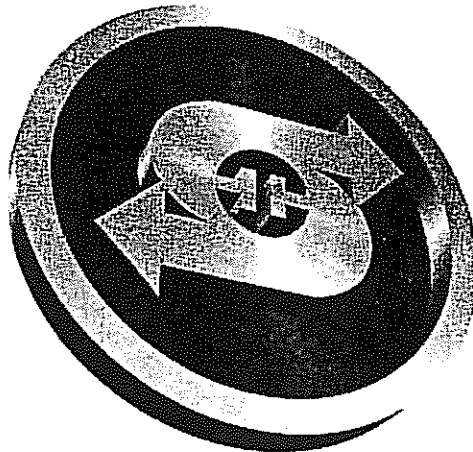


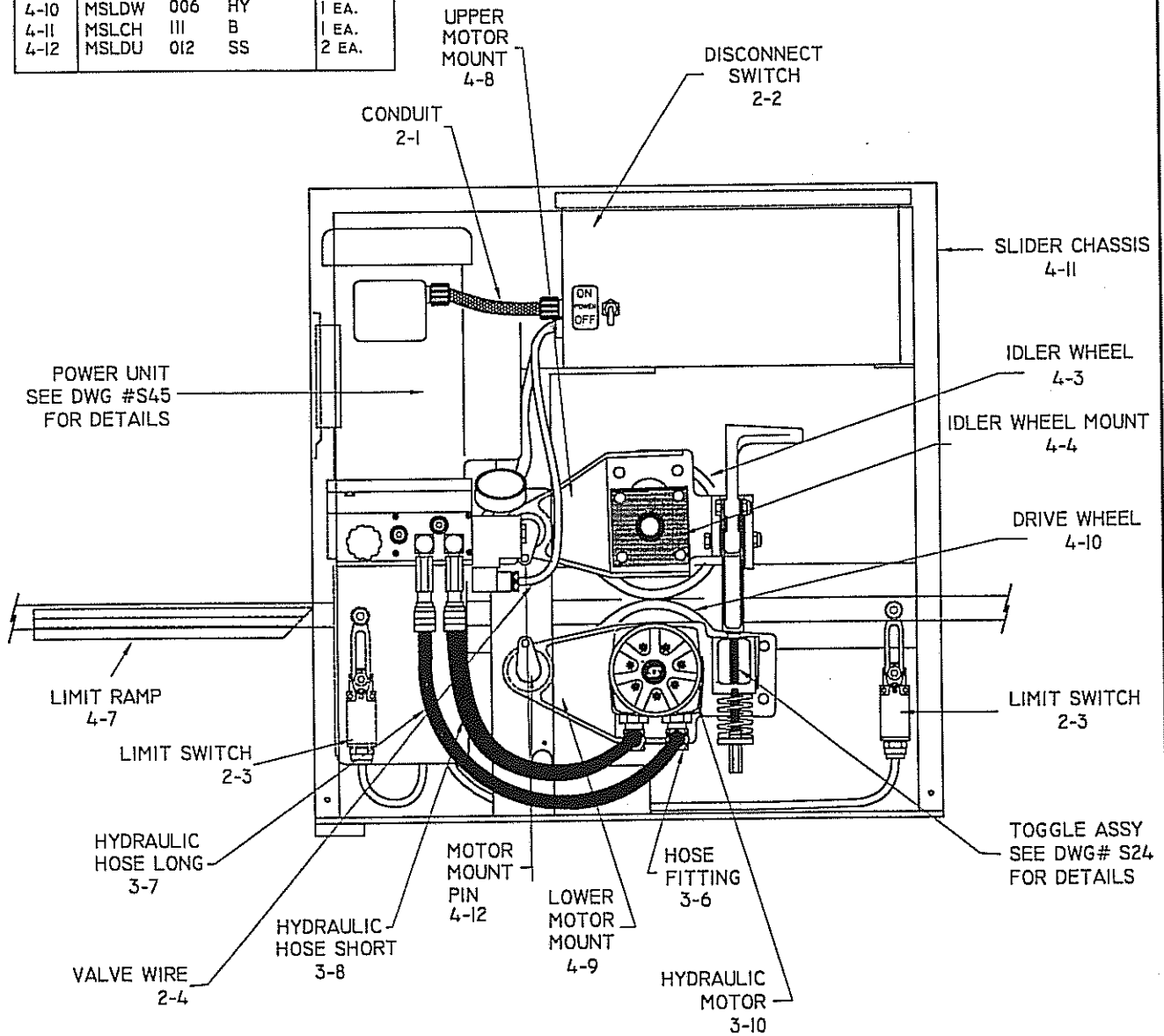
Hy-Security Gate Operators

111 LS SLIDE GATE OPERATOR HANDBOOK



Manufacturers and Designers of Hydraulic Systems

ITEM #				QTY
2-1	ECOMK	001	222	1 EA.
2-2	ESWDI	050	3P	1 EA.
2-3	ESWLS	224	III	2 EA.
2-4	ECOPL	001		1 EA.
3-3	HPPPU	HII		1 EA.
3-6	HSFFI	853	0610	2 EA.
3-7	HSFHO	III	20	1 EA.
3-8	HSFHO	III	18	1 EA.
3-10	HMOMO	010	WRS	1 EA.
4-3	MSLDW	006	I	1 EA.
4-4	MSLDU	043	6I	1 EA.
4-7	MSLLR	012	B	2 EA.
4-8	MSLDU	042	T	1 EA.
4-9	MSLDU	042	B	1 EA.
4-10	MSLDW	006	HY	1 EA.
4-11	MSLCH	III	B	1 EA.
4-12	MSLDU	012	SS	2 EA.

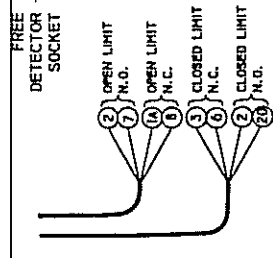


TITLE
COMPONENTS, 111 OPERATORS

DRAWN	DATE	THIRD ANGLE PROJECTION		REV
D. B.	05/17/00			A
CHECKED	DATE	ERN NUMBER	DATE	
APPROVED	DATE	DRAWING NUMBER: LS28		SHT OF
				1 1

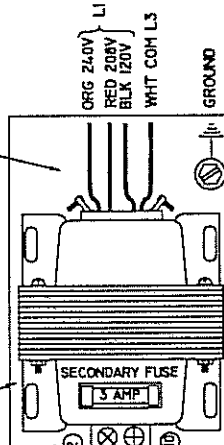
USUALLY, THE #1 AND #4 WIRES SHOULD BE CONNECTED TO THE PULSE OUTPUT ON THE LOWER SIDE OF THE SOCKET. HOWEVER, IF THE FREE ENTRY DETECTOR ALSO SERVES AS AN OBSTRUCTION DETECTOR (LOOP IS WITHIN TEN FEET OF THE GATE) #1 AND #4, MUST BE CONNECTED TO THE PRESENCE OUTPUT ON THE TOP SIDE OF THE SOCKET.

LIMIT SWITCH CONNECTIONS
NOTE: ZZZ TYPE SLIDE GATE OPERATORS HAVE PLUG-IN LIMITS

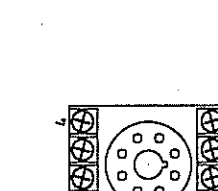
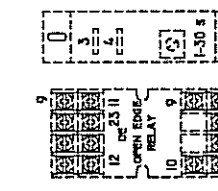
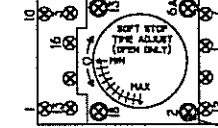
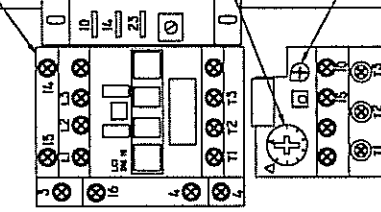


24 VOLT CONTROL
OBSTRUCTION DETECTOR SOCKET
FREE DETECTOR SOCKET
LOOP
SEE NOTE
LOOP

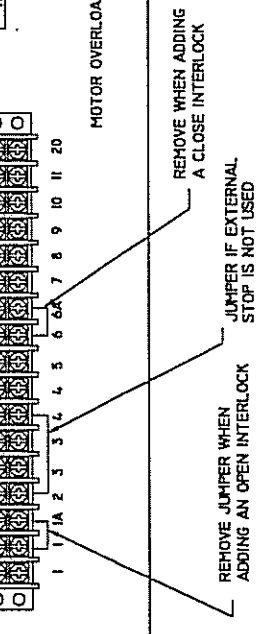
LINE VOLTAGE SIDE
TRANSFORMER
SECONDARY FUSE
5 AMP



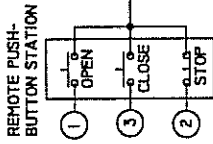
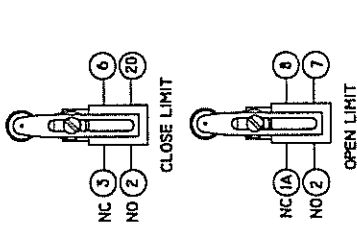
MOTOR CONTACTOR
MAXIMUM RUN
OVERLOAD RESET



OPTION 'D' TWO WAY CONTROL



NOTE: THIS IS THE POINT THAT LINE VOLTAGE POWER ENTERS THE PANEL. CONNECT POWER AND GROUND TO LOOSE CONDUCTORS.



NOTE: IF STOP BUTTON IS NOT USED, JUMPER #2 TO #4.

WIRE #	WIRE COLOR
1	BLUE
2	WHITE
3	RED/BLK STRIP
4	GREEN
5	BROWN
6	WHIT/RED STRIP
7	ORANGE
8	YELLOW
9	GREY
10	VIOLET
11	RED/WHIT STRIP
12	RED
13	BLACK
14	BLK/WHIT STRIP
15	WHIT/BLK STRIP
16	GRN/WHIT STRIP
17	BRN/WHIT STRIP
18	ORG/WHIT STRIP
19	YEL/BLK STRIP
20	GRY/BLK STRIP
21	VLT/WHIT STRIP

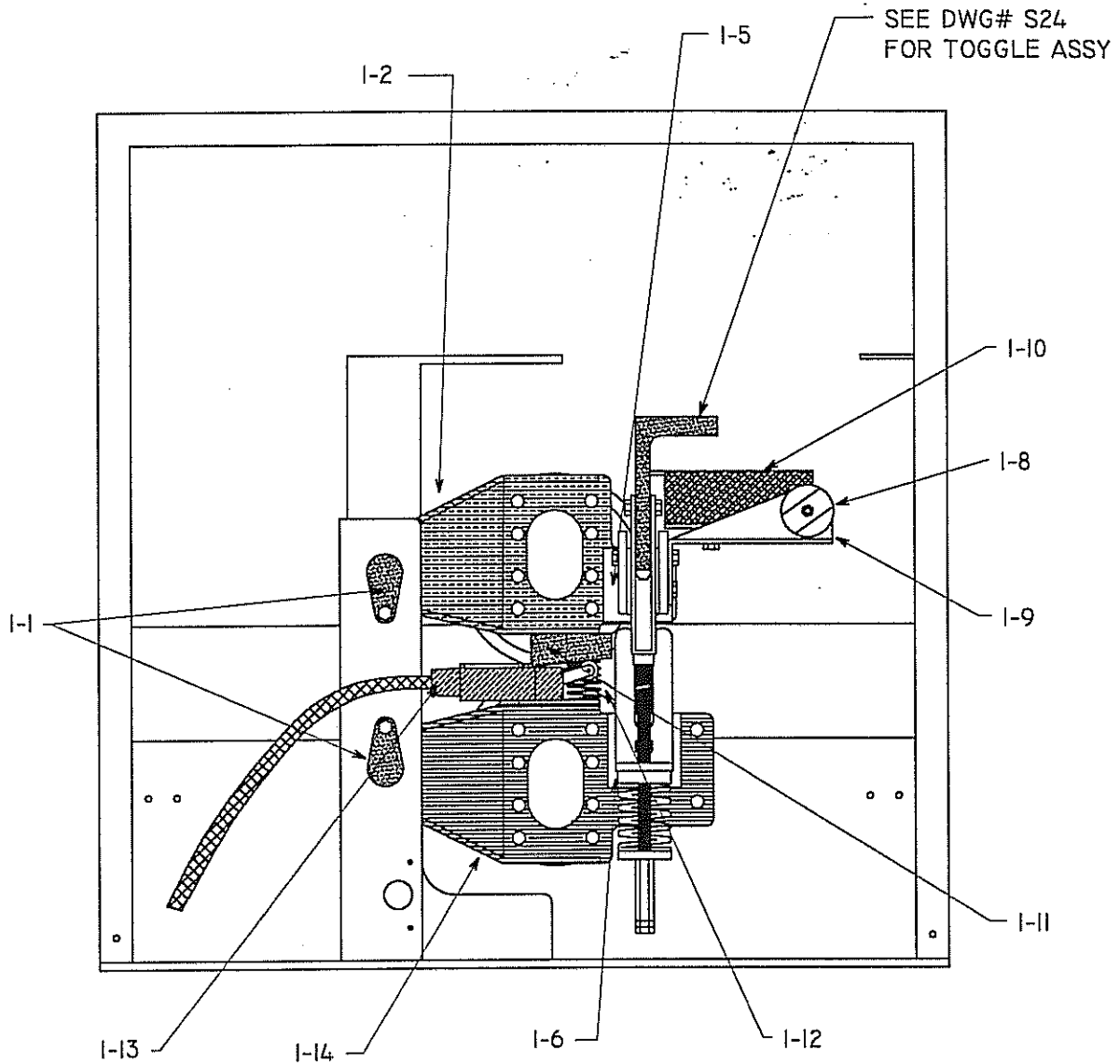
INSTALLER NOTE: IT IS EXTREMELY IMPORTANT TO VERIFY INCORRECT PRIMARY LINE VOLTAGE AND TO MAKE SURE IT IS CONNECTED TO THE MATCHING PRIMARY TAP ON THE TRANSFORMER. THIS IS ESPECIALLY IMPORTANT ON 208V AND 230V MACHINES.

