
Model 9 Signals Equipped With 3594 Series Gate Mechanism

Service and installation manual

Revision E, 02/2009



WESTERN-CULLEN-HAYES, Inc.
2700 West 36th Place • Chicago, Illinois 60632
Telephone: (773)254-9600 • Fax: (773)254-1110
Web Site: www.wch.com

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**GENERAL SPECIFICATIONS FOR
WESTERN-CULLEN-HAYES MODEL 9 GATE
EQUIPPED WITH 3594 MECHANISM**

General Description

The purpose of the Type 3594 Gate Mechanism is to provide a 120 VAC, heavy-duty gate operator for security and bridge gate arms from eight to forty feet in length.

Internal controls include a dead front fused disconnect switch, motor overload relay, motor up and down relays, and four adjustable cam contacts for customer use.

The unit holds the gate arm in the clear position with a de-energized electric brake. In the event of a power failure the gate arm will remain in the existing position.

Emergency manual operation is accomplished by opening the access cover on the side of the unit, inserting a socket attached to a ratchet or speed handle onto the motor pinion gear to operate the gate to the desired position. Control power is disconnected from the unit as long as the access cover is opened.

Clearing and descent times differ depending on the length and construction material of the gate arm. As an example, a properly counterweighted thirty-two foot aluminum/fiberglass gate arm will descend or clear in five to ten seconds.

Gate arms constructed from fiberglass and aluminum/fiberglass are standard with gate arm breakaway feature.

Accessories include gate lamps, warning bells, sidewalk gate arms, mast mounted warning lights, flashing light and operational controls. Application assistance is available from experienced Western-Cullen-Hayes engineers.

Mechanical Specifications

- Housing:** Weatherproof, heavy cast aluminum with cover of like material. Case is shallow wall type allowing easy, unobstructed access to all internal components. Cover is deep wall type that mounts to offset hinge brackets on the case. Cover is gasketed and secured with a spring type latch which can be padlocked.
- Main Shaft:** Double bearing type, of 2 inch diameter steel. The ends of the shaft are splined for positive positioning of the gate and counterweight support arms.
- Gears:** The gear train achieves a reduction ratio of 236 to 1.
- Bearings:** Internally lubricated ball bearings are used throughout. The bearings are sealed, weatherproof, and require no maintenance for the life of the mechanism.
- Motor:** 120 VDC motor bearings are pre-lubricated and require no maintenance throughout the life of the motor. Brush holders are designed so that proper brush pressure is maintained against the commutator. Minimum end play is 0.010 inch.
- Circuit:** Three contacts are used for mechanism operation. Four contacts are available for field use. Cams are independently adjustable to any setting from 0 to 360 degrees. The cam surface has a 93 degree arc. Two cams are of the patented "slide surface" design which provide snap action for motor and brake control.

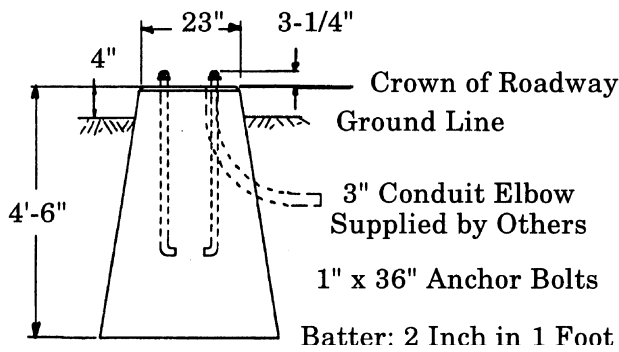
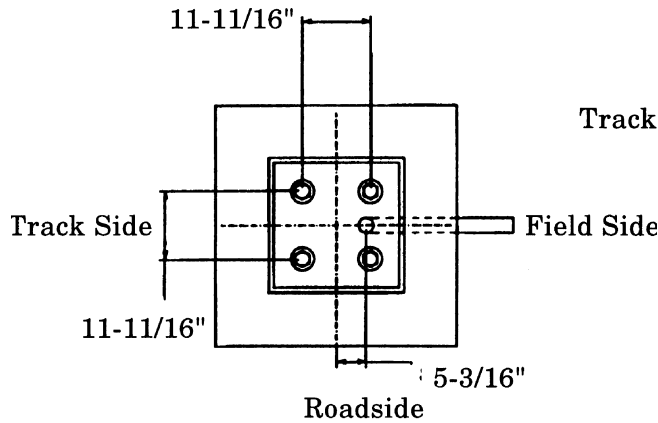
Electrical Specifications

- Input Power:** 120 VAC, 50-60 Hz., 15 amp service measured at the mechanism terminals.
- Fuse:** 10 amp time-delay type fuse. Buss FRN-R10, 15A fuse on units equipped with heaters.
- Overload Relay:** Automatic or manual reset selectable.
- Motor:** 115 VDC, 5 FLA. Internally rectified by an 800 volt, 35 amp bridge rectifier.
- Brake:** 115 VAC. Clutch type, solenoid operated. Brake engaged with solenoid de-energized.
- Cam Contact Rating:** 40 amp resistive at 12 VDC or 115 VAC.
35 amp inductive at 12 VDC or 115 VAC.
- Temperature:** -30 to +160 degrees F.
- Optional Heaters:** Contact heater, 25 watts at 115 VAC.
Brake heater, 16 watts at 115 VAC.

SECTION 1

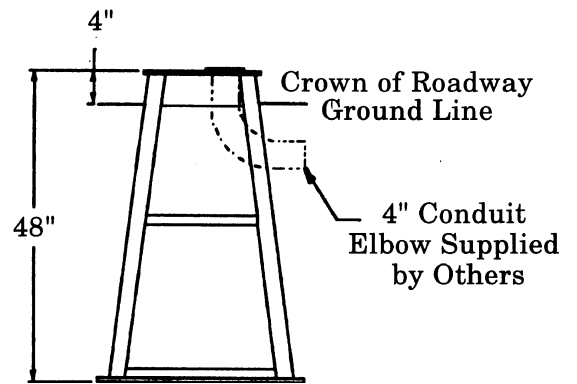
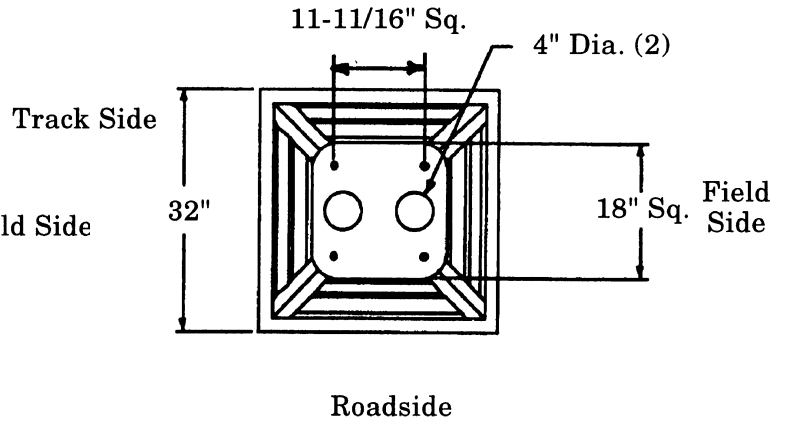
INSTALLATION INSTRUCTIONS - MODEL 9 SIGNAL

1. Install foundation in proper location per the requirements of the installation. Refer to figures 1 and 2 for typical foundation details.



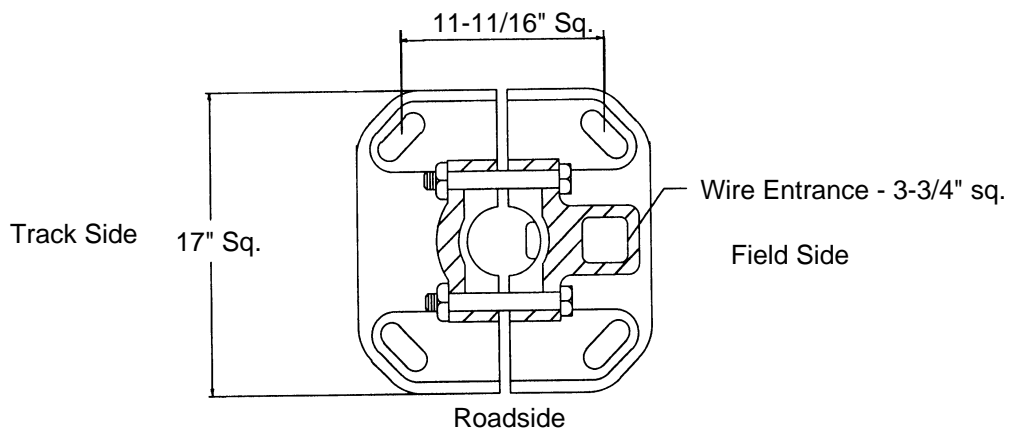
**Suggested Concrete Foundation
for Model 10 Gate Signal Using
2149 Junction Box Base**

Figure 1



**Galvanized Steel Foundation
No. 1181-9**

Figure 2

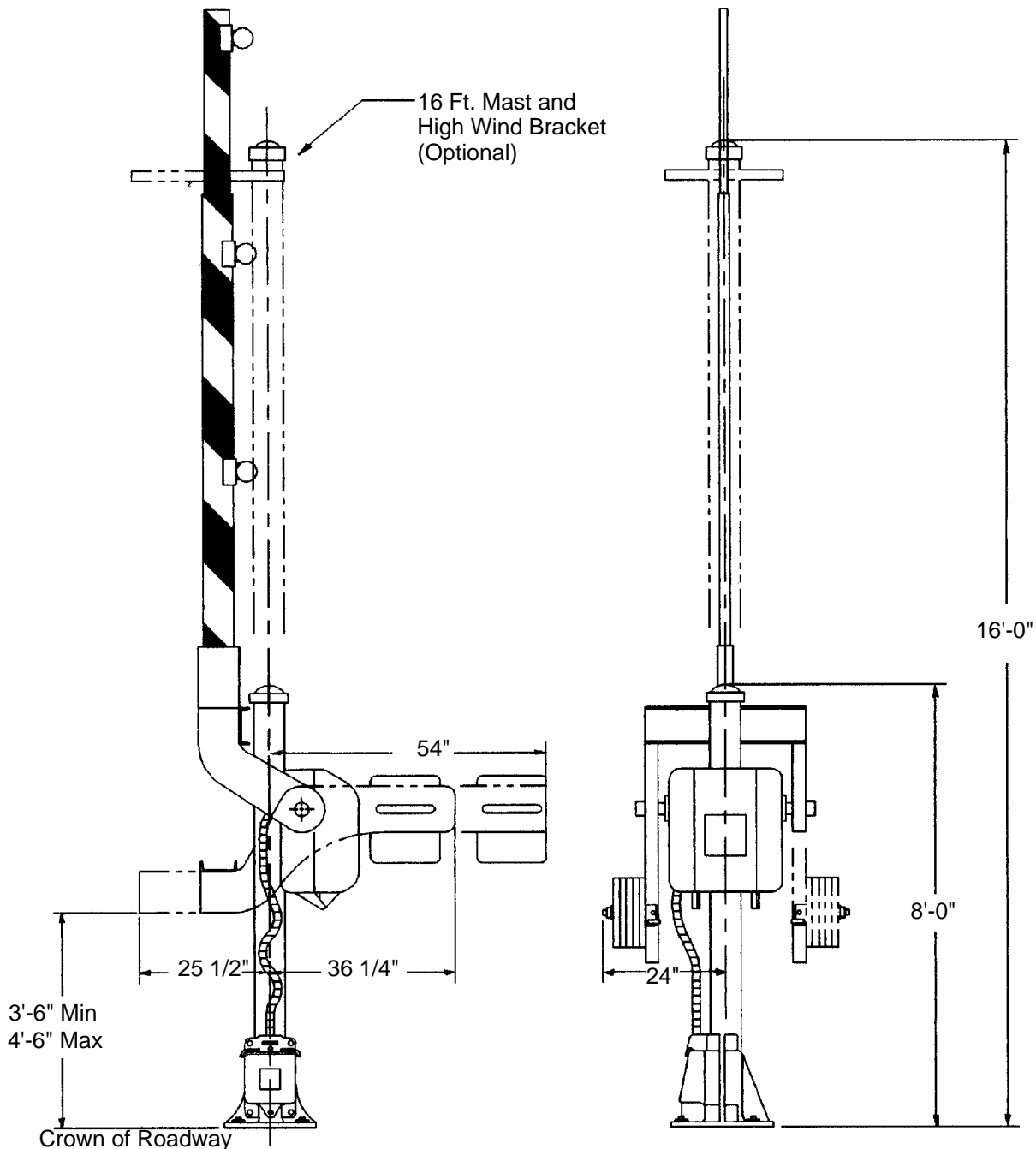


**Plan View of Type 2149
Junction Box Base**

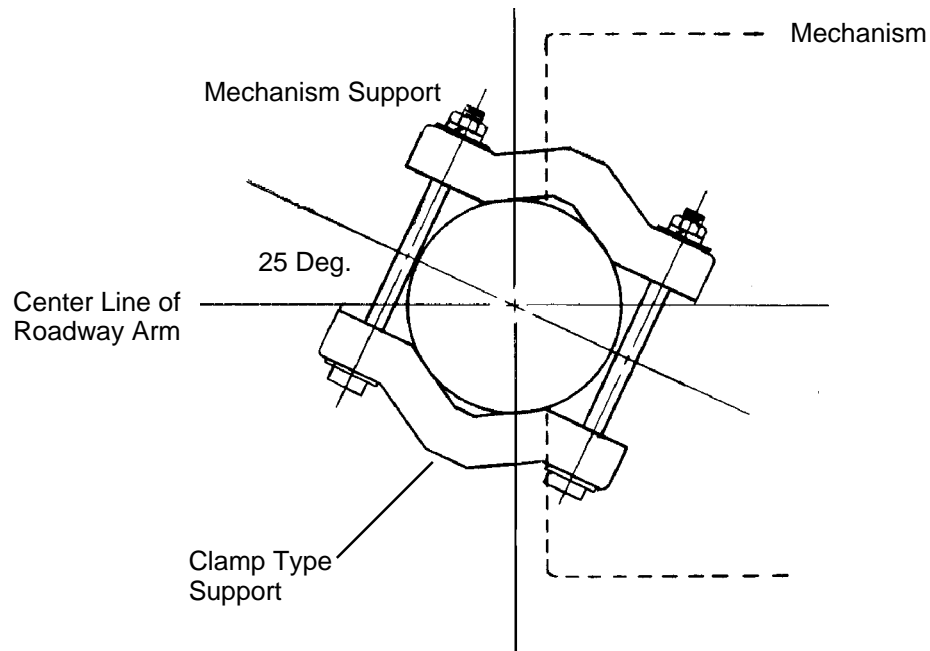
2. Remove the junction box cover to access the conduit adapter and hardware kit. Attach the conduit adapter to the top of the base. Loosen the base clamp bolts and install the lower pipe shield in the bottom of the base. Insert the signal mast into the base and tighten the base clamp bolts. Place the base and mast assembly on the foundation with the junction box cover facing on-coming traffic as shown in figure 3. Secure the assembly to the foundation anchoring bolts.

Typical Model 10 Signal

Figure 3



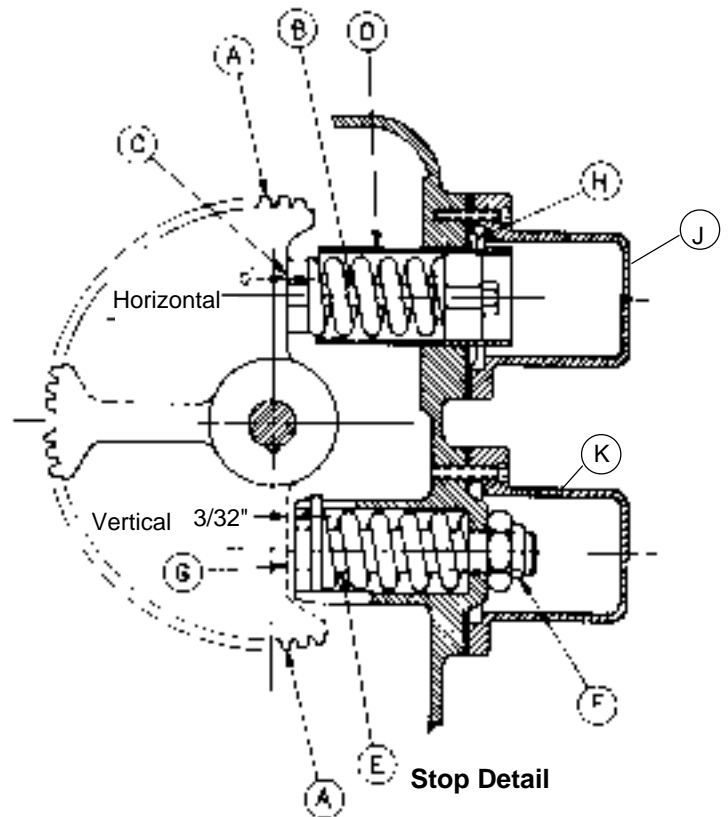
3. Secure the mechanism support assembly to the mast 48 inches above the top of the foundation in a position as shown in figure 4.
4. Install 4 square head bolts into the slots in the rear of the mechanism case. Set the mechanism onto the support assembly. Install saddle clamps and nuts.



