clamp. When door stops, the 9" pulley and limit-shaft should continue to turn for ½ rotation while the clutch slips until the Open-Limit Wheel activates (opens) the Open-Limit Switch and the motor stops. The door should be opened in approximately 12 seconds. The light should come on about 2 seconds after the operator is turned on, and should remain on for approximately 1½ minutes after the door is fully opened and the motor has stopped.
	Door starts to open, but hits an obstruction and its upward movement is stopped. (Light comes on as in above)	When door's travel is stopped, the 9" pulley and limit shaft will continue to rotate with the clutch slipping until the Open Limit Wheel activates (opens) the Open Limit Switch and motor stops. Light should be turned off approximately 1½ minutes after the motor is turned off.

IF, WHILE THE DOOR IS BEING OPENED, THE INSIDE PUSHBUTTON; OUTSIDE KEY SWITCH; OR RADIO TRANSMITTER IS ACTIVATED, THE DOOR WILL REVERSE AND GO DOWN TO FULL CLOSE.

IF, WHILE THE DOOR IS BEING CLOSED, THE INSIDE PUSHBUTTON; OUTSIDE KEY SWITCH; OR RADIO TRANSMITTER IS ACTIVATED, THE DOOR WILL REVERSE AND GO UP TO FULL OPEN.

DOOR IS OPEN; TO CLOSE DOOR

ACTION	OPERATION	DESCRIPTION
1. Press inside Wall Push-button (NuTone Model PB-12); or, activate optional Outside Key Switch (NuTone Model 562); or, turn on remote-control Radio Transmitter	Door closes Light is turned on	Door should be lowered until it is completely closed—flat against the floor, at which time its trolley should hit the rubber bumper at the front T bar clamp. NOTE: The Close Limit Wheel should activate (open) the Anti-Reverse Switch when the bottom of the door is approximately 2 inches above the floor. When door stops, the 9" pulley and limit shaft should continue to turn for 1/2 rotation while the clutch slips until the Close-Limit Wheel activates (opens) the Close-Limit Switch and the motor stops. The door should be fully closed in approximately 12 seconds. The light should come on about 2 seconds after the operator is turned on, and should remain on for approximately 1½ minutes after the door is fully closed and the motor has been turned off.
	Door starts to close, but hits an obstruction, it stops and reverses motion and opens completely as in (1.) above. (Light comes on as in above)	When the door hits an obstruction while closing, the roller chain continues its travel and applies pressure to the reverse plate assembly and activates (closes) the Safety Reverse Switch—applying power to the one-kick latching relay which will reverse phasing to the motor windings. Motor will reverse direction and raise (open) the door as in (1) under TO OPEN DOOR above. NOTE: If the door is within 2 inches of the floor, and the Anti-Reverse Switch is open, the door will not reverse direction. This prevents the door inadvertently opening when its travel is interrupted by packed snow or ice; brooms; etc., and when it reaches its normal fully closed position. When the door is fully opened, the motor will be turned off, and the light will remain on for approximately 1½ minutes.

NOTE: The door's opening and closing should be checked, in turn, with the inside Wall Pushbutton, and when used, with the Outside Key Switch and/or the Remote Radio Controls.

The motor is designed for intermittent use. If run continuously for opening and closing the door, its temperature will rise and its built-in overload protector will open — preventing the motor from running. The motor will remain off until it has cooled and the Automatic Overload Reset has closed.

ALLOW 8-10 MINUTES FOR OVERLOAD TO AUTOMATICALLY RESET BEFORE STARTING OPERATOR.

Suggest that an 8 to 10 second delay between operations (raising and lowering the door) be observed.

FOR COMPLETE DESCRIPTION OF ELECTRICAL AND MECHANICAL OPERATION, SEE PAGES 7-14.

OPERATING ADJUSTMENTS

PERIODIC ADJUSTMENTS OF OPERATOR SENSITIVITIES AND DOOR HARDWARE MAY BE NECESSARY TO INSURE PROPER AND SAFE OPERATION.

<p>1. Front T Bar Clamp/Rubber Bumper and Close Limit Switch (See para. (2.4) and (2.4.1) page 8; and Figure 2 page 6)</p>	<p>With door open, disengage trolley from latch assembly: Pull trolley rope down and lock toward rear as shown in Figure 1A. Manually close door: The front rubber bumper/T bar clamp must be in front of the trolley. With door fully closed, the door arm should be vertical and the trolley should be against the front rubber bumper. (Figure 1C) With the trolley against the front rubber bumper, pull its rope down into automatic engage position. (Figure 1B) Press and hold-in the PB-12 Inside Pushbutton: The chain latch assembly should travel forward until it automatically engages the trolley. Continue holding PB-12 in (with the motor running, the 9" pulley and limit shaft should keep turning and the clutch should slip) until the Close-Limit Wheel activates (opens) the Close-Limit Switch.</p>
<p>2. Rear T Bar Clamp/Rubber Bumper and Open-Limit Switch (See para. (3.5) and (3.5.1) page 8; para. (4) page 10; and Figure 2 page 6)</p>	<p>When fully opened, the bottom of the door should be even with the header and the trolley should be against the rear rubber bumper that is held in place by the rear T bar clamp. With the door closed, disengage the trolley from the latch assembly as shown in Figure 1A. Momentarily short between terminals #1 and #2 of TB1. When latch is near the rear rubber bumper, disconnect the power cord—stopping the operator; and turn the 9" pulley by hand until latch notch is aligned over rear rubber bumper. (Figure 1D) With power cord disconnected, align Open-Limit Wheel: Lift Limit-Wheel Retainer spring out of Open-Limit Wheel (top wheel); and turn the top wheel so that it moves upward on limit shaft until it moves the Open-Limit Switch Lever (opening switch) and an audible "Click" is heard. NOTE: Reseat the wheel retainer spring in notch of Open-Limit Wheel. (See Figure 2) Pull trolley rope for automatic engagement as shown in Figure 1B: Connect power cord. Momentarily short between terminals #1 and #2 of TB1; chain latch assembly should move forward until it automatically engages the trolley—resting against the front rubber bumper—and the operator should be turned off.</p>
<p>The operator limits are now set for a slight over-travel, assuring positive opening and closing of the door. Pulley wheel should rotate approximately ½ turn after door is fully open or closed.</p>	
<p>3. Clutch (See para. (4.1), page 10; Figures 3 and 4, page 6)</p>	<p>Clutch should be tight enough for door to fully open and close—while overcoming slight resistance to its travel—and to slip until the applicable limit-switch has been opened when it reaches full open or full close. To increase torque, tighten nut. To decrease torque (for proper clutch slippage) loosen nut on shaft. If clutch torque must be increased to a point where motor stalls without fully opening or closing door, a door adjustment must be made and/or the interfering obstruction must be removed.</p>
<p>4. Automatic Safety Reverse (See para. (2.6) page 8; para. (6) thru (6.5) page 10 and 11; and Figures 2 and 3 page 6)</p>	<p>To check automatic safety reverse sensitivity, catch the door by hand as it is closing. The door should reverse direction immediately to full open and operator should turn off. If safety reverse switch is activated, but door does not instantly reverse, increase clutch torque. (Figures 3 and 4, pp. 6) To increase safety-reverse sensitivity (decreasing spring pressure) turn sensitivity adjustment screw, one turn at a time, counter clockwise—recheck. To decrease sensitivity (increasing spring pressure) turn screw, one turn at a time, clockwise—recheck sensitivity.</p>
<p>5. Anti-Reverse Switch (See para. (2.6.3) page 8; and para. (5) thru (5.3.2) page 10; and Figure 2 page 6)</p>	<p>The Anti-Reverse Switch should open when the door is approximately 2 inches above the floor—preventing the door being reversed and opening when it hits a broom; packed snow or ice; etc., and when it arrives at full close. To adjust Anti-Reverse Switch: Loosen the screws holding its mounting bracket to the unit. Move the switch and plate up away from the Close-Limit Switch to increase the time between the opening of the two switches. Move the switch and plate closer to the Close-Limit Switch to decrease the time between opening of the two switches.</p>
<p>6. Drive Belt and Pulley (See Figure 2 and 3 page 6)</p>	<p>The 1½" and 9" pulleys should be horizontally aligned. Adjust 1½" pulley by loosening both set screws and positioning on motor shaft. (Figure 2) If belt is too loose, it will slip and overheat. To Adjust belt tension, loosen the motor retainer bolt (Figure 3) and the motor mounting nuts (Figure 4); adjust motor positioning for proper belt tension; while holding motor in place, fasten retainer bolt nuts and the motor mounting nuts.</p>
<p>7. Chain Bracket (Figures 1D and 8)</p>	<p>Does not effect normal operation. Its purpose is to safely limit chain latch travel and is factory set. Do not remove nor relocate. If bracket should come off, reinstall as follows: Disengage trolley (Figure 1A). Run operator until latch assembly is centered over the rear rubber bumper. Secure bracket to chain 4 to 6 inches to rear of front mounting bracket on left side of T Bar (Figure 8).</p>