ELECTRICAL COMPONENTS 111 LS MODEL




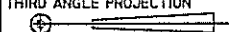
DATE: 12/14/98
REV. NO: ---
REV. DATE: ---
PART NUMBER: N/A
PAGE: --- OF ---
DRAWING NUMBER: E60T2

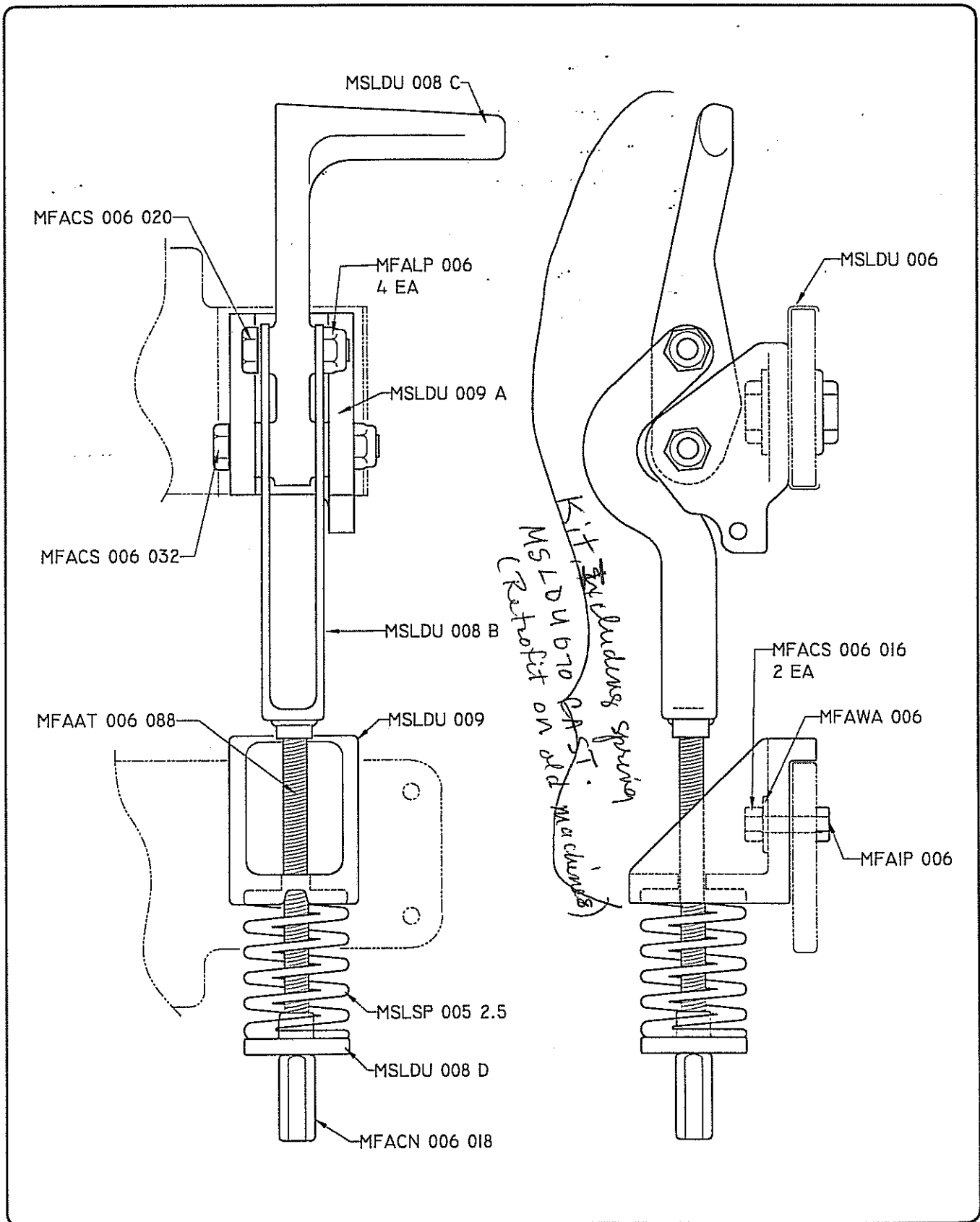
SEE ENGINEERING CHANGE PAGE FOR CURRENT REVISION NUMBER



ITEM#	QTY
1-1	MSLDU 012 SS 2 EA.
1-2	MSLDU 042 T 1 EA.
1-3	MSLDU 042 B 1 EA.
1-5	MSLDU 006 1 EA.
1-6	MSLDU 007 1 EA.
* 1-8	HCYCY 030 I 1 EA.
* 1-9	MSLDU 038 1 EA.
* 1-10	MSLDU 038 A 1 EA.
* 1-11	MSLDU 036 1 EA.
* 1-12	MSLSP 002 1 EA.
* 1-13	ESWLS 224 III 1 EA.
* 1-14	MSLDU 037 1 EA.

*OPTIONAL PARTS - MAY NOT BE ON OPERATOR

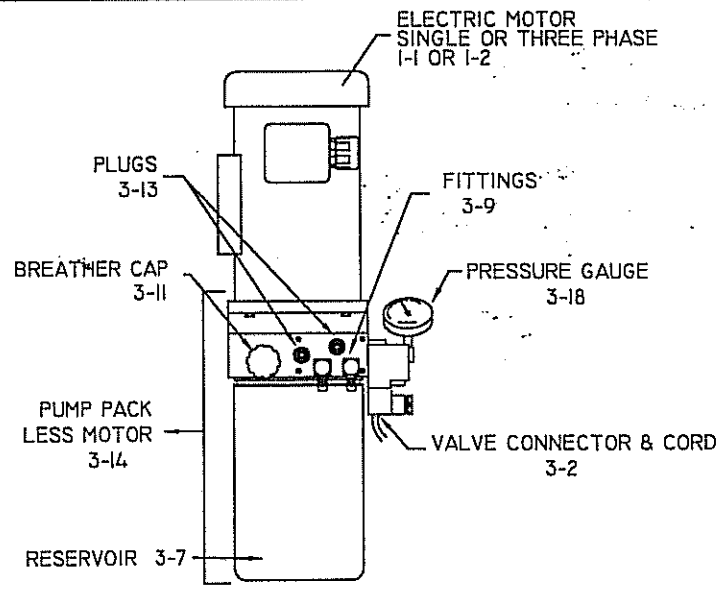
	TITLE	DRAWN	DATE	THIRD ANGLE PROJECTION	REV
	COMPONENTS HYDRAULIC DRIVE ARM & TOGGLE ASSEMBLY	KERI	7/20/00		---
		CHECKED	DATE	PART NUMBER	
		SHOP	MM/YY/DD	N/A	
APPROVED	DATE	DRAWING NUMBER:	S19	SHT OF	
ENGRNG	MM/YY/DD			1 1	



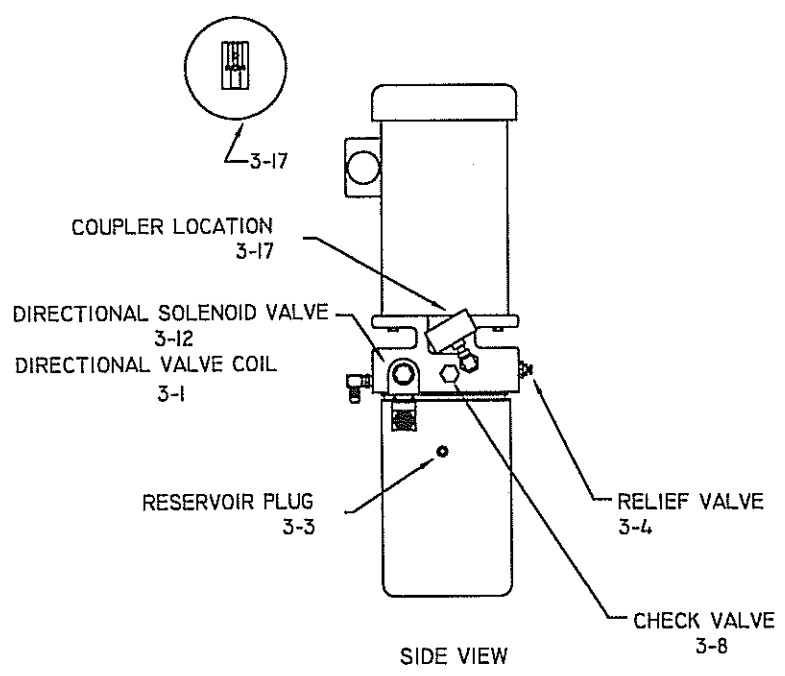
MAS 90
 N/A
 TITLE **COMPONENTS MANUAL RELEASE TOGGLE ASSEMBLY FOR ALL SLIDE GATE OPERATORS**

DRAWN D. B.	DATE 05/12/00	THIRD ANGLE PROJECTION 	
CHECKED -	DATE -	ERN NUMBER -	DATE -
APPROVED -	DATE -	DRAWING NUMBER: S24	

REV
A
 SHT | OF |
 | |



FRONT VIEW



SIDE VIEW

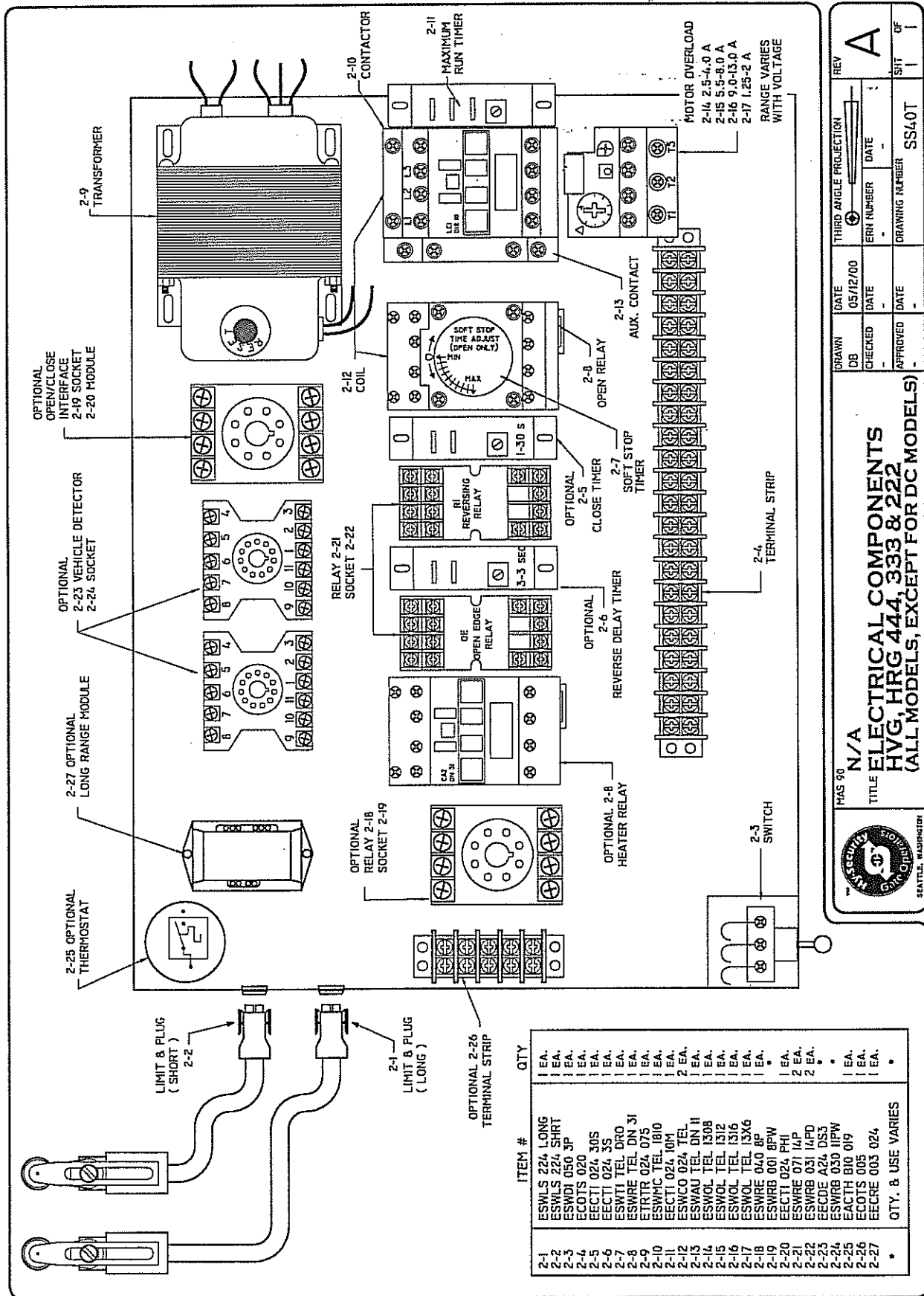
ITEM #	QTY.
I-1	EMOMO 010 .75B EA
I-2	EMOMO 030 .75B EA
3-1	HVASO DEL 024 EA
3-2	ECOPL 001 EA
3-3	HSFFI CSP 06 EA
3-4	HVARE FBN EA
3-7	HRSRS 004 EA
3-8	HVACK 003 EA
3-9	HSFFI 853 0404 2 EA

ITEM #	QTY.
3-11	HRSBC 001 EA
3-12	HVADI DEL 2P EA
3-13	HSFFI 7/4 CS04 2 EA
3-14	HPPPU H11 EA
3-17	MPTCO 010 9T EA
3-18	HASGA 120 MINI EA



TITLE
COMPONENTS, HS-11 POWER UNIT FOR 111 LS

DRAWN	DATE	THIRD ANGLE PROJECTION	REV
KERI	6/16/00		---
CHECKED	DATE	PART NUMBER	
SHOP	MM/YY/DD	N/A	
APPROVED	DATE	DRAWING NUMBER:	SHT OF
ENGRNG	MM/YY/DD	S45	



ITEM #	QTY
2-1	1 EA.
2-2	1 EA.
2-3	1 EA.
2-4	1 EA.
2-5	1 EA.
2-6	1 EA.
2-7	1 EA.
2-8	1 EA.
2-9	1 EA.
2-10	1 EA.
2-11	2 EA.
2-12	1 EA.
2-13	1 EA.
2-14	1 EA.
2-15	1 EA.
2-16	1 EA.
2-17	1 EA.
2-18	1 EA.
2-19	1 EA.
2-20	2 EA.
2-21	1 EA.
2-22	1 EA.
2-23	1 EA.
2-24	1 EA.
2-25	1 EA.
2-26	1 EA.
2-27	1 EA.
QTY. & USE VARIES	

MAS 30

SECURITY SIGNING

SEATTLE, WASHINGTON

ELECTRICAL COMPONENTS
HVG, HRG 444, 333 & 222
 (ALL MODELS, EXCEPT FOR DC MODELS)

REV **A**

THIRD ANGLE PROJECTION

DATE 05/12/00

DB

CHECKED DATE

APPROVED DATE

DRAWING NUMBER **SS40T**

SHEET 1 OF 1

READ THIS FIRST!

Important Information

Automatic gate operators provide convenience and security to users. However, because these machines can produce high levels of force it is important that all gate operator system designers, installers and end users be aware of the potential hazards associated with improperly designed, installed or maintained systems. Keep in mind that the gate operator is only one component of the total gate operating system. It is the joint responsibility of the specifier, designer, purchaser, installer and end user to verify that the total system is safe for its intended use. All parties should be aware that entrapment in a moving vehicle gate can cause serious injury or death.