Clamp Type Mechanism Support Installation

Figure 4

Ref. No	Description
A	Segment Gear
B	Horizontal Stop Pin
C	Contact Point
D	Horizontal Stop Spring Housing
E	Vertical Stop Pin
F	Vertical Stop Pin Nut
G	Clearance Gap 3/32" Minimum
H	Horizontal Stop Pin Locknut
J	Horizontal Stop Pin Cover
K	Vertical Stop Pin Cover



Stop Detail

Figure 5

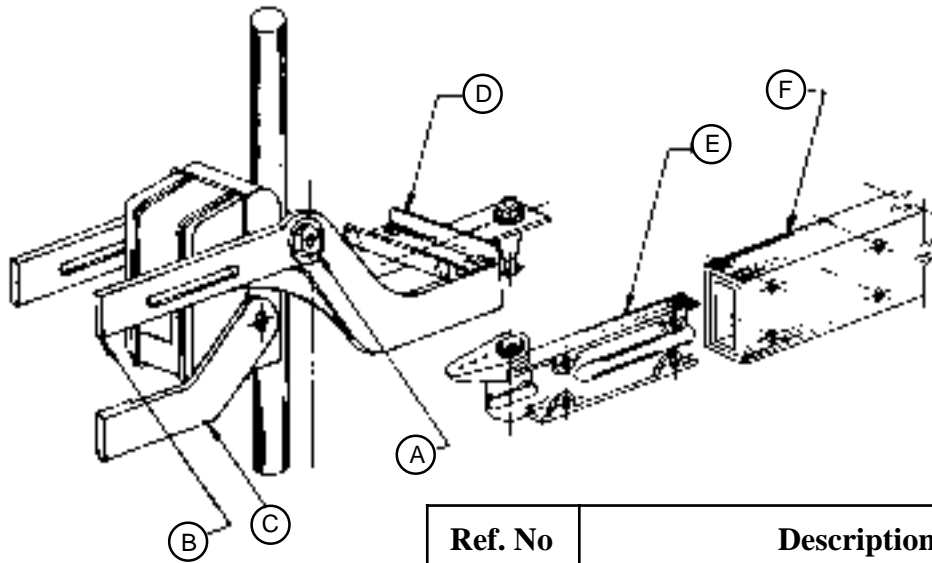
5. Remove hole plugs from mechanism case. Install conduit fittings, adapters, and cable grip if using gate lamps. Install the 1-1/2" sealtite from the base to the mechanism. Be sure enough slack is available to allow rotation of the mechanism.
6. Remove nuts, washers and spline protectors from the ends of the mechanism main shaft.
7. Make sure the main shaft is in the position it assumes when the gate arm is down (horizontal). This condition exists when segment gear (A) is resting on the horizontal stop pin (B) at point (C) as shown in figure 5, page 5.
8. Refer to figure 6, page 7. Apply gate and counterweight support arms (B) to the mechanism main shaft (A). Keeping the gate end of the supports in the down (horizontal) position, install washers and hand tighten nuts on the main shaft. If the mechanism is supplied with a sidewalk arm shaft (C), install the sidewalk arm adapter to the shaft at this time. Do not install the sidewalk arm.

CAUTION: Do not apply counterweight before the roadway gate arm is installed.

9. Install conversion bracket or breakaway adapter channel (D) to the counterweight support arms (B). Secure with provided hardware. The square head bolts fit into the recess on the support arm with the threads facing up.
10. Tighten the main shaft nuts (A).

Installation of fiberglass or aluminum/fiberglass gate arms

11. Assemble the arm by sliding sections together to achieve desired length, minimum arm insertion is 24". In some cases, it may be necessary to drill holes in the inserted arm section. Secure sections with provided hardware.



Gate and Counterweight Support Installation

Figure 6

Ref. No	Description
A	Main Shaft
B	Gate and Counterweight Support Arms
C	Sidewalk Arm Adapter
D	Conversion Bracket
E	Cast Breakaway Adapter
F	Gate Arm Section

PIVOT TYPE BREAKAWAY ADAPTER

Referring to figure 6, insert the cast breakaway adapter (E) into the gate arm end section (F) and secure with provided hardware. Position the gate arm with adapter attached 90 degrees from the mechanism assembly. Slip adapter onto mounting pin. Rotate arm 90 degrees, arm will lock in place.

Top View of Conversion Bracket Assembly

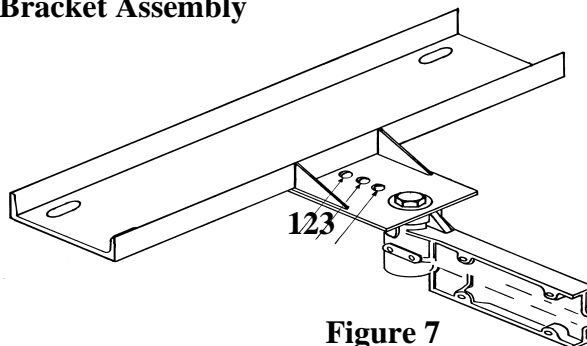


Figure 7

Install brass shear bolts in holes as instructed below. Gate arm length is measured from the centerline of the signal mast. Refer to figure 7, page 7 for hole positions.

0-18' Gate Arms - Holes 2 and 3

19'-28' Gate Arms - Holes 1 and 2

Over 29' Gate Arms - Holes 1, 2 and 3

Arm length is measured from the centerline of the mast.

After securing gate arm to breakaway adapter, install gate lamps. See paragraph 13, page 11, and figure 10, page 12, for gate lamp installation.

12. **Installation of Counterweights**

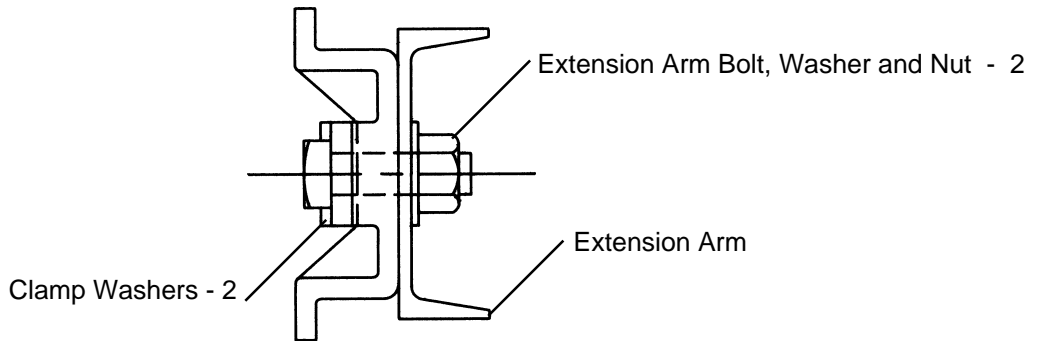
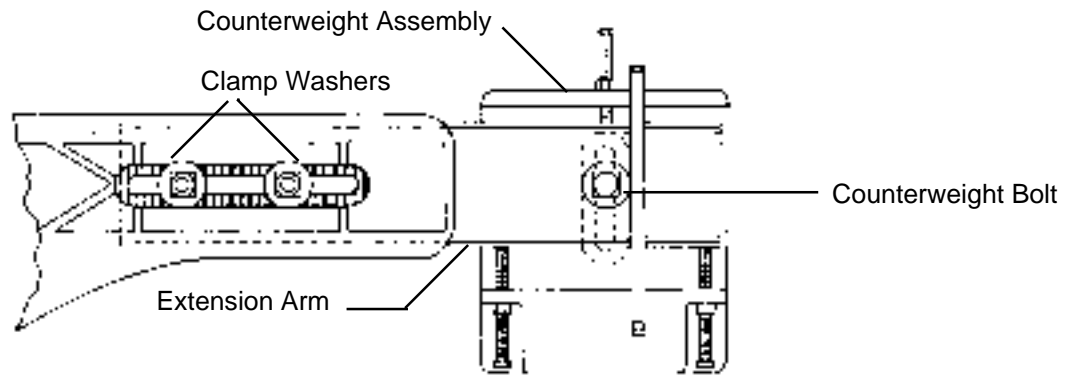
A. **Square single slot counterweights on cast iron counterweight arms with counterweight support assembly**

Refer to figure 8, page 9, for arms longer than 32 feet.

Maintain and secure the gate in the horizontal position. For arms longer than 32 feet, install the counterweight extension arms to the counterweight arms. Install the clamp washers to the extension arm bolts and insert the bolts through the slot from the inside of the counterweight arm. Install the extension arms onto the bolts. Install flat washers and nuts, position the arms near the center of the slot and tighten the nuts. Be sure that the teeth in the clamp washers are seated into the teeth on the inside of the counterweight arm. Slide the counterweight support assembly onto the extension arm and loosely tighten the three support assembly set screws. Install the counterweight bolt from the inside of the extension arm. Install the counterweights by placing each weight onto the support and sliding the slot over the counterweight bolt. Distribute the weights evenly on the two arms. After all weights are installed, install the flat washer and nut onto the counterweight bolt and tighten.

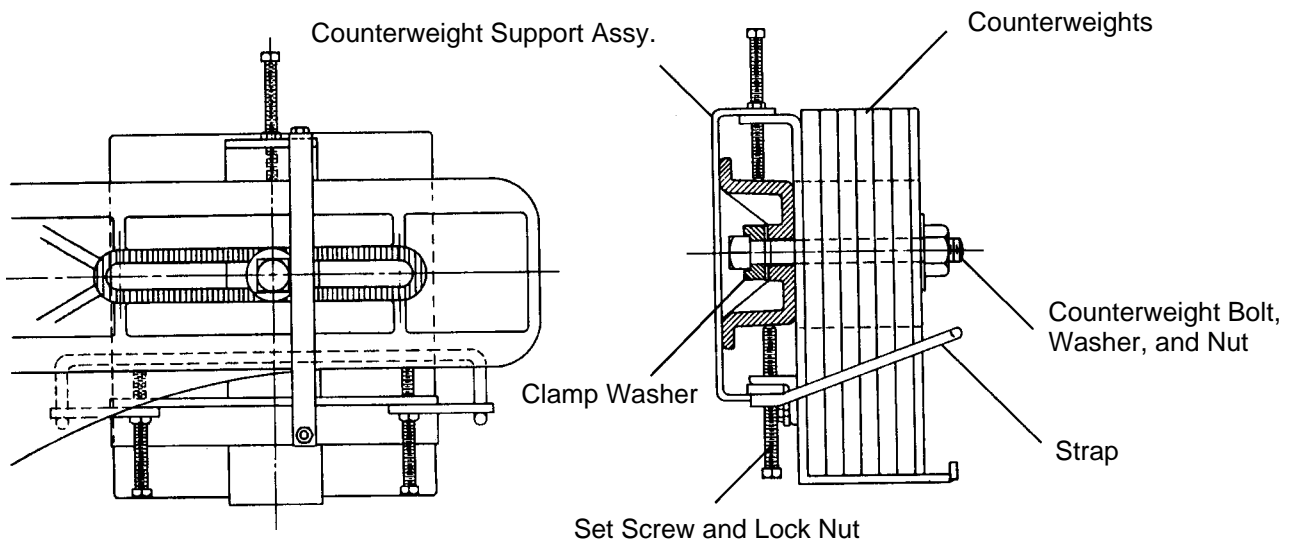
Refer to figure 8A, page 9, for arms less than 32 feet.

Slide the counterweight support assembly onto the counterweight arm. Position the assembly near the center of the slot in the arm and loosely tighten the three support assembly set screws. Install the clamp washer onto the counterweight bolt and insert the bolt through the slot from the inside of the counterweight arm. Install the counterweights by placing each weight onto the support and sliding the slot over the counterweight bolt. If two counterweight arms are supplied, distribute the weights evenly on the two arms. After all weights are installed, install the flat washer and nut onto the counterweight bolt and tighten. Be sure that the teeth in the clamp washer are seated into the teeth on the inside of the counterweight arm.



Single Slot Counterweight Assembly with Extension Arm

Figure 8



Single Slot Counterweight Assembly

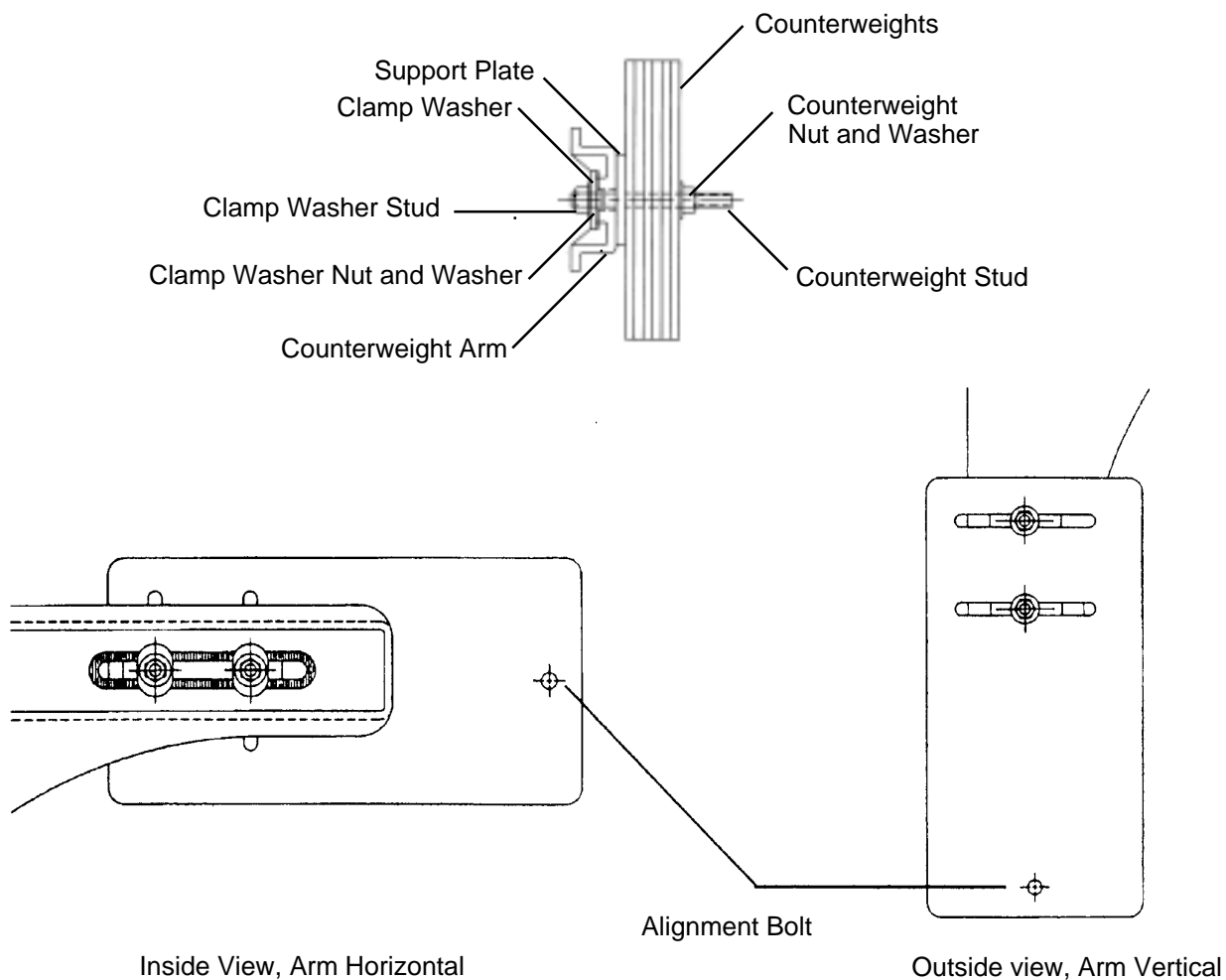
Figure 8A

B. Oblong counterweights on cast iron counterweight arms

Refer to figure 9.

Install the counterweight support plate to the counterweight arm by inserting the clamp washer (short) studs through the slot from the outside of the arm. Install the clamp washers, flat washers and nuts to the studs. Locate the support plate near the center of the slot and tighten the clamp washer nuts. Be sure that the teeth in the clamp washers are seated into the teeth on the inside of the counterweight arm.

Raise and secure the gate arm in the up (vertical) position. Install the counterweights to the counterweight (long) studs. Install the flat washers and nuts to these studs and hand tighten the nuts. If two counterweight arms are supplied, distribute the weights evenly on the two arms. Align the weights and insert the alignment bolt into the holes at the bottom of the weights. Install washers and nut onto the alignment bolt and securely tighten. Now position the weights near the middle of the slot in the weights and securely tighten the counterweight nuts. Lower the gate arm to the horizontal position.