FOR COMPLETE SERVICE INSTRUCTIONS, SEE PAGES 15–18

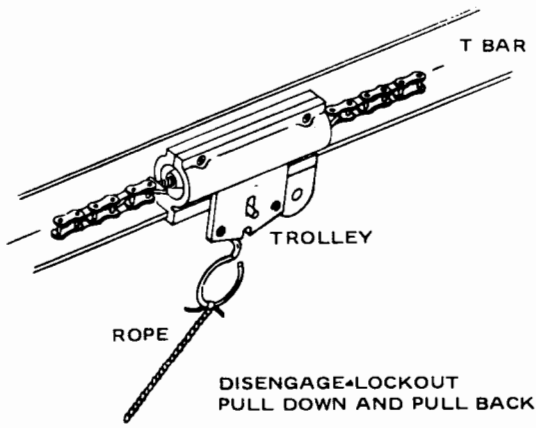


FIGURE 1A

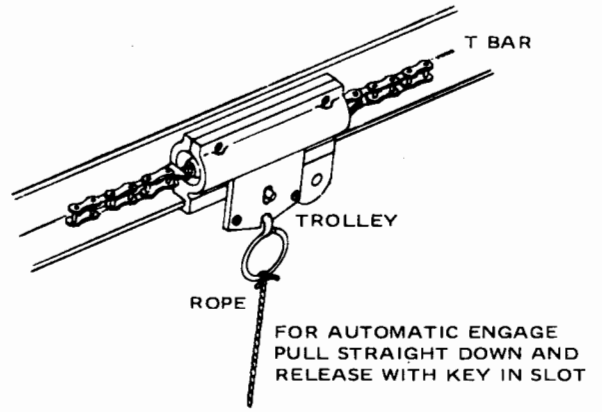


FIGURE 1B

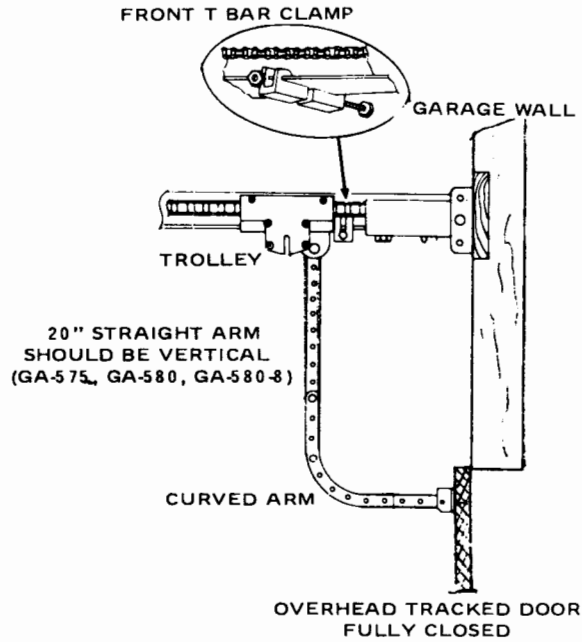


FIGURE 1C

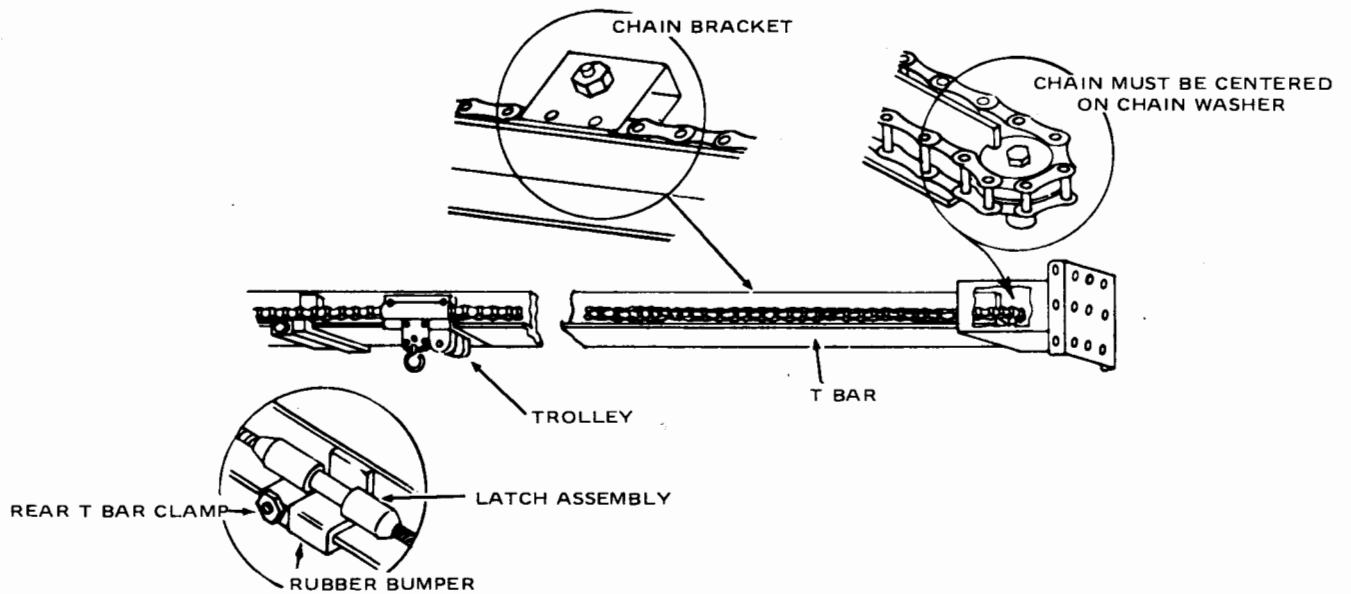


FIGURE 1D

FIGURE 1: ADJUSTMENTS

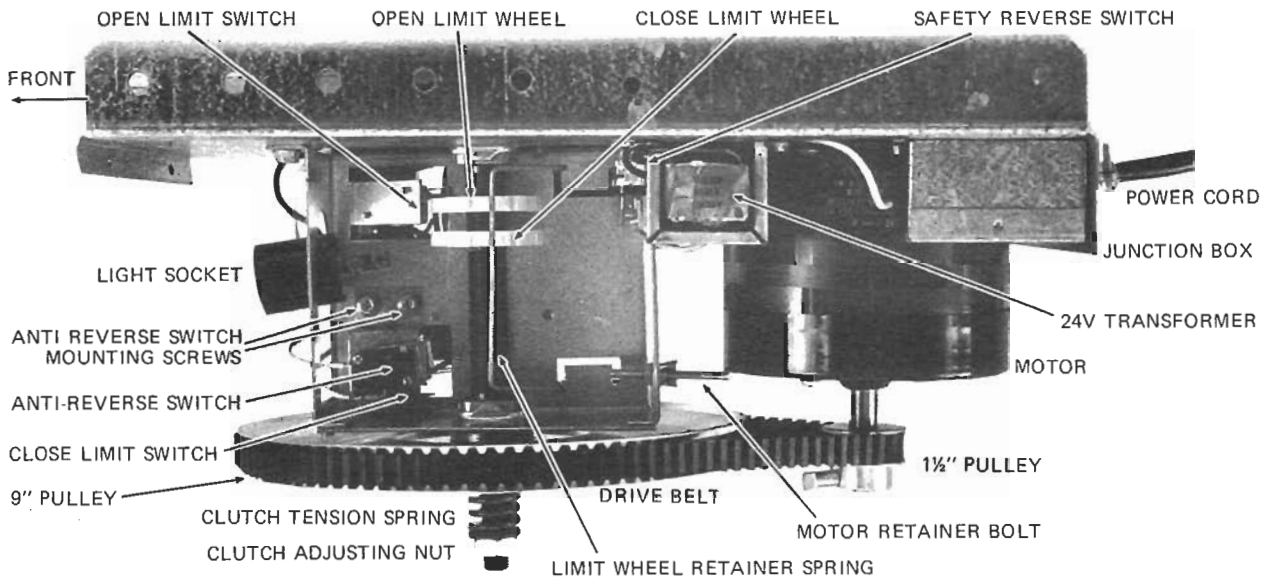


FIGURE 2: POWER UNIT-LEFT SIDE VIEW (COVER REMOVED)

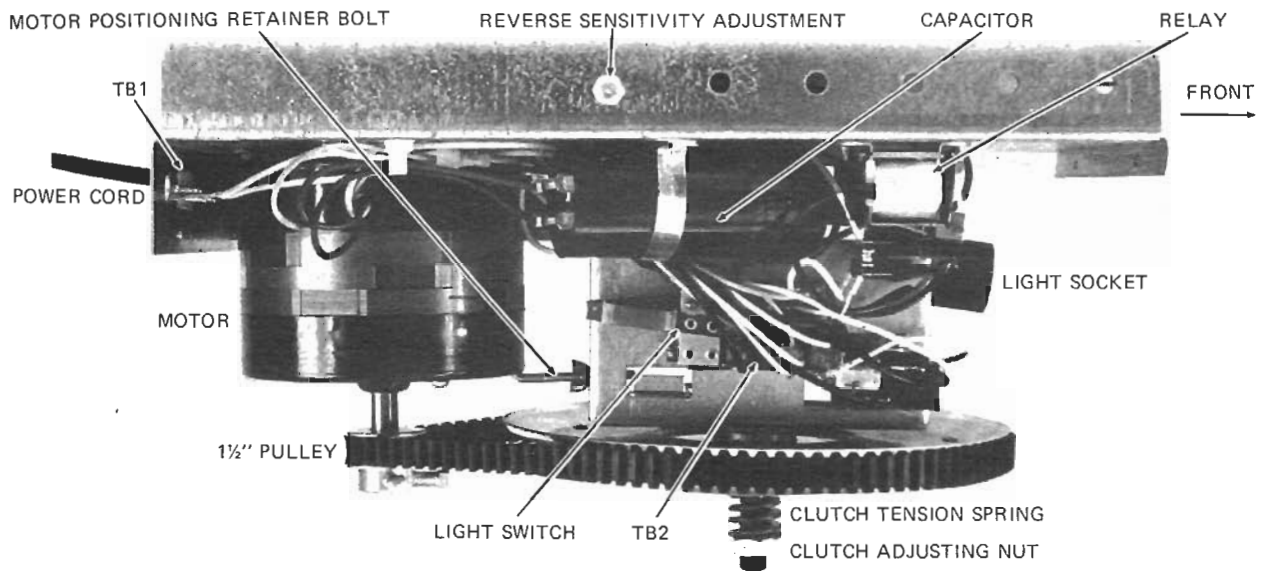


FIGURE 3: POWER UNIT-RIGHT SIDE VIEW (COVER REMOVED)

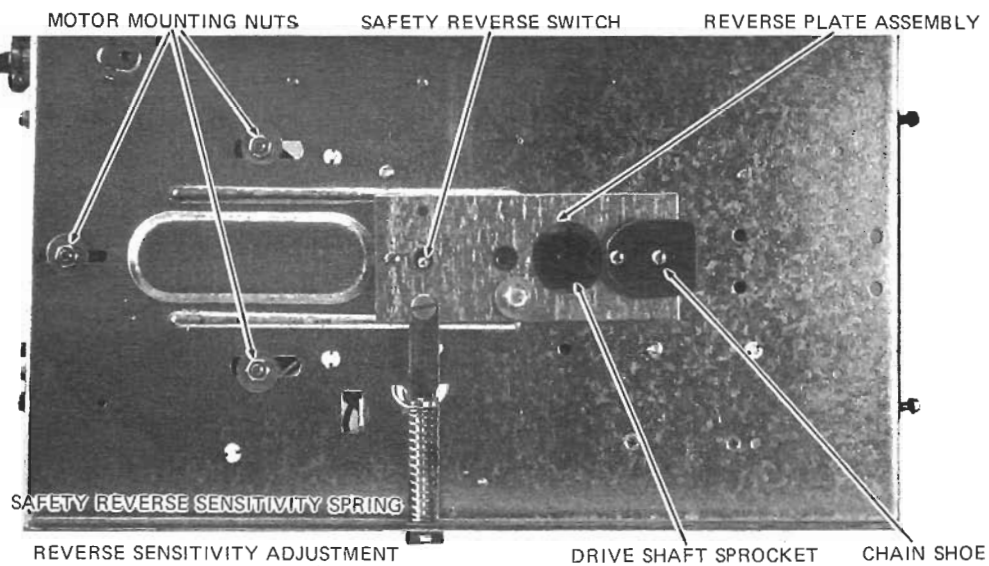


FIGURE 4: POWER UNIT-TOP VIEW

GENERAL

- (1) OPERATING VOLTAGE: 120Vac, 60 Hz.
- (2) MOTOR: 120Vac, 60 Hz., 1/3 HP, 900 RPM when used with 60 microfarad/330Vac capacitor.
 - (2.1) Motor includes an Automatic Overload Reset. Motor (and capacitor) are designed for intermittent use. Overload protector will open when motor temperature rises as a result of repetitive use (without pause between operations) and/or heavy current drain.
- (3) The GDO is supplied complete with safety light socket. Incandescent lamp is not furnished by NuTone. The light should come on approximately 2 seconds after operator is activated and remain on for approximately 1½ minutes after the motor is turned off when door has reached full open or full close position.
- (4) The garage door operators are supplied with an automatic safety reverse feature that is activated when the door meets an obstruction in its downward (closing) travel.
- (5) The GDO includes an automatic safety-reverse cutout that prevents the door reversing when it meets an obstruction such as packed snow, garden hose, etc., within approximately two inches of the floor.
- (6) The operator can be started—to open or close the door—from an Inside Pushbutton (NuTone Model PB-12); Outside Key Operated Switch (NuTone Model 562); and remotely, by radio control.
- (7) The CA-75 is designed for use with overhead-tracked doors with maximum dimensions of 7' high.

NOTICE NOTICE NOTICE

WHEN MALFUNCTION IN LOWERING OR RAISING THE DOOR IS REPORTED, MAKE CERTAIN THAT THE DOOR CAN BE OPERATED EASILY AND SMOOTHLY BY HAND. DISCONNECT THE TROLLEY FROM THE LATCH ASSEMBLY AND RAISE AND LOWER THE DOOR MANUALLY. ALL HINGES MUST BE TIGHT AND SECURE. DOOR TRACKS MUST BE FREE AND CLEAN. MAKE CERTAIN THAT DOOR IS NOT BINDING IN TRACK WHILE OPENING OR CLOSING.

ELECTRICAL OPERATION

(1) STATUS OF ELECTRICAL CIRCUIT WHEN DOOR IS FULLY OPENED (Figure 5)

- (1.1) S1 SAFETY REVERSE SWITCH—open.
- (1.2) S2 ANTI-REVERSE SWITCH—closed.
- (1.3) S3 OPEN-LIMIT SWITCH—open (held open by the Open-Limit Wheel).
- (1.4) S4 CLOSE-LIMIT SWITCH—closed.
- (1.5) S5 LAMP SWITCH—open (light, off)
- (1.6) K1 CONTROL RELAY—in "Door Opening" position, i.e. connected through terminal K1a to the open S3.
- (1.7) Automatic Overload Reset switch in Motor is closed (motor temperature normal).
- (1.8) S10 and S11—open. (These switches are representative of the externally located push-button and radio control that are used to initiate opening and closing of the garage door.)

(2) CLOSING THE DOOR ELECTRICAL SEQUENCE:

- (2.1) Activate (close) S10 or S11. This will connect K1 Relay Coil across the 24V, 60 Hz secondary of T1.
 - (2.1.1) K1 is a one-kick latching relay. When energized as in (2.1) above, its switch will be thrown, and the 120V supply from TB2-4 will be fed through K1a' and the Close-Limit Switch S4 to TB2-6.

(2.2) From TB2-6 the 120V will be connected to one side of S5's heating element. The other side of S5's heating element is connected to the other side of the 120V supply at TB2-5.

(2.2.1) When the 120V is connected across the heating element of S5, the rise in temperature will close its switch, and connect one side of the 120V from TB2-5, through TB2-7, to one side of Lamp Socket I1. The other side of I1 is connected to the other side of the 120V supply at TB2-4 and the light will be ON. If the power to the heating element is on for approximately 8 seconds and then turned off, the switch should remain closed—keeping the light on for 1½ minutes. This is the time required for the heating element to cool and the switch to open.

(2.3) From TB2-6, the one side of the 120V line will be connected to one motor winding Lm1 and through capacitor C1 to one side of the other motor winding Lm2. The other side of Lm1 and Lm2 are connected through the motor's automatic overload reset and its white lead to the other side of the 120V supply at TB2-5.

(2.3.1) When the motor is so energized, it will turn in the proper direction for lowering (closing) the garage door.

(2.3.2) When the motor is running in the closing direction, the threaded limit shaft will turn so as to move the Open-Limit Wheel away from S3. When S3's spring lever is released, the switch will close but will have no effect on the door's operation as it is open ended at K1a.

(2.4) If operation is normal and door is free to completely close, the motor will remain running until the Close-Limit Wheel has moved far enough along the threaded limit shaft to activate (open) S4—breaking the 120V supply to S5 and M1.

(2.4.1) The door should be closed before S4 is opened. The clutch should slip for approximately 1/2 turn after door is closed, i.e. until the Close-Limit Wheel has opened S4.

(2.5) The light will remain on for approximately 1 1/2 minutes after motor has stopped. K1 will be connected through terminal K1a', and the Open-Limit Switch S3 will be closed.