Common Industry Symbols



Attention
–Take Note–



–Danger–
Keep Away



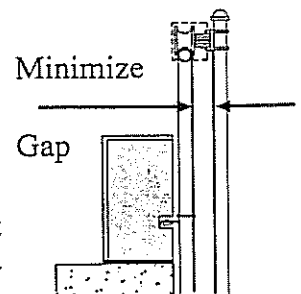
Entrapment
Zone



Possible
Pinch Point

Cautionary Notes also see illustration on next page:

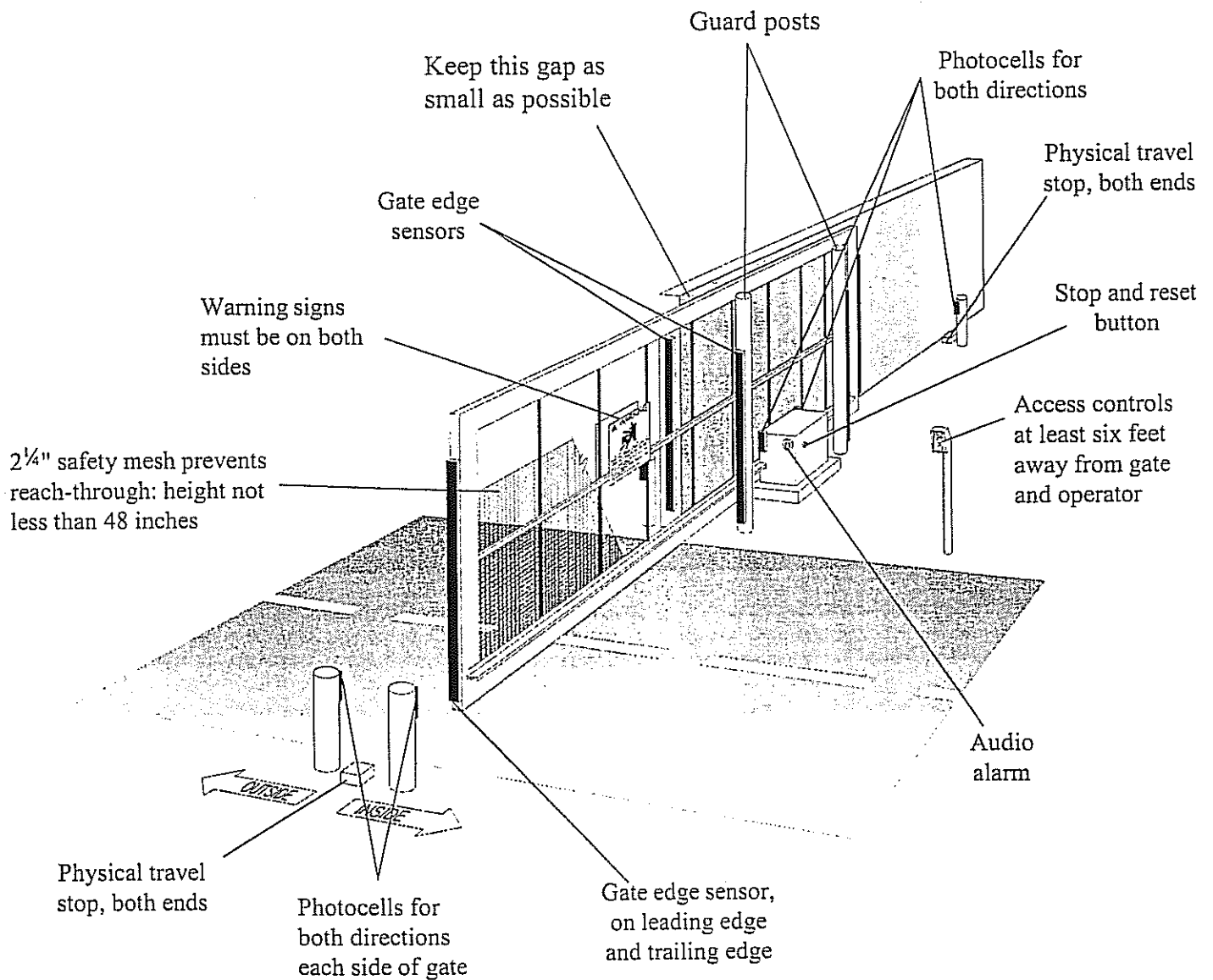
- Hy-Security gate operators are designed for vehicular traffic; *not pedestrians*. Direct all pedestrian traffic to a separate walk-through gate, and clearly display the warning signs on both sides of the vehicle gate.
- Verify that the gate operator is marked as appropriate for the type and usage class of the gate. External sensors must be installed to protect against accidental entrapment in both the opening *and* closing directions of gate travel.
- This type of gate operator must not be installed on the public, or non-secured side of the gate. To minimize the risk of entrapment, assure that the installation includes sufficient clearance between the gate and adjacent structures.
- Children must never be allowed to play on or around the gate.
- All access controls must be mounted at least six feet away from the gate and have a security feature to prevent unauthorized use.
- Install entrapment protection devices and sensors devices appropriate for the type of gate and usage class application: cover exposed rollers, screen across the face of the gate, install electric edge sensors, photoelectric sensors, guard posts, and moving gate alarms. Test all of your entrapment sensors to insure that they are working in the proper manner.
- Install physical stops for the gate panel, in each direction. This will assure that the gate does not accidentally travel farther than intended.
- Always make certain the operator is properly electrically grounded.
- Construct or screen automatic gates, from the bottom of the gate to a minimum height of four feet, so that a sphere 2 1/4" in diameter cannot pass through. The 2 1/4" restriction also applies to the portion of the adjacent fence that the gate covers when open.
- When constructing/installing this type of gate, always minimize the gap between gate and fence. The gate must move freely in both directions. Never over-tighten a clutch or relief valve to compensate for a stiff gate.





Attention

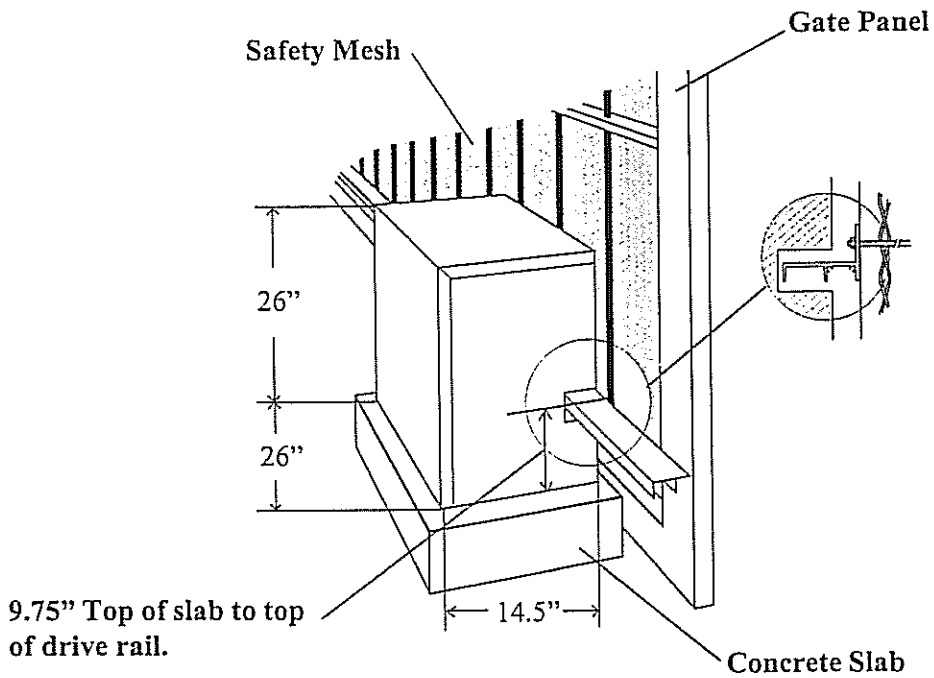
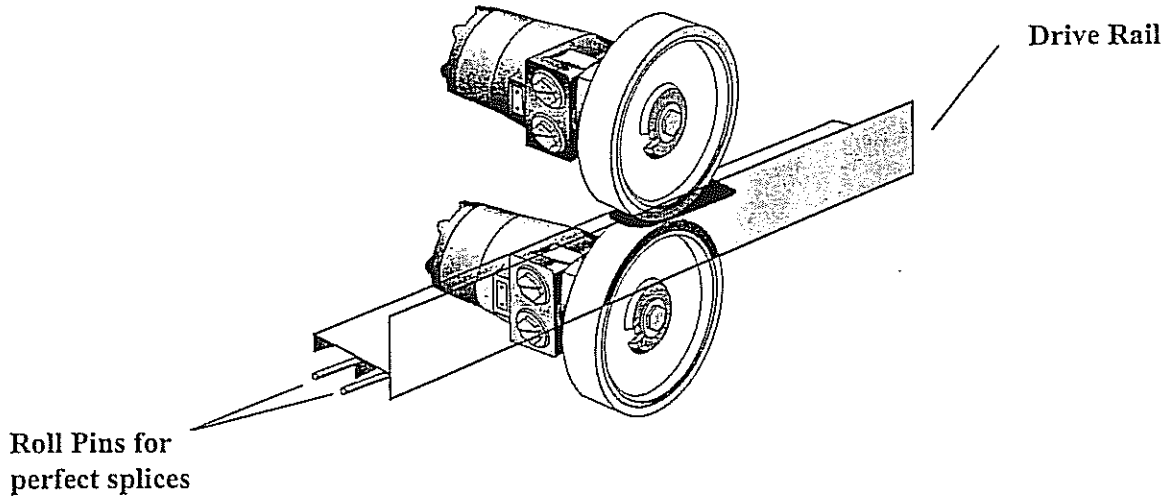
Entrapment Protection Device Schematic for Sliding Gates



This schematic view is not meant to recommend the only way to set up your configuration, but to point out the various elements of a proper automatic vehicular gate installation. The gate operator itself is only one component in the total system. Always install a separate pedestrian gate.

Power transmission: Hydraulic motors to drive rail

Polyurethane drive rail wheel tread eliminates the high wear metal-to-metal contact of conventional chain-drive systems.



TITLE

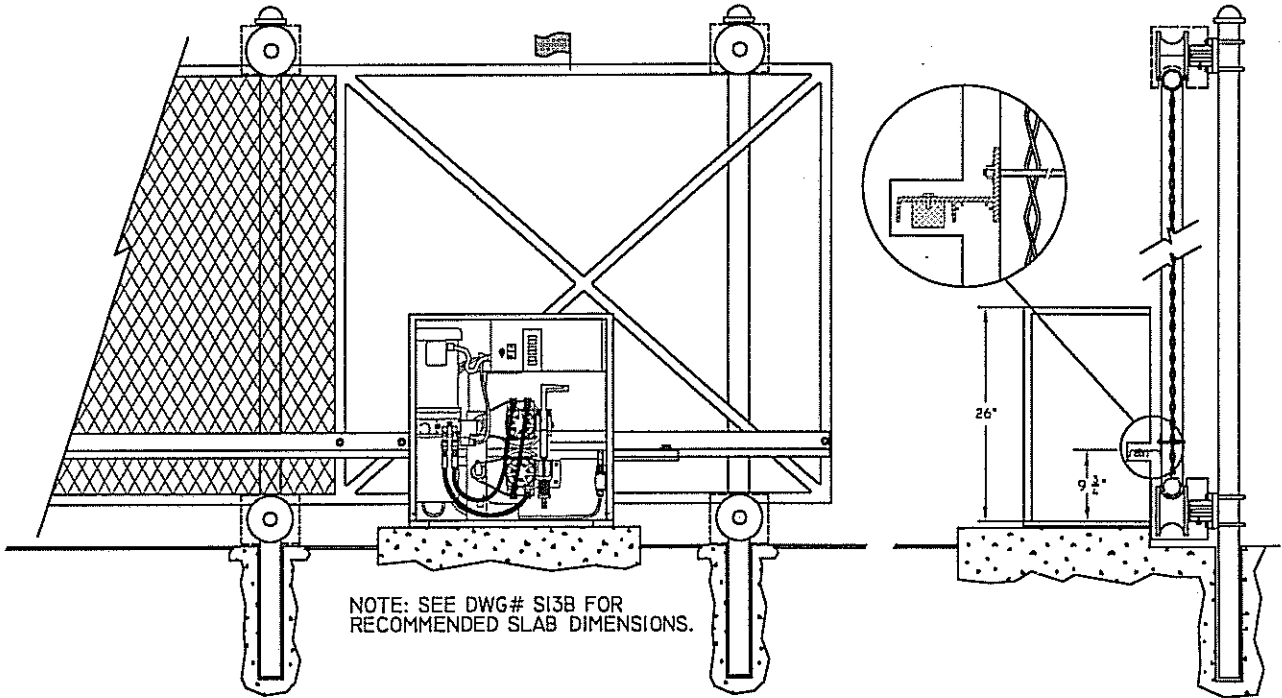
**HYDRAULIC SLIDE
GATE OPERATOR**

DRAWN KERI	DATE 6/1/00	THIRD ANGLE PROJECTION	REV --
CHECKED SHOP	DATE MM/YY/DD	PART NUMBER N/A	
APPROVED ENGRNG	DATE MM/YY/DD	DRAWING NUMBER: SI2	SHT 1
			OF 1

NOTES:

DRIVE RAIL HEIGHT IS MARKED ON THE SIDE OF EACH CHASSIS.

COVERS MUST BE USED FOR PROTECTION ON ALL EXPOSED WHEELS AND/OR HARDWARE. COVERS ARE SHOWN HERE AS DOTTED LINES.



ELEVATION

SECTION

NOTES:

CONSULT FENCE CONTRACTOR FOR RECOMMENDED CANTILEVER POST SPACING. 50% OF GATE OPENING GENERALLY PROVIDES SMOOTH OPERATION.

RIGHT HAND CANTILEVER GATE IS SHOWN IN THE FULLY CLOSED POSITION. OPERATOR COVER OMITTED FROM DETAIL. (DO NOT SCALE).

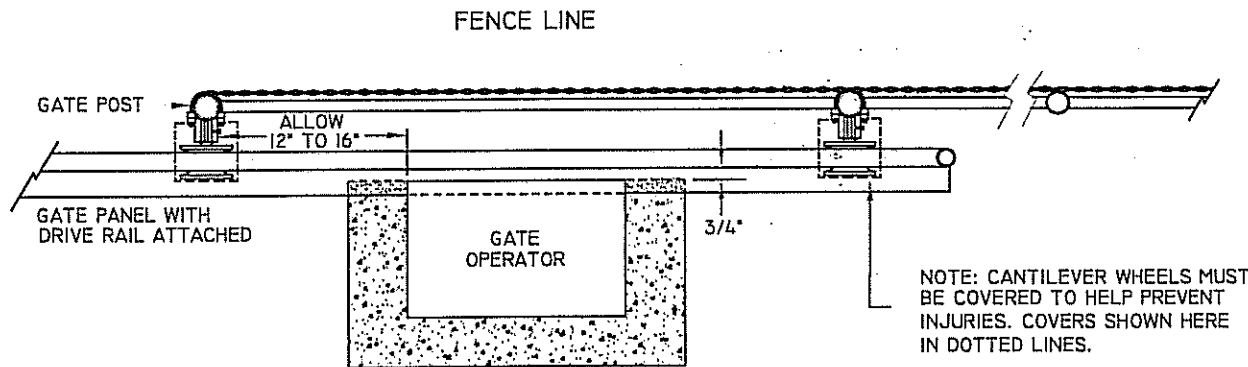
IT MAY BE NECESSARY TO SHIM DRIVE RAIL IF GATE PANEL IS 'BOWED'. RAIL MUST BE INSTALLED IN A STRAIGHT LINE.