Oblong Counterweight Assembly

Figure 9

13. If the unit will have gate arm lights:
 - a. Remove covers from light units.
 - b. Determine position of the lights per figure 10, page 12.
 - c. Position light on gate arm and using two holes in the light housing as a guide, drill two holes through the arm and secure the unit to the gate using two bolts and hardware provided.
 - d. Insert cable grips in the light units. A hole plug is inserted in the hole in the gate light unit located at the arm tip.
 - e. Trim electrical cable to required length. Insert ends of cable into the cable grips. Leave at least 6" of cable inside of the box. Secure cable to the arm using nylon supports. Drill hole apx. every 12" and secure the cable to the arm using the supports and screws provided. Cable should sag slightly to provide drip points.
 - f. Insert the cable from the light unit closest to the mechanism into the cable grip in the mechanism housing, route and terminate the wires to the junction box base, flasher case or mechanism circuit controller as required according to the electrical diagrams provided.
 - g. Connect the cables to the wire in the light unit using wire nuts provided according to the electrical diagrams provided.
 - h. Remove one lens from each light unit and install lamp bulb.
 - i. Re-install lens and light unit covers.

14. Install signal light units, signs and bell or pinnacle as required.

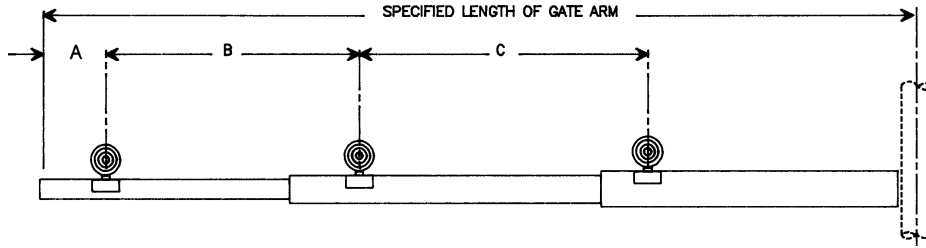
Minimum recommended wire requirements

15. Wire size for the motor circuit should be calculated so that the wire selected has no more than 0.1 ohm resistance between the service and the mechanism terminals. Wire should be soft drawn copper.

Minimum Wire Recommendation:
(Service to mechanism terminals)

<u>2-Way Length of Run</u>	<u>Wire Size</u>
0 - 60 ft.	#10AWG
60 - 120 ft.	#8 AWG
Over 120 ft	#6 AWG

16. Complete field electrical wiring of mechanism, signal lights, and bell as required.



Specified length of gate arm	Dimension "A"	Dimension "B"	Dimension "C"
14 Ft.	6"	36"	5'-0"
15 Ft.	18"	36"	5'-0"
16-17 Ft.	24"	36"	5'-0"
18-19 Ft.	28"	41"	5'-0"
20-23 Ft.	28"	4'-0"	5'-0"
24-28 Ft.	28"	5'-0"	5"-1"
29-31 Ft.	36"	6'-0"	6'-0"
32-34 Ft.	36"	7'-6"	7'-6"
35-37 Ft.	36"	9'-0"	9'-0"
38 Ft. & Over	36"	10'-0"	10'-0"

Suggested Roadway Gate Arm Light Spacing

Figure 10

17. Horizontal Torque Adjustment

Square single slot or oblong counterweights on cast iron counterweight arms.

NOTE: If sidewalk arm is being used, all torque adjustments must be made with the sidewalk arm support installed and the sidewalk gate arm not installed.

Refer to figure 11, page 13, for square weights.

Refer to figure 12, page 14, for oblong weights.

1. Using torque wrench PN: 3590-K9

Place the gate in the horizontal position.

Disconnect power by pulling the dead front fused disconnect.

Remove plastic window in the rear of the motor brake by rotating the window 90 degrees in any direction. Release the brake by moving the lever, which was uncovered by removing the window, downward. When the lever is all the way down, push the lever to the side and it will catch on the brake assembly housing and hold.

Gently push down on the counterweights to raise the gate arm about 2 feet from horizontal.

Attach the 7/8" socket attached to the torque wrench onto the hex surface on the motor pinion gear, with the wrench parallel to the ground.

Slowly release the counterweight arm and allow the wrench to rotate and rest against the housing. Note the scale reading.

The reading should be between 50 and 100 pounds regardless of the length of the gate arm.

If adjusting square weights, loosen the counterweight bolt nut and the lower two counter-weight support assembly set screws to allow the weights to be moved.

If adjusting oblong weights, loosen the clamp washer stud nuts.

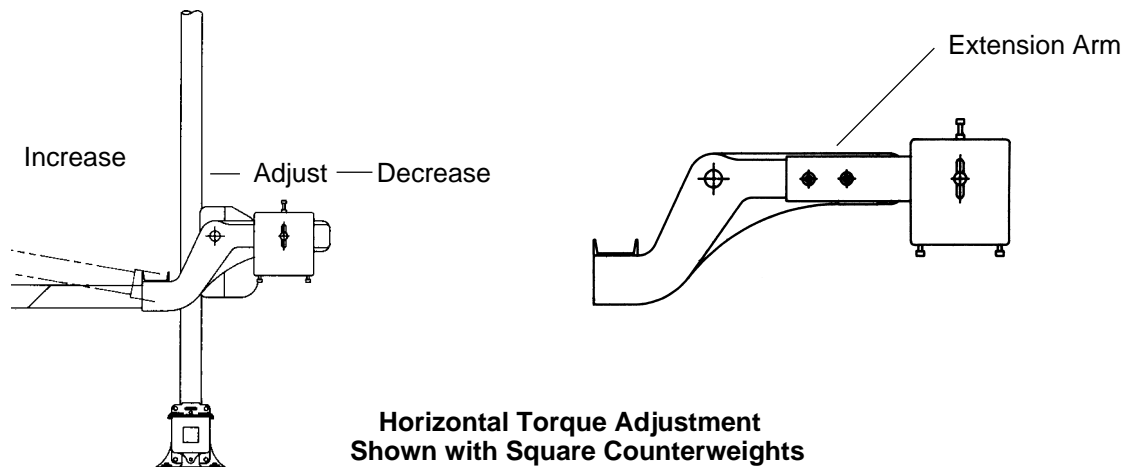
If the reading is more than specified, move the counterweights away from the mechanism.

If the reading is less than specified, move the counterweights toward the mechanism.

When weights are installed on two counterweight arms, move the weights on each arm proportionally.

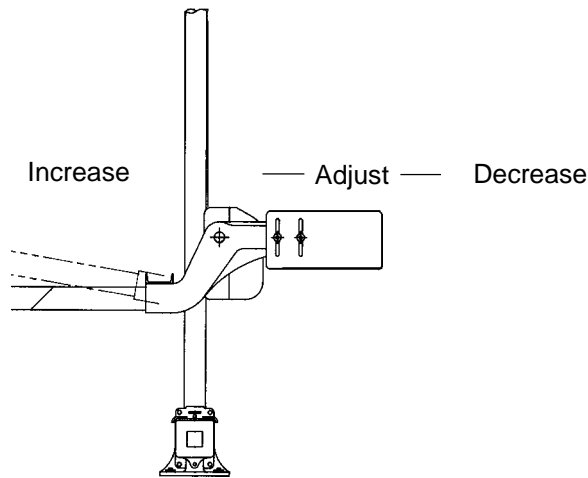
Repeat procedure as required until the scale reading is within the specification. If adjusting square weights, tighten the counterweight nut just enough so that the weights do not move and the clamp washer teeth are securely seated into the teeth in the counterweight arm.

If adjusting oblong weights, tighten clamp washer nuts securely.



**Horizontal Torque Adjustment
Shown with Square Counterweights**

Figure 11



**Horizontal Torque Adjustment
Shown with Oblong Counterweights**

Figure 12

18. Vertical Torque Adjustment

Refer to figure 13, page 15.

1. Using torque wrench PN: 3590-K9

NOTE: Do not attempt to obtain readings with a foot pound torque wrench.

Place the gate in the vertical position.

Disconnect power by pulling the dead front fused disconnect.

Attach the 7/8" socket attached to the torque wrench onto the hex surface on the motor pinion gear.

Be sure to grasp the torque wrench securely. Hold the torque wrench securely in a direction parallel to the ground. Release but do not latch, the motor brake. Slowly allow the wrench to rotate until the wrench rests against the housing. Note the scale reading. Compare the scale reading with the torque specification for the applied length of gate arm as listed in tables 1 and 2, pages 16 and 17, per your counterweight configuration.

Rotate the torque wrench back to a position parallel to the ground. Release brake and remove wrench. Be sure gate arm is stable before removing wrench.

If adjusting square weights, loosen the counterweight bolt nut just enough to allow the weights to be moved when the counterweight support assembly set screws are turned. To adjust, move the set screws with a wrench as follows.

CAUTION: On square weight systems, do not loosen the counterweight bolt nut too much as the counterweights may slip in the counterweight slot and may cause injury or the necessity to reset the horizontal torque.

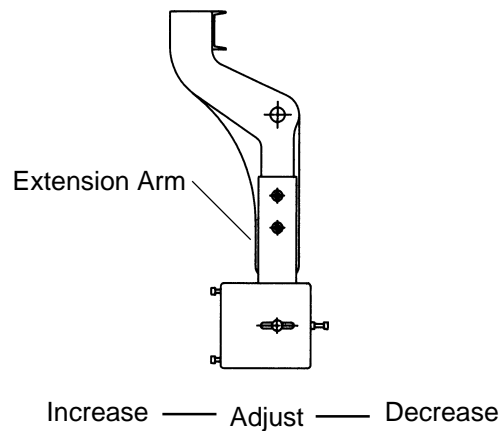
If adjusting oblong weights, loosen the counterweight stud nuts just enough to allow the weights to slide in the slots.

If the reading is more than specified, move the counterweights away from the roadway.

If the reading is less than specified, move the counterweights toward the roadway.

Repeat procedure as required until the scale reading is within the listed specification.

When complete, be sure the brake is released, install window in brake housing, replace the fused disconnect, securely tighten the counterweight bolt nut, the three set screws and the set screw jam nuts.



**Vertical Torque Adjustment
Shown with Square Counterweights**

Figure 13

Table 1

TABLE OF WEIGHT AND VERTICAL TORQUE VALUES FOR
FIBERGLASS AND ALUMINUM/FIBERGLASS GATE ARMS.

SQUARE SINGLE SLOT COUNTERWEIGHTS WITH CAST IRON COUNTERWEIGHT ARMS

Gate Arm Length in Feet	Counterweight Arms	Counterweight Supplied in Pounds	CounterweightsSupplied		Torque Wrench Reading (ft.lbs)
			25lb	50lb	
18	1	175	1	3	200
19-20	1	300	2	5	200
21	1	300	2	5	210
22	1	300	2	5	220
23	1	300	2	5	230
24	1	300	2	5	240
25	1	350	2	6	250
26	1	350	2	6	260
27	1	350	2	6	270
28	1	350	2	6	280
29	2	400	4	6	290
30	2	400	4	6	300
31	2	400	4	6	310
32	2	400	4	6	320
33	2+ Extension	400	4	6	330
34	2+ Extension	400	4	6	340
35	2+ Extension	400	4	6	350
36	2+ Extension	400	4	6	360
37	2+ Extension	400	4	6	370
38	2+ Extension	400	4	6	380
39	2+ Extension	400	4	6	390
40	2+ Extension	400	4	6	400

Table 2

TABLE OF WEIGHT AND VERTICAL TORQUE VALUES FOR
FIBERGLASS AND ALUMINUM/FIBERGLASS GATE ARMS.

OBLONG COUNTERWEIGHTS WITH CAST IRON COUNTERWEIGHT ARMS.

Gate Arm Length in Feet	Counterweight Arms	Counterweight Supplied in Pounds	CounterweightsSupplied 47lb.	Torque Wrench Reading (ft.lbs)
18	1	188	4	200
19	1	235	5	200
20	1	235	5	200
21	1	235	5	210
22	1	235	5	220
23	1	235	5	230
24	1	235	5	240
25	1	329	7	250
26	1	329	7	260
27	1	329	7	270
28	1	329	7	280
29	2	376	8	290
30	2	376	8	300
31	2	376	8	310
32	2	376	8	320
33	2	564	12	330
34	2	564	12	340
35	2	564	12	350
36	2	564	12	360
37	2	564	12	370
38	2	564	12	380
39	2	564	12	390
40	2	564	12	400

SECTION 2

INTERNAL ADJUSTMENT

WARNING: A SHOCK HAZARD EXISTS ANY TIME THE CONTACT SHIELD IS REMOVED AND POWER HAS NOT BEEN TURNED OFF. REMOVE THE DISCONNECT AND TURN OFF THE POWER SERVICE BEFORE MAINTAINING ANYTHING IN THE CIRCUIT BOARD AND CAM AREAS.

1. Horizontal Gate Position and Stop Adjustment

The horizontal and vertical stops are set at the factory. If it is necessary to adjust the stops in the field, follow these directions and refer to figure 5, page 5.

- a. Lower the gate to horizontal position. The segment gear (A) should be resting on the horizontal stop pin (B) at point (C). The clearance between the segment gear and the stop pin is 0.0 inch.
- b. Remove the horizontal stop cover (J).
- c. Attach the angle finder, PN: 3590-1014 to the main shaft and position the angle finder so that a reading of 0 degrees is shown.
- d. To adjust the horizontal gate position, loosen the stop pin lock nut then turn the spring housing in or out until the arm is parallel with the roadway.
- e. Note the reading on the angle finder. If the arm has been adjusted more than 2 degrees either side of 0 degrees, it will be necessary to adjust some of the contact cams, especially the number 4 motor brake cam. Refer to section 2.3, for contact cam adjustment instructions.
- f. Tighten the stop pin locknut and reinstall the cover.

2. Vertical Gate Position. Motor Up Cam and Vertical Stop Adjustment

If your requirements are such that the gate must rest at more or less than the 86 degrees vertical factory setting, the number 1 motor up contact cam will have to be adjusted to stop the gate arm at the desired vertical position.

- a. Remove power by pulling the dead front fused disconnect.
- b. With the brake engaged, manually raise the gate to the required vertical position.
- c. Loosen the number 1 motor up cam and rotate downward until the contact is open and the cam has cleared the contact.

- d. Note and record the angle finder reading.
- e. Holding the metal frame of the cam, rotate the cam upward until the cam surface is approximately 1/16 inch below the contact cam follower. Be certain that the sliding portion of the cam is fully downward within the cam frame. Tighten the contact cam. Refer to section 2.3 below for specifications on the contact and cam clearances.
- f. When complete, cycle the gate. Note the reading on the angle finder. If the reading is between 84 and 90 degrees, adjust the vertical stop pin. Refer to instruction below. If the reading is less than 86 degrees, it will be necessary to adjust the gate clear cam. A minimum differential of 4 degrees between the closing of the gate clear contact and the opening of the power up contact must be maintained. Refer to section 2.3 below for contact cam adjustments.

If the reading is less than 84 degrees, do not adjust the vertical stop pin.

Refer to figure 5, page 5.

- g. To adjust the vertical stop pin (E), remove the stop pin cover (K). Turn the stop pin nut (F) counterclockwise until the stop pin just contacts the segment gear (A) at (G). Then turn the nut clockwise until a minimum clearance of 3/32 inch is achieved between the stop pin (E) and the segment gear (A) at point (G). Check this with a 3/32 inch wire gauge, PN:3590-1013. Reinstall and tighten the cover.

WARNING: Do not place hands into the gear area when checking this clearance.

3. Contact Cam Adjustments

WARNING: A SHOCK HAZARD EXISTS ANY TIME THE CONTACT SHIELD IS REMOVED AND POWER HAS NOT BEEN TURNED OFF. REMOVE THE DISCONNECT AND TURN OFF THE POWER SERVICE BEFORE MAINTAINING ANYTHING IN THE CIRCUIT BOARD AND CAM AREAS.

Refer to figures 14A and 14B, page 21.

Cams and contacts are factory set at the positions shown on the wiring diagram.

Be sure that the slots in the power up cam (G) are kept free of foreign material at all times, that cam and cam follower surfaces are clean and a light coating of Bison all-temperature lubricating grease, PN: 3590-1650, or semaphore oil, is present on the cam surface (E) and (H).

CAUTION: Do not use any other type of lubricant on the cam surface. Do not lubricate the sides of the cam or the cam frame.

- a. Beginning with the gate in the horizontal position, attach the angle finder, PN: 3590-1013 to the main shaft and position it so that a reading of 0 degrees is shown.
- b. Move the gate to the position required. Refer to the mechanism wiring diagram for the normal operational positions.
- c. Loosen one allen head cap screw (A) or (L), rotate the cam to a position where the contact cam follower (B) just touches the end of the cam surface (E) or (H).

EXAMPLE: If adjusting the number 4 motor down cam, position and hold the gate at 45 degrees, position the cam so that the motor down contact is open and the cam follower (B) is touching the end of the cam surface (E).

- d. After adjustment, be certain to tighten the allen head cap screw securely.
Caution needs to be taken when tightening the cap screws referred to below.

Referring to figure 14B, the number 1 and 6 cams have a slotted insert (G) which allows for 3/16 inch radial travel. When cam insert (H) is rotated to the closest point toward cap screw (L), a gap of 1/16 inch must be maintained between the cap screw and the cam insert at location (J).

Referring to figure 14A, for all other cams, a gap of 1/16 inch must be maintained between cam insert (E) and cap screw (A) at position (K).