(2.6) SAFETY REVERSE: If the door's downward (closing) travel is interfered with to a sufficient degree, the Safety Reverse Switch S1 will be closed (See MECHANICAL OPERATION); relay coil K1 will be energized and the 120V from terminal TB2-4 will be connected through K1a to the now closed Open-Limit Switch S3.

(2.6.1) When the 120V is fed through S3, it is connected to one side of motor winding Lm2 and through C1 to the other motor winding Lm1. With the motor so energized, it will turn in the opposite direction, i.e. raise (open) the door.

(2.6.2) If Anti-Reverse Switch is open, the 24V will not be connected across K1 even though S1 is closed.

(2.6.3) To prevent activating the Safety-Reverse when the door has arrived at the full closed position, the Close-Limit Wheel will open Anti-Reverse Switch S2 when the door is approximately two inches above the floor.

(3) OPENING THE DOOR ELECTRICAL SEQUENCE:

(3.1) Activate (close) S10 or S11. This will connect K1 Relay Coil across the 24V, 60 Hz. secondary of T1.

(3.2) When energized, latching relay K1 will switch the 120V power lead from TB2-4 through its contact K1a and the Open-Limit Switch S3 to one side of motor winding Lm2 and through C1 to one side of the other motor winding Lm1. When

Motor M1 is energized in this manner, it will turn in the proper direction for raising (opening) the garage door.

(3.3) When the 120V line from TB2-4 is connected through K1a and S3, it will also be connected through C1 and the black lead to terminal TB2-6 and then to one side of S5's heating element. The other side of the heating element is connected to other side of the 120V supply at TB2-5.

(3.3.1) The rise in temperature across the heating element will cause S5 switch to close. This will connect the 120V line from TB2-5, through TB2-7, to one side of lamp socket I1. The other side of I1 is connected to the other side of the 120V supply at TB2-4.

(3.3.2) The light will come on approximately 2 seconds after the heating element of S5 is energized.

(3.4) When the motor is running in the door opening direction, the threaded limit shaft will turn so as to move the Close-Limit Wheel away from S4. When S4's spring lever is released, the switch will close but, will have no effect on the door's opening operation as it is open ended at K1a'.

(3.5) In normal operation the door will continue to raise (open) until the trolley is against the rear T Bar Clamp (see MECHANICAL OPERATION). When door reaches this position, the clutch will slip and continue to turn approximately 1/2 turn—or until the Open Limit Wheel activates (opens) the Open Limit Switch S3.

(3.5.1) When S3 is opened, the 120V line from TB2-4 will be opened; the motor stopped; and the power to the heating element of S5 removed.

(3.5.2) After the power to the heating element of S5 is removed, the light should remain on for approximately 1 1/2 minutes.

(3.6) If the door meets an obstruction and is stopped in its upward (opening) travel, the 9" pulley will continue turning (the clutch will slip) and the threaded limit shaft will turn until the Open-Limit Wheel activates (opens) S3. Then the motor will stop and S5 will be opened.

MECHANICAL OPERATION

POWER UNIT MECHANICAL DRIVE TRAIN

(1) When energized, the Motor ① turns the 1 1/2" Pulley ②. The 1 1/2" Pulley drives the 9" Pulley and Limit Shaft ④ via the Drive Belt ③.

(2) When the Pulley and Limit Shaft rotate, the Open Limit Wheel ⑬ and the Close Limit Wheel ⑭ move up or down the shaft—depending on the direction of the Shaft's rotation. The limit wheels can move up and down the shaft because they are prevented from turning with the shaft by the Limit Wheel Retainer Spring ⑮.

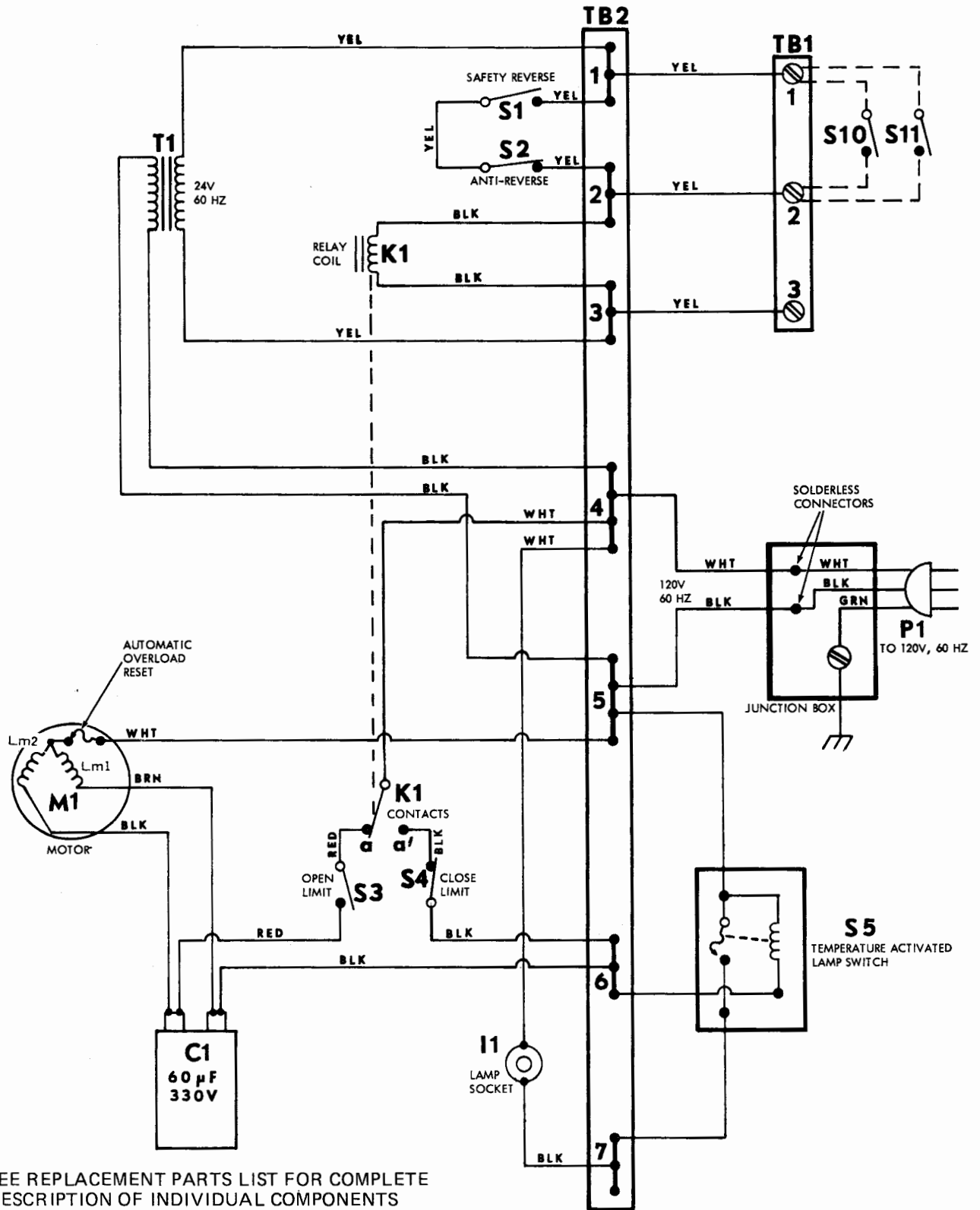
(2.1) When the door is being lowered (closing) the Limit Wheels move down the shaft.

(2.2) When the door is being raised (opening) the Limit Wheels move up the shaft.

(3) The bottom surface of the 9" Pulley is coupled through the Clutch Drive Disc ⑤ to the keyed Clutch Plate ⑥.

(3.1) When the proper tension is applied by the Clutch Pressure Spring ⑦ (controlled by the Clutch Pressure Adjusting Nut ⑧), the Clutch will turn the keyed Drive Shaft ⑨.

(3.2) The clutch pressure must be great enough to drive the shaft (plus chain and door), and yet



SEE REPLACEMENT PARTS LIST FOR COMPLETE DESCRIPTION OF INDIVIDUAL COMPONENTS

MODEL CA-75 ELECTRICAL SCHEMATIC
(CIRCUIT SHOWN WITH DOOR IN FULL OPEN POSITION)

FIGURE 5

allow the clutch to slip if the door meets an obstruction in its upward (opening) travel. When the door reaches the limits of its upward or downward travel, the clutch should slip for ½ turn to make certain that the applicable Limit-Switch is opened.

(4) When the door is being raised (opened) the Open Limit Wheel will travel up the Limit Shaft until it engages the lever of S3 Open Limit Switch (19). When the wheel activates the lever, the switch will be opened and the power to the motor turned off. (The light will remain on for approximately 1½ minutes-until S5 has cooled and opened.)

(4.1) If the door meets an obstruction while being opened, it may stop, but the 9" Pulley and Limit Shaft will continue to turn-while the Clutch slips-until the Open-Limit Wheel engages the lever and opens S3 Open-Limit Switch.

(5) When the door is being lowered (closed) the Close Limit Wheel will travel down the Limit Shaft until it engages the lever and opens S2 Anti-Reverse Switch (20) and shortly after, it should engage the lever of S4 Close-Limit Switch (21). When the Close-Limit Switch is opened the motor will be turned off and the light remain on as in para (4) above.

(5.1) The Anti-Reverse Switch S2 should be opened when the door reaches approximately 2 inches (while in its downward travel) above the floor.

(5.2) Opening S2 when the door is within 2 inches of the floor, prohibits the door's reversing in case it should hit ice or snow; broom; etc., and when it arrives at its full close position.

(5.3) To increase the time difference between opening the Anti-Reverse Switch S2 and the Close Limit Switch S4: Loosen the screws holding S2's mounting bracket; slide the bracket and switch assembly up-increasing the space between S2 and S4 levers; tighten the bracket mounting screws.

(5.3.1) To decrease the time difference between opening the Anti-Reverse Switch S2 and the Close Limit Switch S4: Loosen the screws holding S2's mounting bracket; slide the bracket and switch assembly down-decreasing the space between S2 and S4 levers; tighten the bracket mounting screws.

(5.3.2) NOTICE: When adjusting S2's position, disconnect power from the operator, and make very small changes in the bracket and switch position; check door's closing operation, and repeat adjustment as necessary.

(6) If, when the door is closing (downward travel) it meets an obstruction, the Roller Chain (47) will apply pressure to Chain Shoe (24), which will cause the Reverse Plate Assembly (22) to turn and apply pressure to the lever of S1 Safety Reverse Switch (15). When S15 is activated (closed) it completes the low voltage circuit (24Vac) across the Latching Relay K1. When K1 is energized it switches connection of the 120V supply from K1a'

to K1a-reversing the motor. The motor will raise the door until it reaches normal open stop position.

(6.1) The Safety Reverse pressure is determined by the force applied to the Reverse Arm (11) by the Spring (13). The Spring pressure may be set by turning Sensitivity Adjustment Screw (12). If Anti-Reverse Switch S2 is open (normally when door is within two inches of the floor-or close stop) and the Safety Reverse Switch S1 is closed, the circuit will not be completed; K1 will not be activated; and the door will continue its downward travel to full close.

(6.2) To increase Spring pressure—decreasing sensitivity of Safety Reverse—turn hex head screw clockwise.

(6.3) To decrease Spring pressure—increasing sensitivity of Safety Reverse—turn hex head screw counter clockwise.

(6.4) The sensitivity should be set so that the door will completely close without reversing. Normally if the door is caught by hand while closing, it should reverse direction and completely open.

(6.4.1) When adjusting Safety Reverse Sensitivity, turn the hex-head screw one turn at a time until the door reverses when barely caught by hand, and then turn the screw one full turn clockwise to assure full closing of the door. (Figure 3 and 4, pp 6).

(6.5) If door fails to reverse direction immediately when Safety Reverse is activated, increase Clutch Drive Disc Pressure (reducing slippage) by tightening Clutch Pressure Adjusting Nut. Adjust nut approximately ½ turn at a time, and then check operation. Do not over-tighten. The clutch must slip if door meets an obstruction in its upward travel and when the door reaches its full closed or full open position.

(7) The motor speed, 900 RPM, is reduced by a factor of 6 (9 inch/1½ inch) for a drive shaft speed of 150RPM. This should open or close the door in approximately twelve seconds.

(8) The drive belt tension is set and checked at the factory and normally should not require adjusting.