TITLE

**SLIDE GATE OPERATOR (TYP) R.H.
CANTILEVER GATE PANEL**

DRAWN KERI	DATE 6/12/00	THIRD ANGLE PROJECTION 	REV --
CHECKED	DATE	PART NUMBER	
SHOP	MM/YY/DD	N/A	
APPROVED	DATE	DRAWING NUMBER:	SHT OF
ENGRNG	MM/YY/DD	S13A	1 1

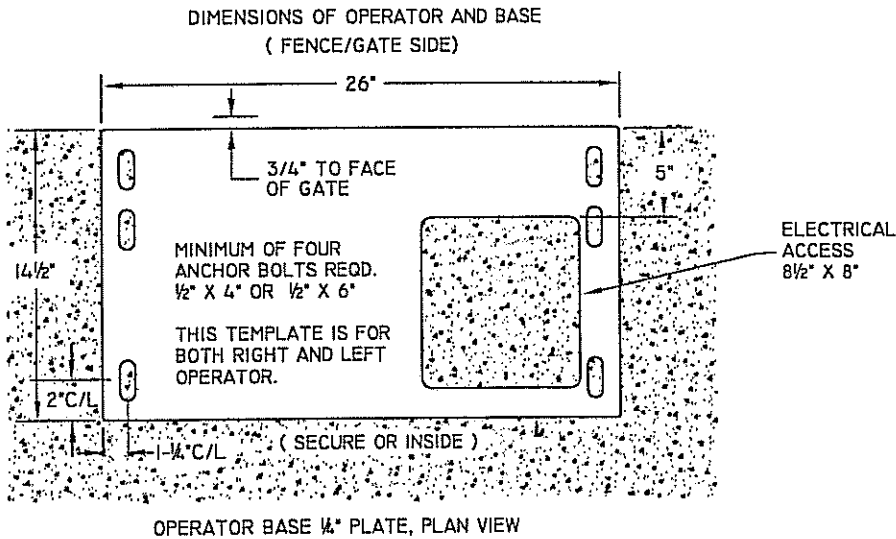


NOTE: CANTILEVER WHEELS MUST BE COVERED TO HELP PREVENT INJURIES. COVERS SHOWN HERE IN DOTTED LINES.

NOTE:

MINIMUM CONCRETE SLAB DIMENSIONS RECOMMENDED ARE:
 30" WIDE, 20" FROM FRONT TO BACK AND 16" DEEP.
 CHECK LOCAL FROST CONDITIONS AND SOIL CHARACTERISTICS
 FOR EXACT REQUIREMENTS IN YOUR AREA.

OPERATOR IS INSTALLED ON A CONCRETE PAD AND CONNECTED
 TO THE RIGHT HAND CANTILEVER GATE PANEL. 4" POSTS ARE
 SHOWN FOR GATE SUPPORT AND FENCE TERMINATION.



OPERATOR BASE 1/4" PLATE, PLAN VIEW

NOTE:
 CONTACT A FENCE CONTRACTOR FOR EXACT SPACING ON CANTILEVER POSTS.
 50% OF OPENING WIDTH GENERALLY PROVIDES A SMOOTH OPERATION.



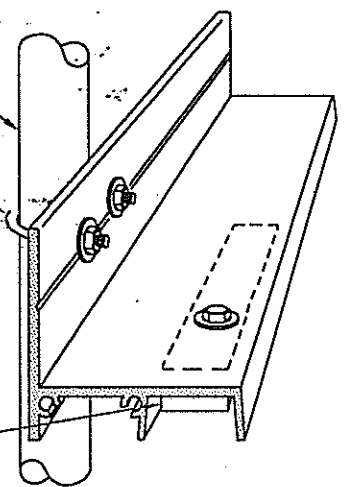
TITLE
**SLIDE GATE OPERATOR (TYP) R.H.
 CANTILEVER GATE PANEL**

DRAWN KERI	DATE 6/12/00	THIRD ANGLE PROJECTION 	REV --
CHECKED SHOP	DATE MM/YY/DD	PART NUMBER N/A	SHT OF 1 1
APPROVED ENGRNG	DATE MM/YY/DD	DRAWING NUMBER: SI3B	

VERTICAL GATE MEMBER

"U" BOLTS

LIMIT SWITCH RAMP



KEYWAYS FOR SPLICE PINS

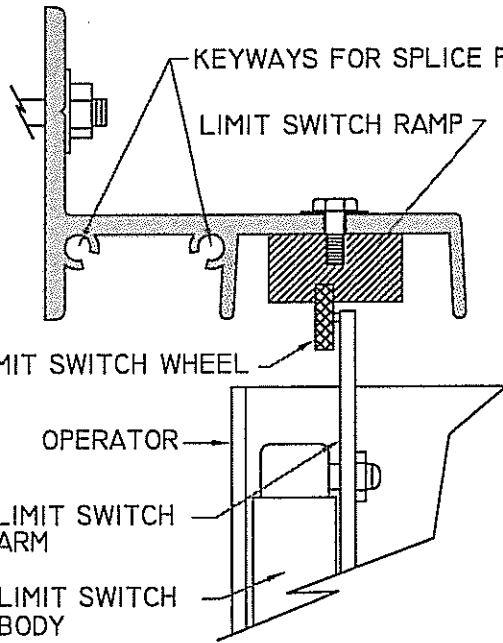
LIMIT SWITCH RAMP

LIMIT SWITCH WHEEL

OPERATOR

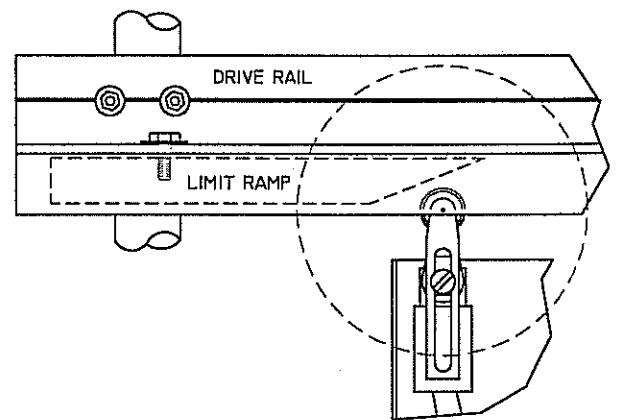
LIMIT SWITCH ARM

LIMIT SWITCH BODY



SECTION THROUGH DRIVE RAIL AND LIMIT SWITCH SHOWING RELATIONSHIP OF SWITCH, LIMIT RAMP AND DRIVE RAIL.

SIDE VIEW OF LIMIT RAMP AND LIMIT SWITCH IN OPERATION. TAPERED ENDS, ALWAYS POINT TOWARD THE OPERATOR DRIVE WHEELS.



NOTE: ALUMINUM RAIL SHOWN, STEEL RAIL SIMILAR.




TITLE

DRIVE RAIL SLIDE GATE OPERATION

DRAWN
KERI
CHECKED
SHOP
APPROVED
ENGRNG

DATE
6/12/00
DATE
MM/YY/DD
DATE
MM/YY/DD

THIRD ANGLE PROJECTION

 PART NUMBER
N/A
DRAWING NUMBER:
S22

REV
--
SHT OF
1 1



Hy-Security Gate Operators

Phone: 1-800-321-9947 • Fax: (206) 286-0614 • Web: www.hy-security.com • 1200 W Nickerson St • Seattle, WA. 98119

Installation Instructions for Hydraulic Sliding Gate Operators (Except DC versions)

1. See drawings S13A & S13B for concrete slab size, operator footprint, and spacing dimensions. With the aid of the template enclosed inside the operator, locate the operator with clearance of 1-3/4" to the gate panel.
2. Mount operator to pad with a minimum of four concrete anchor bolts of 1/2" diameter.
3. Remove the plastic shipping plug on the pump manifold and replace it with the vented cap supplied. You will find it in a box with the plastic limit ramps.

4. Injury and Entrapment Protection - minimum safeguards:

- A. Since automatic gates are not intended for pedestrian use, always install a separate pedestrian walkway and access gate. Install signs which direct persons to use the pedestrian gate, and to not enter through the vehicle gate.
- B. Be certain that all open gate rollers are completely guarded by covers.
- C. Be certain that the gate has been constructed such that the opportunity for persons to reach through any opening have been minimized. A sphere 2-1/4" must not pass through any part of the gate, or the fence adjacent to the gate when fully open. It may be necessary to install screening to prevent reach through injury.
- D. Placement of physical stops for maximum open and maximum close is essential to prevent any over travel that might allow the gate to fall. The limit ramps are not to be used as gate stops.
- E. Be certain that all access controls are located at least a six foot distance from the gate, to reduce the possibility of any attempt to reach through in order to operate the gate.
- F. Be certain to mount at least two of the enclosed 8-1/2" x 11" warning placards on each side of the gate to warn users of the hazards of a power operated gate.
- G. **Button Station Operation:** Be certain to mount a warning placard near each button station that warns that the area must be clear before operating the gate. If there are no entrapment protection sensors to guard the open and close operation of the gate, the push button station must be wired for constant hold operation only. This is achieved by cutting jumper wires in the control circuit, see drawing E63T2 or E55T2 for the 111 LS model.
- H. **Automatic Operation:** Entrapment protection sensors must be installed to guard both the opening and closing of the gate. Install two photo electric eyes, or attach a minimum of two edge sensors to create a reversing function for each direction of gate travel. All sensors guarding the closing direction connect to terminals #1 and #6 in the control box. All sensors guarding the opening direction connect to terminals #9 and #6. See drawing #E41 for mounting and connection details of the edge sensors.

Caution: vehicle detectors are not entrapment protection sensors.

5. Connect appropriate power wiring. Be certain to oversize supply conductors to allow for voltage drop, especially for single phase machines. Follow the wire size schedules (drawing# E16a,b). Machines that are to operate on voltages above 120 do not need a neutral wire. Route conduit to the front left corner of the control box. Wirenut the supply power wires to the loose wires at the back of the on/off switch. Be certain to connect a ground wire.

6. Verify that the primary tap of the control transformer is connected to match the supplied voltage. It is especially important to distinguish between 208 and 230 volt supplies. The various voltage taps are identified by a label on the transformer or in the electrical drawings.
7. Test the basic functions of the operator first, before connecting any external control wiring. If your operator is equipped with vehicle detectors, be certain that they are connected to a loop or un-plugged so that they do not cause interference with the function of the machine. If the motor turns, but nothing moves, reverse two poles of a three phase power source. Also be certain that the hose quick connectors are firmly engaged. If the open and close functions are reversed, refer to step 9.
8. All operators are manufactured to be right hand. If reversing the hand is necessary, first swap locations of the two limit switches (do not change the wires, just move the limit switches, the cords are long enough). On 222 models, the handing can be changed by simply unplugging and reversing the limit wiring on the left side of the control enclosure. A label is affixed on the control panel which describes this procedure in more detail. It is also necessary to reverse the two hydraulic hoses going to the pump. On the 111 LS operators, a wrench will be required to remove and reattach the hoses. All 222 models are provided with hydraulic quick connectors which require no tools to reverse handing. Run the operator to verify correct functioning. If the hydraulic hoses were incorrectly reversed, the gate will move in the opposite direction than commanded. If the limit switch cords were incorrectly reversed, the operator would not stop when the gate reached its full travel. Never reverse wiring to the push button station.
9. After testing the basic functions, follow our electrical connection diagrams to add any accessories or external control wiring. Test the operator functions again.
10. Install drive rail on gate panel at the specified height. The drive rail must be close to the center of the cutout in the operator housing as it passes between the drive wheels. Check to see that the arms supporting the wheels are at similar angles from horizontal. Be sure that the drive rail maintains a consistent height in relation to the operator wheels, throughout the travel of the gate. (This may not be level or parallel with the gate frame because the gate panel and the fence may not be level.) The maximum up and down variance of the drive rail, as it passes between the wheels, is one inch for the entire length of the gate travel. The point at which the rail should pass between the wheels is marked on the exterior of the operator housing.
11. Actuate the toggle clamp to grip the wheels onto the drive rail. Gauge the tension on the red spring. If more or less tension is needed, release the toggle clamp, adjust the nut on the threaded rod that penetrates the spring. A compression to 2" in height will be sufficient even for very heavy gates. Slightly less compression should be used for gates that weigh under 1000 pounds, or roll very easily. 2 1/8" compression is the maximum for the 111 LS operator.
12. Adjust the lever arms of limit switches to maintain at least 1/4" clearance from the underside of the drive rail. This will avoid false tripping of the limits (see drawing# S 22). The limit switch arm should be approximately in the center of the rail channel. If adjustment is required, remove the limit arm before bending. This will avoid breaking the head of the switch. Locate the plastic limit ramps on the underside of the drive rail to control maximum travel of the gate in the open and close direction. Mount the limit ramps to trip the limit switches approximately three inches ahead of the desired gate stopping position. This clearance is needed for gate deceleration travel, after the limit switch has been tripped.
13. Check the "soft stop" open timer, which is mounted on top of the control relay. The label on the timer dial shows the minimum and maximum settings. In operation the timer only needs to be set long enough for the gate to coast to a smooth stop after opening. There is no bad effect if the timer is set for too long, except that the operator cannot be started closed until this timer times out. There is no timer adjustment for the close direction.

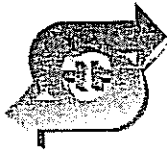
14. Set the maximum run timer, which is located at the extreme right, inside of the electric panel. The range is adjustable to 10 minutes. Set the timer for more than twice the amount of time needed for the gate to traverse the opening.

ADJUSTMENT OF ACCESSORIES AND INFORMATION ABOUT TWO FOOT/SECOND OPERATORS

1. Set "timer to close" accessory for desired delay. This optional timer is located on the left side of the main control relay. The range is adjustable from 1 to 30 seconds. The timer will close the gate from any position, but all open and safety signals must be absent.

2. All operators, except 111 LS and 222 SS, have a reverse delay timer mounted at near center of the control panel. The delay is adjustable from .3 to 3 seconds, and works together with the soft stop feature to provide smooth reversing. Larger gates will need a longer delay to allow time for the momentum of the gate to be stopped. Most gates will only need a second or less. The time needed to stop and reverse a gate is partly a function of the optional brake valves that are included with many models. See number three for their correct adjustment.

3. All two foot per second operators, as well as any operator that is intended to drive gates in excess of 1,000 pounds should be equipped with the "E" option, which adds a reverse delay and hydraulic brakes, to rapidly decelerate a gate. The positioning of the limit ramps should be 6 inches ahead of full gate travel to give some space for deceleration. Adjustment of the brake valves, one for each direction, affects the limit switch adjustment. If adjustment is necessary, loosen the 9/16" lock nut on the end of the brake valves (located on the front side of the hydraulic pump). Turn the adjustment stem with an allen wrench. The adjustment works opposite of typical, in that a counter-clockwise adjustment will stop the gate more rapidly. If the adjustment is set too loose, the gate will coast too far. If the adjustment is set too tight the gate speed will decrease. Be certain to re-tighten the locking nut when the adjustment is complete.



Hy-Security Gate Operators

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Installation Instructions for Hydraulic Sliding Gate Operators (Except DC versions)

1. See drawings S13A & S13B for concrete slab size, operator footprint, and spacing dimensions. With the aid of the template enclosed inside the operator, locate the operator with clearance of 1-3/4" to the gate panel.

2. Mount operator to pad with a minimum of four concrete anchor bolts of 1/2" diameter.

3. Remove the plastic shipping plug on the pump manifold and replace it with the vented cap supplied. You will find it in a box with the plastic limit ramps.

4. Injury and Entrapment Protection - minimum safeguards:

A. Since automatic gates are not intended for pedestrian use, always install a separate pedestrian walkway and access gate. Install signs which direct persons to use the pedestrian gate, and to not enter through the vehicle gate.