4. Circuit Controller Contact Adjustment

WARNING: A SHOCK HAZARD EXISTS ANY TIME THE CONTACT SHIELD IS REMOVED AND POWER HAS NOT BEEN TURNED OFF. REMOVE THE DISCONNECT AND TURN OFF THE POWER SERVICE BEFORE MAINTAINING ANYTHING IN THE CIRCUIT BOARD AND CAM AREAS.

Bending adjustment of contacts is not normally required unless the contact has been replaced.

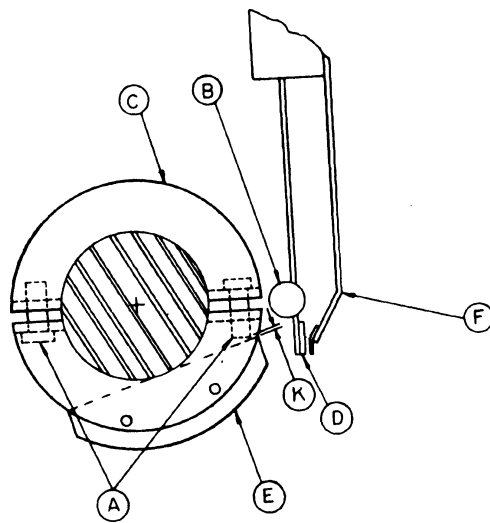
To adjust a contact, it will be necessary to bend the contact spring to achieve the following specifications by using the contact adjusting tool, PN: ES-6104-2.

When adjusting contacts, gently bend the contact spring by applying several gentle upward or downward forces against the contact spring. Recheck the gap or pressure after each operation. Repeat this procedure until specification is achieved. Overbending may damage the contact and make it impossible to achieve proper contact spring pressure. Always apply the adjusting tool at the top of the contact directly beneath the circuit controller board. Never bend the

contact body or at the bend near the contacting surface. Do not twist the contact while bending. Minimum contacting area must be 1/4 inch.

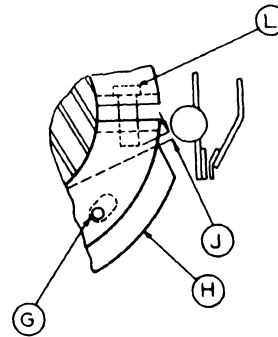
Using an insulated 1/16 inch gauge, PN: 3590-1010, adjust contacts in the following order. Refer to figure 14A.

- a. With the contact in the fully open position, the clearance between the cam follower (B) and the metal frame of the cam (C) must be a minimum of 1/16 inch. To adjust, bend the back contact until specification is achieved.
- b. With the contact in the fully open position, the clearance between the contacting surfaces (D and F) must be a minimum of 1/16 inch. To adjust, bend the front contact until specification is achieved.



Cam and Contact Detail

Figure 14A



Sliding Cam Detail

Figure 14B

Ref. No	Description
A	Cap Screws
B	Cam Follower
C	Cam Frame
D	Minimum Gap 1/16"
E	Cam Insert Surface

Ref. No	Description
F	Attach Spring Scale 18-28 oz. Number 1 and 6 16-24 oz. All other Contact
G	Cam Slot
H	Cam Insert Surface
J	Minimum Gap 1/16"
K	Minimum Gap 1/16"
L	Cap Screw

Using an ounce spring scale, PN: 3565-211, and contact adjusting tool, PN: ES-6104-2, adjust contact spring pressure as follows. Refer to figure 14A.

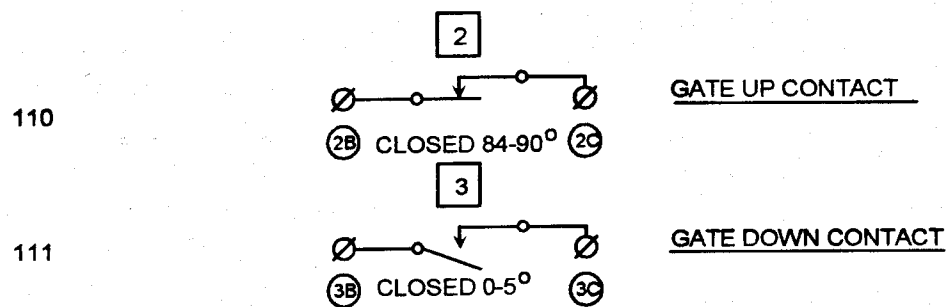
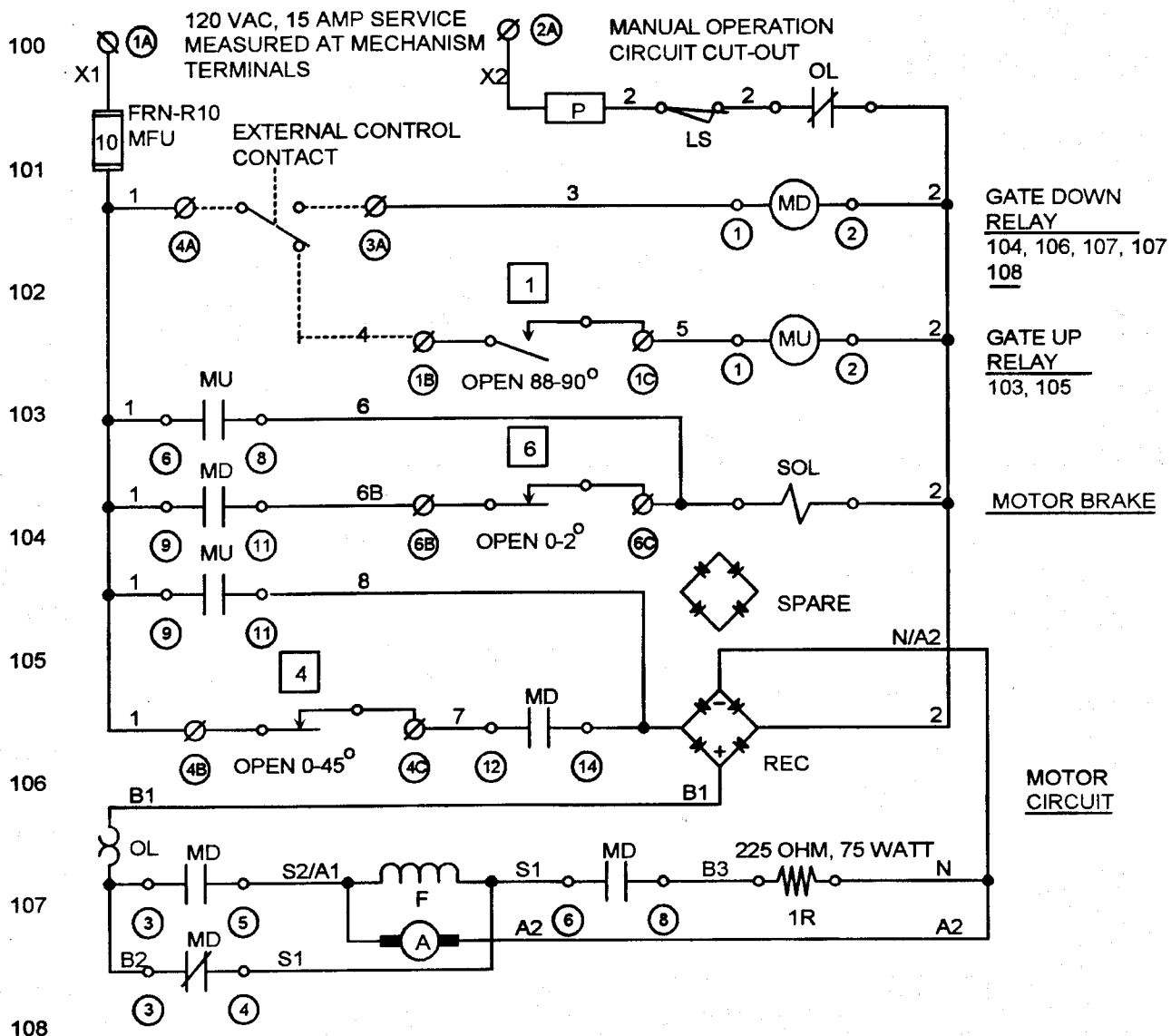
Position the gate so that the contact cam follower (B), is well upon the cam surface (E) or (H) and the contact is fully closed. Hook the end of the scale to the front contact at the bend (F), near the contacting surface and lift gently until the contact opens. The reading should fall between 18 to 28 ounces on the motor up contact and between 16 to 24 ounces for all other contacts. To adjust, bend the front contact while the contact is closed. To reduce pressure, bend the contact away from the cam. To increase pressure, bend the contact toward the cam.

CAUTION: Do not overbend the contact. Overbending may damage the contact and make it impossible to achieve the correct gap or contact spring pressure.

WHEN ALL MAINTAINENCE IS COMPLETE IN THE CIRCUIT BOARD AND CAM AREAS, REPLACE THE CONTACT SHIELD, RESTORE POWER SERVICE AND INSTALL THE DISCONNECT.

5. Wiring Diagram

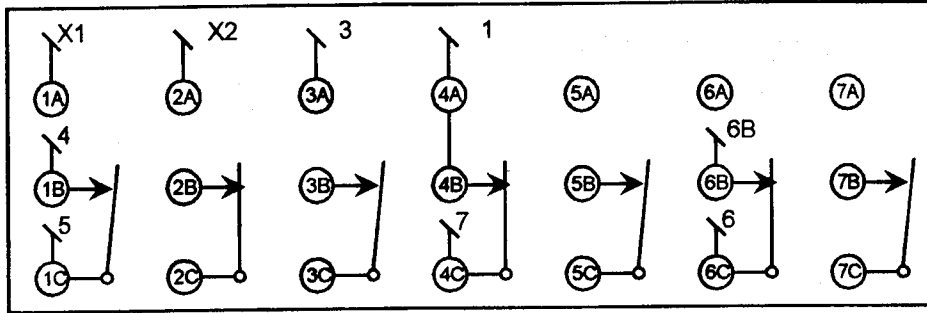
The following wiring diagrams illustrate the arrangement of mechanism wiring and operating circuits for 3594 series crossing gate mechanisms. The same diagrams show the standard adjustment of all circuit controller contacts as set at the factory.



CIRCUIT SHOWN WITH GATE IN VERTICAL POSITION

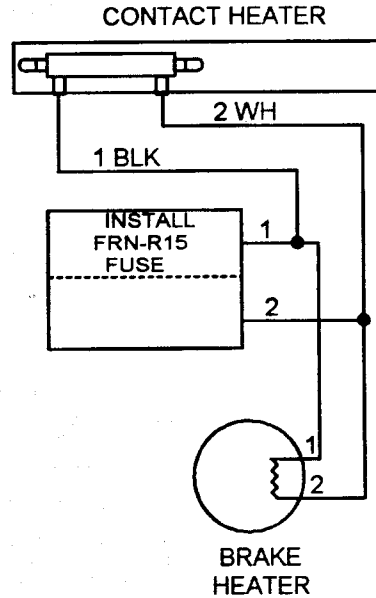
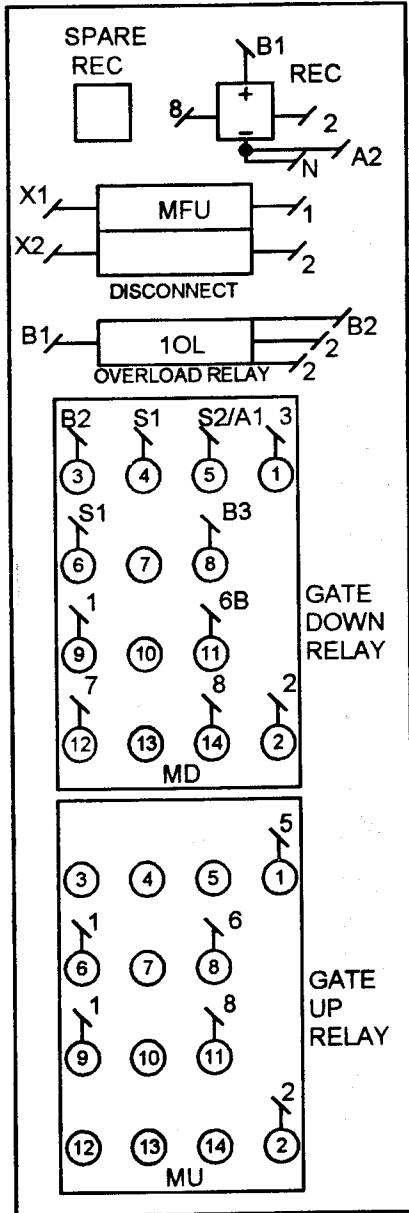
112

WESTERN-CULLEN-HAYES, INC.
 2700 W. 36TH PLACE, CHICAGO, IL 60632
 773-254-9600 FAX:773-254-1110
 TITLE:
 3594 GATE MECHANISM WIRING DIAGRAM



CIRCUIT CONTROLLER

CONTROL PANEL



OPTIONAL CONTACT & BRAKE HEATER WIRING
(IF SO EQUIPPED)

WESTERN-CULLEN-HAYES, INC.

2700 W. 36TH PLACE, CHICAGO, IL 60632
773-254-9600 FAX:773-254-1110

TITLE:

3594 GATE MECHANISM WIRING DIAGRAM

SECTION 3

GENERAL MAINTENANCE

1. Operational Tests.

All mechanisms are given a final inspection and are properly lubricated and adjusted before shipment from the factory.

Before placing any mechanism in service:

- A. Supply voltage should be maintained between 110 and 120 volts AC. Check supply voltage at the motor supply terminal.
- B. Operate the mechanism through an up-down cycle and note operating voltage readings. As the gate goes up, voltage should not drop below 110 volts and current should range from 4 to 10 amps. As the gate descends, voltage should not drop below 110 volts and current should range from 4 to 10 amps. Readings will vary depending on the length of gate arm. If voltage drops below 110 volts, check motor supply wiring between the service and the mechanism terminal points for proper wire sizing and voltage drop. Correct wiring where necessary.
- C. Normal field descending time should be between 4 and 10 seconds depending on gate arm length.

- D. Check the clearing time:

Depending on gate arm length and voltage supplied, the arm should raise to the clear position between 5 to 10 seconds.

- E. No field adjustments are recommended to the motor control relay. Field tests suggested are:
 - 1. Verify pick values.
 - 2. Visually inspect contacts for arcing or burning.

Part Number 50-0267 Relay Specifications:

Coil Resistance: 120 ohm

Maximum required voltage to pick: 102 VAC

SETUP CHECKLIST

Location: _____ In Service Date: _____

- 1. Supply voltage between 110 and 120 volts AC. _____ volts
- 2. Check for grounds in wiring. _____
- 3. Check descending time. _____
- 4. Check clearing time. _____
- 5. Check relay pick voltage. _____ volts
- 6. Set horizontal gate arm torque. _____ ft. lbs.
- 7. Set vertical gate arm torque. _____ ft. lbs.
- 8. Gate parallel to roadway surface. _____
- 9. 3/32" clearance between segment gear and horizontal stop. _____
- 10. Contact cams adjusted if gate stop positions have been altered. _____
 - Number 1 and 6 cams. _____
 - Number 4 brake cam closed at 2 degrees. _____
- 11. Contact shield in place. _____

Installed by: _____

Checked by: _____

2. Lubrication.

Time interval for periodic lubrication will be governed by usage.

This interval, therefore, should be determined by the user.

The mechanism gear train, main shaft and motor bearings are pre-lubricated and sealed. No periodic lubrication is required for these bearings.

The gear teeth are to be lubricated periodically with, PN: 3590-1650 Bison all-temperature lubricating grease. Contact cams to be lubricated as specified in section 2, paragraph 3, page 19.

3. Motor Service.

NOTE: Place gate in the horizontal position and remove fused disconnect, before performing any motor service.

The motor has a totally enclosed, non-ventilated housing and has pre-lubricated sealed bearings.

The motor brushes should be periodically inspected for wear. Replace brushes and springs when carbon portion has worn to 5/8 inch length or less.