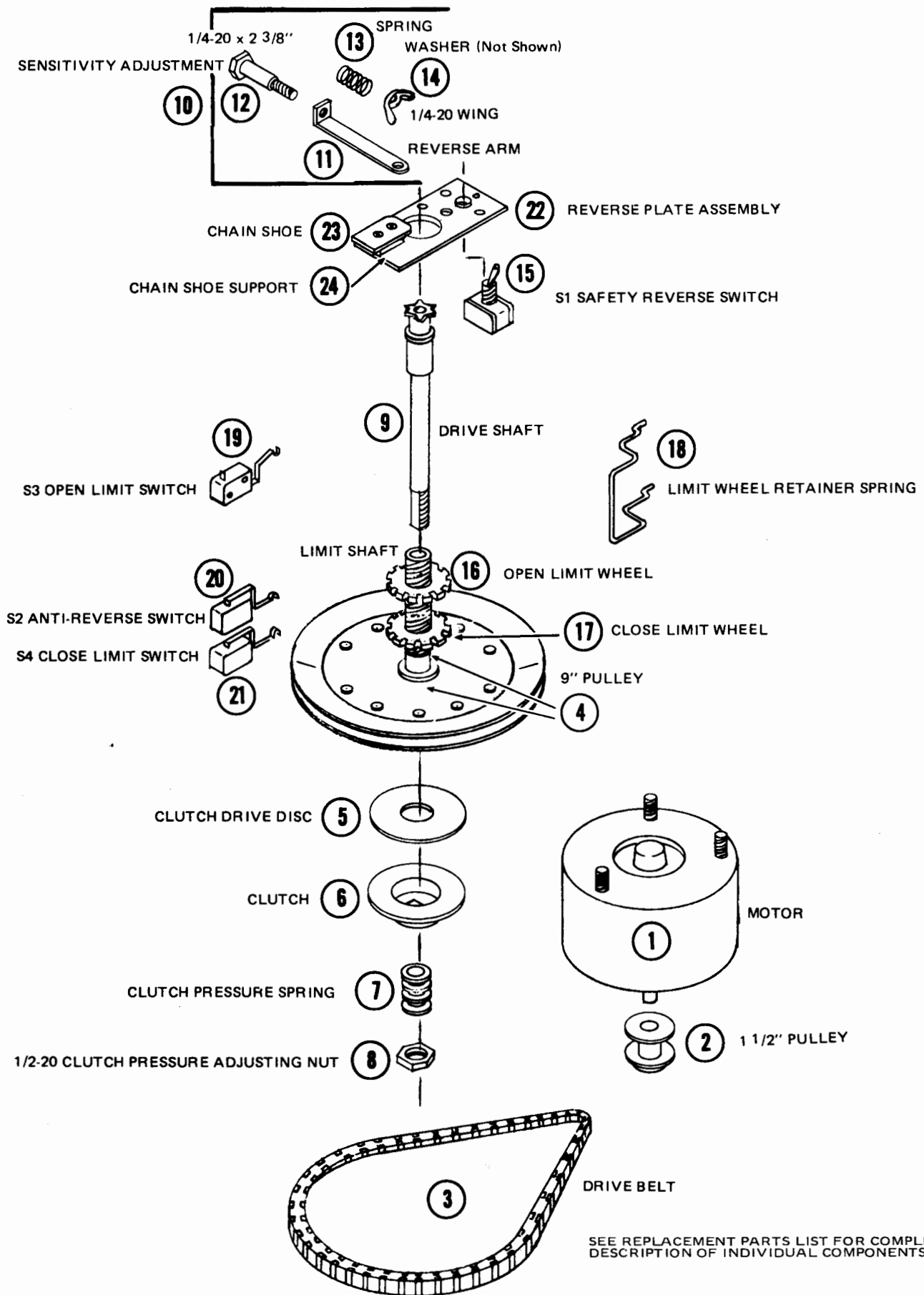
(8.1) If the belt slips from being too loose, there will be a loss of torque; and the belt will overheat and result in reduced belt life.

(8.2) If belt is too tight, drive will not be smooth and the pressure can result in undo wear of the motor and drive shaft bearings.

(9) The belt tension is adjusted by positioning the motor: (See Figures 2 and 4)

Loosen both the keps and wing nuts on the motor retaining bolt. (Figure 2) When in position, the right angle head of the bolt fits into one of the holes in the motor frame.

Loosen the three motor mounting nuts on top of power unit.



SEE REPLACEMENT PARTS LIST FOR COMPLETE DESCRIPTION OF INDIVIDUAL COMPONENTS

POWER UNIT MECHANICAL DRIVE TRAIN
FIGURE 6

While holding the motor in position with the desired tension on the belt, tighten the three motor mounting nuts on top of unit and tighten the keys and wing nuts on the motor retainer bolt.

(10) The 1½ inch and 9 inch pulleys should be in horizontal alignment. Adjust by positioning the 1½ inch pulley: loosen the two set screws; position motor pulley and retighten screws. (Note two "Flats" on motor shaft for proper positioning of the set screws.)

(11) The temperature activated Lamp Switch S5 is connected direct to the slip on terminals #5, #6, and #7 on TB2. (Figures 3 and 7)

(12) Defective switches must be replaced.

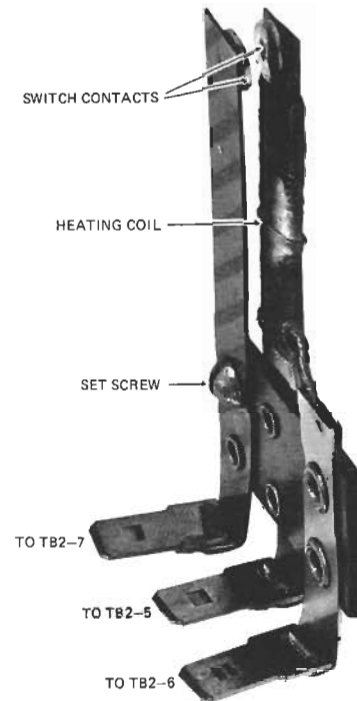


FIGURE 7: S5 LIGHT SWITCH

T BAR ASSEMBLY DRIVE TRAIN

(1) The Roller Chain (47) is driven by the Sprocket at the top of the Drive Shaft (9). The Chain is continuous with the ends joined to the Latch Assembly (35). The Chain must be centered on the Chain Washer (38), which is part of the Front Mounting Bracket Assembly (36).

(2) When properly centered on the Chain Washer, the Roller Chain will ride approximately ¼" above the Plastic Keeper (40)

(2.1) If the Chain is loose and slips off the Chain Washer, the Plastic Keeper will prevent it from riding on the Spacer (39).

(3) Each end of the Roller Chain is joined to the Latch Assembly by a Chain Link Lock Assembly (32, 33, 34).

(4) The Latch Assembly operates as a turn-buckle. Using a wrench at the flattened surfaces, and with a heavy nail or steel pick in the hole of the adjustable section, the Assembly can be locked in position with the proper tension on the Roller Chain. The Chain should not be twisted.

(4.1) The Chain should be clean; free of dirt, grit, corrosion, etc.

(4.2) The Chain should be lightly lubricated.

(5) The Latch Assembly is keyed to receive the plunger of the Trolley (45). When the Trolley Pull Key is in position (in slot in bottom), the Trolley is locked to the Latch Assembly and will travel forward and backward on the T Bar (25) with the Latch and Chain. (Figure 1B, pp 5)

(5.1) The Trolley is disengaged for manual operation by pulling the rope down and back. (Figure 1A, pp 5)

(5.2) When the Trolley is free of the Latch Assembly and the Pull Key is in the lock (engage) position, the Trolley will automatically lock in position on the Latch Assembly when the Latch Assembly is ran into the Trolley.

(6) The front and rear Rubber Bumpers/T Bar Clamps (31, 27, 28, 29, 30) are used to limit Trolley (and thus door) travel. If the front Bumper and Clamp are too close to the center of the T Bar, the door can not completely close. If the rear Bumper and Clamp are too near the center of the T Bar, the door can not completely open.

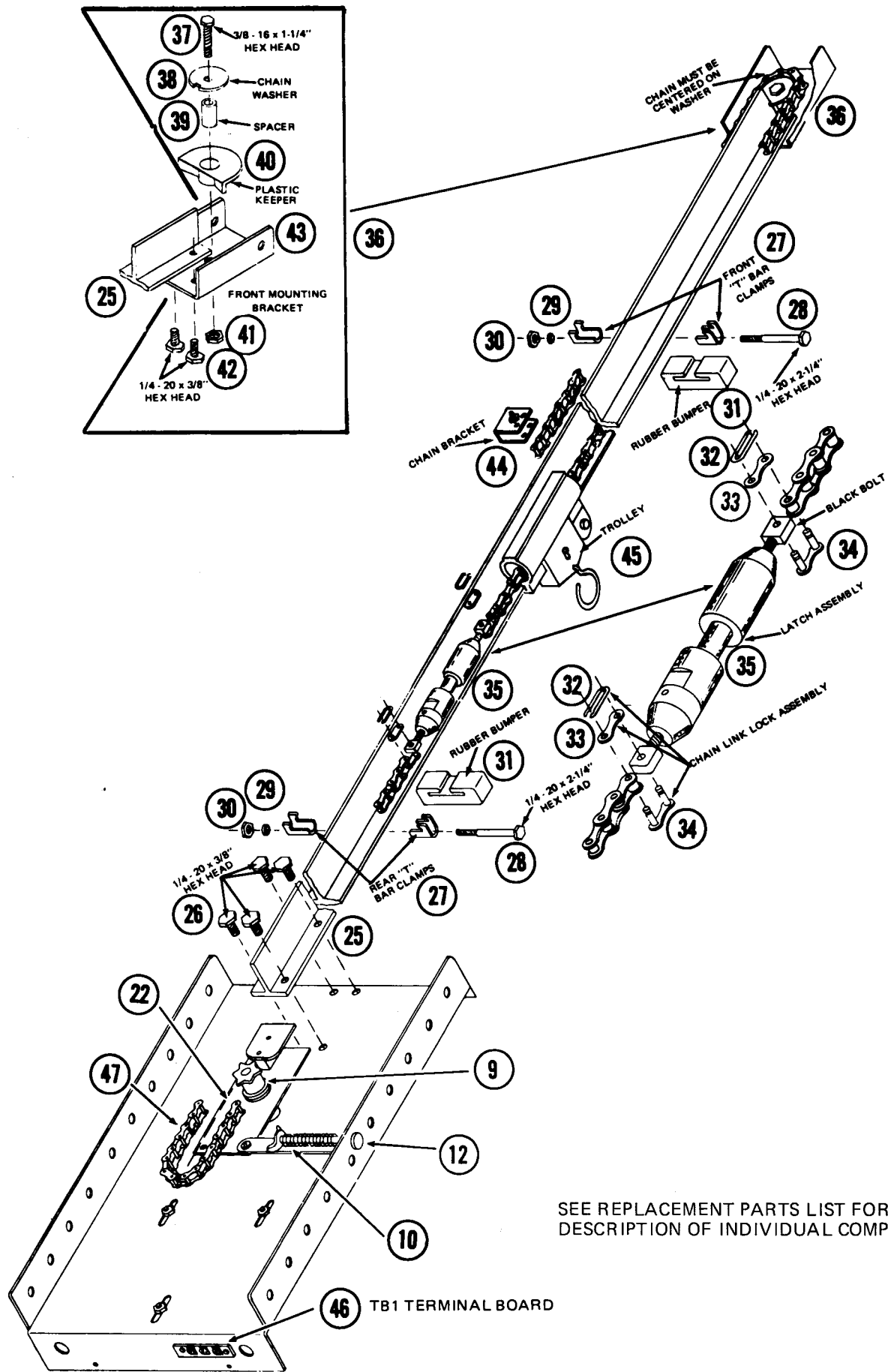
(6.1) To position the Bumper and Clamp, loosen the Bolt (28) in the Nut (30) and slide the Bumper and Clamp in position; then tighten Bolt so that Clamp is securely fastened to T Bar. When the door is fully closed, the Trolley should rest against the front Rubber Bumper; and when the door is fully opened, with the bottom of the door even with the header, the Trolley should rest against the rear Rubber Bumper. (Figures 1C, and 1D pp 5)

(7) The Chain Bracket (44) is not required for normal operation. If a Rubber Bumper/T Bar Clamp should fail to stop the Latch and Trolley, it would limit Chain and Latch Travel. Do not remove nor relocate the Bracket.

(8) The 3 inch Hinge Pin (49) permits free pivoting of the T Bar and Front Mounting Bracket in the Front Hanger Bracket (48). (Figure 9)

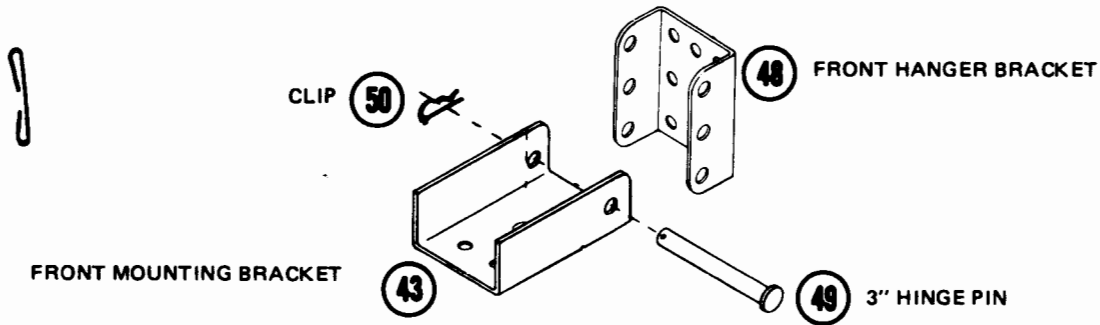
(8.1) The 1 inch Hinge Pin (52) permits the Door Arm—to pivot freely in the Door Mounting Bracket (51).

(8.2) The ¾ inch Hinge Pin (58) allows the Door Arm to pivot freely at the trolley.