B. Be certain that all open gate rollers are completely guarded by covers.

C. Be certain that the gate has been constructed such that the opportunity for persons to reach through any opening have been minimized. A sphere 2-1/4" must not pass through any part of the gate, or the fence adjacent to the gate when fully open. It may be necessary to install screening to prevent reach through injury.

D. Placement of physical stops for maximum open and maximum close is essential to prevent any over travel that might allow the gate to fall. The limit ramps are not to be used as gate stops.

E. Be certain that all access controls are located at least a six foot distance from the gate, to reduce the possibility of any attempt to reach through in order to operate the gate.

F. Be certain to mount at least two of the enclosed 8-1/2" x 11" warning placards on each side of the gate to warn users of the hazards of a power operated gate.

G. **Button Station Operation:** Be certain to mount a warning placard near each button station that warns that the area must be clear before operating the gate. If there are no entrapment protection sensors to guard the open and close operation of the gate, the push button station must be wired for constant hold operation only. This is achieved by cutting jumper wires in the control circuit, see drawing E63T2 or E55T2 for the 111 LS model.

H. **Automatic Operation:** Entrapment protection sensors must be installed to guard both the opening and closing of the gate. Install two photo electric eyes, or attach a minimum of two edge sensors to create a reversing function for each direction of gate travel. All sensors guarding the closing direction connect to terminals #1 and #6 in the control box. All sensors guarding the opening direction connect to terminals #9 and #6. See drawing #E41 for mounting and connection details of the edge sensors.

Caution: vehicle detectors are not entrapment protection sensors.

5. Connect appropriate power wiring. Be certain to oversize supply conductors to allow for voltage drop, especially for single phase machines. Follow the wire size schedules (drawing# E16a,b). Machines that are to operate on voltages above 120 do not need a neutral wire. Route conduit to the front left corner of the control box. Wirenut the supply power wires to the loose wires at the back of the on/off switch. Be certain to connect a ground wire.

6. Verify that the primary tap of the control transformer is connected to match the supplied voltage. It is especially important to distinguish between 208 and 230 volt supplies. The various voltage taps are identified by a label on the transformer or in the electrical drawings.

7. Test the basic functions of the operator first, before connecting any external control wiring. If your operator is equipped with vehicle detectors, be certain that they are connected to a loop or un-plugged so that they do not cause interference with the function of the machine. If the motor turns, but nothing moves, reverse two poles of a three phase power source. Also be certain that the hose quick connectors are firmly engaged. If the open and close functions are reversed, refer to step 9.

8. All operators are manufactured to be right hand. If reversing the hand is necessary, first swap locations of the two limit switches (do not change the wires, just move the limit switches, the cords are long enough). On 222 models, the handing can be changed by simply unplugging and reversing the limit wiring on the left side of the control enclosure. A label is affixed on the control panel which describes this procedure in more detail. It is also necessary to reverse the two hydraulic hoses going to the pump. On the 111 LS operators, a wrench will be required to remove and reattach the hoses. All 222 models are provided with hydraulic quick connectors which require no tools to reverse handing. Run the operator to verify correct functioning. If the hydraulic hoses were incorrectly reversed, the gate will move in the opposite direction than commanded. If the limit switch cords were incorrectly reversed, the operator would not stop when the gate reached its full travel. Never reverse wiring to the push button station.

9. After testing the basic functions, follow our electrical connection diagrams to add any accessories or external control wiring. Test the operator functions again.

10. Install drive rail on gate panel at the specified height. The drive rail must be close to the center of the cutout in the operator housing as it passes between the drive wheels. Check to see that the arms supporting the wheels are at similar angles from horizontal. Be sure that the drive rail maintains a consistent height in relation to the operator wheels, throughout the travel of the gate. (This may not be level or parallel with the gate frame because the gate panel and the fence may not be level.) The maximum up and down variance of the drive rail, as it passes between the wheels, is one inch for the entire length of the gate travel. The point at which the rail should pass between the wheels is marked on the exterior of the operator housing.

11. Actuate the toggle clamp to grip the wheels onto the drive rail. Gauge the tension on the red spring. If more or less tension is needed, release the toggle clamp, adjust the nut on the threaded rod that penetrates the spring. A compression to 2" in height will be sufficient even for very heavy gates. Slightly less compression should be used for gates that weigh under 1000 pounds, or roll very easily. 2 1/8" compression is the maximum for the 111 LS operator.

12. Adjust the lever arms of limit switches to maintain at least 1/4" clearance from the underside of the drive rail. This will avoid false tripping of the limits (see drawing# S 22). The limit switch arm should be approximately in the center of the rail channel. If adjustment is required, remove the limit arm before bending. This will avoid breaking the head of the switch. Locate the plastic limit ramps on the underside of the drive rail to control maximum travel of the gate in the open and close direction. Mount the limit ramps to trip the limit switches approximately three inches ahead of the desired gate stopping position. This clearance is needed for gate deceleration travel, after the limit switch has been tripped.

13. Check the "soft stop" open timer, which is mounted on top of the control relay. The label on the timer dial shows the minimum and maximum settings. In operation the timer only needs to be set long enough for the gate to coast to a smooth stop after opening. There is no bad effect if the timer is set for too long, except that the operator cannot be started closed until this timer times out. There is no timer adjustment for the close direction.

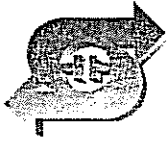
14. Set the maximum run timer, which is located at the extreme right, inside of the electric panel. The range is adjustable to 10 minutes. Set the timer for more than twice the amount of time needed for the gate to traverse the opening.

ADJUSTMENT OF ACCESSORIES AND INFORMATION ABOUT TWO FOOT/SECOND OPERATORS

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3. All two foot per second operators, as well as any operator that is intended to drive gates in excess of 1,000 pounds should be equipped with the "E" option, which adds a reverse delay and hydraulic brakes, to rapidly decelerate a gate. The positioning of the limit ramps should be 6 inches ahead of full gate travel to give some space for deceleration. Adjustment of the brake valves, one for each direction, affects the limit switch adjustment. If adjustment is necessary, loosen the 9/16" lock nut on the end of the brake valves (located on the front side of the hydraulic pump). Turn the adjustment stem with an allen wrench. The adjustment works opposite of typical, in that a counter-clockwise adjustment will stop the gate more rapidly. If the adjustment is set too loose, the gate will coast too far. If the adjustment is set too tight the gate speed will decrease. Be certain to re-tighten the locking nut when the adjustment is complete.



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Use and Adjustment of the Manual Release Mechanism

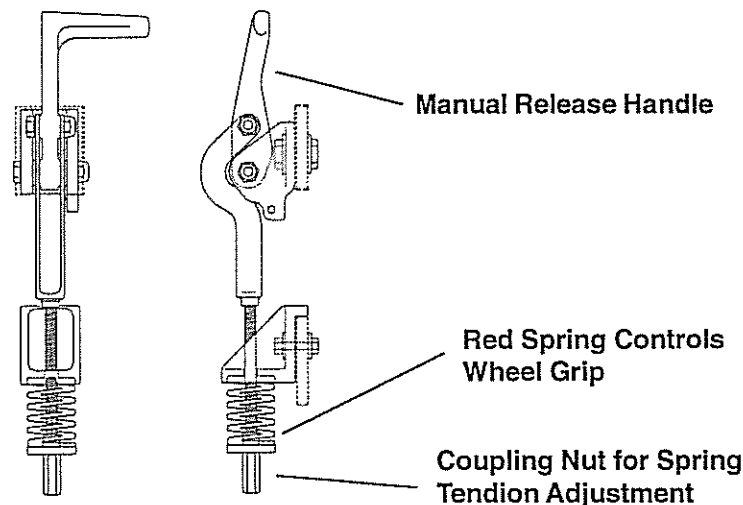
All slide gate series operators come equipped with a toggle handle manual release mechanism to disengage the drive wheels from the drive rail. The manual release is located under the electric control panel and to the right of the hydraulic motors. To disengage the drive wheels, simply pull the aluminum handle down.

USE CAUTION: at first the toggle handle will rapidly pop down, as the loaded spring releases. This action will cause the lower drive wheel to drop and disengage from the drive rail. When the coupling nut on the threaded rod drops to its lowest position it will push on the base of the operator which will cause the upper drive wheel to lift and disengage from the drive rail.

For shipment, a piece of wood was placed between the coupling nut and the chassis. If the wood is still in place, discard it.

If the drive rail has been installed at the correct height to the chassis, the manual toggle release mechanism will equally spread both wheels away from the drive rail. If the rail has been mounted higher than specified, it may be necessary to insert a 3/8" bolt into the bottom of the coupling nut which will create additional lift clearance for the upper drive wheel when manually released. If used, adjust the 3/8" bolt so the drive wheels spread equally when the manual toggle release is fully disengaged.

The coupling nut must always be adjusted correctly so the wheels provide a strong clamping force on the drive rail. The red spring should measure 2" to 2-1/8" in height when under correct compression.



For assistance call your Distributor.



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Wire Size Schedules

for 1/2-hp through 5-hp motors

Supplying a gate operator with the right electrical service is crucial to the way the performance of the operator the life of its electrical components. If the wire size used is too small, the voltage loss—especially during motor starting—will prevent the motor from attaining its rated horsepower. The percent of horsepower lost is far greater than the percentage of the voltage loss. A voltage loss could also cause the control components to chatter while the motor is starting, substantially reducing their life due to the resultant arcing. There is no way to restore the lost performance resulting from undersized wires, except to replace them; therefore it is much more economical to choose a sufficient wire size at the initial installation.

The tables on the following page are based on copper wire and allow for a 5% voltage drop. The ampere values shown are the service factor ampere rating (maximum full load at continuous duty) of the motor.

Always connect in accordance with the National Electrical Code, article 430, and other local codes that may apply.

The maximum distance shown is from the gate operator to the power source; assuming that source power is from a panel box with adequate capacity to support the addition of this motor load. The values are for one operator, with no other loads applied to the branch circuit. For two operators applied to one circuit, reduce the maximum allowed distance by half.

Use this chart to determine maximum allowable control wiring distance. If the location required exceeds the distances listed on the chart at the right, addition of a long range interface will be necessary.

<i>Pushbutton Control Wiring</i>	
16 ga	125' Maximum
14 ga	200' Maximum
12 ga	300' Maximum
10 ga	500' Maximum



Wire Size for Voltage Drop Over Distance

Wire Sizes for Power Wiring, Single Phase Distances are shown in the unshaded boxes

Amps	115 V, SINGLE PHASE							208 V, SINGLE PHASE							230 V, SINGLE PHASE						
	10.0	11.6	14.4	27.2	NA	NA	NA	5.5	6.1	7.6	14.2	16.2	16.2	NA	5.0	5.8	7.2	13.6	14.8	27.0	
Horse Power	1/2HP	3/4HP	1HP	2HP	3HP	5HP	1/2HP	3/4HP	1HP	2HP	3HP	5HP	5HP	1/2HP	3/4HP	1HP	2HP	3HP	5HP		
12ga	90	75	60	30	-	-	290	260	205	110	100	-	-	350	300	245	130	120	65		
10ga	140	120	100	50	-	-	460	415	330	175	155	-	-	560	480	385	205	190	105		
8ga	220	190	155	80	-	-	725	650	525	280	245	-	-	880	760	610	325	300	165		
6ga	350	300	245	130	-	-	1,150	1,040	835	445	390	-	-	1,400	1,210	975	515	475	260		
4ga	555	480	385	205	-	-	1,825	1,645	1,320	710	620	-	-	2,220	1,915	1,550	815	750	410		
2ga	890	765	620	330	-	-	2,920	2,630	2,110	1,130	1,000	-	-	3,550	3,060	2,465	1,305	1,200	660		

Wire Gauge

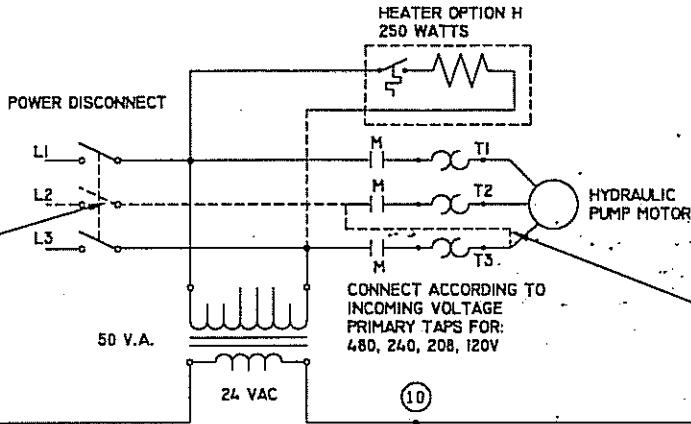
Wire sizes for Power Wiring, Three Phase Distances are shown in the unshaded boxes

Amps	208 V, THREE PHASE							230 V, THREE PHASE							460 V, THREE PHASE						
	2.7	3.1	4.2	6.5	6.7	16	2.4	3.0	3.8	6.2	6.4	15.4	1.2	1.5	1.9	3.1	3.2	7.7			
Horse Power	1/2HP	3/4HP	1HP	2HP	3HP	5HP	1/2HP	3/4HP	1HP	2HP	3HP	5HP	1/2HP	3/4HP	1HP	2HP	3HP	5HP			
12ga	590	510	375	245	235	100	730	585	460	280	270	115	2,915	2,950	1,850	1,130	1,100	455			
10ga	930	810	600	390	375	160	1,160	930	730	450	435	180	4,640	3,710	2,930	1,800	1,740	725			
8ga	1,475	1,285	950	615	595	250	1,835	1,470	1,160	710	690	285	7,340	5,870	4,650	2,840	2,750	1,150			
6ga	2,350	2,045	1,510	975	945	400	2,925	2,340	1,845	1,130	1,095	455	11,700	9,350	7,400	4,550	4,400	1,800			
4ga	3,720	3,240	2,390	1,545	1,500	630	4,625	3,700	2,920	1,790	1,735	720	18,500	14,800	11,700	7,200	7,000	2,900			

Wire Gauge

Always connect in accordance with the National Electrical Code, article 430, and other local codes that may apply.

NOTE:
ON SINGLE PHASE
OMIT CENTER LEG
AND ADD JUMPER
T3 OT L2. ALSO
OMIT CONNECTION
T3 TO THE MOTOR.



NOTE:
ON THREE PHASE
REMOVE THE JUMPER
AND RESTORE MIDDLE
LEG. CONNECT T3 TO
THE MOTOR.