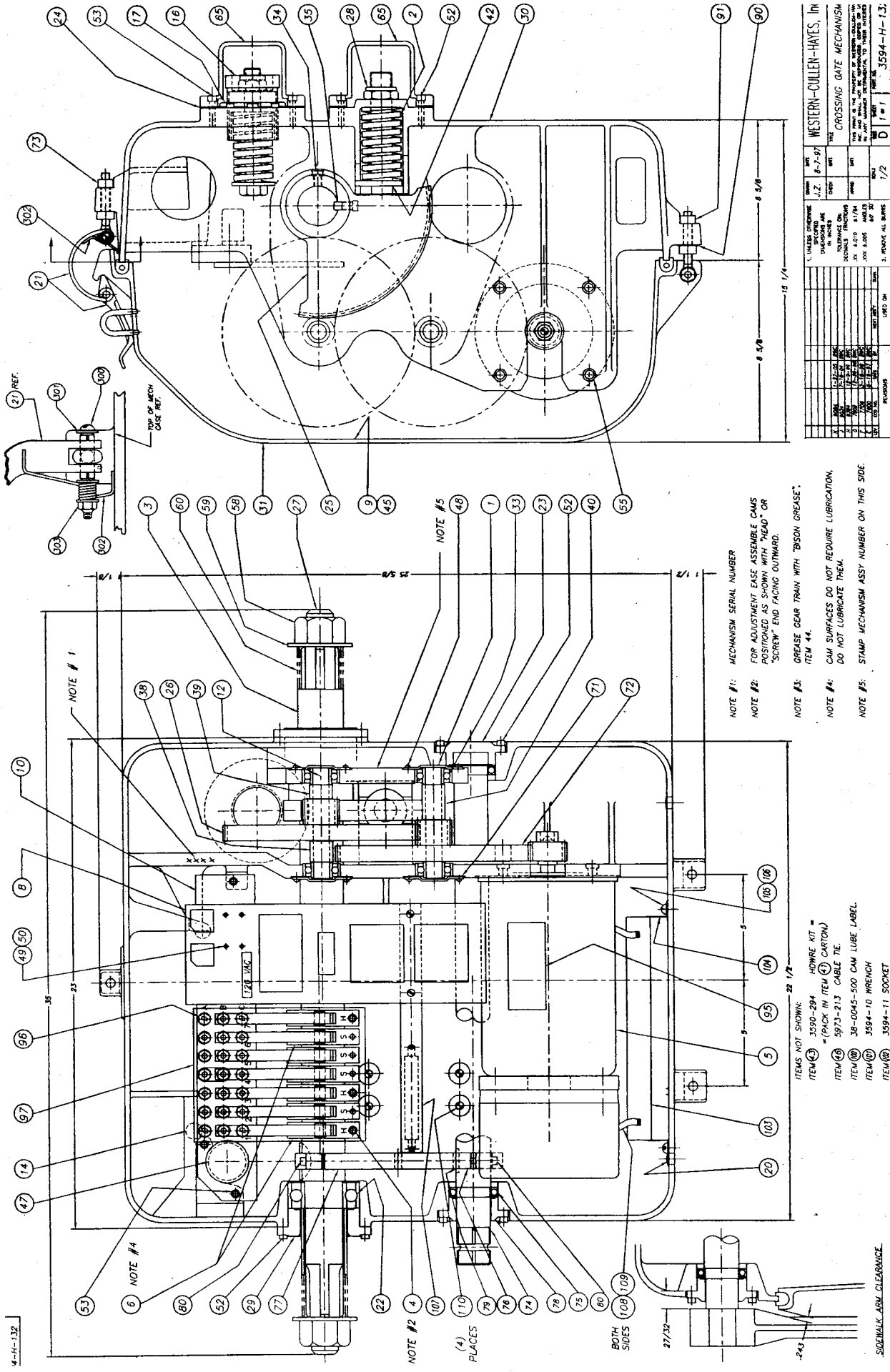
NOTE: Motor brush caps screw on. Remove caps by turning counter-clockwise. Hand tighten only when replacing caps. Always remove motor brushes when gate arm is in the horizontal position. No dynamic braking is provided with a brush removed. Note: brushes are spring-loaded in holder, care should be taken during disassembly.

SECTION 4

OPTIONALEQUIPMENT

1. Sidewalk Arm Kit, permits the addition of a sidewalk arm to the mechanism in service. The kit includes necessary bearings, gears, keys, shafts and instructions. Does not include sidewalk arm bracket or sidewalk arm.
2. Heater, may be attached to the mechanism for prevention of frost formation on controller contacts and installed in the motor brake to prevent frost formation on the disks.
3. Set-up and adjustment tools are listed on the last page of the mechanism parts section.

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- NOTE #1: MECHANISM SERIAL NUMBER
- NOTE #2: FOR ADJUSTMENT EASE ASSEMBLE CAMS POSITIONED AS SHOWN WITH "HEAD" OR "SCREW" END FACING OUTWARD.
- NOTE #3: GREASE GEAR TRAIN WITH "BISON GREASE", ITEM 44.
- NOTE #4: CAM SURFACES DO NOT REQUIRE LUBRICATION. DO NOT LUBRICATE THEM.
- NOTE #5: STAMP MECHANISM ASSY NUMBER ON THIS SIDE.

- ITEMS NOT SHOWN:
- ITEM (3) 3590-294 HOWRE KIT = (PACK IN ITEM (4) CARTON)
 - ITEM (6) 5973-213 CABLE TIE
 - ITEM (8) 38-0045-500 CAM LUBE LABEL
 - ITEM (10) 3594-10 WRENCH
 - ITEM (11) 3594-11 SOCKET

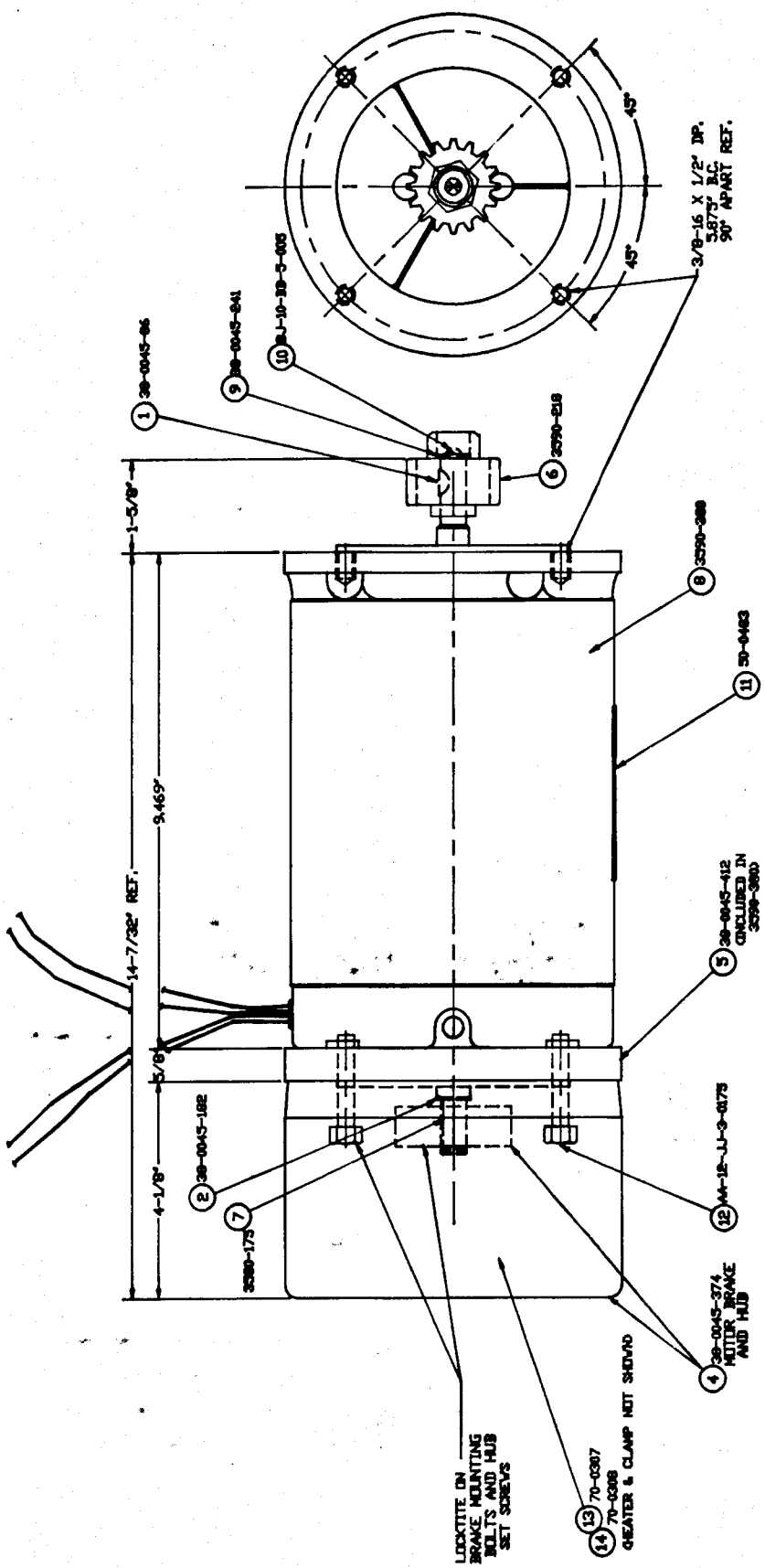
UNLESS OTHERWISE SPECIFIED		WESTERN-CULLEN-HAYES, INC.	
SIZE	FINISH	STANDARD	THIS CROSSING GATE MECHANISM
1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4, 4 1/2, 5, 5 1/2, 6, 6 1/2, 7, 7 1/2, 8, 8 1/2, 9, 9 1/2, 10, 10 1/2, 11, 11 1/2, 12, 12 1/2, 13, 13 1/2, 14, 14 1/2, 15, 15 1/2, 16, 16 1/2, 17, 17 1/2, 18, 18 1/2, 19, 19 1/2, 20, 20 1/2, 21, 21 1/2, 22, 22 1/2, 23, 23 1/2, 24, 24 1/2, 25, 25 1/2, 26, 26 1/2, 27, 27 1/2, 28, 28 1/2, 29, 29 1/2, 30, 30 1/2, 31, 31 1/2, 32, 32 1/2, 33, 33 1/2, 34, 34 1/2, 35, 35 1/2, 36, 36 1/2, 37, 37 1/2, 38, 38 1/2, 39, 39 1/2, 40, 40 1/2, 41, 41 1/2, 42, 42 1/2, 43, 43 1/2, 44, 44 1/2, 45, 45 1/2, 46, 46 1/2, 47, 47 1/2, 48, 48 1/2, 49, 49 1/2, 50, 50 1/2, 51, 51 1/2, 52, 52 1/2, 53, 53 1/2, 54, 54 1/2, 55, 55 1/2, 56, 56 1/2, 57, 57 1/2, 58, 58 1/2, 59, 59 1/2, 60, 60 1/2, 61, 61 1/2, 62, 62 1/2, 63, 63 1/2, 64, 64 1/2, 65, 65 1/2, 66, 66 1/2, 67, 67 1/2, 68, 68 1/2, 69, 69 1/2, 70, 70 1/2, 71, 71 1/2, 72, 72 1/2, 73, 73 1/2, 74, 74 1/2, 75, 75 1/2, 76, 76 1/2, 77, 77 1/2, 78, 78 1/2, 79, 79 1/2, 80, 80 1/2, 81, 81 1/2, 82, 82 1/2, 83, 83 1/2, 84, 84 1/2, 85, 85 1/2, 86, 86 1/2, 87, 87 1/2, 88, 88 1/2, 89, 89 1/2, 90, 90 1/2, 91, 91 1/2, 92, 92 1/2, 93, 93 1/2, 94, 94 1/2, 95, 95 1/2, 96, 96 1/2, 97, 97 1/2, 98, 98 1/2, 99, 99 1/2, 100, 100 1/2, 101, 101 1/2, 102, 102 1/2, 103, 103 1/2, 104, 104 1/2, 105, 105 1/2, 106, 106 1/2, 107, 107 1/2, 108, 108 1/2, 109, 109 1/2	1/2	D	1/2
MATERIALS		MATERIALS	
STEEL	304	STEEL	304
BRASS	360	BRASS	360
COPPER	110	COPPER	110
ALUMINUM	6061	ALUMINUM	6061
ZINC	105	ZINC	105
NICKEL	201	NICKEL	201
TIN	102	TIN	102
LEAD	103	LEAD	103
PHOSPHOR	104	PHOSPHOR	104

3594 GATE MECHANISM PARTS

ITEM	PART NUMBER	DESCRIPTION
1	38-0045-30	BEARING COVER
2	38-0045-38	SPRING
3	38-0045-42	MAINSHAFT SPACER
4	38-0045-55	CAM ASSEMBLY
5	38-0045-380-X	MOTOR ASSEMBLY
	38-0045-381-X	MOTOR ASSEMBLY WITH BRAKE HEATER
6	38-0045-92	SLIDE CAM ASSEMBLY
8	38-0045-370	RELAY PANEL ASSEMBLY
9	3594-WD	WIRING DIAGRAM
10	38-0045-373	CIRCUIT CONTROLLER
12	38-0045-267	CLUSTER GEAR SHAFT
16	38-0045-305	SPRING ASSEMBLY
17	38-0045-314	2" CONDUIT LOCKNUT
20	1265-6-B	VENTPLUG
21	1265-40-1	HASP ASSEMBLY
22	3580-166	MAIN SHAFT BEARING
23	3580-226-M	END CAP
24	3580-281	GASKET
25	3590-219-F	SEGMENT GEAR
26	3590-220-F	CLUSTER GEAR
27	3590-222	MAIN SHAFT
28	3590-231	NYLOCK NUT
29	3590-232	MAIN SHAFT CAP
30	3594-20-1	MACHINED CASE
31	3590-240-2-1	COVER ASSEMBLY
	3590-240-2-3	COVER ASSEMBLY WITH LOCKOUT SWITCH
33	3590-249	BEARING
34	3590-251	SET SCREW
35	3590-254	WOODRUFF KEY
38	3590-277	SPACER
39	3590-278	SPACER
40	3590-279	SPACER
42	3590-293	BUMPER PIN ASSEMBLY
43	3590-294	HARDWARE KIT
47	6560-51	PIPE PLUG
48	BB-32-BB-3-0037	8-32 X 3/8" BUTTON HEAD SOCKET SCREW
49	AA-10-CC-C-0125	10-24 X 1-1/4" MACHINE SCREW
50	RR-00-AH-3	10 LOCKWASHER
52	BB-23-EE-3-0075	1/4-20 X 3/4" HEX SCREW
53	BB-23-EE-3-0125	1/4-20 X 1-1/4" HEX SCREW
55	BB-23-JJ-3-0075	3/8-16 X 3/4" SOCKET HEAD SCREW
58	JJ-12-AD-3	1-1/4-7 HEX NUT
59	PP-00-AW-3	1-1/4" PLAIN WASHER
65	38-0045-329-M	STOP ADJUSTMENT CAP
71	3590-275	BEARING CAP SPACER

3594 GATE MECHANISM PARTS		
ITEM	PART NUMBER	DESCRIPTION
72	3590-220-G	CLUSTER GEAR WITH HOLE
74	3590-223	SIDEWALK ARM SHAFT
75	3590-248	BEARING
76	3590-224	SEGMENT GEAR
77	3590-225	SEGMENT GEAR
95	50-0483	LABEL
96	R-2000-1	BLACK CAP
97	38-0045-389	CONTACT SHIELD
101	3594-10	SPEED WRENCH
102	3594-11	7/8" SOCKET
103	50-0272	RESISTOR
104	50-0273	RESISTOR MOUNTING CLIPS
107	38-0045-416	CONTACT HEATER
300	AA-10-DD-D-3-02	10-32 X 2 RHMS STL
301	PP-00-AH-3	#10 PL STEEL WASHER
302	3590-382	TORSION SPRING-FORME
303	AL-12-DD-3	10-32 NY-LOK HEX NUT

RELAY PANEL PARTS		
ITEM	PART NUMBER	DESCRIPTION
2	50-0124	BRIDGE RECTIFIER
5	2305-12	DICONNECT
6	50-0153	FUSE PLUG
7	400-35-19	10 AMP FUSE, USED WITHOUT HEATERS
	400-35-17	15 AMP FUSE, USED WITH HEATERS
8	50-0954-F	OVERLOAD RELAY
9	50-0956-F	OVERLOAD RELAY HEATER
11	50-0267	120V RELAY
12	91254-1	RELAY COVER



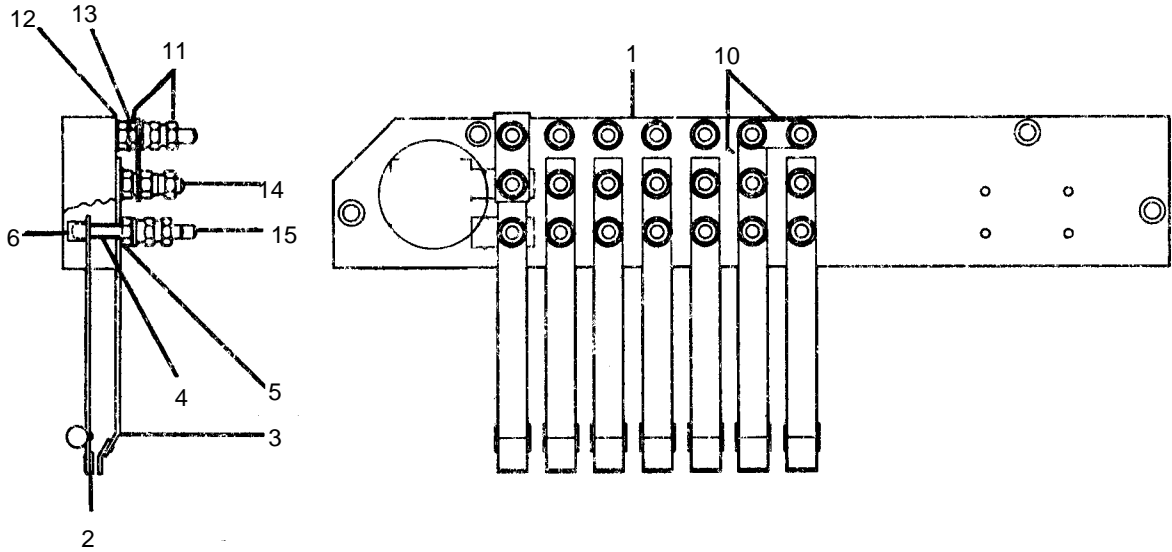
WESTERN-CULLEN-HAYES, Inc.		DATE	BY	CHKD	APP'D	SCALE	SHEET	TOTAL
		9-19-66	BY	Z		1/2	B	38-0045-381-X
TITLE		HECH MOTOR - 110 V.D.C. ASSEMBLY V/BRAKE HEATER						
TOLERANCE ON DIMENSIONS ARE IN INCHES		TOLERANCE ON DECIMALS FRACTIONS						
XX ±.010 ±1/64		XX ±.005 ANGLES ±.07						
1. UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		2. REMOVE ALL BURRS						
REV	BY	DATE	DESCRIPTION	USED ON				
1	REDAWN	9-25-67	BVC					
2		11-13-67	BY	3894-11-132	1			
3								