SEE REPLACEMENT PARTS LIST FOR COMPLETE DESCRIPTION OF INDIVIDUAL COMPONENTS

T BAR ASSEMBLY DRIVE TRAIN
FIGURE 8



FOR COMPLETE FRONT MOUNTING BRACKET ASSEMBLY
SEE ITEM 36 FIGURE 8

SEE REPLACEMENT PARTS LIST FOR COMPLETE
DESCRIPTION OF INDIVIDUAL COMPONENTS

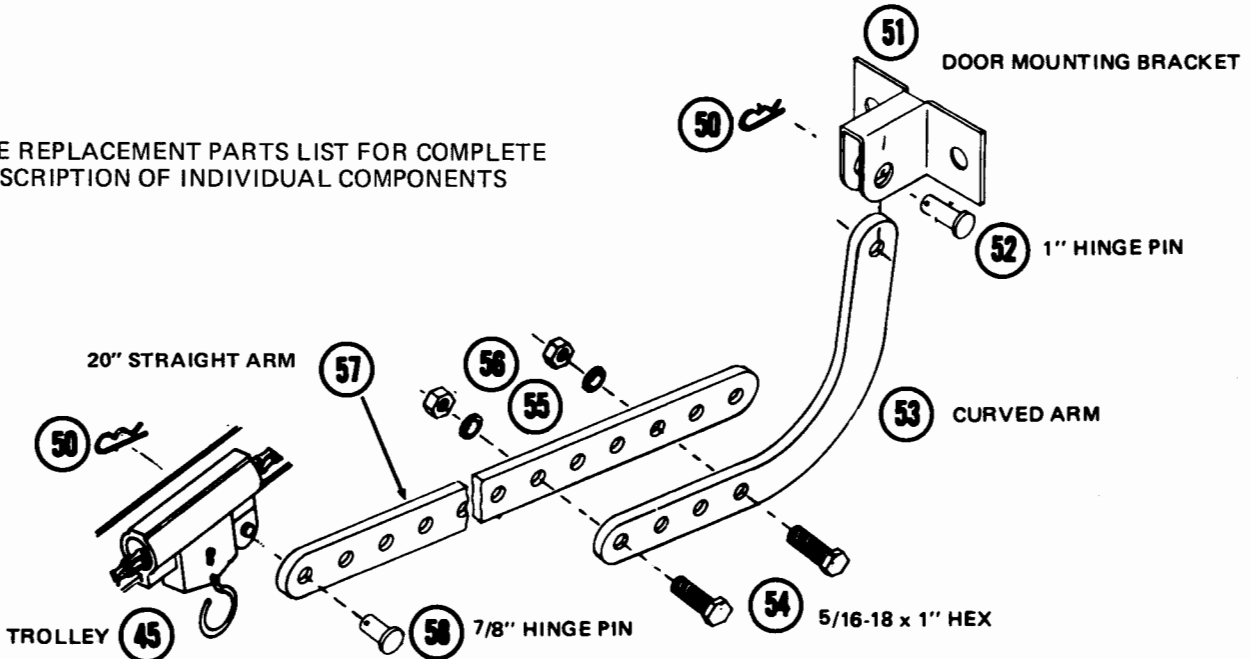


FIGURE 9: FRONT END/DOOR MOUNTING AND INSTALLATION HARDWARE

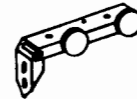
(9) The Curved Arm (53) must be connected to the Door Mounting Bracket (51). In some installations the other end of the Curved Arm may be connected to the Trolley (45) with 7/8" Hinge Pin

(58) and Hinge Pin Clip (50). When the operator is too high for the Curved Arm to reach, the 20-inch Straight Arm (57) (or, required length) may be used. Cut off excess Straight Arm.

OPTIONAL EQUIPMENT



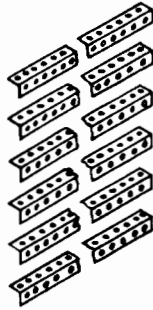
(1) MODEL 562 OUTSIDE KEY SWITCH: With its mounting plate, installs on door jamb or wall. Permits security operation of the door from outside the garage.



(3) MODEL 564 LOW HEADROOM KIT: For use with doors in garages with low ceilings where normal installation clearance between door and T Bar is not possible.



(2) MODEL 563 OUTSIDE KEY OPERATED MANUAL RELEASE: Used primarily in garages without a secondary entrance. Permits disengagement of the trolley from outside so that door can be manually opened in case of operator failure.



(4) **MODEL 566 INSTALLATION STRAPPING:** Six pieces of strapping, $\frac{3}{4}$ " x $\frac{3}{4}$ " x 25", 18-gauge galvanized angle arm with $\frac{1}{32}$ " holes on 1" centers, for securing the power unit to the ceiling. Two pieces are normally furnished with each operator.

(5) **MODEL 567 SECURITY LATCH (not shown):** Because of the added leverage of the 4 foot door arms, this Latch is used for entry security.

(6) Defective optional equipment should be replaced, except, receivers and transmitters which should be returned to NuTone, Toronto for service. (See GUARANTEE, back page)

(7) **SERIES C-90 RADIO CONTROLS:** Model C-90-1: Single set, includes one C-90-R Receiver, and one C90-T Transmitter. Both tuned to same frequency.

(7.1) Model C90-2: Double set, includes one C90-R Receiver, and two C-90-T Transmitters. All tuned to same frequency. (26.79 MHz.—27.27 MHz. RF Band).

(7.2) Model C-90-T: Additional Transmitter(s) for use in additional car(s). Tuned to the same frequency as the receiver and other transmitter(s) used in system.

(7.3) The super-heterodyne receiver is RF crystal controlled. The local oscillator frequency is lower than the RF carrier, resulting in an IF of 455 KHz. The receiver is powered by the 24Vac from terminals #1 and #2 of TB1 on power unit.

(7.4) The Transmitter is RF crystal controlled and is modulated by an audio sub-carrier in the 7-10 KHz. range, the sub-carrier is shifted by a time-base code-rate at 90 Hz. The transmitter is powered by a self-contained 9V battery, NEDA 1604.

(7.5) Transmitter is carried in the automobile. Receiver should be installed near the power unit. The Receiver's antenna should be fully extended and clear of metal objects, beams, etc. that may shield it.

SERVICING THE GDO

NOTICE NOTICE NOTICE

WHEN MALFUNCTION IN LOWERING OR RAISING THE DOOR IS REPORTED, MAKE CERTAIN THAT THE DOOR CAN BE OPERATED EASILY AND SMOOTHLY BY HAND. DISCONNECT THE TROLLEY FROM THE LATCH ASSEMBLY AND RAISE AND LOWER THE DOOR MANUALLY. ALL HINGES MUST BE TIGHT AND SECURE. DOOR TRACKS MUST BE FREE AND CLEAN. MAKE CERTAIN THAT DOOR IS NOT BINDING IN TRACK WHILE OPENING OR CLOSING.

WARNING WARNING WARNING

DOOR COUNTERBALANCE SPRINGS CAN CAUSE SERIOUS INJURY. DOORS SHOULD BE ADJUSTED ONLY BY QUALIFIED PERSONNEL USING THE TOOLS DESIGNED FOR THIS PURPOSE.

DOOR SPRINGS MAY BE DRY, DIRTY, AND CORRODED. THEY SHOULD BE CLEAN AND LUBRICATED. SPRINGS MAY BE CLEANED WITH A WIRE BRUSH AND/OR ONE OF THE COMMERCIALY AVAILABLE SILICONE LUBRICATING CLEANERS. AFTER CLEANING, LUBRICATE SPRINGS WITH A CLEAN HIGH-QUALITY LUBRICANT.

(1) POWER UNIT

(1.1) Cover does not have to be removed when adjusting the Safety Reverse Sensitivity and Clutch Pressure.

(1.2) Disconnect power: Most installations, pull plug out of 120Vac socket; others, throw switch.

(1.3) Remove the four (two in front and two in back) #8-32 x $\frac{3}{8}$ " hex head cover mounting screws.

(1.4) Pull cover straight down. Use caution, do not hit the safety lamp.

(1.5) The power should be applied only if voltage measurements or operating check is required. If making sensitivity adjustments to Limit-Wheels, Limit-Switches, etc. and/or if making resistance (continuity) measurements, leave power disconnected.

(1.6) When checking the Light Switch S5; Terminal Board TB2; and Relay K1, the protecting, insulating fish-board must be removed.

(1.7) When removing suspected component, disconnect its wiring. Wiring at TB2 can be disconnected by pulling the "Slip-on" connectors straight forward. After wiring is removed, the mounting screws and/or clamps should be removed.

(1.8) When installing components, physically secure in place and CONNECT WIRING IN EXACT COMPLIANCE WITH THE SCHEMATIC DIAGRAM, FIGURE 5, PAGE 9.

(2) DEMOUNT COMPLETE OPERATOR (Figures 6, 8 & 9, Pages 11, 13 & 14)

(2.1) Close door.

(2.2) Disconnect power wiring: Most installations—pull Plug P1 out of 120Vac socket.

(2.2.1) Where the Operator is fixed wired, throw switch or remove fuse and disconnect wiring at the electrical junction box.

(2.3) Disconnect wiring from Inside Pushbutton; Radio Control Receiver and/or from Outside Key Switch at terminal #1 and #2 of TB1.

(2.4) Remove the Hinge Pin Clip (50) from 7/8" Hinge Pin (58). Remove Hinge Pin and lower the Door Arm away from trolley.

(2.5) Remove screws that hold Power Unit to Hanger Strap and lower Power Unit to floor.

(2.6) Remove Hinge Pin Clip (50) from 2" Hinge Pin (49) and remove Hinge Pin from Front Mounting Bracket (43) and Front Hanger Bracket (48), and then lower front of GDO to floor.

(3) TO REINSTALL OPERATOR: Reverse Steps (2.2) through (2.6) above.

(3.1) Check GDO's complete operation and adjustments according to the charts, pages 3 and 4.

(4) REPLACING TROLLEY (Figures 8 and 9)

(4.1) Close Door.

(4.2) Remove the Hinge Pin Clip (50) from 7/8" Hinge Pin (58). Remove Hinge Pin and Lower the Door Arm away from Trolley.

(4.3) Disengage Trolley. (Figure 1A, pp. 5)

(4.4) Short terminals #1 and #2 of TB1 (46) (or press inside pushbutton, PB12), starting operator; when Latch Assembly (35) has moved to the rear approximately one foot, turn off the power—pull plug or throw switch—to stop the movement.

(4.4.1) If required, disconnect the 120Vac power wiring at the electrical junction box.

(4.5) Remove screws that hold Power Unit to Hanger Strap and lower Power Unit to floor.

(4.6) Remove Hinge Pin Clip (50) from 2" Hinge Pin (49) and remove Hinge Pin from Front Mounting Bracket (43) and Front Hanger Bracket (48), and then lower front of GDO to floor.

(4.7) Secure Roller Chain to T Bar in a couple of places between Latch Assembly and Power Unit. Use tape; wire; or string.

(4.8) Loosen turnbuckle end of Latch Assembly (35) just enough to allow removal of the front Chain Link Lock Assembly (32) (33) (34).

(4.9) Pull end of Roller Chain out of Trolley and from around Chain Washer (38) and secure front left section of Chain to T Bar near the Chain Bracket (44).

(4.10) Remove the two 1/4-20 x 3/8" hex-head nuts (41) and (42) and separate the T Bar from the Front Mounting Bracket Assembly (36).

(4.11) Mark position of front Rubber Bumper/T Bar Clamp (28)-(31). Loosen T Bar Clamp and slide Clamp and Rubber Bumper off the T Bar.

(4.12) Slide Trolley (45) forward and remove from T Bar.

(4.13) Slide new (or repaired) Trolley on T Bar and reassemble and install operator by reversing steps (4.2) through (4.11) above.

(4.13.1) Front Rubber Bumper/T Bar Clamp should be secured at the mark made when completing step (4.11) above.

(4.13.2) Make certain that the bolts are in a horizontal plane when installing the Chain Link Lock Assembly between the end of the Roller Chain and the front of the Latch Assembly; and when tightening the turnbuckle arrangement. Chain must not be twisted. Chain must ride on the Chain Washer (38) in the Front Mounting Bracket Assembly (36).

(5) Chain should be clean and free of rust and corrosion; and lightly oiled.

(6) When the GDO is completely assembled and installed, check its operation and adjustments according to charts on pages 3 and 4.

IF THE OPERATOR WILL NOT START BECAUSE MOTOR IS OVER-HEATED AND THE AUTOMATIC OVERLOAD RESET IS OPEN, ALLOW 10 MINUTES COOLING TIME BEFORE AGAIN ATTEMPTING TO START OPERATOR.