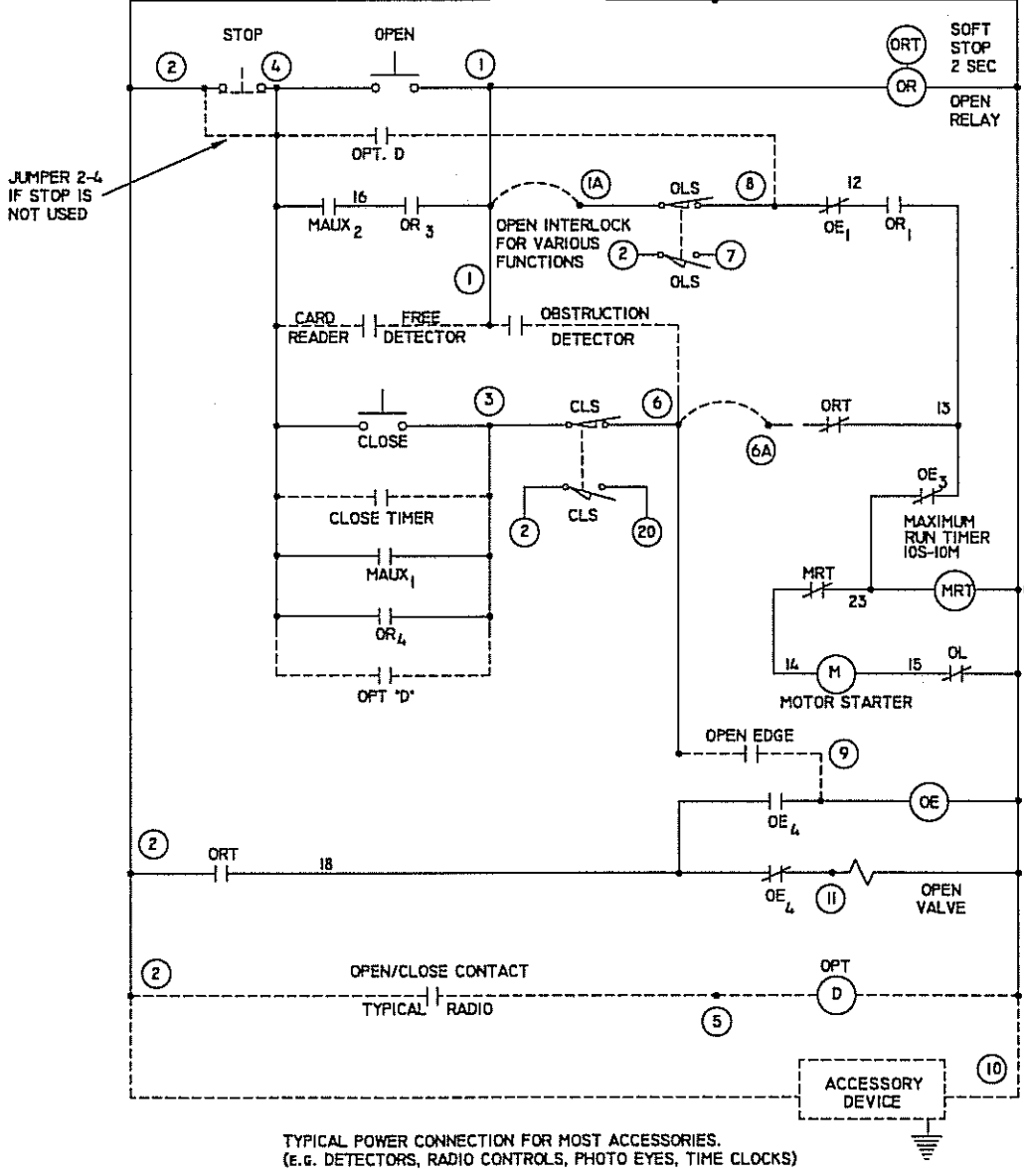
PART NUMBER: N/A
DATE: 12-14-98
PAGE: 1
REV. NO.: 0
DRAWING NUMBER: ES5T2
REV. DATE: 0

LOGICAL DIAGRAM 111 LS

TITLE:



SEE ENGINEERING CHANGE PAGE FOR CURRENT REVISION NUMBER

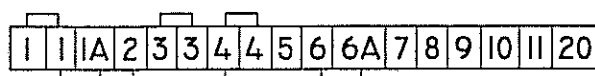


NOTES:
ANY REQUIRED CIRCUIT
PROTECTION IS BY
OTHERS.
LIMIT SWITCHES SHOWN
WITH GATE IN TRANSIT
AND CONTROLS DE-
ENERGIZED.
NUMBERS IN CIRCLES
INDICATE TERMINAL
NUMBERS.
DASHED LINES INDICATE
OPTIONAL WIRING.
IF THE THREE BUTTON
STATION IS NOT USED
JUMPER 2 TO 4 TO
REPLACE STOP BUTTON.

JUMPER 2-4
IF STOP IS
NOT USED

TYPICAL POWER CONNECTION FOR MOST ACCESSORIES.
(E.G. DETECTORS, RADIO CONTROLS, PHOTO EYES, TIME CLOCKS)

TERMINAL STRIP

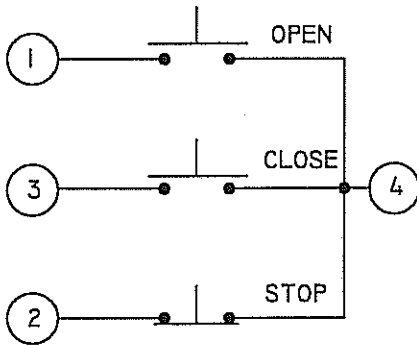


REMOVE JUMPER WHEN ADDING
AN OPEN INTERLOCK

JUMPER IF EXTERNAL
STOP IS NOT USED

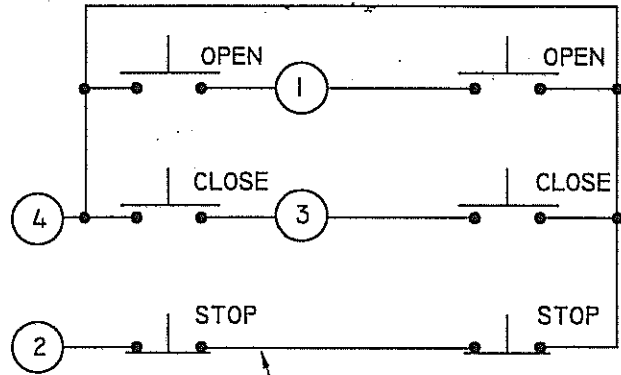
REMOVE WHEN ADDING
A CLOSE INTERLOCK

WIRE #	WIRE COLOR
1	BLUE
1A	WHITE
2	RED/YEL STRP
3	GREEN
4	BROWN
5	WHT/RED STRP
6	ORANGE
6A	YELLOW
7	GREY
8	VIOLET
9	RED/WHT STRP
10	RED
11	BLACK
12	BLU/WHT STRP
13	BLK/WHT STRP
14	WHT/BLK STRP
15	GRN/WHT STRP
16	BRN/WHT STRP
17	ORG/WHT STRP
18	YEL/BLK STRP
19	GRY/BLK STRP
20	VLT/WHT STRP



NOTE:
 WIRING FOR ALL REMOTE 24 VAC CONTROL
 PUSHBUTTONS. EXCEPT HTG 320.
 SINGLE BUTTON STATION REQUIRE 4 CONDUCTORS.
 FIRST STATION IN MULTIPLE STATION GROUP
 REQUIRES FIVE CONDUCTORS (SEE EXAMPLE).

SINGLE BUTTON STATIONS
 EXCLUDING OPERATOR MOUNTED



NOTE:
 ON MULTIPLE STATIONS BE SURE TO CUT JUMPER
 (CLOSE TO STOP) IN FIRST STATION AND ADD WIRE
 BETWEEN THE TWO STOP BUTTONS.

MULTIPLE BUTTON STATIONS
 EXCLUDING OPERATOR MOUNTED



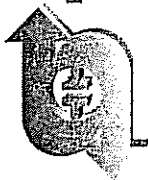
THE NUMBERS IN THE CIRCLES ARE WIRES THAT CORRESPOND TO THE CONTROL CIRCUIT. CONNECT
 THE PUSHBUTTON STATION TO THE TERMINAL STRIP INSIDE THE CONTROL BOX. MATCH WIRE NUMBER
 TO THE TERMINAL NUMBER.



MAS 90
 N/A
 TITLE

**REMOTE 4 WIRE
 PUSHBUTTON WIRING**

DRAWN DB	DATE 05/04/00	THIRD ANGLE PROJECTION 		REV A
CHECKED -	DATE -	ERN NUMBER -	DATE -	
APPROVED -	DATE -	DRAWING NUMBER E57		SHT OF

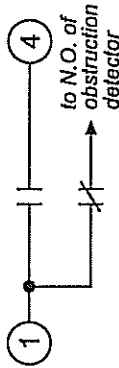


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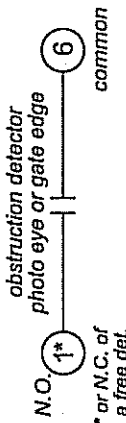
Electrical Circuit Options Applies to all operators except HTG 320 models

A Any Open Device or Free Detector



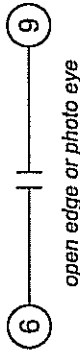
Any device used to open the gate, such as a pushbutton, key switch or detector, connects to #1 to #4. The gate will be held in the open position if contact is maintained.

B Closing Obstruction Sensor



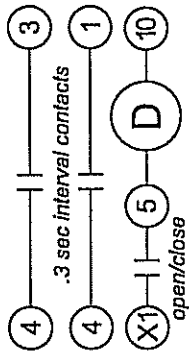
This input allows connection of an obstruction sensor to guard the closing of a gate. Connect the sensor output to #1 and #6. If the sensor is a vehicle detector and is used with a free detector, connect the N.O. of the obstruction detector to the N.C. of the free detector, as shown at left. If tripped while closing, the gate will reverse to the full open position.

C Opening Obstruction Sensor



This input allows connection of an obstruction sensor to guard the opening of a gate. If tripped while opening, the gate will reverse slightly, and then self-disable for two seconds. Connect a N.O. contact (edge sensor or photo eye) to terminals #6 and #9.

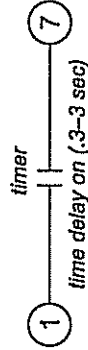
D Open/Close Interface



This special interface allows one contact, two-way control: the gate can be closed only after opening fully, but can be opened from any position. For 222SS models only, option D must be ordered with option E, Reverse Delay. Refer to the connection diagram for detailed wiring information.

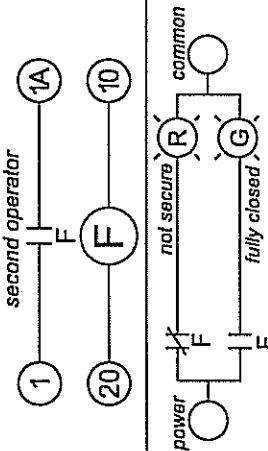
E Reverse Delay

—not available on 111LS—
standard with all operators
except 222SS



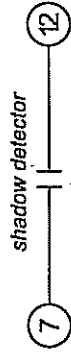
This option delays start in the open direction. It is also used to delay instant reverse. It can be added by itself or as part of several factory modifications necessary to convert operators to 'E' type. Remove the jumper between #1 and #7 when installing the reverse delay.

F Interlock & Relay



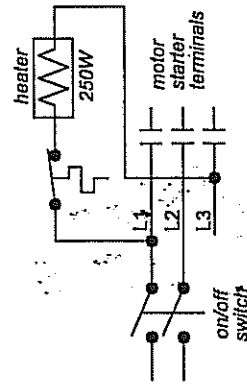
To interlock two Hy-Security machines connect a N.O. pole of the 'F' relay to the other operator (in all but the 111LS), and remove the jumper between #1 and #1A. In the 111LS, remove open limit wire #8 and wire in series with 'F' relay N.O. to #8.

G Shadow Detector



Swing gates require an additional loop and detector for the area under the arc of the gate. This detector can hold the gate when open, but is turned off when the gate begins to close.

H Heater



We recommend a heater be installed in colder climates; use one rated for the supplied voltage. Connect to terminals L1 and L3 of the motor starter. On 480 VAC systems an additional relay is required.



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Long Range Pushbutton Control Connection Diagram

Voltage loss over distance is caused as a function of control amperage multiplied by the resistance of the wiring, and may be expressed: Voltage loss = (wire resistance) X (control amperage). This limits pushbutton control wiring to the following schedule:

16 ga. wire = up to 125 feet max 12 ga. wire = up to 300 feet max

14 ga. wire = up to 200 feet max 10 ga. wire = up to 500 feet max

For applications requiring pushbutton controls from a long distance, or circuits of limited current, order the factory modification, long range interface. The following schedule indicates the improved control range using the long range interface:

16 ga. wire = up to 50 miles

20 ga. wire = up to 19 miles

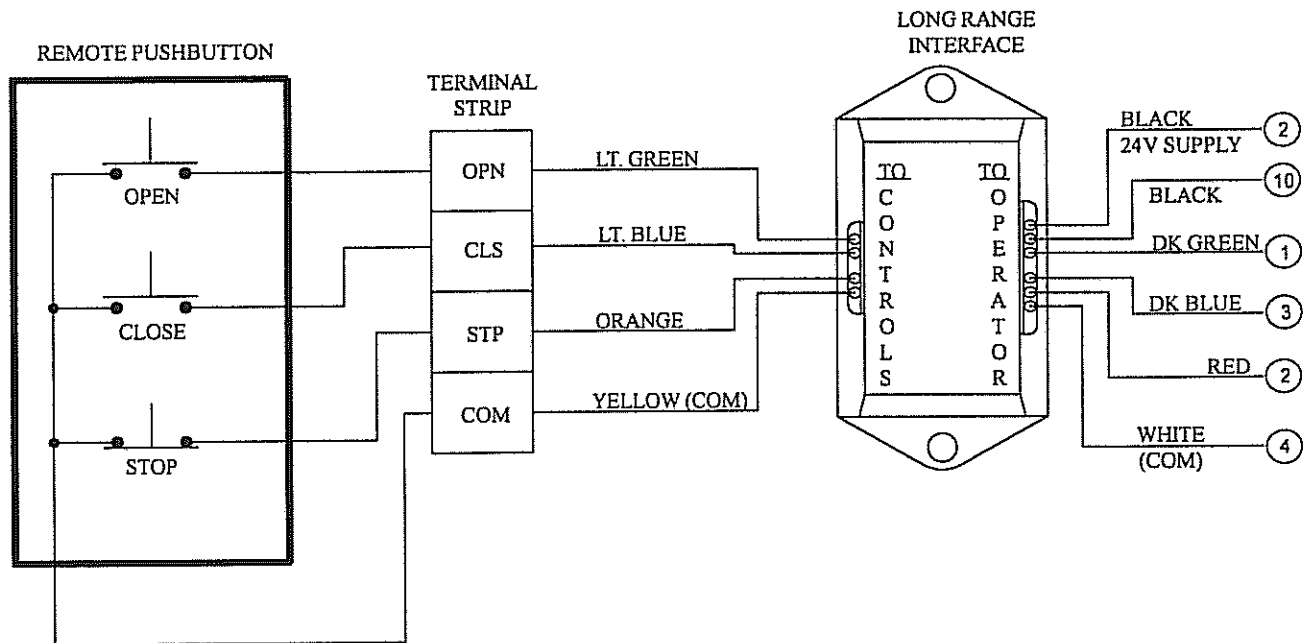
18 ga. wire = up to 30 miles

22 ga. wire = up to 12 miles

FOR BEST PERFORMANCE
USE 20 GAUGE WIRE OR LARGER

Be certain to remove factory-installed jumper (#2 to #4) and also verify that no other external stop button is connected at #2 and #4.