REV	BY	DATE	DESCRIPTION	USED ON
1	REDAWN	9-25-67	BVC	
2		11-13-67	BY	3894-11-132
3				

MOTOR ASSEMBLY PARTS		
ITEM	PART NUMBER	DESCRIPTION
1	38-0045-86	PINION GEAR WOODRUFF KEY
2	38-0045-182	WASHER
4	38-0045-374	MOTOR BRAKE
5	38-0045-412	BRAKE ADAPTER PLATE
6	3590-218	MOTOR PINION GEAR
7	3580-175	KEY, BRAKE END OF ARMATURE
8	3590-380	120V DC MOTOR
9	38-0045-241	WASHER
10	BJ-10-BB-5-005	8-32 X1/2" NYLOCK SCREW
12	3594-84	3/8 X 1-3/4 SOCKET HEAD
13	70-0307	CARTRIDGE HEATER
14	70-0308	HEATER CLAMP

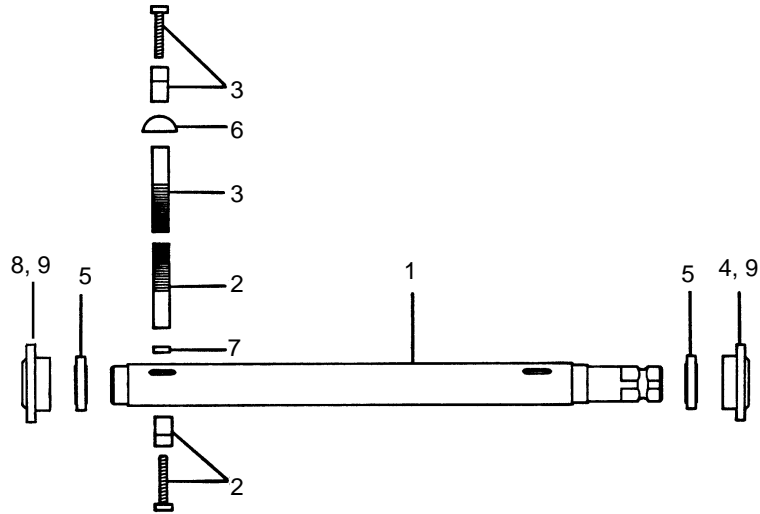
COVER ASSEMBLY PARTS		
ITEM	PART NUMBER	DESCRIPTION
1	3590-240-2-2	COVER WITHOUT LOCKOUT SWITCH
	3590-240-2-3	COVER WITH LOCKOUT SWITCH
2	1265-4	STAPLE
3	3590-258-2	GASKET
4	CC-12-GG-3-0225	5/16-18 X 2-1/4" HEX BOLT
6	3590-381	EYE BOLT
7	HH-12-JJ-3	3/8-16 HEAVY NUT
8	AL-12-GG-3	5/16-18 NYLOCK NUT
9	3594-1	LIMIT SWITCH
10	3594-2	LIMIT SWITCH ACTUATOR
11	3594-3	MICRO SWITCH COVER
12	3594-4	RECEPTACLE COVER
19	3594-30	LOCKOUT SWITCH 120V AC, 15 AMP
21	3594-32	LOCKOUT SWITCH ACTUATOR

CIRCUIT CONTROLLER ASSEMBLY



CIRCUIT CONTROLLER PARTS		
ITEM	PART NUMBER	DESCRIPTION
1	38-0045-21	TERMINAL BOARD
2	38-0045-27	BACK CONTACT SPRING ASSEMBLY
3	38-0045-28	FRONT CONTACT SPRING ASSEMBLY
4	38-0045-29-A	INSULATOR SLEEVE
5	38-0045-29-B	INSULATOR WASHER
6	38-0045-77	BINDING POST SEAT
10	1705-4	CONNECTOR. LOCATION MAY VARY.
11	10706	BINDING NUT
12	10707	CLAMP NUT
13	10708	WASHER
14	10709-2	BINDING POST, 1-7/8"
15	10709-3	BINDING POST, 2-1/4"

SIDEWALK KIT



SIDEWALK KIT AND PARTS		
ITEM	PART NUMBER	DESCRIPTION
	3590-295	SIDEWALK ARM SHAFT KIT
		DOES NOT INCLUDE ADAPTOR OR GATE ARM
1	3590-223	SIDEWALK ARM SHAFT
2	3590-224	SIDEWALK SHAFT GEAR SEGMENT
3	3590-225	MAIN SHAFT GEAR SEGMENT
4	3590-227	COLLAR
5	3590-248	BEARING
6	3590-254	MAIN SHAFT WOODRUFF KEY
7	3590-255	SIDEWALK SHAFT KEY
8	3580-226-M	CAP
9	AA-15-EE-3-0075	1/4-20 X 3/4" SOCKET HEAD SCREW

SET-UP AND ADJUSTMENT TOOLS

Torque wrench with socket, PN: 3590-K-9.

Used for measuring gate arm torque.

Ounce spring scale, PN: 3565-211

Used to measure contact spring pressure.

1/16" insulated gauge , PN: 3590-1010

Contact bending tool for contacts without stiffeners, PN: ES-6104-2

Used to adjust circuit board contact.

Angle finder, PN: 3590-1014

Used to set contact cam operating position.

3/32" wire gauge, PN: 3590-1013

Used to check vertical stop to segment gear clearance.

Bison all temperature lubricating grease, PN: 3590-1650

For lubrication of gears and contact cams, 1 quart can.

Installation, Service and Parts List for Series 56,000 (rev. A)

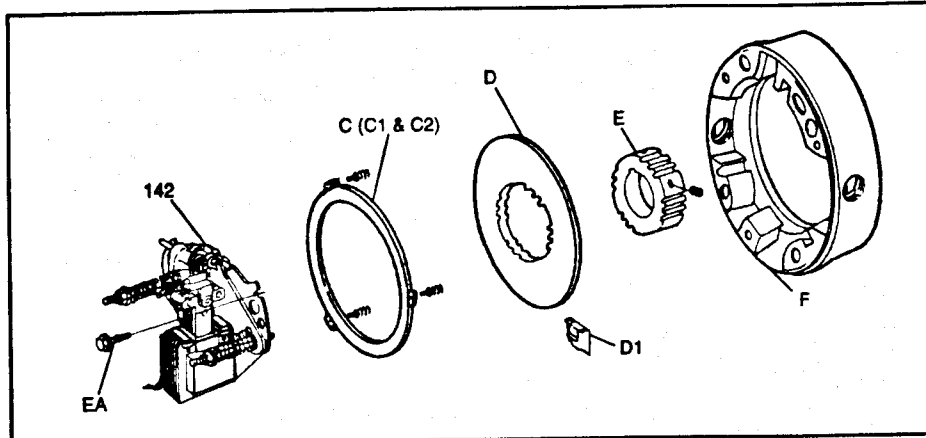


Figure 1

Important

Please read these instructions carefully before installing, operating or servicing your Stearns Brake. Failure to comply with these instructions could cause injury to personnel and/or damage to property if the brake is installed or operated incorrectly. For definition of limited warranty/liability, contact Rexnord Corporation, Stearns Division, 120 North Broadway, Milwaukee, Wisconsin 53202, (414) 272-1100.

Caution

1. Installation and servicing must be made in compliance with all local safety codes including Occupational Safety and Health Act (OSHA). All wiring and electrical connections must comply with the National Electric Code (NEC) and local electric codes in effect.
2. Do not install the brake in atmospheres containing explosive gases or dusts.
3. To prevent an electrical hazard, disconnect power source before working on the brake. If power disconnect point is out of sight, lock disconnect in the *off* position and tag to prevent accidental application of power.
4. Make certain power source conforms to the requirements specified on the brake nameplate.
5. Be careful when touching the exterior of an operating brake. Allow sufficient time for the brake to cool before disassembly. Surfaces may be hot enough to be painful or cause injury.
6. Do not operate brake with housing removed. All moving parts should be guarded.
7. Installation and servicing should be performed only by qualified personnel familiar with the construction and operation of the brake.
8. For proper performance and operation, only genuine Stearns parts should be used for repairs and replacements.

9. After usage, the brake interior will contain burnt and degraded friction material dust. This dust must be removed before servicing or adjusting the brake.

DO NOT BLOW OFF DUST using an air hose. It is important to avoid dispersing dust into the air or inhaling it, as this may be dangerous to your health.

- a) Wear a filtered mask or a respirator while removing dust from the inside of a brake.
- b) Use a vacuum cleaner or a soft brush to remove dust from the brake. When brushing, avoid causing the dust to become airborne. Collect the dust in a container, such as a bag, which can be sealed off.

General Description

These brakes are spring set, electrically released. They contain one or more rotating friction discs (D) driven by a hub (E) mounted on the motor or other shaft.

Caution! While the brake is equipped with a manual release to allow manual shaft rotation, the motor should not be run with the manual release engaged, to avoid overheating the friction disc(s).

Caution! Do not operate manual release until brake is installed to preserve alignment of friction disc(s) for ease of brake assembly.

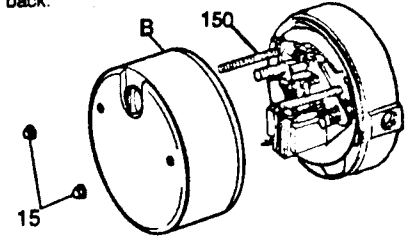
IA. Installation Procedure (see Section IB, only if installing 20 and 25 lb-ft brakes mounted vertical to motor)

To remove housing, follow instructions listed under each enclosure style in Figure 2, then continue with the following steps.

1. Remove hub (E) from brake assembly, using caution to preserve alignment of friction disc(s) for ease of assembly. Do not operate manual release until brake is installed.

Note 1: Check face of motor, machine or foot mounting bracket to which brake is to be mounted to be sure NEMA tolerances of

NEMA 1 Standard Enclosure: Remove two housing nuts (15) by unscrewing from housing studs (150), remove housing (B) by pulling back.



NEMA 4 (formerly DTWP) and NEMA 4X (BISSC, Washdown) Enclosures: Remove three housing nuts (15) and washers (15A) by unscrewing from housing studs (150), remove housing (B) by pulling back.

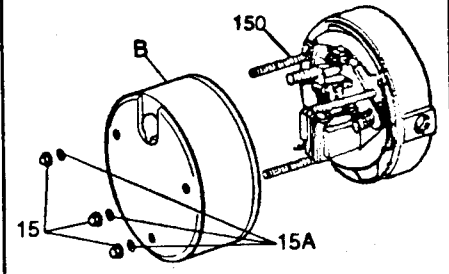


Figure 2

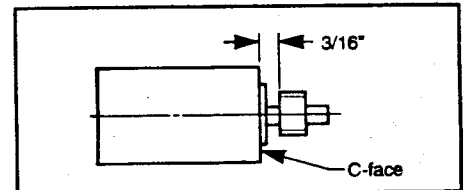


Figure 3

0.004" T.I.R. on concentricity and face run out are met. Shaft run out is to be 0.002" T.I.R. Maximum shaft end float is 0.020".

2. Use a key (not supplied) tight fitting and full axial length of hub (E). Hub is 13/16" long for NEMA 1 brakes rated to 15 lb-ft and NEMA 4, 4X brakes to 6 lb-ft. Hub is 1-3/16" long for NEMA 1 brakes rated 20, 25 lb-ft and NEMA 4, 4X brakes rated 10-25 lb-ft.

Slide hub on shaft positioning inboard face of hub about 3/16" from mounting face. See Figure 3. Securely tighten both hub set screws with torque of 156 in-lbs or until the long arm of hex wrench flexes 10° to 16°.

3. Attach brake to mounting face by sliding brake friction disc(s) (D) over hub, engaging without force. Brake endplate (F) face is to be tight against mounting face.

Note 2: On single disc brakes (1.5, 3 and 6 lb-ft rating), the friction discs must be positioned so that the two spring clips (D1) are 90° to each other and **OPPOSITE** the set screw positions on the hub. Positioning the springs over the set screws will result in damage to the spring clips.

Note 3: Brake may be installed in any position. To make air gap measurement easier, horizontal brake should be mounted with solenoid plunger above solenoid frame.

- Install (2) 3/8"-16 cap screws 180° apart (not supplied). Four screw mounting recommended for 20 and 25 lb-ft ratings. Tighten to 15-20 lb-ft torque.
- Check the solenoid air gap by viewing the ground plunger surface position directly behind the air gap reset label. The ground plunger surface to be at the set level of the air gap label. See Figure 4. See Section IV-A if adjustment is required.

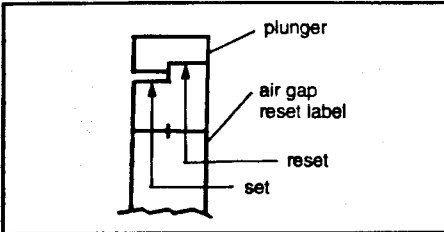


Figure 4

- See electrical connection for coil connection.
- Replace housing, housing nuts, and gaskets for NEMA 4 and 4X models. Tighten housing nuts 3/4 to 1 turn (or 8 in-lbs) beyond contacting the NEMA 1 housing surface. For NEMA 4 and 4X models, tighten to 11 in-lb.

IB. Installation Procedure for 20 and 25 lb-ft brakes if mounted vertical to motor shaft. (These brakes are factory assembled for horizontal operation.)

- Follow Steps 1, 2, 3 and 4 of Section IA.
- Remove support plate by loosening the three mounting screws (EA).
- Remove stationary discs (C) and friction discs (D).
- Using the spring kit provided with this brake, insert three springs of identical color into each stationary disc hole. Springs are inserted from the side opposite the indent mark (see Figure 5A). Stationary disc should be placed on a clean flat surface with a clearance hole to allow the tip of the spring to extend through the bottom side of the support plate. Using the 1/8" pin provided and a hammer, drive the narrow end of the spring through the hole until the large coil diameter bottoms out against the disc.

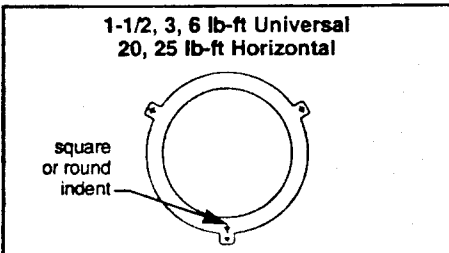


Figure 5A

- Reassemble the disc pack with the stationary discs in the proper arrangement shown in Figure 5B.
- Mount support plate and torque screws (EA) evenly to 55 in-lbs. Continue with Step 5 of Section IA.

II. Electrical Connection of Brake

CAUTION: Inverter Motor and Special Control Systems. This brake contains either a single phase AC coil or DC coil that requires instantaneous power within $\pm 10\%$

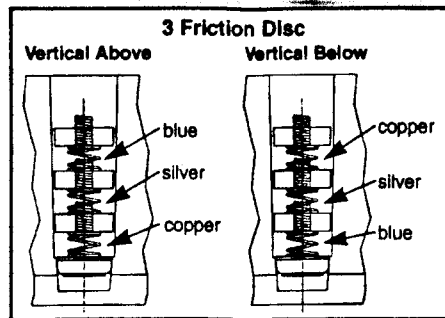


Figure 5B

of rating at the coil. A separate power source is required when this brake is used in conjunction with a motor or control system that limits voltage or current input (i.e. inverter motors) or causes a ramping of the power supply.

Note 1: Brake coil connections described here cover common motor connections. For nonstandard motor or control connections contact respective supplier or Stearns Division.

Note 2: On brakes with space heater, connect to appropriate power source. Heater is to be energized continuously.

Note 3: Be sure lead wires to coil are not tight or pinched, and that leads will not be rubbed by friction disc, trapped between solenoid plunger and frame, caught between lever arm and endplate, or by linkage.

Note 4: After connection, apply pipe thread sealant to conduit pipe plugs for NEMA 4 and 4X models.

A. AC coils - single and dual voltage

All Stearns AC coils are single-phase. May connect to single or three-phase power or motor control source.