TROUBLE SHOOTING CHART
READ AND UNDERSTAND PAGES 7 THROUGH 14

MALFUNCTION	CHECK	SERVICE PROCEDURE
1. Operator does not run when inside pushbutton is pressed; when outside key switch is activated; nor when remote radio transmitter is turned on.	120Vac Supply and connections thereto	Remove Power Plug P1 from receptacle and plug-in drill, lamp, or other electrical appliance. If appliance operates properly, 120Vac to receptacle is normal. If device does not work, check line fuses and if required wiring to receptacle. If test appliance works, check plug, and wiring at Junction Box. If junction box and plug wiring is ok, check motor temperature. If motor is hot, the automatic overload reset will be open. Allow 8 to 10 minutes for motor to cool. Check for 24Vac between terminals #1 and #3 of TB1. If voltage is present, check Relay K1 for open coil. If coil is oke, check contacts for pitting, wear, etc. Replace if defective.
2. Operator does not run when inside pushbutton is pressed but, does run when key switch is activated and when remote radio transmitter is turned on.	Inside Pushbutton PB-12 and IW-2 wiring between TB1 and pushbutton	Check pushbutton with ohm meter, should read "Short" between contacts when button is pressed. Replace if defective. Check individual wires in IW-2 cable for "Open," if defective, replace cable. (#18-2, NuTone IW-2)
Operator does not run when key switch is activated. Other operations normal	Model 562 Key Switch and IW-2 wiring between switch and TB1.	Check switch contacts for continuity when key is operated. Should read "Short." Replace if defective. Check individual wires in IW-2 cable for "Open." Replace defective cable.
Operator does not run when remote radio control transmitter is turned on. All other operations normal.	Receiver	Connections between receiver and TB1. Wiring between TB1 and receiver for open, replace if defective. Position of receiver antenna: Must not be shielded by beams, metal partitions, etc., should be fully extended from receiver.
(See Radio Control Service Manual)	Transmitter	Check battery. Replace with 9V (NEDA 1604) if suspected.
3. Operator runs properly most of the time, but occasionally will inadvertently open or close.	Inside Pushbutton and Outside Key Switch.	Make certain that Pushbutton does not partially stick. Check switches for intermittent short, replace if suspected. Check wiring between TB1 and switches, and make certain that they do not short—look for frayed insulation, etc. Replace if defective. (Use IW-2)
	Radio Controls.	Spurious signals can key the receiver. If the receiver is being keyed by a particular device (CB radio; transmitter harmonic; homing equipment; radar; diathermy; etc.) it may be necessary to replace the receiver and transmitter with ones operating on a different frequency.
4. Door starts down, but reverses and opens.	Manual operation of the door	Disconnect the Trolley (Figure 1A, page 5) from the Latch Assembly. If door does not operate free and easy, correct any binding, drag or severe out of balance condition. (NOTE: Older doors can have paint wear from the door and gather in tracks. This can exert stopping pressure on outside edge of door when closing. Clean excess paint from doors, and make certain that there is free space between front of door and door track or batten.)
	Sensitivity Adjustment	If sensitivity adjustment is too light, door will reverse at the slightest resistance to its downward travel. Increase sensitivity spring pressure (reducing sensitivity) in small increments. When door is coming down and it is grabbed by hand, it should reverse.
	Clutch Adjustment	Turn clutch adjustment toward increase, ½ turn at a time until door overcomes slight resistance to downward travel.
5. Door starts up, but stops before it is completely open	Manual operation of the door	See 4. above.
	Clutch Adjustment	See 4. above.
6. Push the wall pushbutton and the motor starts, but the door does not move or moves erratically	Manual operation	See 4. above.
	Clutch adjustment	See 4. above.
	Drive Belt	Remove power unit cover. Check tension of belt and alignment of pulleys. If belt is too loose, release motor retaining screw (Figure 2 and 3, page 6) and loosen motor mounting nuts at top of unit (Figure 4, page 6). Move motor to position where proper tension is on Drive Belt. Tighten motor mounting nuts, and secure in place by tightening thumbnut and keps nut on motor retainer stud.
	Loose 1½" pulley on motor shaft	Tighten pulley set screws. Shaft has two flats at right angle, and both screws must be tight. Pulley should be horizontally aligned with 9" pulley.

MALFUNCTION	CHECK	SERVICE PROCEDURE
7. The door goes down (closes) until it hits the floor, and then reverses and fully opens	Anti-Reverse Switch S2	See Figure 2, page 6: Switch S2 should be opened by the Close-Limit Wheel when the door is approximately two inches above the floor—just before it opens the Close-Limit Wheel. For proper alignment of Close-Limit Wheel and switches, see steps 1. and 2. of OPERATING ADJUSTMENTS, page 4. If switch is shorted, it will allow the Safety-Reverse to operate even when the Close-Limit Wheel has activated its lever. Switch is defective. Disconnect S2's wiring from Relay K1 and TB2-6. Remove S2 Mounting Bracket screws and remove switch and bracket from power unit. Replace switch on bracket and install assembly and align as indicated in step 2, page 4.
8. Door completes opening or closing cycle; motor and light are turned off but power unit continues to buzz (loud hum).	PB-12 Inside Pushbutton, Outside Key Switch, and Radio Receiver; and the wiring between TB1 and these components.	Disconnect wiring at TB1 terminals #1 and #2. If buzz stops, check the Pushbutton and Key Switch for hanging-up (shorted); Receiver for closed relay; wiring between units for shorts. The wiring from the Pushbutton, Key Switch and Radio Receiver can be reconnected, one-at-a-time, and each operation checked to isolate defective component. Replace suspected units.
9. Door goes down but does not completely close; motor and light are turned off.	Front Rubber Bumper/T Bar Clamp and Door Arm	Door arm should rest against front rubber bumper as noted in step 1., page 4. (See Figure 1C, page 5). Adjust as required and reset Close-Limit Switch.
	Down-Limit Wheel	If Down-Limit Wheel activates (opens) the Down-Limit Switch before the door is completely closed against the front Rubber Bumper, adjust the Close-Limit Wheel: lift Limit-Wheel Retainer Spring out of the Close-Limit Wheel notch, and turn the Wheel so that it moves up the Limit Shaft and the Close-Limit Switch Lever is released (closing the switch) with an audible click; give the wheel another turn or so up the shaft and then adjust as indicated in step 1, page 4.
10. When unit is started, light comes on, but motor does not turn	Motor windings and motor's Automatic Overload Reset	Check motor connections. Check motor windings: The d-c resistance between the WHT and BRN wires should be approximately equal to that between the WHT and BLK wires. The d-c resistance between the BRN and BLK wires should be equal to the sum of the previous two measurements. If the motor's automatic overload reset is opened, resistance measurements between the WHT wire and either the BRN or BLK wire will show an open circuit. If the motor's automatic reset overload has been opened as a result of a temperature rise in the motor, allow the motor to cool for 8 to 10 minutes before attempting to start Operator. If defective winding and/or overload reset is noted, replace motor. Connect wires in exact compliance with Schematic Diagram Figure 5.
	Capacitor C1	Check for open. (charge and discharge with ohmmeter) Check for shorts with ohmmeter. Generally if a capacitor has been overheated through sustained operation or through an internal short, it will show evidence of the electrolyte around its top. Replace defective unit, and connect as directed in Schematic Diagram, Figure 5.
11. When operator is turned on, safety light does not come on, all other operations normal	Incandescent lamp	Replace if burnt out
	Light Switch S5	Remove insulating fish board, and pull switch straight forward away from TB2 (Figures 5 & 7, pages 9 and 12). Check switch for open heater coil; pitted and/or worn contacts; and for fatigued switch. Replace defective switch.

IF, WHEN CLOSING, THE DOOR GOES DOWN UNTIL IT TOUCHES THE FLOOR AND THEN REVERSES BUT DOES NOT FULLY OPEN – THE LIMIT WHEELS SHOULD BE REALIGNED AS FOLLOWS:

PRESS AND HOLD-IN CONTINUOUSLY THE WALL MOUNTED PUSHBUTTON UNTIL THE DOOR IS FULLY CLOSED.

WITH THE PUSHBUTTON HELD-IN THE DOOR CANNOT REVERSE. THE CLUTCH SHOULD SLIP AND THE LIMIT SHAFT TURN UNTIL THE LIMIT WHEELS ARE REALIGNED.

THE CLOSE-LIMIT WHEEL SHOULD ACTIVATE (OPEN) THE ANTI-REVERSE SWITCH AND THEN THE CLOSE-LIMIT SWITCH; AND THE MOTOR WILL BE TURNED OFF.

IF REPEATED REALIGNMENT IS NECESSARY, INCREASE CLUTCH PRESSURE.

REPLACEMENT PARTS LIST

ELECTRICAL COMPONENTS

Circuit Symbol	NuTone Part No.	Description	Circuit Symbol	NuTone Part No.	Description					
C1	51180-000	Power Unit, complete	S1	50053-000	Cover, junction box					
	50055-000	Capacitor, motor, 60 microfarads @ 330V: G. E. #35F307BA1		50044-000	Switch, toggle, SPST, normally open, momentary close: 20A @ 120Vac; 10A @ 250Vac SAFETY REVERSE					
	50056-000	Clamp, capacitor mounting		50045-000	Locking Ring, use with S1					
	28058-015	Screw, #8-32 x 3/8" Slit Hex/W #1, secure capacitor mounting clamp		63207-000	Lock Washer, use with S1					
I1	51088-000	Socket, lamp	S2, S3, S4	50013-000	Switch, lever activated, SPST, normally closed, momentary open: 15A, 1/2 HP, 125-250 Vac. ANTI-REVERSE; OPEN-LIMIT; CLOSE-LIMIT McGill Mfg. Co., No. 4600 Series					
	28058-015	Screw, #8-32 x 3/8" Slit Hex/ #1, lamp mounting		51086-000	Bracket, mounting for S2					
K1	50057-000	Relay, latching-switching, SPDT Coil: 24Vac intermittent duty. Contacts: 1/2 HP @ 117Vac MidTex #48-11Q100; AmPar #330-32		51087-000	Barrier, insulating fishpaper for S2, S3 and S4					
	28058-015	Screw, #8-32 x 3/8" Slit Hex/W #1, relay mounting		50015-015	Screw, #4-40 x 5/8" Slit Rd SF, mounting for S2, S3 and S4					
	51096-000	Barrier, insulating fishpaper for K1		28058-015	Screw, #8-32 x 3/8" Slit Hex/W #1, for S2 mounting bracket					
M1	1901A-000	Motor, 1/2 HP @ 900 (+ 100, - 0) RPM, 115V, 60 Hz., automatic overload reset. Use with 60 microfarad, 330V capacitor	S5	29129-039	Washer, 3/8" x 3/16" for S2 mounting bracket screws					
	51133-015	Stud, #10/32 x 2 1/4", right angle end, motor position lock		50037-000	Limit Wheel, white nylon, for activating S2, S3 and S4					
	51134-038	Nut, #10-32 wing, motor stud		50043-000	Spring, limit wheel positioning control					
	10435-015	Lockwasher #10 Int. Th., motor stud		51095-000	Switch, lamp, temperature activated contacts close on energize in 2 to 4 seconds; hold time after 8 seconds energized is 1.5 minutes minimum, ambient compensated: -20°F to +40°F					
P1	51098-015	Washer, #10, motor stud	T1	51203-000	Transformer, wire and terminal assembly, Primary black leads, 117Vac, 60 Hz; Secondary yellow leads, 30Vac @ no-load; 24Vac @ 0.5Aac resistive load Better Coil and Transformer #PN-8440-P					
	28321-015	Nut, #10-32 Keps, motor stud			28058-015	Screw, #8-32 x 3/8" Slit Hex Hd/W #1, Transformer mounting				
	50445-000	Power Plug, wire and ring terminal assembly				51091-000	Terminal Strip, 3 screw connections			
	17351-000	Solderless Connector, end-type, nylon: Amp #53224-1					51093-000	Terminal Board, 7 screw connections		
	50447-000	Barrier, galvanized, power wiring						64867-015	Screw, #8-32 x 5/8" PH RH Taptite, TB2 mounting	
	28058-015	Screw, #8-32 x 3/8" Slit Hex/W #1, barrier mounting							67482-000	Spacer, standoff for TB2 mounting screws
	50448-000	Retainer, wire, galvanized, 7/8" flatted hole								
	50446-000	Grommet, strain relief, black nylon, for 7/8" hole in wire retainer								
	14990-000	Grommet, strain relief, black nylon, for 1/2" wiring hole in junction box								
	50052-000	Junction Box								
28058-015	Screw, #8-32 x 3/8" Slit Hex/W #1, junction box mounting									

MECHANICAL COMPONENTS

Drawing Number	NuTone Part No.	Description	Drawing Number	NuTone Part No.	Description
1	1901A-000	Motor	4	51107-000	Pulley, 9", assembly complete with Limit Shaft Sleeve
	51133-015	Stud, #10/32 x 2 1/4", right angle end, motor position lock	5	50478-000	Disc, clutch drive
	51134-038	Nut, #10-32 wing, motor stud	6	50039-015	Clutch
	10435-015	Lockwasher #10 Int. Th., motor stud	7	50040-000	Spring, clutch pressure
	51098-015	Washer, #10, motor stud	8	50041-003	Nut, 1/2-20, clutch adjusting
	28321-015	Nut, #10-32 Keps, motor stud	9	51113-000	Drive Shaft, assembly complete
2	50149-000	Pulley, motor, 1 1/2"	10		Sensitivity Adjustment, assembly complete
3		Drive Belt, V, 1/2" x 32"	11	50028-000	Reverse Arm,
	69515-000	Drive Belt and Clutch Drive Disc Assembly (only way supplied)	12	51117-015	Bolt, 1/4-20 x 2 3/8" Hex., sensitivity adjustment
			13	50429-000	Spring, compression, sensitivity
				50426-015	Washer, 1/4, sensitivity bolt