When the long range interface option is used in conjunction with a pushbutton control, connect to the operator as shown below:



NOTE:
The part number for the long range interface, installed at the factory, A EIIF 001 OCS
The same part designation for the long range interface, in kit form, A EKIF 001 OCS



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Master/Slave Interconnection Instructions

FOR ALL MODELS EXCEPT: HTG 320

Operation of two Hy-Security gate operators as a master/slave pair is simply a matter of correctly interconnecting the two control circuits. Join the following four wires from the master operator to the slave:

Terminal #1 master to terminal #1 slave,
Terminal #3 master to terminal #3 slave,
Terminal #4 master to terminal #4 slave,
*Terminal #10 master to terminal #10 slave

All stop control inputs must be connected to the master operator only. The slave operator must not have any connection between terminal #2 and terminal #4, such as a stop button or jumper.

*On DC battery powered operators, interconnect the black wires (-) to the on/off switch instead of the #10 wires. This prevents one operator from powering the other when the disconnect switch is off.

For assistance call your Distributor.



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Installation Instructions For Gate Reversing Sensing Edge

1. Securely bolt the edge sensor to the edge of the gate. The edge should line up with the lower corner of the gate frame.
2. If the reversing edge is to wire directly to the gate operator:
 - A. Locate a mounting position for a curl cord attachment, or retracting cord reel holder where there will be no possibility of the cord rubbing on the moving gate panel.
 - B. Attach the cord to the gate in a position that is roughly near the position of the automatic operator, when the gate is closed.
 - C. Route the wires to the leading edge of the gate and join to the wires of the reversing edge. Wirenut and thoroughly tape the connections so that they are not prone to vibrate loose.
 - D. Join the fixed end of the cord reel or curl cord directly to terminal numbers 1 and 6 inside the control box of the operator.

3. If the reversing edge is to transmit to the gate operator:

- A. Mount the reversing edge transmitter (Multi Elmac Model #3022, or equivalent) onto the gate panel near the upper corner of the leading edge of the gate.
- B. Join the wires of the reversing edge to the two terminals inside of the edge transmitter. Set a unique code on the "DIP" switches inside the transmitter. Remount the cover of the transmitter and tighten the screws firmly so that no water will leak inside.

If a receiver for the reversing edge has been prewired inside the operator, proceed directly to step #3D.

- C. Mount a commercial style radio receiver* (one with a connector for an external antenna) on the inside of our operator enclosure. Connect the 24 Volt supply wires to terminal numbers X1 and 10 on the terminal strip. Connect the radio contact wires to terminal numbers 1 and 6 on the terminal strip.
- D. Mount an external antenna onto the top of a fixed post of the fence near the operator. Connect the antenna into the socket on the radio receiver.
- E. Set the "DIP" switches in the receiver to match the same code used in the edge transmitter.

*If there is also to be a radio receiver for a hand held transmitter to operate the gate, be certain to use a two channel commercial receiver.

4. Test the operation of the reversing edge to be certain that it is functioning. Advise the user of the gate to be certain to retest this vital function weekly.



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Photoelectric Eye, Reflector Adjustment Instructions

Correct installation and alignment of a retro-reflective photo eye and its reflector are important for a trouble free installation. Systems operating at a range of 15' or more are prone to weather caused reductions in range. We feel that if care is taken in the initial mounting and alignment of the 13" reflector then the chance of problems is greatly reduced. Taking steps to protect the reflector from being exposed to fog and being absolutely certain the photo eye is perfectly aligned will greatly increase the apparent power of the photo eye.

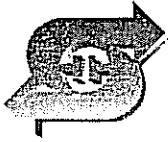
The ideal mounting for the reflector is suspended inside a 12" long piece of 3" P.V.C. conduit. Cut the opening of the 3" P.V.C. conduit at a 45 degree angle to act as a drip shield. The reflector is held against the backside of the 3" conduit by attaching a 3" male connector. Do not cement the connector so that the reflector can be reached for future cleaning. To create a mounting base, attach a 3" aluminum meter hub or flange to the connector. The whole package can now be mounted to any flat surface.

Locating the reflector in the center of the invisible beam of infrared light is important to achieve the most sensitive alignment. The center is determined by the following test. While holding the reflector in your hand, slowly raise it until the beam is no longer returned and the photo eye trips. Mark this maximum height. Now lower your hand and determine the lower limit of the infrared beam by watching the trip point. Mark this position well. Repeat the same procedure for left and right at the center elevation of the beam, as determined by the previous test. Once the four limits have been determined, either mount the reflector in the center of the area outlined or realign the eye for the position of the reflector. If the photo eye is realigned, be sure to perform the centering test again to verify that the reflector is truly in the center.

As a last tip, smearing dish soap on the reflector will also help to repel any possibility of fogging from moisture that gets into the 3" pipe. With all of these steps taken, the optimum performance of the retro-reflective photo eye system will be achieved.

Note: To cover greater distances, or to operate in adverse weather conditions, consider a through-beam photo eye.

For Assistance call your Distributor.



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Detector Installation Guide

Loop Basics

The vehicle detector passes a small current flow through the “loop” which then becomes an inductive coil. When a vehicle passes over a loop the detector senses the resultant drop in the inductance, and actuates it’s output relay.

Loop Configurations

Configurations differ depending on the application. In parking applications with our HTG320 operator, a loop may be as small as 3’ x 6’. In traffic applications employing one of our sliding gate operators, or swing gate operators, the smallest loop should not be less than six feet square.

Rules to Follow for Security Gate Applications

1. The side of the loop closest to the gate shall be located at least four (4) feet distant from it’s line of travel.
2. The shortest side of the loop shall be between six (6) and eight (8) feet in length. The longest side of the loop shall be between six (6) and twenty (20) feet in length. For applications that need to span a wide area, use several smaller loops. Do not exceed a maximum of 200 square feet of loop area to only one detector.
3. In applications with multiple loops, keep each loop at least six feet apart. This avoids “cross talk”. It is possible to have loops closer together by selecting different frequencies.
4. For greater sensitivity and less chance of false calls caused by the motion of the gate, it is better to use two smaller loops, connected in a series circuit, to one detector instead of one large, single loop.
5. To avoid interference, keep loops at least two (2) inches above any reinforcing steel. Do not route loop wires with, or in close proximity to, any other conductors, including other loop leads, unless shielded lead-in cable is used.
6. Loop and lead-in wire should be one continuous piece. Avoid splices, if possible. If a splice is necessary for any reason, “pot” the splice in epoxy or use heat shrink to ensure that the quality of the splice covering is the same as the original wire jacket.
7. Use only number 12, 14, or 16 gauge stranded wire with a direct burial jacket. Cross linked polyethylene insulation types, such as, XLPE or XHHW, will last much longer and are less prone to damage during installation than conventional insulation types. Preformed loops can be used before road surfacing or under pavers.
8. Twist loose tails of lead-in wires tightly, approximately ten times per foot.

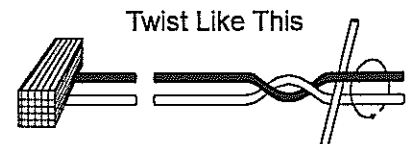
Twist lead-in at least 10 turns per foot



Like This



Not Like This



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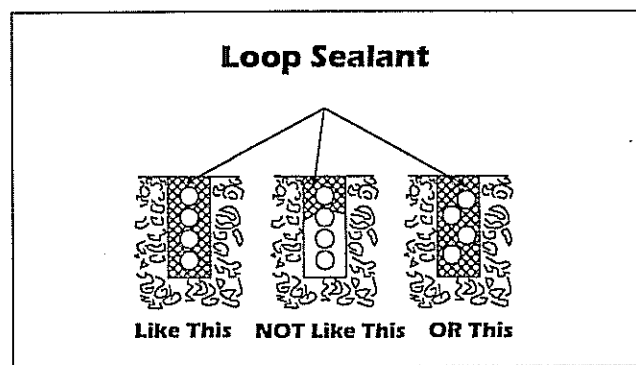
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9. Follow this guide for the correct number of turns in the loop;

12 to 20 sq. ft = 5 turns 20 to 60 sq. ft. = 4 turns 60 to 240 sq. ft. = 3 turns

10. This guide is written from a design perspective, but installation workmanship practices are equally important to insure proper operation and long loop life. The best way to insure a quality installation is to employ a professional installer experienced with detector loops. A few important practices are: **A.** The slot in the surface should be cut $\frac{1}{4}$ " wide x $1\frac{1}{2}$ " deep. **B.** The corners of the cut must be at an angle or core drilled to relieve stress on the wires. **C.** After the wire is installed, the slot must be completely backfilled with a non-hardening sealer. Note that if the loop wires are able to move in the slot after the sealer has set, the detector may give false calls.



Detector Logic

Hy-Security Gate Operators recommends that vehicle detectors be used for free open and obstruction sensing logic only. The exception is in parking applications with our HTG320 operator where detectors may be also used to close the gate. In applications employing our swing, vertical lift, or sliding gate operators, closing logic cannot be used. Because of their slower speeds, closing logic is a poor choice for security gate systems. Since there are several ways that the gate may be left standing open and because there is a loss of safety. Our circuit has not been designed to accommodate "detect to close" logic.

Loop Diagnostics

The following tests cannot guarantee a functioning loop, but failure of either test means that the loop is definitely suspect, even though it may still be functioning at the time.

Test #1:

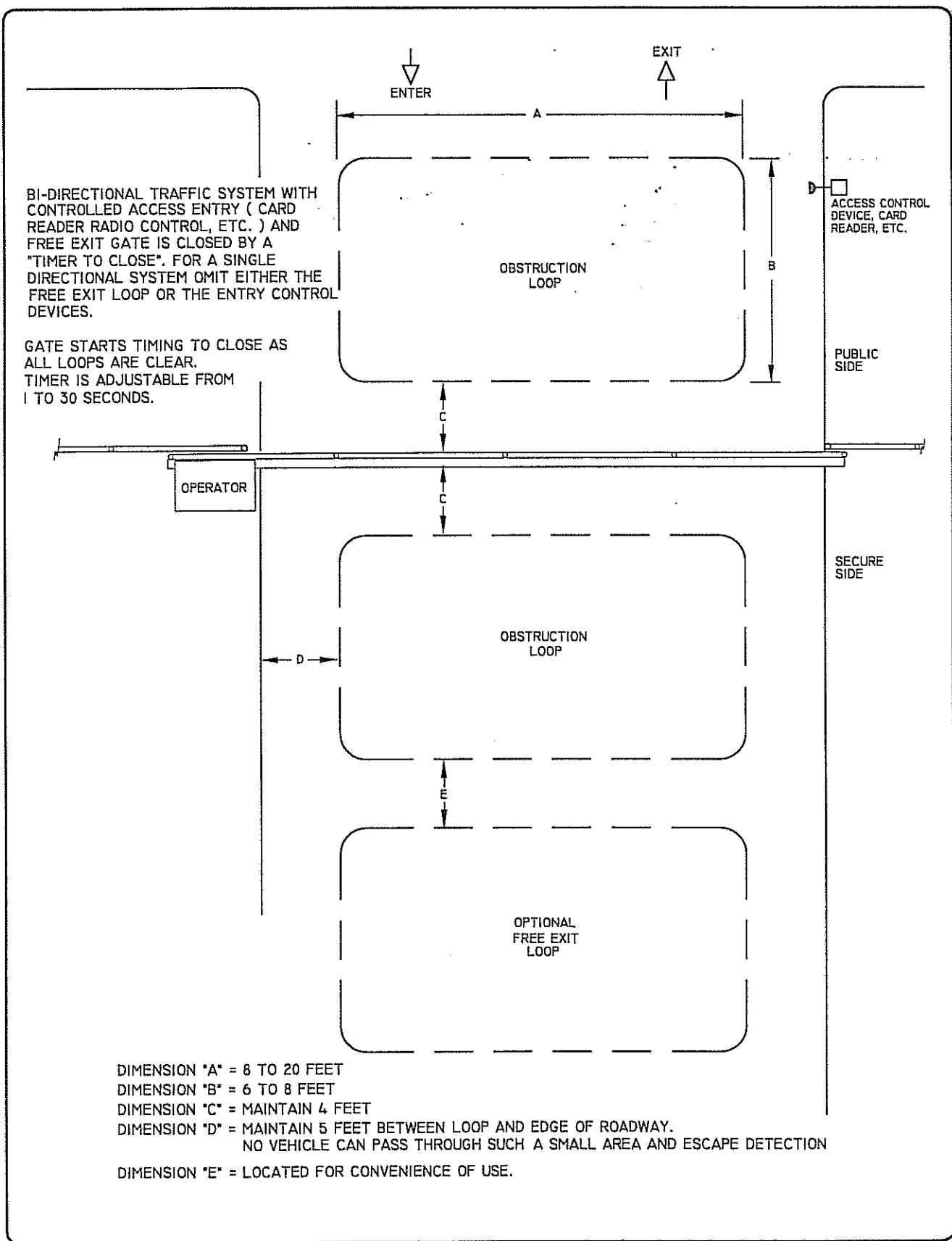
Resistance of the loop and lead-in wire should not exceed 4.0 Ohms.

Test #2:

The resistance to earth, as measured with a 500V "Megger", should be 100 Megohms or more. Loops may function at 10 Megohms or less but will not be reliable (e.g. when the ground is wet from rainfall). Low resistance indicates broken or moisture saturated insulation. This is common if inappropriate wire insulation has been used.

BI-DIRECTIONAL TRAFFIC SYSTEM WITH CONTROLLED ACCESS ENTRY (CARD READER RADIO CONTROL, ETC.) AND FREE EXIT GATE IS CLOSED BY A "TIMER TO CLOSE". FOR A SINGLE DIRECTIONAL SYSTEM OMIT EITHER THE FREE EXIT LOOP OR THE ENTRY CONTROL DEVICES.

GATE STARTS TIMING TO CLOSE AS ALL LOOPS ARE CLEAR. TIMER IS ADJUSTABLE FROM 1 TO 30 SECONDS.



- DIMENSION "A" = 8 TO 20 FEET
- DIMENSION "B" = 6 TO 8 FEET
- DIMENSION "C" = MAINTAIN 4 FEET
- DIMENSION "D" = MAINTAIN 5 FEET BETWEEN LOOP AND EDGE OF ROADWAY.
NO VEHICLE CAN PASS THROUGH SUCH A SMALL AREA AND ESCAPE DETECTION
- DIMENSION "E" = LOCATED FOR CONVENIENCE OF USE.



TITLE
SLIDE GATE LOOP LAYOUT

DRAWN DB	DATE 05/15/00	THIRD ANGLE PROJECTION 	
CHECKED -	DATE -	ERN NUMBER -	DATE -
APPROVED -	DATE -	DRAWING NUMBER E96	

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Operator Maintenance Hydraulic System

Fluid Level: Under normal conditions, hydraulic systems do not consume oil. Before adding any oil, check the system thoroughly for leaks. Remove the bright metal plug in the tank, fill to plug level, then replace plug. We recommend our *Uniflow* hydraulic oil, part number H-004, which is sold in one gallon containers by our distributors. Automatic transmission fluid may be used, although its performance in cold weather will be sluggish unless the operator is well heated. *Do not use brake fluid.*

Look for leaks: Occasionally there may be slight seeping at the fittings after some usage. Tightening of the fittings will usually correct the problem. If the leaking persists, replace "O" rings, fittings or hoses, if required. No further leaks should occur.