- Single voltage coil. Connect the two coil lead wires to power source.
- Dual voltage coil. Lead wires are factory connected for high voltage. Wire nut provided to insulate connection. Rewire per Figure 6 if operating at low voltage. Connect lead wires 1 and 2 to power.

AC Voltage Coil Connection

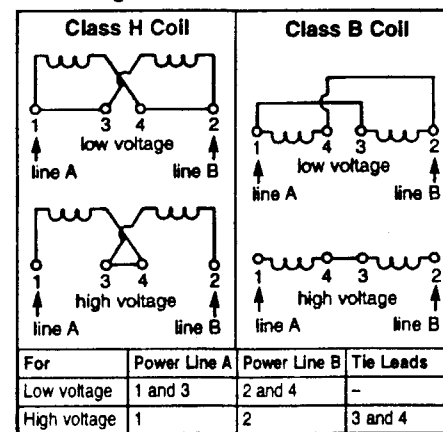


Figure 6

- Coil connection to Delta (Δ) and Wye (Y) motor wiring. See Figures 7 and 8. To use a 230 volt coil (or a dual voltage coil connected for 230 volts) with a 230/460 dual voltage three-phase motor, the brake leads are connected across two motor terminals as shown, or other equivalent combinations. If a 230 volt brake coil is connected as shown in Figures 7 or 8,

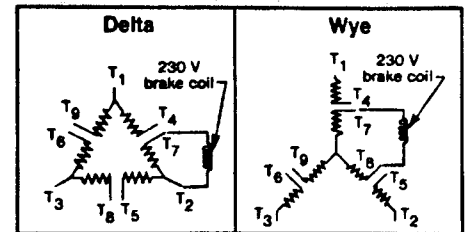


Figure 7

Figure 8

the motor can be operated on either 230 volts or 460 volts with no adverse effect on brake operation.

B. DC coils

Connect the free red and black lead wires, from the electronic DC switch, to power. See Figure 9. See notes and cautions below.

DC Voltage Coil Connection

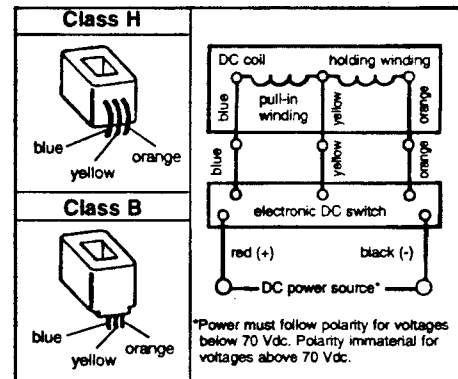


Figure 9

Note 1: Polarity is immaterial for DC voltages greater than 70 Vdc.

Note 2: For DC voltages less than 70 Vdc, the (red +) lead wire must be connected to positive and the (black -) lead wire to negative.

Note 3: Due to high initial current demands of a DC solenoid, a separate DC power source of adequate current capacity is usually required.

Caution! Never use a series resistor to drop power supply voltage to the coil as brake malfunction will result.

Caution! For electrical release of brake, apply full rated coil voltage instantly. Do not increase voltage slowly.

III. Torque Adjustment

Brake is factory set for nominal rated static torque which is maximum torque. Torque may be decreased up to 50% for increased stopping times up to 2 second stop time. See Catalog 200, application section, for additional information. The torque on the 1-1/2 lb-ft brake may not be reduced.

Turn both adjustment nuts (Q), Figure 10, equal amounts counterclockwise to decrease torque. See Table 1 for torque reduction permissible amounts.

IV. General Maintenance

Warning! Any mechanism or load held in position by the brake should be secured to prevent possible injury to personnel or damage to equipment before any disassembly of the brake is attempted or before the manual release knob is operated on the brake.

Observe all cautions listed at the beginning of this manual before attempting to service brake.

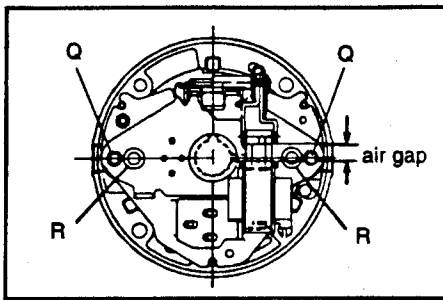


Figure 10

Table 1

Nominal Static Torque (lb-ft)	Original Spring Height (inches)	Max. Counterclockwise Turns	% Torque Reduction per Turn
1-1/2	1-9/16	-	-
3	1-1/2	5-1/2	9%
6	1-1/2		
10	1-9/16		
15	1-9/16		
20	1-9/16		
25	1-1/2		

A. Wear adjust (see Figures 4 and 10)

Adjustment is necessary when the ground plunger surface is behind the "reset" level of the label.

- To check air gap, view the ground plunger surface position directly behind the air gap reset label. To accurately check air gap, depress solenoid plunger and allow it to snap out several times. (On vertical mounted brakes it is necessary to push plunger into frame until spring pressure is felt before measuring air gap.)
- The air gap is decreased by turning both adjustment screws (R) equal amounts clockwise in increments of 1/8 turn until the ground plunger surface is at the "set" level of the label. Counterclockwise rotation will increase gap. Repeat Step 1.
- Air gap can be set to Table 2 measurement as alternate to visual method.

Table 2: Air Gap Settings

Nominal Static Torque (lb-ft)	Air Gap
1.5, 3 and 6	3/8"
10 and 15	7/16"
20 and 25	1/2"

B. Friction disc(s) replacement

Replace friction disc(s) when worn area is one half of the original 3/16" thickness.

- Remove support plate mounting screws (EA) and support plate assembly (142). See Figure 1.
- Remove stationary disc(s) (C) and friction disc(s) (D).
- Reassemble new friction disc(s) and stationary disc(s) in the same order, being sure all slide freely without binding. Be sure to reassemble the stationary discs with springs on the three ears facing inward toward motor.

C. Inspection or replacement of solenoid and associated components

- Refer to Figures 10 and 11. Insert screwdriver between support plate (X)

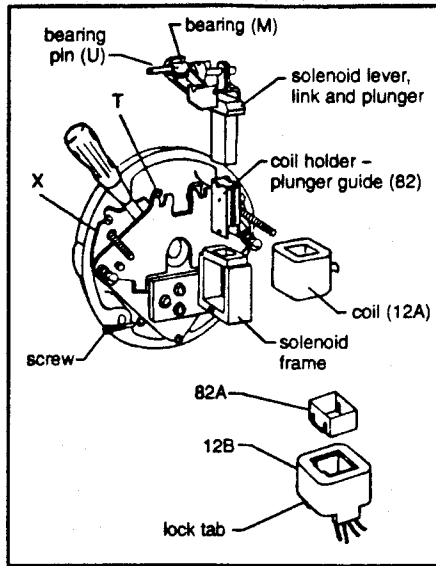


Figure 11

and lever arm (T). Wedge apart and remove as an assembly bearing pin (U), bearing (M), pin (Y), solenoid lever (N) connected to solenoid link and plunger.

- On coil type (12A) remove plunger guide screws. Remove both plunger guides (82) by prying up on the flanges. Slide coil (12A) sideways from frame noting position of coil terminals or lead wires.
 - On coil type (12B), remove plunger guide (82A) by lifting out of top of solenoid frame. Coil (12B) has a lock tab, located at bottom of coil opposite lead wire side which is pressed against coil and coil is slid sideways from solenoid frame.
- Inspect and clean all items. If coil, plunger guides, or solenoid replacement is required, refer to appropriate replacement parts list and select necessary replacement part, kit or assembly. Kits or assembly packets contain full retrofit instructions.
- Reassemble brake in reverse order of Steps 1 and 2.

D. Miscellaneous parts replacement

All parts shown in parts list are available as kits, assemblies, or piece parts. Kits and assembly packets contain complete repair instructions.

V. Troubleshooting

A. If brake does not stop properly or overheats, check the following:

- Are friction discs excessively worn, charred, or broken?
- Hub may have become loose and shifted on shaft. Recheck set screw torque. Reposition hub if shifted.
- Is hub clean, and do friction discs slide freely on hub?
- Do stationary discs slide freely in the endplate? Check slots of endplate for wear at the areas where stationary discs are in contact. Grooves in the slots can cause hang-up of ears of stationary discs. If grooving is noted, replace endplate.
- Check for broken or missing stationary disc separator springs on each of the three stationary disc ears.

- With brake de-energized and housing (B) removed, check compressed length of pressure springs (S). Compare to Table 1 values and adjust to minimum height to obtain desired stop times. See Section III, *Torque Adjustment*.

- Is solenoid air gap adjusted correctly? See Section IV-A for instructions.
- Solenoid may not be energizing and releasing the brake. Check voltage at the coil and compare to the coil and/or nameplate voltage rating.
- Whether brake is AC or DC a voltage drop may be occurring. If excessive drop in voltage is noted, check wire size of power source. Wire sized to prevent excessive voltage drop.

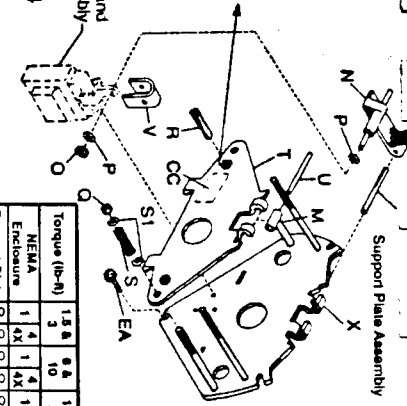
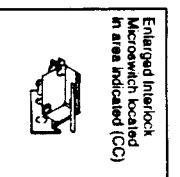
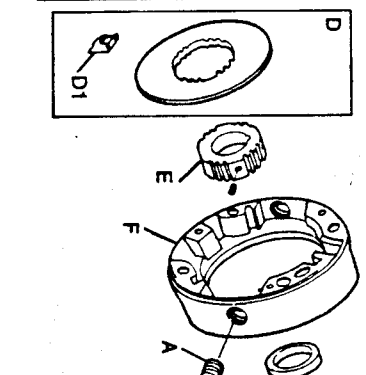
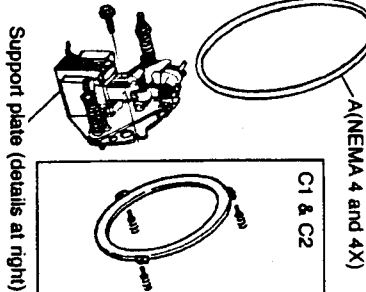
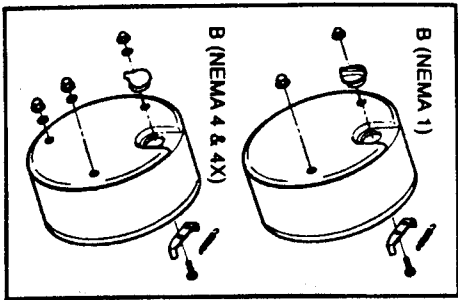
Note: A method to check voltage at coil is to insert a block of wood of the approximate thickness of the solenoid air gap between the solenoid frame and plunger. (The block will prevent brake from releasing when coil is energized.) Connect voltmeter leads at the coil terminals or lead wires. Energize coil. Voltmeter needle will not fluctuate and reading can be taken. Reading should be taken immediately and coil de-energized to prevent overheating the coil. Compare voltage reading with coil rating.

- Check linkage for binding. Depress solenoid plunger down to frame surface. Movement to be without binding.
- Are brake cycle controls operating properly?
- Brake coil should be energized at same time or prior to energization of motor, and de-energized at same time or after de-energization of motor.
- If stopping time is more than one second (rule of thumb) and/or application is more than five stops per minute, check thermal requirements of load versus thermal rating of brake.
- Mounting face per NEMA tolerances?
- Replace friction disc(s) when worn area is one half of original thickness (3/16").
- Check to be sure wear adjust screws are of equal height. Measure from inboard side of support plate with depth micrometer. Turn one screw to obtain equal height, reassemble and see Section IV-A for instructions.

B. If solenoid hums, pulls in slowly, or coil burns out, check the following:

- Check A-6 through A-11 of this Section.
- Check for broken or cracked shading coils on solenoid frame surfaces.
- Solenoid plunger to frame contact surface may be excessively dented.
- Are solenoid plunger to frame contact surfaces sticky and dirty.
- Solenoid mounting screws may have become loose, causing frame to shift and plunger to seat improperly.

- Information required when ordering replacement parts:**
- Give part number of parts or kits needed, brake model number, and brake serial number. The brake model and serial number may identify special brakes not covered by this parts list.
 - When ordering hubs, specify shaft diameter (hub bore) and keyway.
 - Enclosure is specified as follows:
 - NEMA 1 (formerly referred to as standard)
 - NEMA 4 (formerly referred to as DTMF dust-tight/waterproof)
 - NEMA 4X (formerly referred to as BISSC washdown)



Solenoid and Coil Assembly

TABLE 1
Components of Standard AC or DC Brake

Item	Description	Part Number ¹	Torque (lb-ft)	1.5 and 3	6	10	15	20 and 25	30 and 40
A	Hardware kit - NEMA 1 Hardware kit - NEMA 4 Hardware kit - NEMA 4X	5-66-1001-00 5-66-1002-00 5-66-1003-00	1	1	1	1	1	1	1
A1	Plug/insert kit - NEMA 1 - NEMA 4 - NEMA 4X	5-66-0533-00 5-66-0534-00 5-66-0535-00	1	1	1	1	1	1	1
B	Housing & release knob kit - NEMA 1 Housing & release knob kit - NEMA 4 Housing & release knob kit - NEMA 4X	5-66-8756-00 5-66-8757-00 5-66-8758-00	1	1	1	1	1	1	1
C	Stationary disc kit (1 disc universal)	5-66-8354-00	1	1	1	1	1	1	1
C1	Stationary disc kit (2 disc universal)	5-66-8355-00	1	1	1	1	1	1	1
C2	Stationary disc kit (3 disc universal)	5-66-8356-00	1	1	1	1	1	1	1
D	Friction disc kit	5-66-8482-00	1	1	1	1	1	1	1
D1	Stabilizing spring	8-161-5055-00	2	2	2	2	2	2	2
DP	Disc pack kit - 1 disc Disc pack kit - 2 disc Disc pack kit - 3 disc	5-66-8601-00 5-66-8602-00 5-66-8603-00	1	1	1	1	1	1	1
E	Hub and set screw assembly 1 & 2 disc (NEMA 1) 1 disc (NEMA 4 & 4X)	5-16-5151-00-01B 5-16-5151-00-01E 5-16-5151-00-01D	1	1	1	1	1	1	1
F	Engage and release knob assembly 1 & 2 disc (NEMA 1) 2 & 3 disc (NEMA 4) 1 disc (NEMA 4X)	5-02-5033-00 5-02-5034-00 5-02-5035-00 5-02-5036-00	1	1	1	1	1	1	1

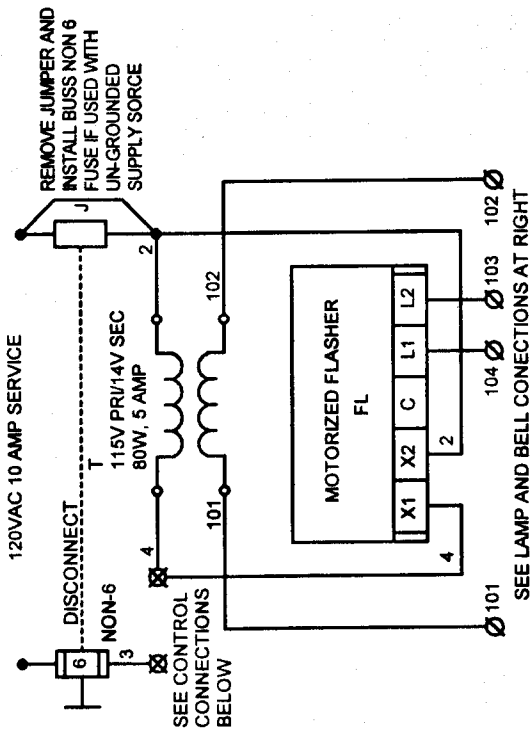
¹Contains multiple friction disc model numbers require a single stabilizer clip (D1) added to each friction disc. If your brake has these clips, they must be replaced when the friction disc is replaced. This clip is included as part of the friction disc kit 5-66-8482-00.
²Case coupled brakes identified by 8 in the 8th digit. Example: -056-XXX-8X

TABLE 2
Components of Support Plate and Coil Assembly

Item	Description	Part Number ¹	Torque (lb-ft)	1.5 & 3	6	10	15	20	25	30 & 40
M	Bearing	8-008-5011-00	1	1	1	1	1	1	1	1
N	Solenoid lever	8-008-5012-00	1	1	1	1	1	1	1	1
P	Retaining ring	8-008-5013-00	1	1	1	1	1	1	1	1
Q	Spacer	8-45-0169-00	2	2	2	2	2	2	2	2
R	Torque adjustment nut	8-40-3928-00	2	2	2	2	2	2	2	2
S	Pressure spring	8-70-1215-00	2	2	2	2	2	2	2	2
SI	Pressure spring	8-70-1524-00	2	2	2	2	2	2	2	2
SI	Spring washer	8-46-0010-00	4	4	4	4	4	4	4	4
T	Lever arm and stop nut assembly	5-17-5011-00	1	1	1	1	1	1	1	1
U	Bearing pin	8-29-4826-00	1	1	1	1	1	1	1	1
V	Support plate and spring and assembly (2 housing studs)	8-094-5033-00	1	1	1	1	1	1	1	1
X	Support plate and spring and assembly (3 housing studs)	5-29-5019-00	1	1	1	1	1	1	1	1
Y	Pinion pin	8-29-4836-00	1	1	1	1	1	1	1	1
EA	Mounting screws	8-23-9013-00	3	3	3	3	3	3	3	3