Drawing Number	NuTone Part No.	Description	Drawing Number	NuTone Part No.	Description
14	16133-015	Nut, 1/4-20 wing		51123-015	Plunger, trolley
15	50044-000	S1 Safety Reverse Switch, toggle		51122-015	Pull, trolley
16	50037-000	Open Limit Wheel	46	51124-003	Spring, trolley
17	50037-000	Close Limit Wheel	47	51091-000	TB1 Terminal Strip, 3-terminals
18	50043-000	Spring, limit wheel retaining	48	64910-000	Roller Chain
19	50013-000	S3 Open Limit Switch	49	50103-015	Pin, 3" hinge front bracket
20	50013-000	S2 Anti-Reverse Switch	50	50106-015	Clip, hinge pin
21	50013-000	S4 Close Limit Switch		50102-015	Bolt, lag, 5/16-9 x 1 1/2", front hanger bracket mounting (not shown)
22	51099-000	Reverse Plate Assembly	51	50574-000	Bracket, door mounting
	51100-000	Reverse Plate	52	50104-015	Pin, 1" hinge door bracket
23	50026-000	Chain Shoe	53	50096-005	Arm, curved, door connecting
24	51102-015	Support, chain shoe	54	50099-015	Screw, 5/16-18 x 1" Hex Hd., curved arm to straight arm
	51118-000	T Bar, assembly complete	55	22077-038	Lockwasher, 5/16"
25	50073-000	T Bar	56	50100-015	Nut, 5/16-18 Hex
26	50009-015	Screw, 1/4-20 x 3/8" Hex. Hd.	57	50095-005	Arm, 20" straight, door connecting
27	50094-015	Clamp, T Bar, 2 required for both front and rear	58	50105-015	Pin, 7/8" hinge, straight arm to trolley
28	51117-015	Bolt, 1/4-20 x 2 3/8" Hex. Hd. for T Bar clamp		51181-000	Cover, power unit, complete assembly
29	31903-015	Lockwasher	← 69484-000		Lens and retainer spring assembly, light in power unit
30	08478-003	Nut, 1/4-20	29861-000		Spring, power unit cover light lens
31	50219-000	Rubber Bumper, front and rear	50066-000		Retainer, lens spring
32, 33, 34	69486-000	Chain Link Lock, complete assembly	28058-015		Screw, #8-32 x 3/8" Hex/W SF, cover to power unit mounting
35	51128-000	Latch Assembly complete	50204-000		Strap, hanger, power unit installation
36	51125-000	Front Mounting Bracket, complete assembly	50109-000		Rope, 18" plastic covered, trolley manual release
37	51127-015	Bolt, 3/8-16 x 1/4" Hex Hd.	05120-900		Pushbutton, inside (NuTone Model PB-12)
38	50083-000	Washer, chain	50138-000		Wire, 22/2 ribbon type, 30' coil, control between pushbutton and TB1
39	50084-015	Spacer			
40	51126-000	Keeper Plastic			
41	50042-003	Nut, lock, 3/8-16 Hex			
42	50009-015	Screw, 1/4-20 x 3/8" Hex Hd.			
43	50082-000	Front Mounting Bracket			
44	69482-000	Bracket, roller chain mounting, complete assembly			
45	1020A-000	Trolley, complete assembly			

NUTONE WARRANTY

NuTone products are warranted to be free from defects in material and workmanship for (12) months from original date of installation unless otherwise stated. Light bulbs, dial lights, record changer needles and batteries (with exception of those specifically designated as rechargeable) are not warranted or guaranteed, in any manner for any length of time.

During this warranty period, NuTone will repair or replace at NuTone's sole option, free of charge, any defective parts returned prepaid to our closest Authorized Service Center. Provide the model number of the product, original date of installation, and nature of difficulty being experienced.

For the name of your nearest NuTone Authorized Service Center, residents of the contiguous United States call, toll free, 800-543-8687. In Ohio call, 800-582-2030.

Residents of Alaska, Hawaii and all other locations outside the contiguous U.S., except Canada, write: Field Engineering Department, NuTone Division of Scovill Mfg., Madison and Red Bank Roads, Cincinnati, Ohio 45227.

Canadian residents contact: NuTone Electrical Limited, 2 St. Lawrence Avenue, Toronto, Ontario M8Z 5T8, 416-251-6580.

Our warranty does not cover damage or failure caused by abuse, misuse, abnormal usage, faulty installation, improper maintenance or any repairs other than those provided by an Authorized NuTone Service Center.

There will be charges rendered for product repairs made after our warranty period has expired (12 months after original date of installation).

Specific parts of certain models have an extended warranty period. These are specially noted in the current NuTone Catalog. NuTone is responsible for parts only during the remaining portions of the warranty period after the first 12 months. Labor is extra - to be charged to the customer. Your Authorized Service Center can tell you what portions of your particular model may have an extended warranty.

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 OR SCOVILL MANUFACTURING COMPANY FOR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT OR OTHER INDIRECT DAMAGES WITH RESPECT TO LOSS OF USE, REVENUES OR PROFIT. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THE WARRANTIES SET FORTH HEREIN MAY NOT BE EXTENDED OR ALTERED EXCEPT BY WRITTEN AMENDMENT.

NuTone Housing Products

Scovill

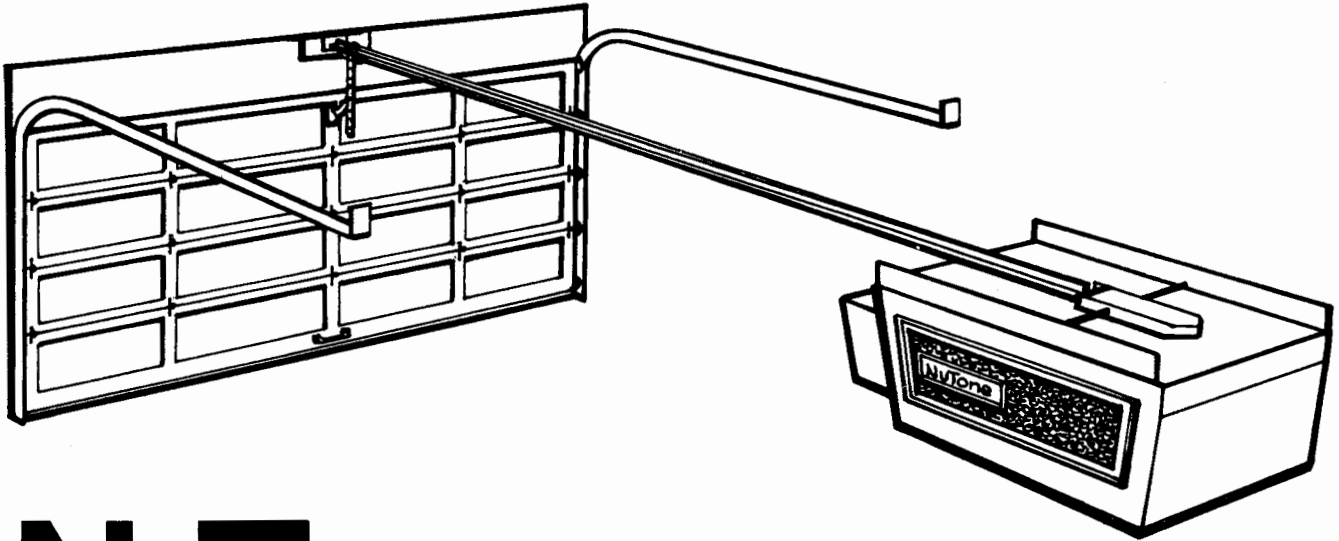
NUTONE ELECTRICAL, LTD.

2 ST. LAWRENCE AVE., TORONTO, ONT. M8Z-5T8

416-251-6580

Part No. 51188-000
May, 1975

Homeowner's Manual



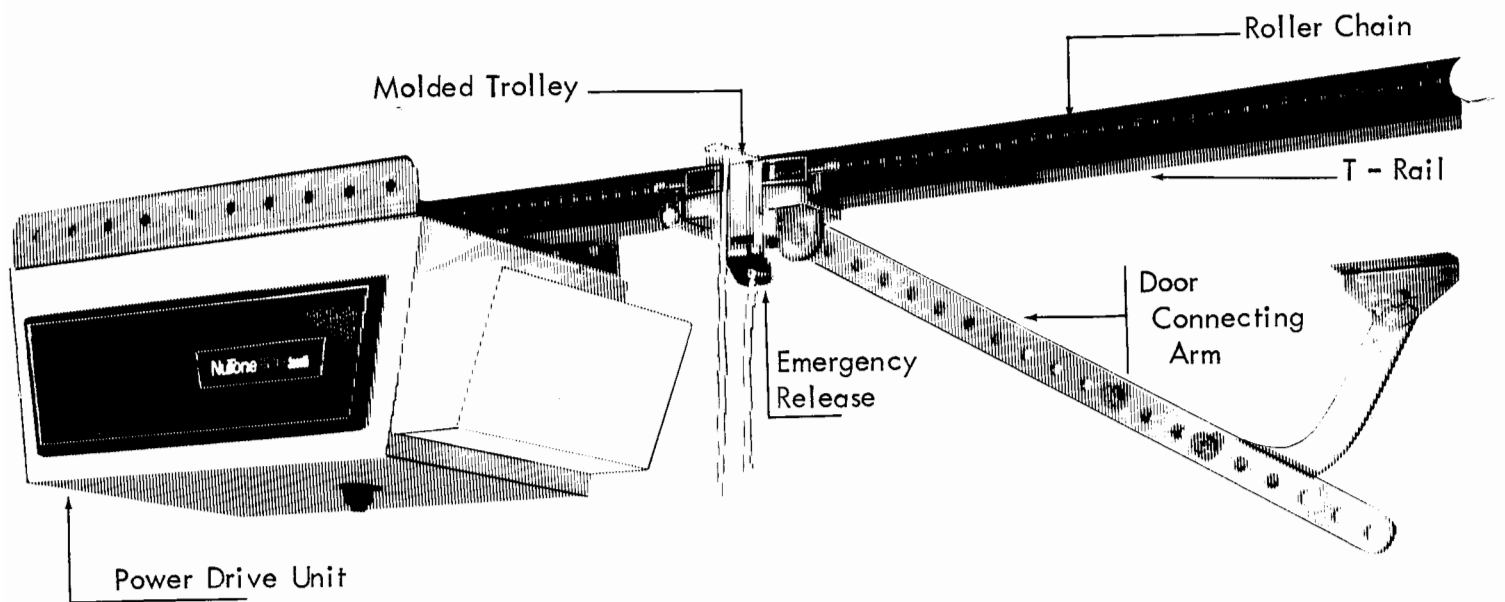
NuTone

The automatic Garage Door Operator

You've made an excellent choice! Your NuTone Automatic Garage Door System was designed with you in mind . . . with many extra features for your convenience, safety and peace of mind. To assure you that your system is a product of top engineering skill and finest quality materials and workmanship, it is backed by NuTone's guarantee and service provisions. Enjoy the convenience and trouble-free performance of your Garage Door System . . . you'll be glad you chose NuTone!

NuTone Housing Products

Scovill



DESCRIPTION AND FUNCTION OF THE GARAGE DOOR OPERATOR

The garage door operator is an Electro-Mechanical Appliance which will operate any type of upward acting, spring counterbalanced, garage door. On all models the initial speed reduction is by belt and pulley, assuring smooth, quiet, efficient, and long lasting operation.

The power drive is connected to the door through a continuous roller chain which pulls a molded trolley along a heavy duty "T-Rail". The high strength factors and friction free characteristics of this system assure unparalleled operational life.

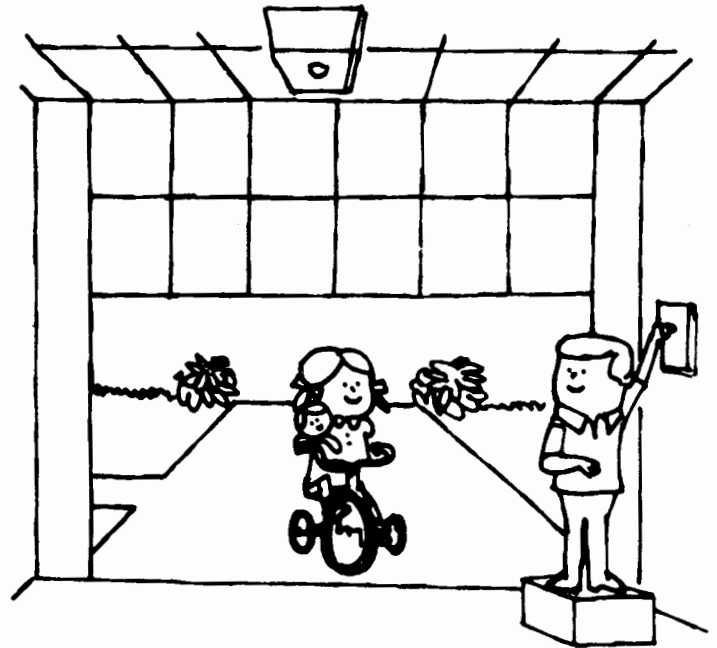
Actuating the wall push button, radio transmitter or optional key switch will start the garage door in the direction desired. The motion of the door is maintained until it reaches its full open or closed position. The motor is then electrically turned "off" by the limit switches which are self contained and automatically actuated,

The operator is approved by The Canadian Standards Association For Electrical Safety.

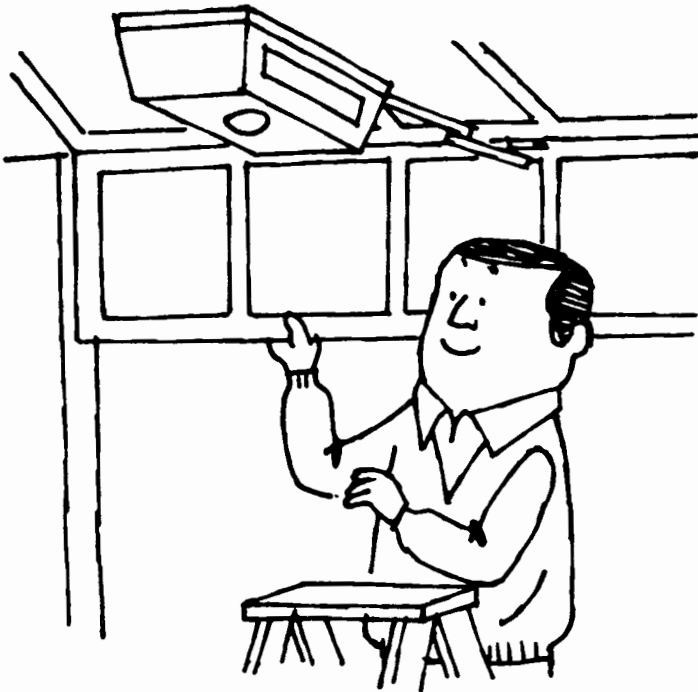
CAUTION



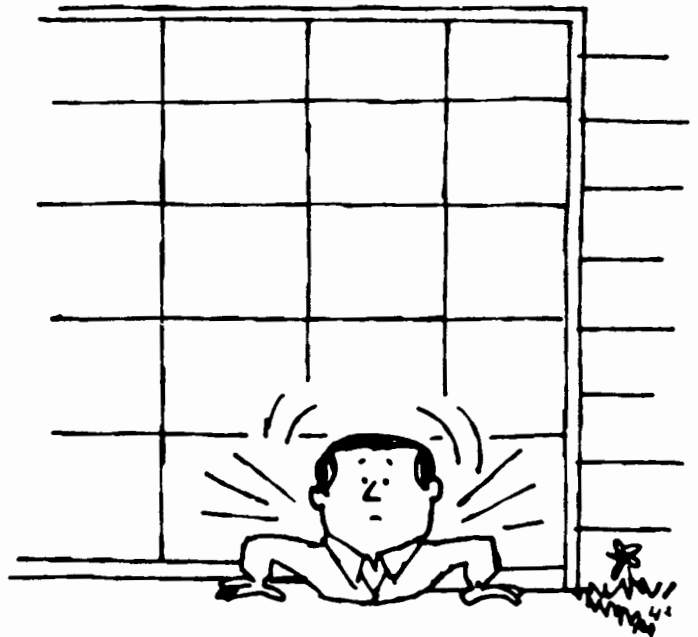
1 Keep the area under and near the door clear and free of unnecessary objects. This will prevent any inconvenience and assure full operation of the door.



2 Do not allow children to play with the controls of your automatic door.



3 Check the door periodically to assure that it stays in good working condition. A defective door will have adverse effect on the electric operator.



4 To Avoid Surprises — Have the door in sight when it is operated by remote transmitter or push button.

THE FOLLOWING IS A PRELIMINARY TROUBLESHOOTING AND CORRECTION GUIDE. A COMPLETE SERVICE MANUAL AND PARTS LIST IS AVAILABLE FROM —

PARTS DEPARTMENT C/O

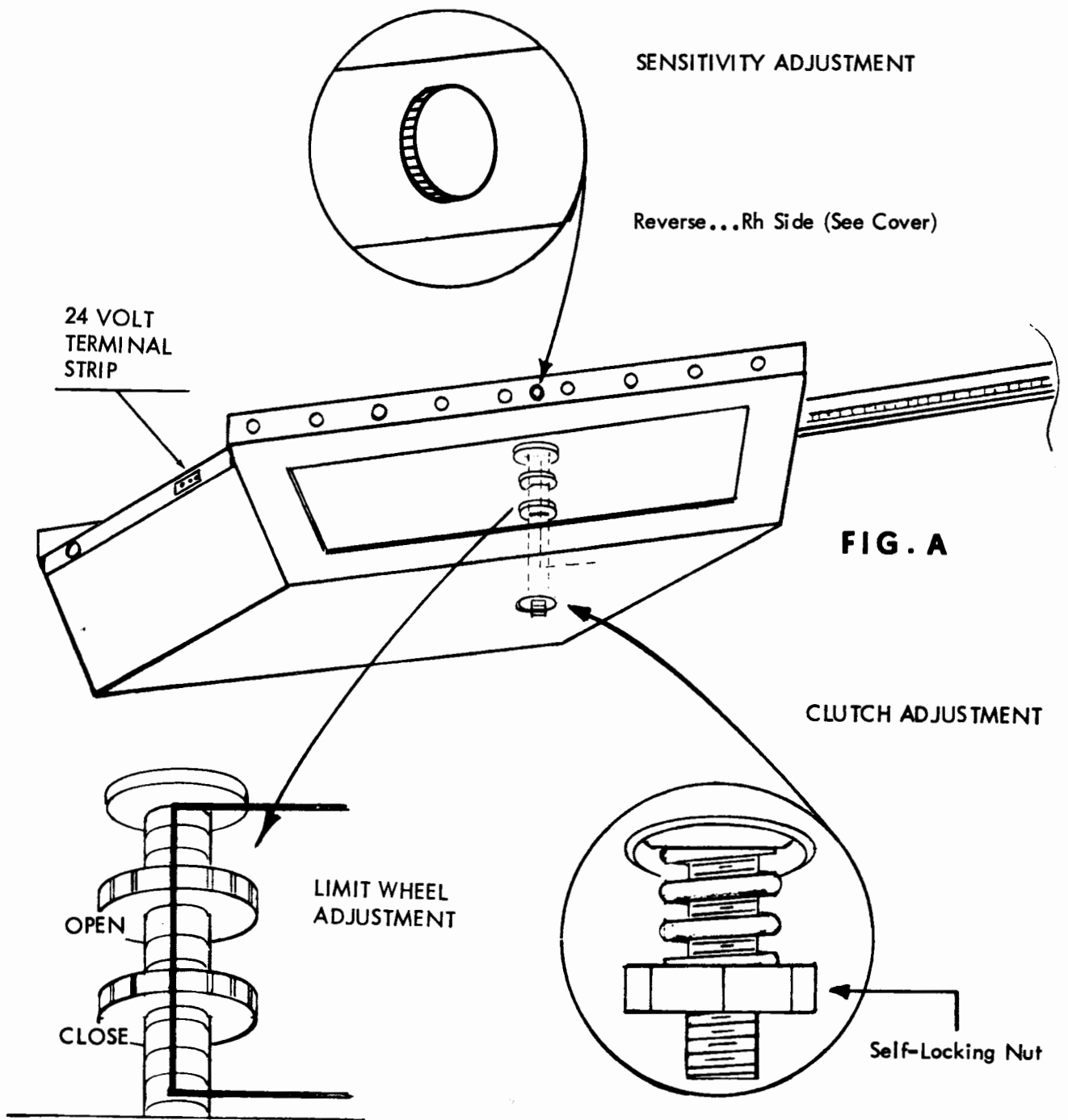
**NuTone Electrical Mfg. Co. of Canada, Ltd.
2 St. Lawrence Ave.
Toronto 18, Canada**

PRICE \$2.00

*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.



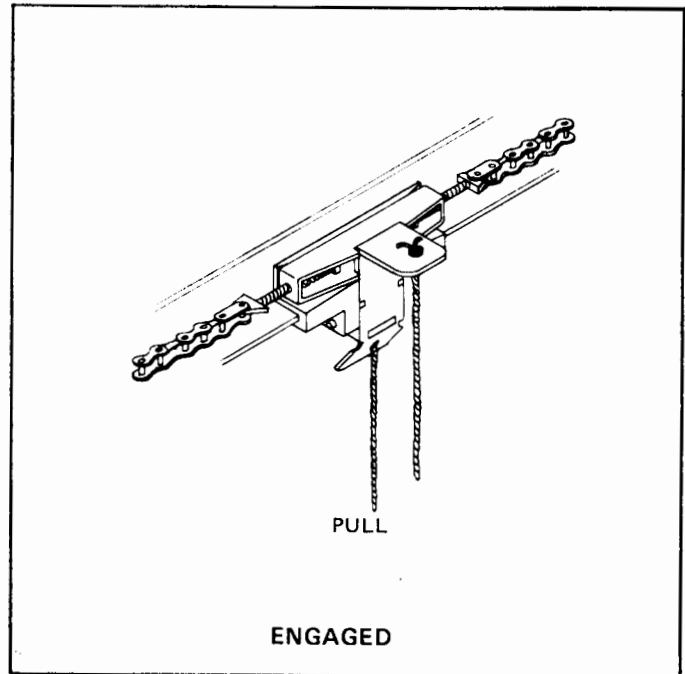
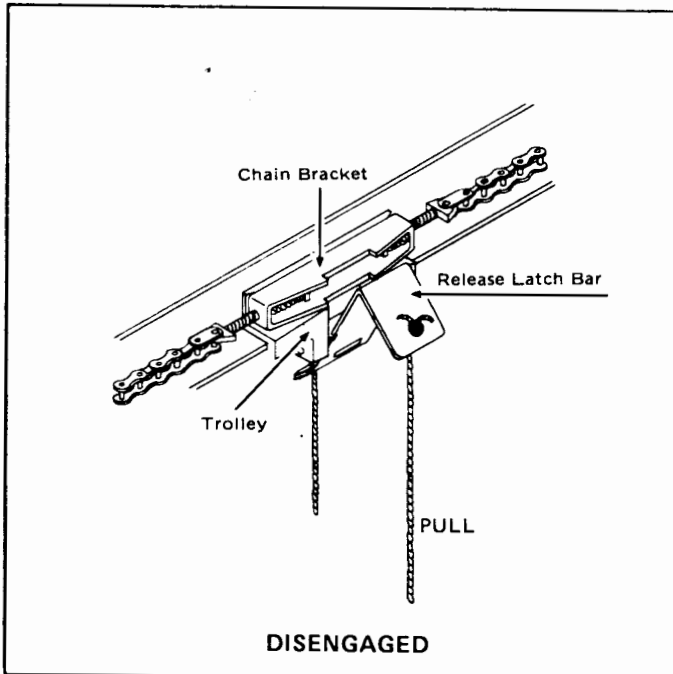
OPERATOR CONTROL ACTION

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.

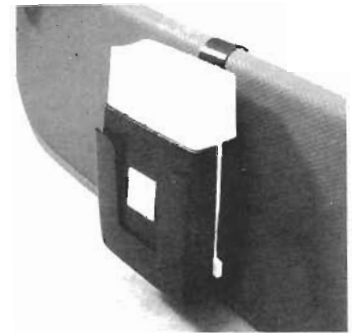


1. Pull the rope which is attached to the top of the release latch bar. This will disconnect the trolley from the chain and allow manual operation of the door.

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.

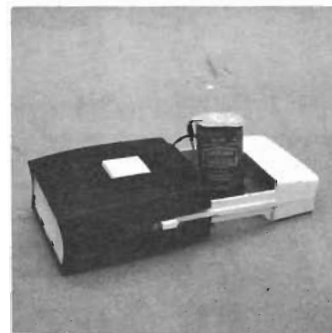
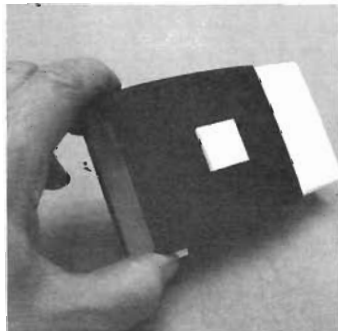
TRANSMITTER MOUNTING INSTRUCTIONS

1. Attach mounting clip to transmitter holder, using screws & nuts provided.
2. Place transmitter in holder & mount to sun visor.
3. Do not store on dash, seat, or turned down visor exposed to direct rays of sun. This will prevent possible damage to battery, transistors, case or other parts.



BATTERY REPLACEMENT

1. Depress tabs on each side of the transmitter case.
2. Push slide forward to expose battery.
3. Disconnect old battery and reconnect new battery to plug. Use standard 9-volt transistor battery (NEDA-1604). Plug is keyed so battery cannot be connected incorrectly.
4. Reassemble battery and transmitter case.



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

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NuTone Electrical Mfg. Co. of Canada, Ltd., 2 St. Lawrence Ave., Toronto 18, Canada