Oil Change: A hydraulic system does not foul its oil, unlike a gas engine, so oil changes do not need to be frequent. Rather, heat breakdown is the main concern in a hydraulic system. If the unit is subjected to high use, especially in a warm climate, change the oil more frequently. In general, we recommend draining the reservoir and replacing the oil at five or ten year intervals.

There are several ways to change the hydraulic oil, depending on the type of operator being serviced. If you don't know how to drain the oil, contact your distributor for directions. Refill with new *Uniflow* hydraulic oil (available from your distributor). To avoid overfilling, never pour into the port where the black breather cap is located. Instead, remove only the bright metal plug in the tank. Slowly pour the oil into the tank until the oil is within one inch of the filler port. Replace the plug and wipe up any spilled oil.

Cold Weather:

1. Check that your reservoir is filled with *Uniflow* high performance oil.
2. Ice can partly or totally jam gate operation. Check by operating the gate manually.

Electrical Controls

Before servicing, turn off power disconnect switch

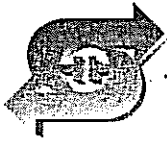
No routine maintenance is needed for the electrical system or controls. If the environment is very sandy or dusty, seal all holes in the electrical enclosure. Blow dust out of the electric panel with compressed air. A qualified electrician may troubleshoot with the aid of the electrical drawings in Appendix 4.

If it is necessary to call a distributor for assistance, be sure to have your model and serial number ready. Other helpful information would include the name of the job, approximate date of installation, and the service record of the operator, especially any work that has been done recently. Be prepared to describe as exactly as you can what the machine is or is not doing. Describe any unusual sounds or location of oil leaks.

How to Adjust the Pressure Relief Valve: To check your relief valve setting, first disconnect one of the hoses. Run the operator either open or closed (the gate will not move with the hose disconnected). The relief valve is found on the rear of the hydraulic power unit. It has a hex adjusting head and lock nut. To adjust, loosen the lock nut and screw the threaded bolt clockwise for increased pressure, counterclockwise to decrease pressure.

MODEL	FACTORY SETTING
111 Series	750 psi
SS, E Models	1000 psi
EX Model	1300 psi
444 Series	1300 psi

Do not attempt to use the relief valve as an entrapment protection device. Photocells or gate edges are the best methods to protect pedestrians and reserve power to the drive gate.



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Hydraulic Slide Gate Operator Maintenance Schedule

Name of Part	What To Do		Check at These Recommended Monthly Intervals					
			1	3	6	12	120	
Gate and Hardware	Check for damage and wear	1*	X					
Drive Wheels	Check for excessive wear	2*		X				
Wheel clamp spring	Check clamping tension	3*			X			
Limit Switches	Check adjustment	4*			X			
Anchor bolts	Check for tightness				X			
Fluid Level	Check for loss of fluid	5*				X		
Hydraulic Fluid	Drain and replace fluid							X

Special notes*

*1. Your gate and it's hardware will require more maintenance than the Hy-Security operator that is moving the gate. A damaged gate or worn hardware may cause operation to appear slow or erratic and will result in excess drive wheel wear. Lubricate the gate hardware frequently and check for smooth operation by opening the toggle clamping mechanism and then pushing the gate manually. One person should easily be able to push all but the largest of gates. Damage or warped gates panels should be straightened or replaced.

*2. Normally, the drive wheels will last for many years because they are designed to not slip on the rail. The life of the wheels may be greatly shortened by any of these faults: clamping spring not correctly adjusted, operator misaligned in relation to gate panel, badly warped gate panel or extremely stiff hardware. Also see note #1 above.

*3. 111 LS Series and 222 SS Series have similar requirements. Verify that the red clamping spring is compressed tightly, so that the drive wheels apply a strong grip on the power rail. The red spring should normally be compressed to 2" in height.

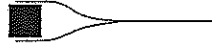
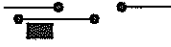
*4. The limit switch rollers should ride 1/4" to 1/2" below the drive rail, near the center of the channel. Misadjustment may result in false or early tripping or no limit function at end of travel. Verify that the limit trip ramps are tightly bolted to the drive rail.

*5. The oil level should remain approximately one inch below the filler hole. See maintenance instructions for oil filling. Loss of fluid is not normal and indicates a leak that must be located and repaired. The cap for the filler hole is a breather and needs only to be finger tight. Use "Uniflow" fluid, part# H004, if additional fluid is required.

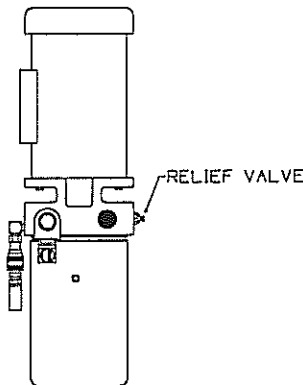


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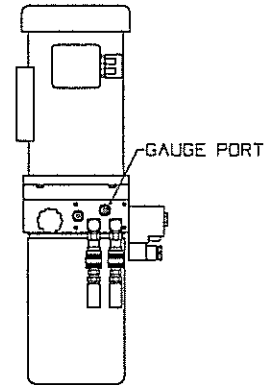


Pressure Relief Valves Adjustment Procedures



Side View

<u>Model</u>	<u>Factory Setting</u>
111 Series	750 psi
222 SS, E	1000 psi
222 EX	1300 psi
444 Series	1300 psi
HRG Series	1300 psi
HVG Series	2000 psi
HTG 360	1000 psi
HTG 320-6	1000 psi
HTG 320-3	1000 psi
HTG 320-2	700 psi



Front View

The relief valve can be found on the back side (gate side) of the hydraulic power unit. It is the only component located here and has a hex adjusting head and lock nut. To adjust setting, loosen the lock nut screw the threaded bolt CW for increased pressure, turn CCW to decrease pressure.

Pressure relief valves are preset at the factory to utilize maximum available horsepower. The relief valve can be lowered to smooth starting if necessary. This is most easily done by decreasing the pressure until the gate operation slows, and then increasing the pressure just enough to provide normal gate speed.

It must be understood that if you reduce the pressure setting, you will lose horsepower to move the gate if additional resistance (old gate hardware, snow and ice, etc.) is encountered.

Do not attempt to use the relief valve as an entrapment protection device. A photo eye or a gate edge is the best method to protect pedestrians and reserve power to drive the gate.



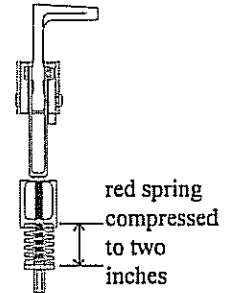
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Troubleshooting Guide - Slide Operators

Trouble With Gate Movement, in General:

1. For adequate traction, the red spring that clamps the drive wheels must be compressed to $2\frac{1}{8}$ " - 2". (Include the portion of the spring that is hidden in the spring retainer, when measuring compression.)
2. Look inside the chassis under the wheels for metal shavings. This might indicate that the machine or the gate panel are out of alignment. Realign operator or drive rail as necessary.
3. Check for smooth operation of the gate by disengaging the drive wheels and pushing the gate manually.



Electrical Problems in General:

1. Check Overload Reset button in lower right-hand corner of control enclosure.
2. Check Transformer Reset button.
3. Reset Maximum Run timer by turning off power or pressing the Stop button.
4. Measure and record the actual line voltage supply, while the operator is running.
5. Disconnect accessories like access controls, detectors and photocells, and recheck function.

Other Problems:

"I pushed the button, but nothing runs."

1. Verify that the line voltage is correct, and on three phase machines verify that all phases are working.
2. You may need to reset the control circuit breaker on the transformer.
3. Be sure control voltage is approximately 24 volts. Measure voltage between terminals #2 and #10 on 111 LS and #X1 and #10 on 222SS & EX. Reset the circuit breaker if control power is absent. Check the transformer primary tap if control voltage is incorrect.
4. Check overload (red button in electrical enclosure) by pushing the button in.
5. Be sure the limit switch levers are at least one quarter-inch below the drive rail so the levers won't trip accidentally.
6. Check for a jumper from #2 to #4, if an external stop button is not used.
7. Check the wire size schedules for maximum allowable length of control wiring runs to verify that voltage drop is not a problem.

"The pump is running but the wheels are not turning."

1. If the power is three phase, reverse any two of the three lines to correct rotation direction of the electric motor.
2. Check the level of hydraulic oil by removing the plug in the reservoir. Add oil, at this location, to within one inch of the hole that contained the plug.
3. If the hydraulic hoses are connected with quick disconnects, be certain that the connections are fully seated.
4. Read the pressure on the gauge to verify that the pump is set to deliver sufficient pressure. See the pressure relief valve adjustment page.

"The wheels turn backwards, or only in one direction."

1. Check hose connections for correct handling.
2. Verify that electrical fitting to hydraulic valve is coil is functional by attempting to slide it off the valve stem while the system is activated in the open direction.
3. If the gate only opens, chances are the solenoid is stuck, clean or replace the valve.



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Conversion of Primary Operator Voltage

These instructions do not apply to conversions from single phase to three phase or vice versa. Conversion from one phase to another is not recommended.

Steps required to convert the voltage of an operator within the same phase:

1. *The overload must be changed to match the motor current at the new operating voltage.*

To do this, remove the overload device from the contactor by loosening the three screws T1, T2 and T3 on the contactor. Remove all the wires on the overload and replace them exactly the same position on the new overload. Mount and tighten screws firmly. Be certain the new overload is adjusted to match the motor nameplate amps that correspond to the new voltage. Note that the existing overload has sufficient range to accommodate adjustment from 208 volts to 230 volts or vice versa.

2. *The primary tap on the control transformer must be changed to the new voltage.*

This is accomplished by first reading the label on the top of the control transformer to determine which color primary lead corresponds to the new voltage to be used. Disconnect the existing primary lead (**Caution:** Do not disconnect the primary "Common" lead) and reconnect the primary lead to the same location.

3. *The power leads to the motor must be reconnected in the motor junction box to match the new voltage.*

You must remove the cover from the junction box on the electric motor. Reconnect the primary leads in the new configuration shown on the motor nameplate that matches the new voltage. Note this step does not need to be performed for conversion between 208 volts and 230 volts.

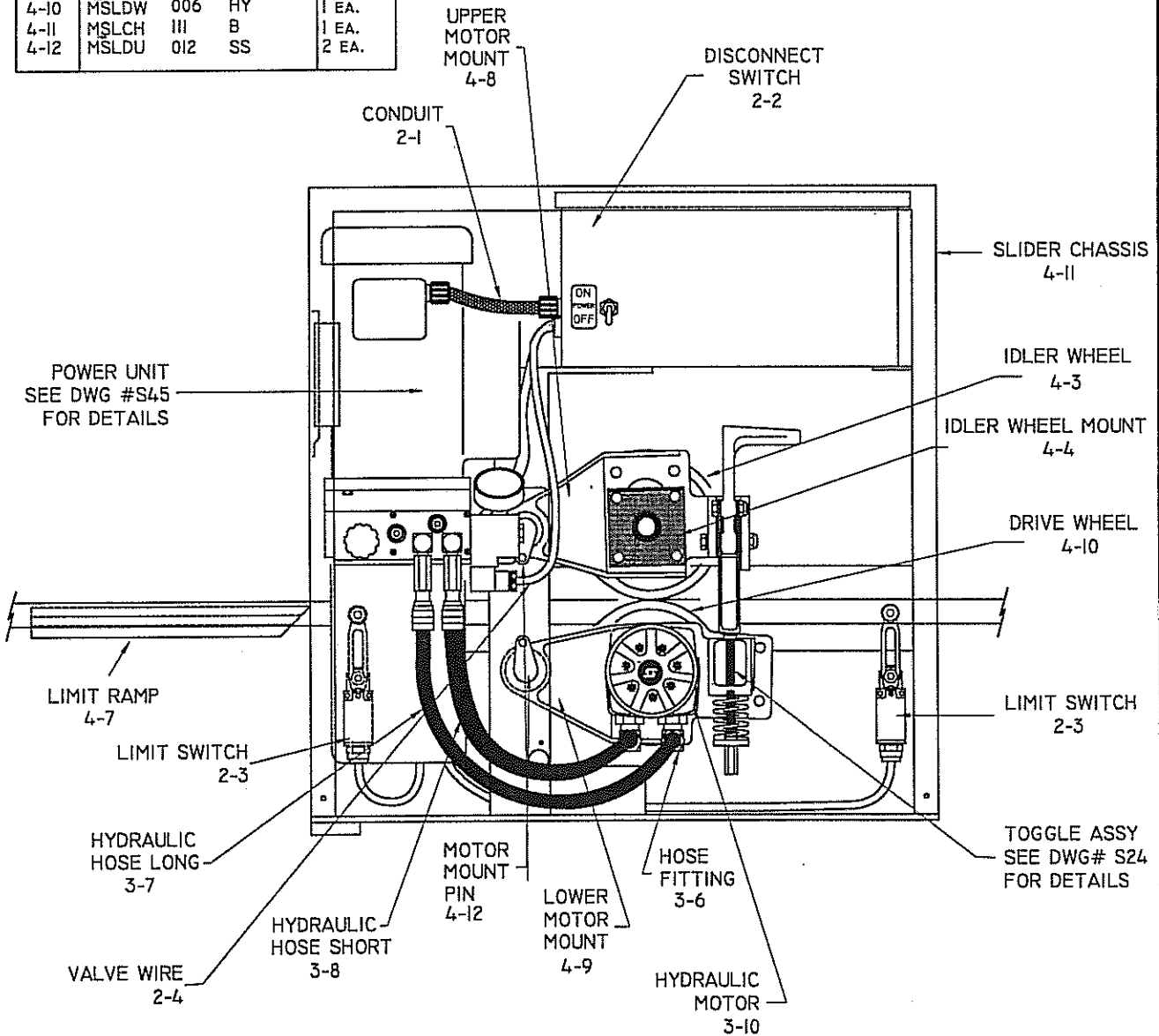
4. *The operator must be re-labeled to indicate the new voltage.*

Apply new labels to the operator so that the correct primary voltage is indicated.

5. To add a heater you need the following parts: (includes thermostat wire and all mounting hardware):

120 VAC	AEKHE 120 250
208-240 VAC	AEKHE 240 250
480 VAC (includes relay)	AEKHE 480 250

ITEM #				QTY
2-1	ECOMK	001	222	1 EA.
2-2	ESWDI	050	3P	1 EA.
2-3	ESWLS	224	III	2 EA.
2-4	ECOPL	001		1 EA.
3-3	HPPPU	HIII		1 EA.
3-6	HSFFI	853	0610	2 EA.
3-7	HSFHO	III	20	1 EA.
3-8	HSFHO	III	18	1 EA.
3-10	HMOMO	010	WRS	1 EA.
4-3	MSLDW	006	I	1 EA.
4-4	MSLDU	043	6I	1 EA.
4-7	MSLRL	012	B	2 EA.
4-8	MSLDU	042	I	1 EA.
4-9	MSLDU	042	B	1 EA.
4-10	MSLDW	006	HY	1 EA.
4-11	MSLCH	III	B	1 EA.
4-12	MSLDU	012	SS	2 EA.



	TITLE	DRAWN	DATE	THIRD ANGLE PROJECTION		REV
	COMPONENTS, 111 OPERATORS	D. B.	05/17/00			A
		CHECKED	DATE	ERN NUMBER	DATE	
		APPROVED	DATE	DRAWING NUMBER: LS28		SHT OF