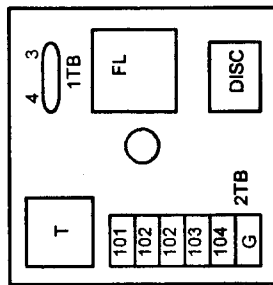
TABLE 3:
Contents of Kits and Assemblies

Item	Kit Description
A	Hardware kit - NEMA 1 (5-66-1001-00) 2 - Housing acorn nuts 2 - Conduit plugs Hardware kit - NEMA 4 (5-66-1002-00) Hardware kit - NEMA 4X (5-66-1003-00)
B	1 - Housing & release knob assembly 1 or 2 - Housing nut/gasket (NEMA 4 and 4X)
C	Stationary disc kit (5-66-8354-00) 1 - Stationary disc
C1	Stationary disc kit (5-66-8355-00) 2 - Stationary discs with springs
C2	Stationary disc kit (5-66-8356-00)
D	Friction disc kit (5-66-8482-00) 1 - Friction disc 2 - Stabilizing springs (for 1-1/2 & B-H brakes use only)
DP	Disc pack kit (5-66-8601-00) 1, 2 or 3 - Stationary disc(s) 2 - Stabilizing springs (for 1-1/2 & B-H brake use only) 3, 6 or 9 - Stationary disc separator springs Hubs and set screw assembly - all types, all bores (5-16-515X-00) 2 - Set screws
E	No. 4 solenoid kit (5-66-5042-00) 1 - Plugger 1 - Solenoid link 1 - Frame 1 - Solenoid link cap screw 1 - Solenoid link nut 3 - Solenoid mounting screws
MA	No. 4 AC coil kit (5-66-645X-XX) and DC coil assembly (5-66-645X-XX) Coil / top (Pulger) gasket / Wire nut
DC	DC switch kit (5-57-571X-15) 1 - Electronic switch 1 - Mounting bracket 3 - Bracket mounting screws 4 - Nut 4 - Lock washers 5 - Crimp connectors
BB	Brake release interlock switch (5-57-5528-00) 1 - Interlock switch 2 - Bracket mounting screws 2 - Switch mounting screws 2 - Lockwasher 2 - Nut 2 - Lead wire assembly

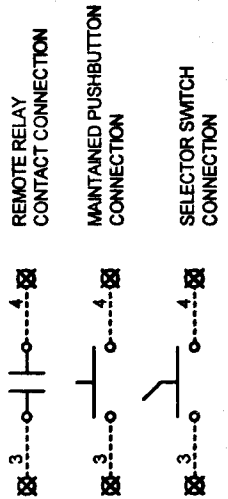


BILL OF MATERIALS

- DISC DISCONNECT 2305-12
- FUSE NON-6 FUSE 400-35-08
- T TRANSFORMER 3810-A
- FL FLASHER 90251-1

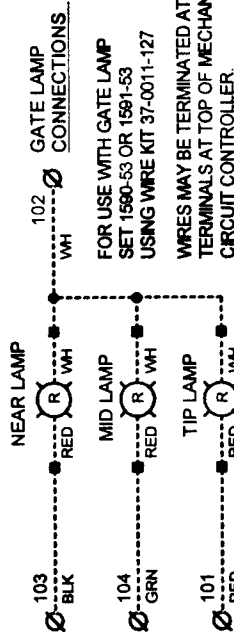
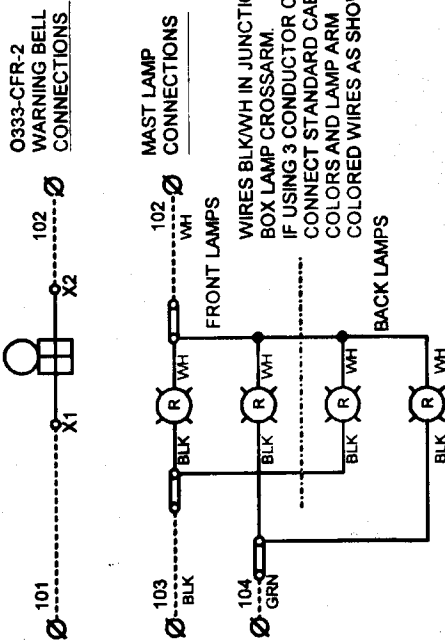


CONTROL CONNECTIONS



LAMP AND BELL CONNECTIONS

- MAXIMUM LOAD:**
- 2 - 2 WAY FLASHING LIGHT SIGNALS. TOTAL 8 LAMPS.
 - 1 - 2 WAY GATE / FLASHING LIGHT SIGNAL. TOTAL 7 LAMPS.
 - 2 - GATE ARMS WITH LAMPS. TOTAL 6 LAMPS.
 - MAXIMUM 2 BELLS USED WITH ANY COMBINATION.



FOR USE WITH GATE LAMP SET 1580-53 OR 1591-53 USING WIRE KIT 37-0011-127

WIRES MAY BE TERMINATED AT SPARE TERMINALS AT TOP OF MECHANISM CIRCUIT CONTROLLER.

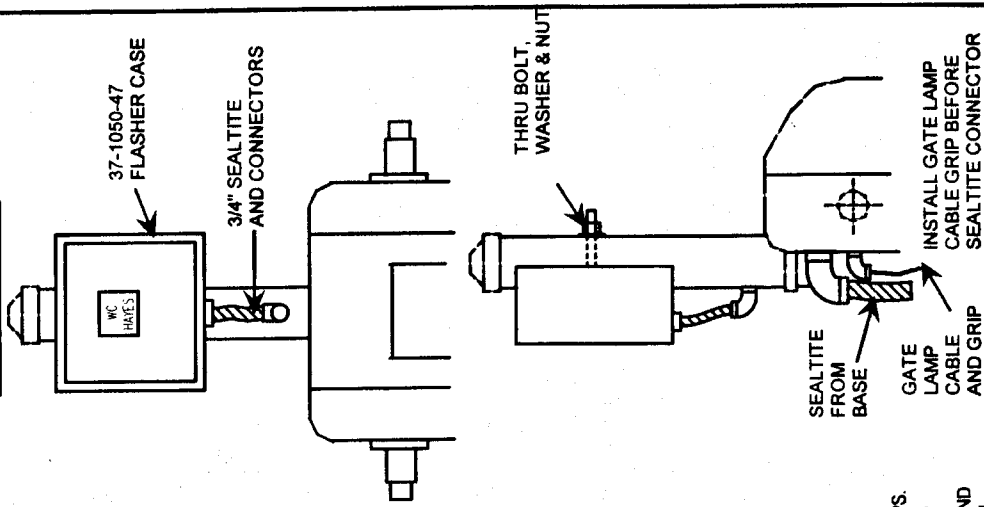
WIRES RED/WH OR BLK/WH INSIDE GATE LAMP JUNCTION BOX.

CONNECT STANDARD CABLE COLORS AND GATE LAMP COLORED WIRES AS SHOWN.

SYMBOL LEGEND

- ⊗ = CONNECTION AT 1TB
- ⊙ = CONNECTION AT 2TB
- = WIRE NUT AT GATE LAMP
- = CONNECTION AT LAMP ARM

MOUNTING DETAILS



WESTERN - CULLEN - HAYES, INC.

2700 W. 36TH PLACE, CHICAGO, IL 60632

773-254-9600 FAX: 773-254-1110

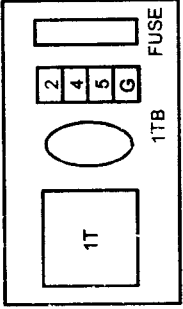
TITLE:

37-1050-47 SERIES FLASHER CASE CONNECTION AND MOUNTING INSTRUCTIONS

DRAWN BY: RLY DATE: 10-14-87

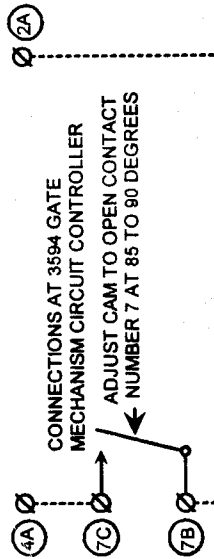
PART NO: 37-1050-47-IS

REV:



BILL OF MATERIALS

- FUSE NON-5 FUSE 400-35-07
- 1T TRANSFORMER 37-1050-59



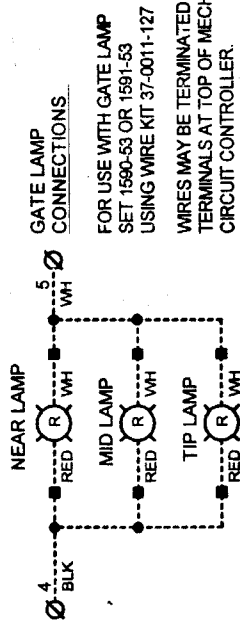
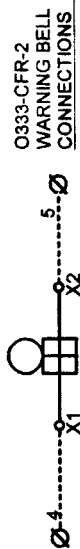
CONNECTIONS AT 3594 GATE MECHANISM CIRCUIT CONTROLLER
 ADJUST CAM TO OPEN CONTACT NUMBER 7 AT 85 TO 90 DEGREES

MATCH WIRING WITH DIAGRAM OR INSTRUCTIONS AS SUPPLIED WITH THE TRANSFORMER

115V PRI/12V SEC

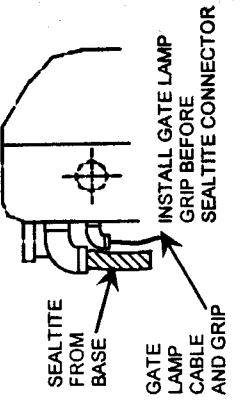
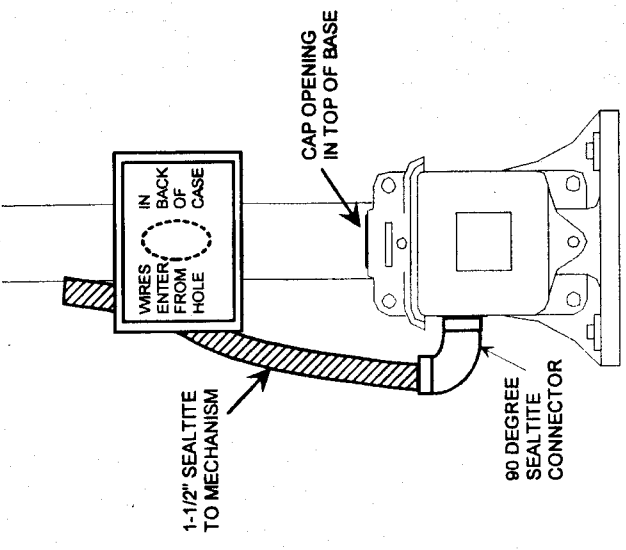
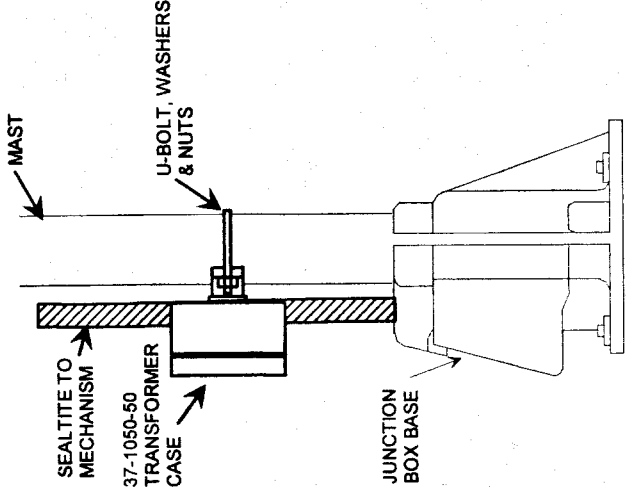
LAMP AND BELL CONNECTIONS

MAXIMUM LOAD:
 1 - GATE ARM WITH LAMPS, TOTAL 3 LAMPS.
 MAXIMUM 1 BELL.



FOR USE WITH GATE LAMP SET 1590-53 OR 1591-53 USING WIRE KIT 37-0011-127

WIRES MAY BE TERMINATED AT SPARE TERMINALS AT TOP OF MECHANISM CIRCUIT CONTROLLER.
 WIRE NUT CONNECTIONS AT GATE LAMPS. WIRES RED/WH OR BLK/WH INSIDE GATE LAMP JUNCTION BOX.
 CONNECT STANDARD CABLE COLORS AND GATE LAMP COLORED WIRES AS SHOWN.



MOUNTING DETAILS

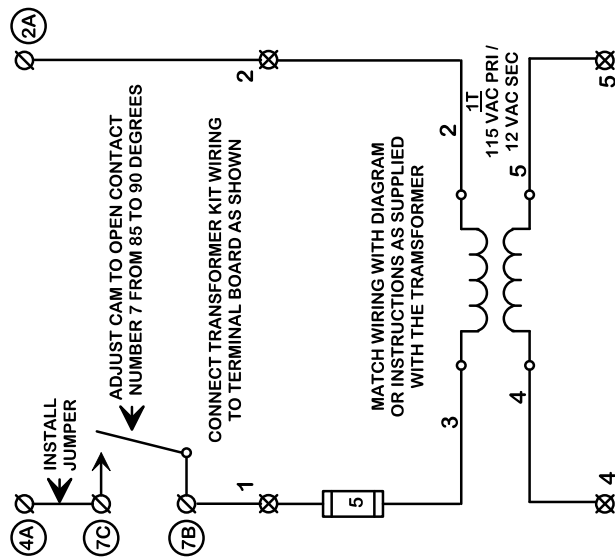
SYMBOL LEGEND

- ☒ = CONNECTION AT 1TB
- = CONNECTION MECHANISM CIRCUIT CONTROLLER
- = WIRE NUT AT GATE LAMP

WESTERN-CULLEN-HAYES, INC.
 2700 W. 36TH PLACE, CHICAGO, IL 60632
 773-254-9600 FAX: 773-254-1110

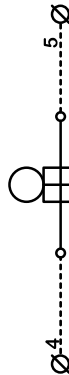
TITLE:
 37-1050-50 SERIES TRANSFORMER CASE CONNECTION AND MOUNTING INSTRUCTIONS

DRAWN BY: RLY DATE: 10-14-97 PART NO: 37-1050-50-IS REV:

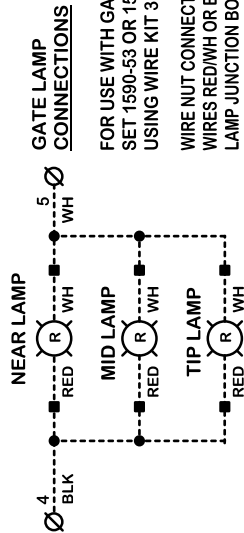


LAMP AND BELL CONNECTIONS

MAXIMUM LOAD:
1 - GATE ARM WITH 3 LAMPS.
MAXIMUM 1 BELL.

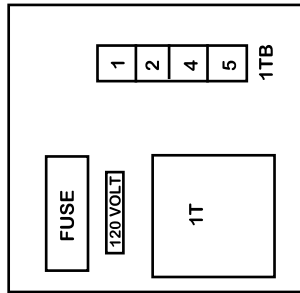


O333-CFR-2 or
0777-CFR
WARNING BELL
CONNECTIONS



GATE LAMP
CONNECTIONS

FOR USE WITH GATE LAMP
SET 1590-53 OR 1591-53
USING WIRE KIT 37-0011-127
WIRE NUT CONNECTIONS AT GATE LAMPS.
WIRES RED/WH OR BLK/WH INSIDE GATE
LAMP JUNCTION BOX.
CONNECT STANDARD CABLE COLORS AND
GATE LAMP COLORED WIRES AS SHOWN.



BILL OF MATERIALS

DESCRIPTION	PART NUMBER
FUSE	400-35-07
FUSE BLOCK	50-0275
TRANSFORMER	37-1050-59
TERMINAL BLOCK	2508-69-4

SYMBOL LEGEND

⊗ = CONNECTION AT 1TB

∅ = CONNECTION MECHANISM CIRCUIT CONTROLLER

■ = WIRE NUT AT GATE LAMP

WESTERN-CULLEN-HAYES, INC.

2700 W. 36TH PLACE, CHICAGO, IL 60632
773-254-9600 FAX: 773-254-1110

TITLE:
STEADY BURNING GATE LAMP
TRANSFORMER KIT FOR MODEL 9 GATES
CONNECTION AND MOUNTING INSTRUCTIONS

DRAWN BY: RLY
ECO: 9034
DATE: 7/20/2004

PART NO: 3594-60
REV: