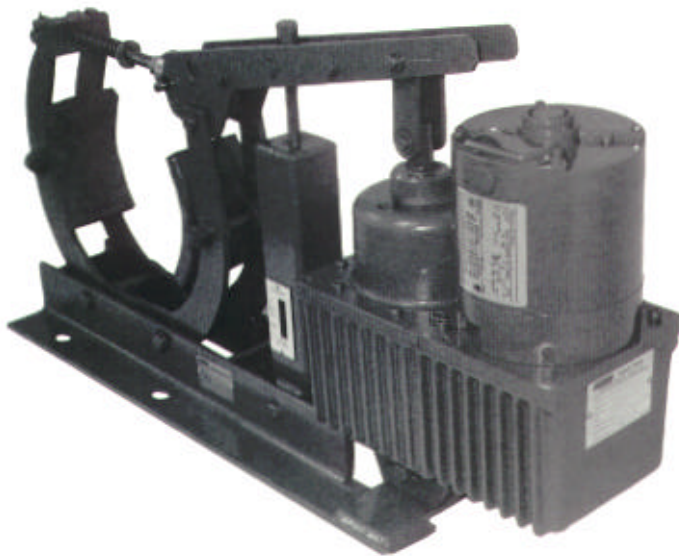


***PATRIOT***

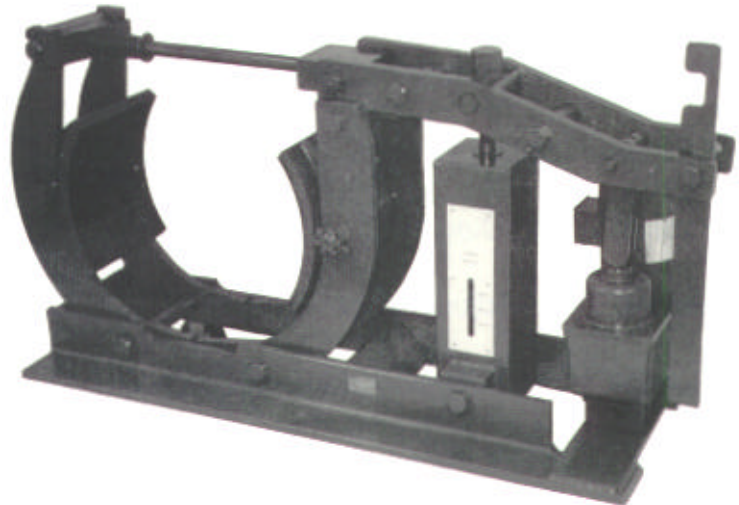
Sensors & Controls Corporation

## Industrial Brake Products Electro Thrust (Model ET) Shoe Brakes



SPRING  
APPLIED  
ELECTROHYDRAULIC  
RELEASE

MADE  
IN THE  
U.S.A.



***GEMCO***

# Index

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

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## **ELECTRO-THRUST (MODEL ET) SHOE BRAKES**

### **DESIGN**

The Series ET style of shoe brakes are spring set and electrically released by a continuously rated, sealed electro-hydraulic actuator. This brake provides smooth brake setting due to the response of the actuator. This inherent cushion effect is desirable for many brake applications. Rugged construction makes this brake suitable for steel mill cranes, container cranes, stacker reclaimers, lock and dam gates, and other heavy-duty applications.

### **STANDARD BRAKE FEATURES INCLUDE:**

- Electro-Thrust actuator
- Self-aligning cast iron shoes
- Self-centering shoes
- Over-the-wheel tie rod
- Asbestos-free bonded linings
- External torque spring
- Floor mounting
- Torque indicator
- Adjustable setting time

### **OPTIONAL FEATURES OFFERED ARE:**

- Time delays for brake release and/or brake setting
- Enclosures in both NEMA 4 and NEMA 3R ratings
- Heater/Thermostat assemblies for use with enclosures
- Limit switch for indication of “brake set” and/or “brake released”
- Self-adjust mechanism
- Auxiliary hydraulic cylinder
- Hand release (latching or non-latching)
- Limit switch for indication of “hand release latched”

### **BRAKE ACTUATOR OPERATION**

The electro-hydraulic actuator has a standard 56C motor that drives an impeller inside a heavy duty cast aluminum housing. Energizing the motor rotates the impeller, which hydraulically extends a cylinder. This in turn releases the brake by overcoming the main brake spring.

The design of the impeller allows operation of the motor in either direction. An adjustable setting valve is provided as a standard feature to allow “delayed” brake setting.

Employing a “standard” 560 motor results in 460 volt, 3 phase, 60 Hz. operation or 230 V.D.C. operation. Other voltages are available depending on motor availability.

The Electro-Thrust actuator provides a trouble-free brake operation. There are no magnets involved that traditionally accumulate dirt and other debris. The actuator is completely enclosed in a mill duty style housing with a large reservoir for heat dissipation.

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES AISE SIZES

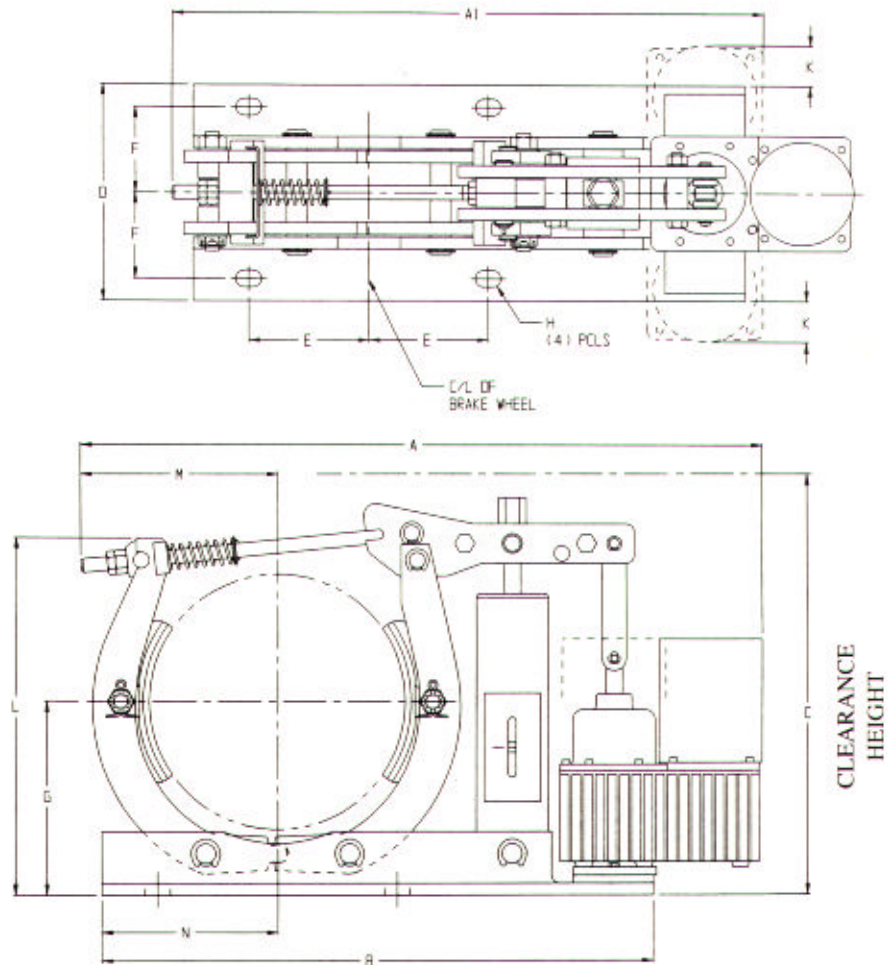
### CHARACTERISTICS

- Supply 460, 3 phase 60 Hz available, or 230 V.D.C.
- Special voltages/frequencies available. Dependent on motor availability.
- Standard working temperature range -13°F (-25°C) through 104°F (+40°C).
- Special fluid for -40°F (-40°C).

### DIMENSIONS AND TORQUE RATINGS FOR ELECTRO-THRUST (MODEL ET) SHOE BRAKES AISE SIZES

J = Shoe Face Width  
(Not Shown)

H = Mounting Slot  
Width X Length



BRAKE STYLE	WHEEL DIAMETER (Inches)	A	A1	B	C	D	E	F	G	H	J	K	L	M	N	TORQUE LB. FT.
ET8	8	29.47	23.75	21.63	10.50	7.40	3.25	2.88	7.00	.7X1.03	3.25	5.60	13.02	7.10	6.08	100
ET10	10	32.07	26.38	24.41	20.50	8.40	4.00	3.12	8.38	.7X1.03	3.75	5.12	15.53	7.64	6.80	200
ET13	13	38.28	32.68	29.81	22.00	12.06	5.75	4.50	9.87	.81X1.2	5.76	3.30	18.63	10.06	8.25	550
ET16	16	42.71	37.00	34.70	26.00	13.56	7.50	5.38	12.12	1.06X1.5	6.75	2.50	22.41	12.25	10.93	1000
ET19	19	51.25	45.58	42.75	29.00	18.44	9.25	6.50	13.25	1.06X1.5	8.50	1.10	25.38	14.83	12.50	2000
ET23	23	58.75	52.65	49.00	34.50	20.56	11.75	8.00	15.87	1.31X1.9	11.00	N/A	30.38	18.03	15.25	4000
ET30	30	76.75	N/A	74.31	44.50	22.80	15.00	9.50	20.75	1.56X2.3	14.25	N/A	40.00	23.42	21.00	9000

All dimensions for estimating only. For specific applications request certified drawings. All dimensions in inches.

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES NON-AISE SIZES

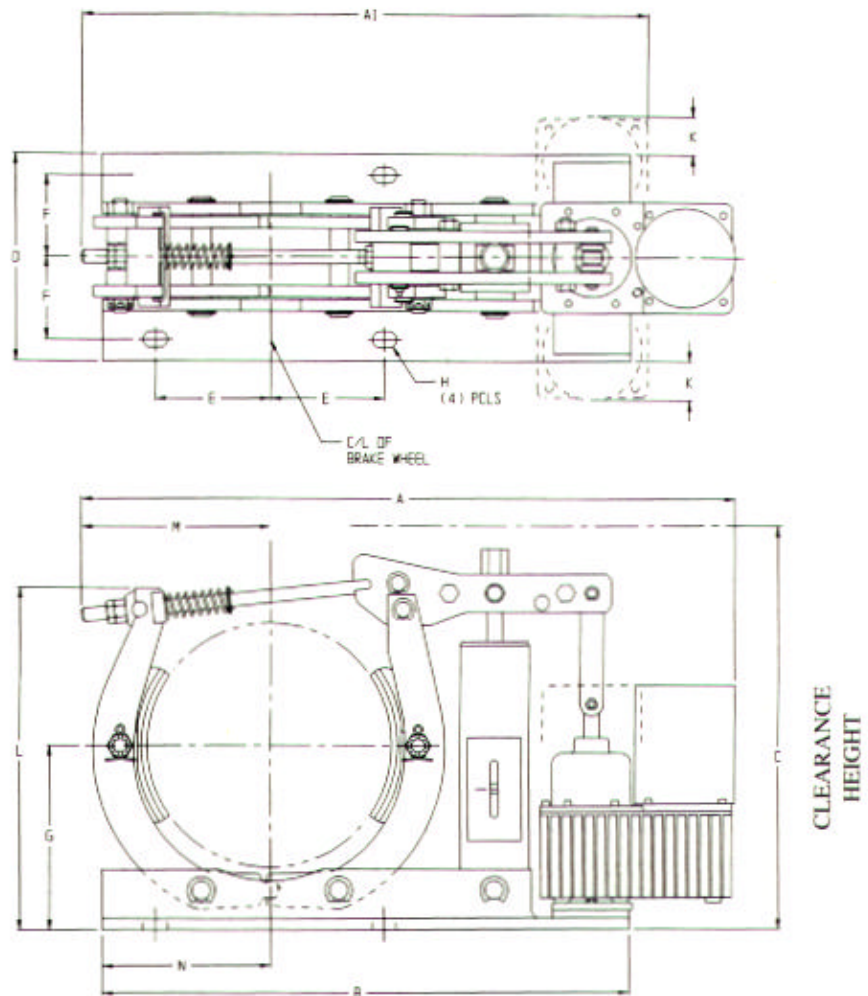
### CHARACTERISTICS

- Supply 460, 3 phase 60 Hz available, or 230 V.D.C.
- Special voltages/frequencies available. Dependent on motor availability.
- Standard working temperature range -13°F (-25°C) through 104°F (+40°C).
- Special fluid for -40°F (-40 C).

### DIMENSIONS AND TORQUE RATINGS FOR ELECTRO-THRUST (MODEL ET) SHOE BRAKES NON-AISE SIZES

J = Shoe Face Width  
(Not Shown)

H = Mounting Slot  
Width X Length



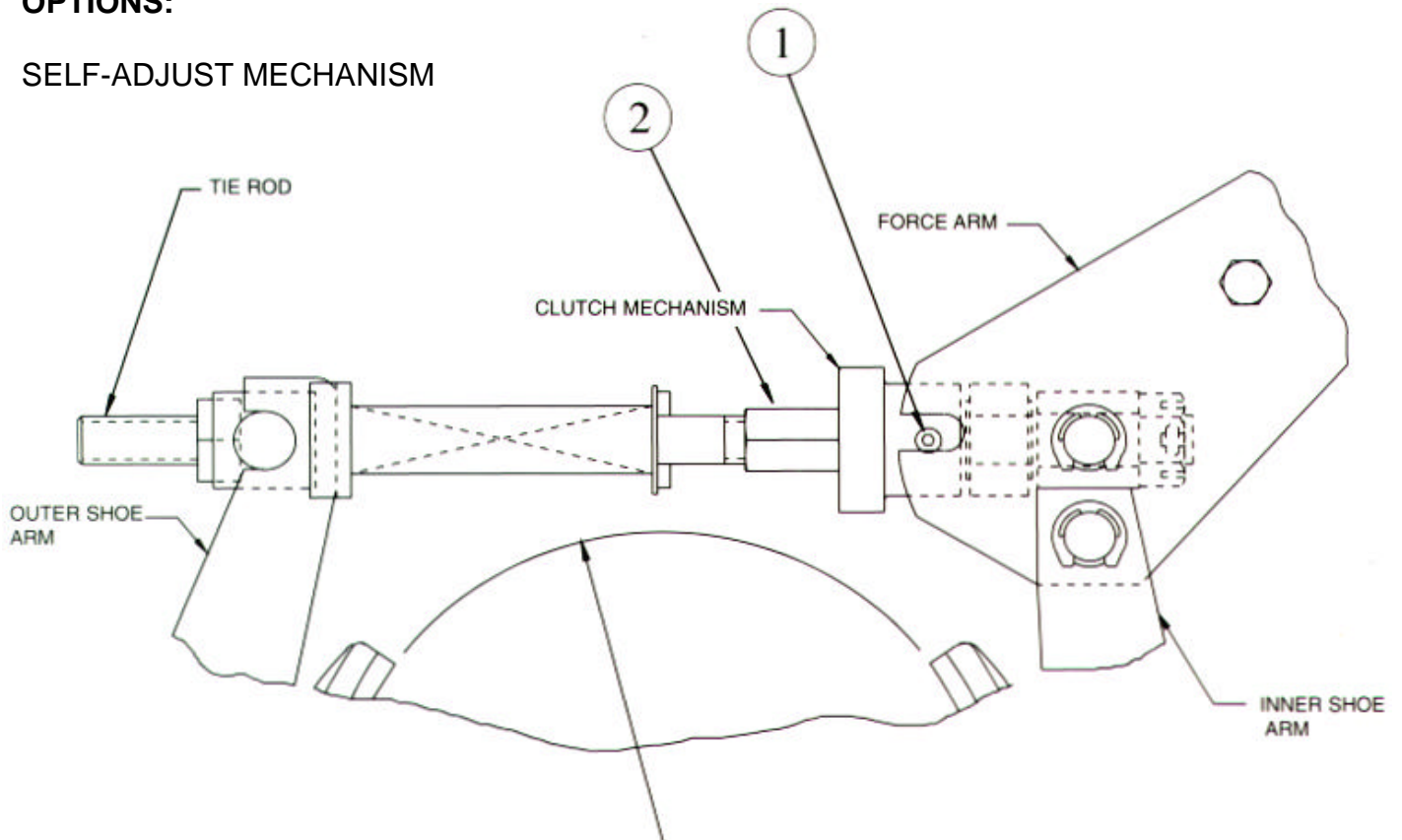
BRAKE STYLE	WHEEL DIAMETER (Inches)	A	A1	B	C	D	E	F	G	H	J	K	L	M	N	TORQUE LB. FT.
ETN6A	6	CONSULT FACTORY														60
ET8NA	8	30.00	24.18	22.75	20.50	7.40	5.75	2.63	6.13	.69 X 1.0	3.00	5.62	12.23	7.10	7.10	160
ET11NA	11	34.06	28.36	27.24	21.50	9.40	7.50	3.50	8.25	.69 X 1.0	5.00	4.62	15.53	7.96	8.80	400
ET14NA	14	40.95	35.25	33.69	25.00	14.50	7.50	5.38	10.50	1.06X1.5	6.00	2.07	23.57	11.06	10.88	800

All dimensions for estimating only. For specific applications request certified drawings. All dimensions in inches.

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### OPTIONS:

#### SELF-ADJUST MECHANISM



The self-adjust mechanism is designed to provide automatic compensation for lining wear. When a brake is utilized, normal lining wear occurs. With the self-adjust feature, a clutch mechanism maintains the proper actuator stroke by adjusting “in” the tie rod. This also maintains the brake at it’s proper operating torque.

For brakes with self-adjust option, adjustments are made as follows:

- Remove shoulder bolt 1.
- Rotate clutch hub 2, to adjust brake, as required.
- Re-install shoulder bolt 1.

Note: For specific procedures see installation section on page 14.

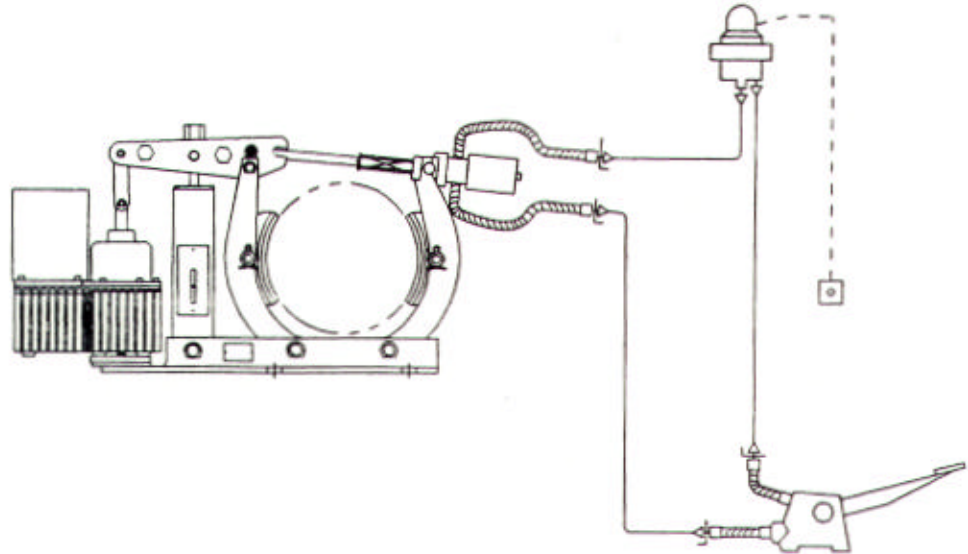
Maintenance time is reduced as a direct result of employing the self-adjust feature.

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

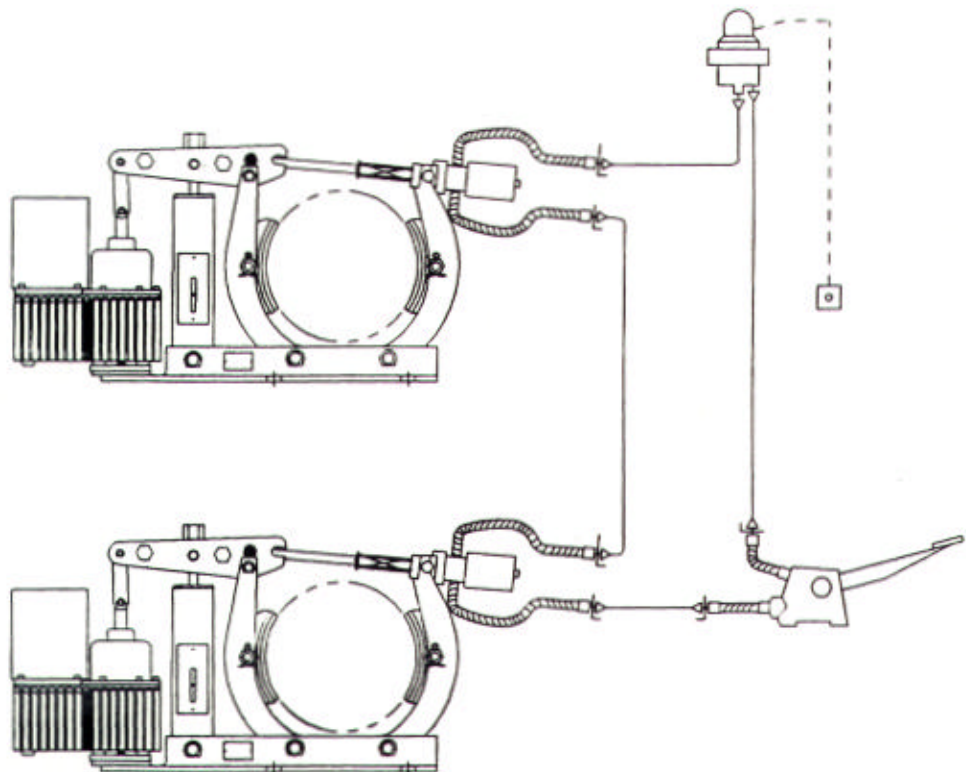
### OPTIONAL OPERATION VIA HYDRAULIC CYLINDER

### ELECTRO-THRUST BRAKE WITH AUXILIARY CAB CONTROL ("ETH STYLE")

One Brake System



Two Brake System



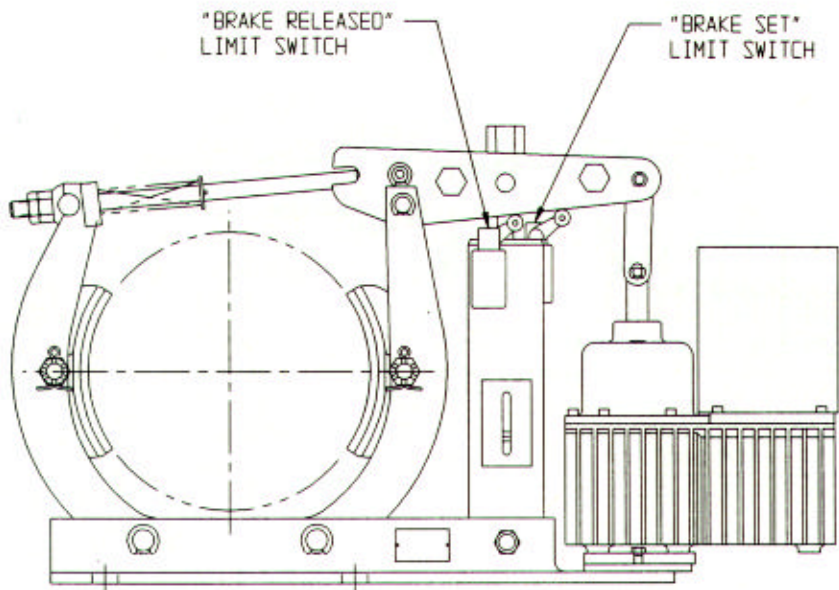
The Electro-Thrust brake assembly can be purchased with an auxiliary hydraulic cylinder to allow cab control. When the brake is energized electrically, the actuator compresses the main spring which frees the brake wheel. The auxiliary hydraulic cylinder then becomes usable, and the brake can be applied with a manual control cylinder and pedal located in the cab.

**NOTE: MAXIMUM BRAKE SIZE WITH CAB CONTROL = 16"**

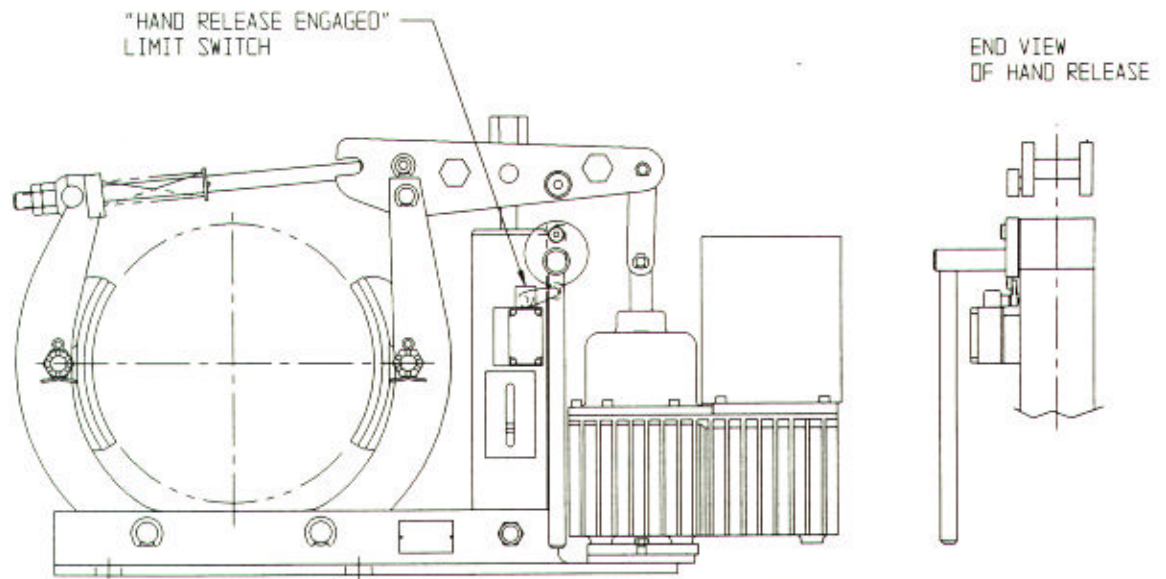
## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### OPTIONS:

#### LIMIT SWITCH OPTION



#### HAND RELEASE WITH LIMIT SWITCH



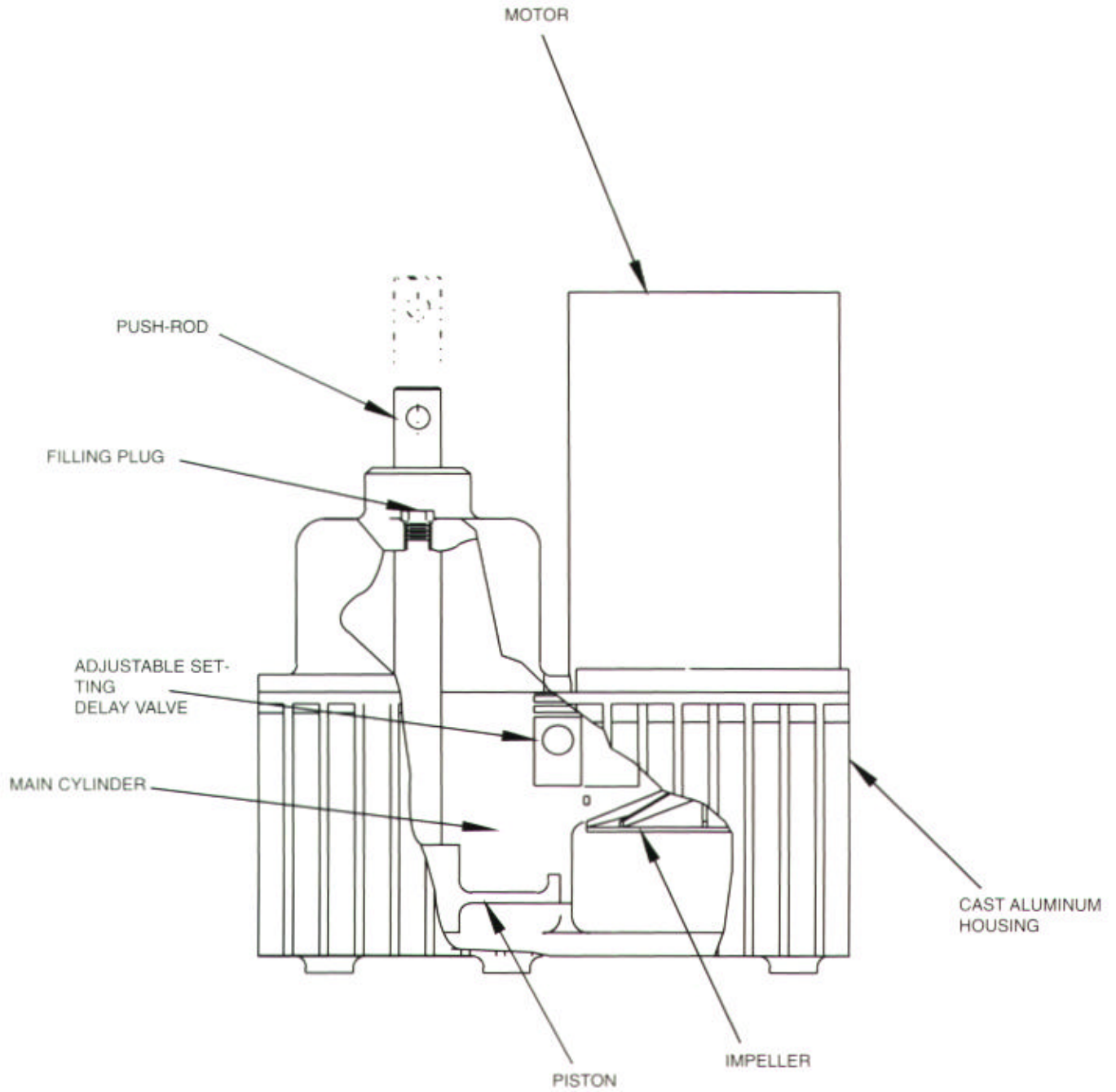
Limit switches can be provided to indicate the status of the brake. Two limit switches can be mounted on the spring case assembly. These switches provide contacts to indicate the brake arm is in the down (brake applied) or up (brake released) position. Switch locations will vary upon size of brake.

A third limit switch can be mounted on the brake to indicate that the brake has been manually released.



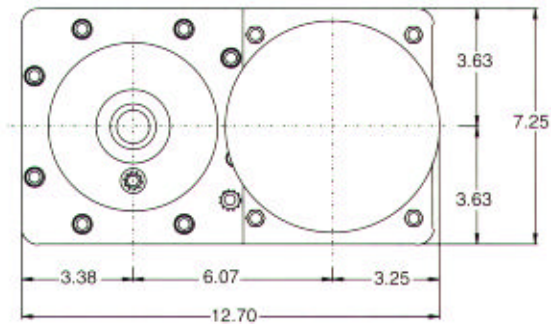
# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

## ELECTRO-THRUST ACTUATOR CROSS SECTION

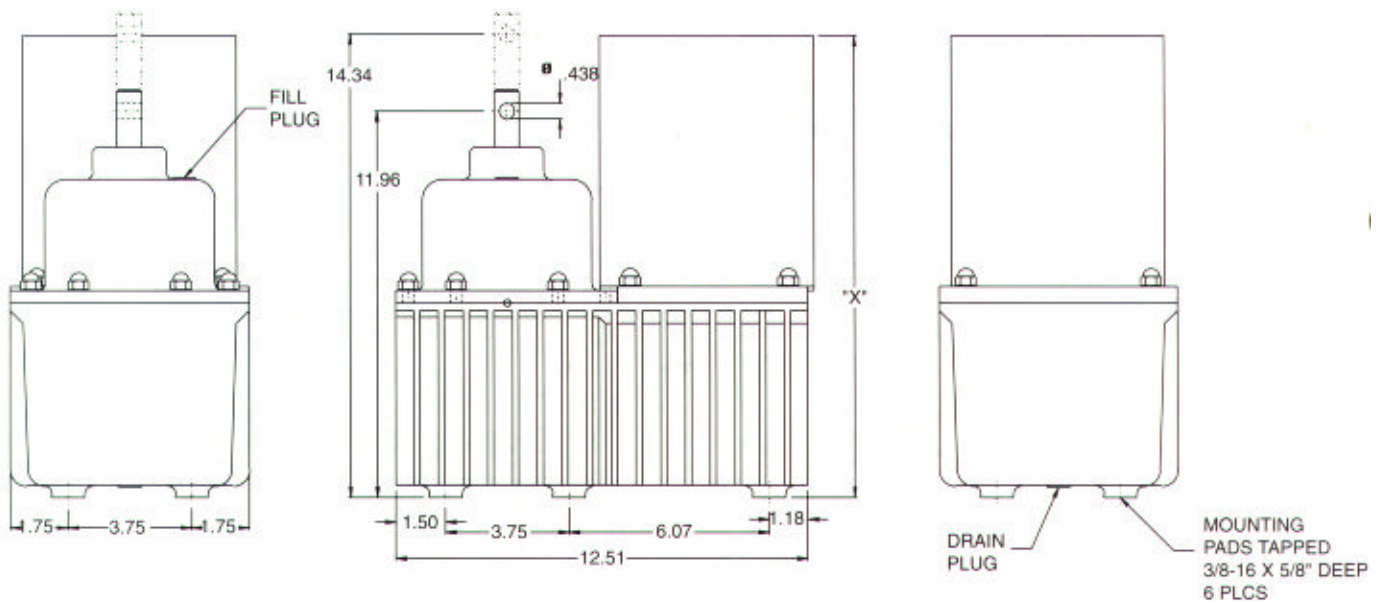


# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

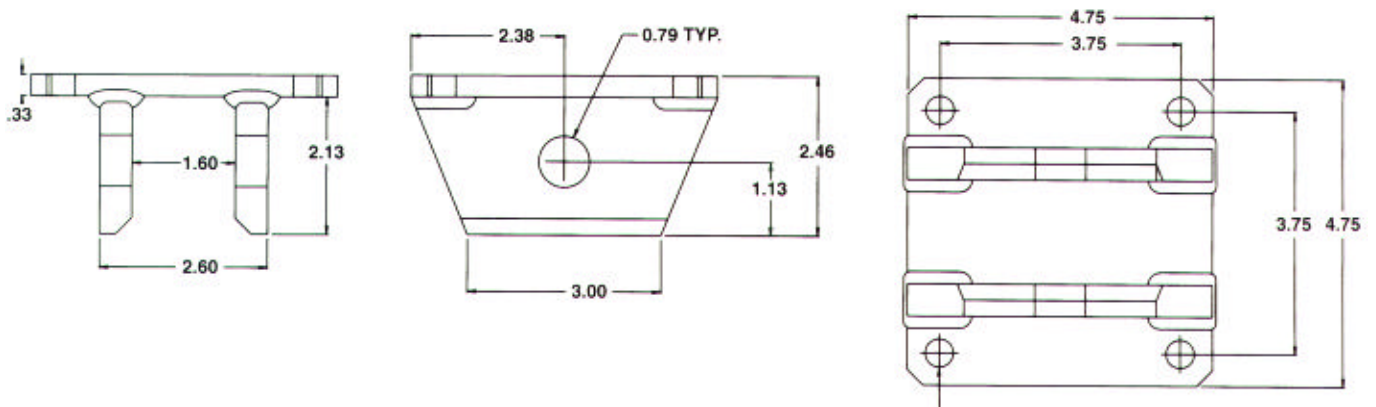
## ACTUATOR MOUNTING DIMENSIONS



**“X” DIMENSION:  
CONSULT FACTORY**

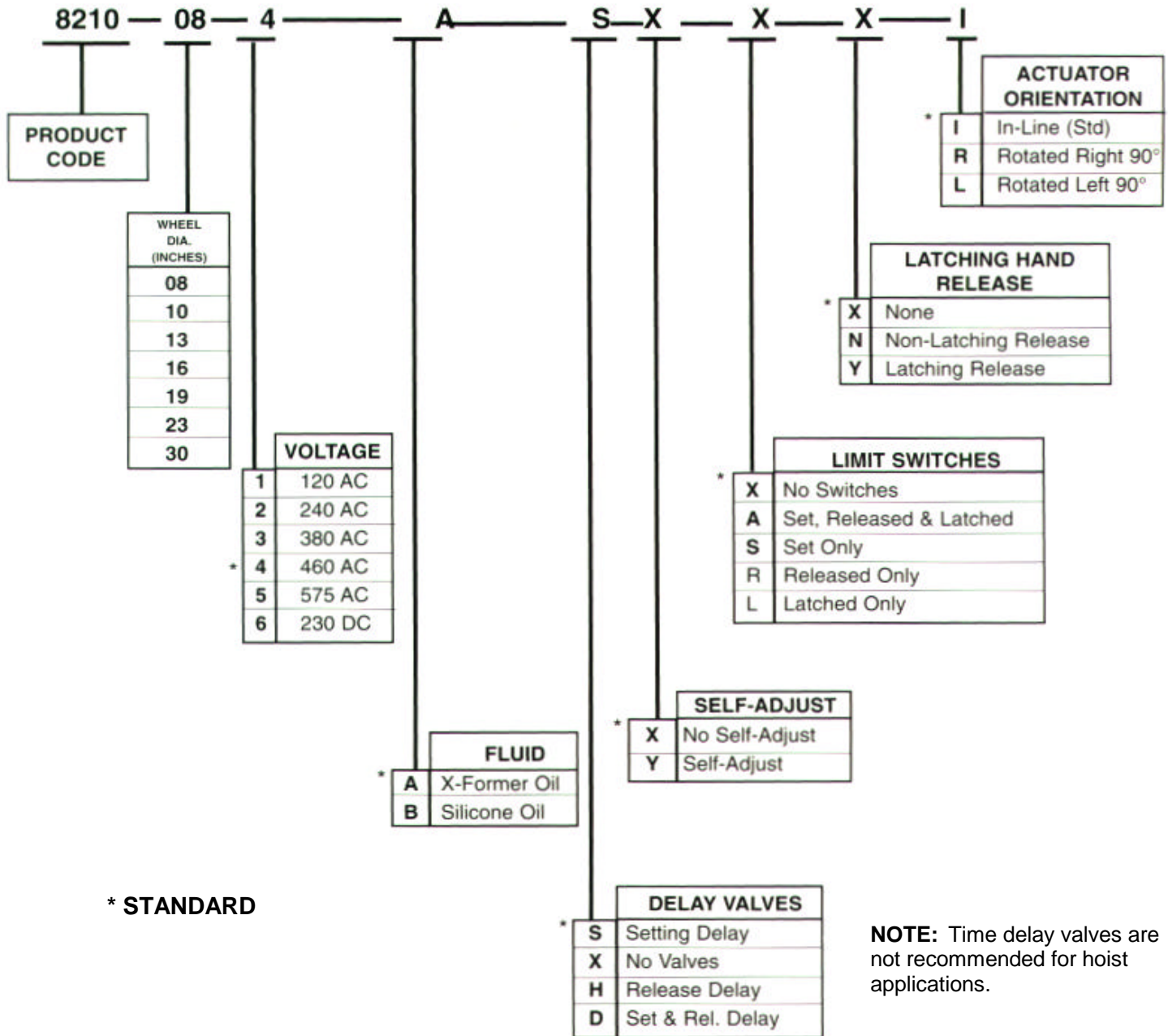


## CUSTOM MOUNTING AVAILABLE:



# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

## PART NUMBERING SEQUENCE FOR STANDARD AISE SIZE BRAKES



**EXAMPLE:**

Electro-Thrust Brake 8" Size with:  
 460 Volt Actuator A.C.  
 Standard Fluid  
 Setting Valve  
 No-Self Adjust  
 No Limit Switches  
 No Hand Release  
 In Line Actuator Orientation

**8210 - 08 - 4 - A - S - X - X - X - I**

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### ET BRAKE SETTING TIMES

BRAKE TYPE	TIME TO SET (SEC.)		TIME TO RELEASE (SEC.)	
	WITHOUT VALVE	WITH VALVE	WITHOUT VALVE	WITH VALVE
ET8	1.1	1.5-7.2	0.26	0.7-9.5
ET10	0.75	1.3-7.3	0.33	0.8-11.6
ET13	0.75	1.2-4.8	0.25	0.9-12.1
ET16	0.45	0.8-3.8	0.18	0.5-6.8
ET19	0.35	0.7-3.0	0.11	0.5-8.4
ET23	0.27	0.4-1.7	0.16	0.4-7.5
ET30	CONSULT FACTORY			

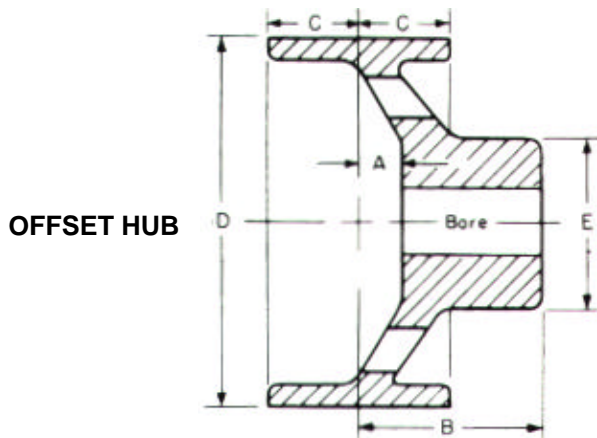
All times are based on the actuator stroke at the optimum setting. As the brake lining wears the actuator stroke will increase, which will in turn increase setting times. Setting times are also based on the brake set at rated torque. A reduced torque setting will increase brake setting times.

### APPROXIMATE BRAKE WEIGHTS

ET8	140 LBS.
ET10	150 LBS.
ET13	250 LBS.
ET16	400 LBS.
ET19	640 LBS.
ET23	875 LBS.
ET30	1500 LBS.

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### DIMENSION SHEET: BRAKE WHEELS



- Standard wheels are ASTM A 536 ductile iron 80-60-03 or 80-55-06.
- Hub length and diameter shown are the maximum obtainable from standard casting.
- If finish bore is not specified on order, brake wheel will be supplied with a solid hub.

### AISE SIZE

A	B	C	D	E	* MAX. BORE	* MAX. SPEED	WK <sup>2</sup> LB. FT <sup>2</sup>	WEIGHT LBS.
.50	4.25	1.62	8.0	3.75	2.25	5525	1.5	30
.00	4.25	1.88	10.0	3.75	2.75	4425	3.7	40
.88	5.38	2.88	13.0	5.75	3.75	3400	13.6	80
1.00	6.50	3.38	16.0	7.00	4.50	2750	43.8	170
1.50	7.50	4.37	19.0	7.00	4.625	2350	100.4	260
1.44	8.75	5.62	23.0	8.50	5.50	1925	237.4	450
1.50	10.75	7.12	30.0	13.00	7.50	1475	772.8	760

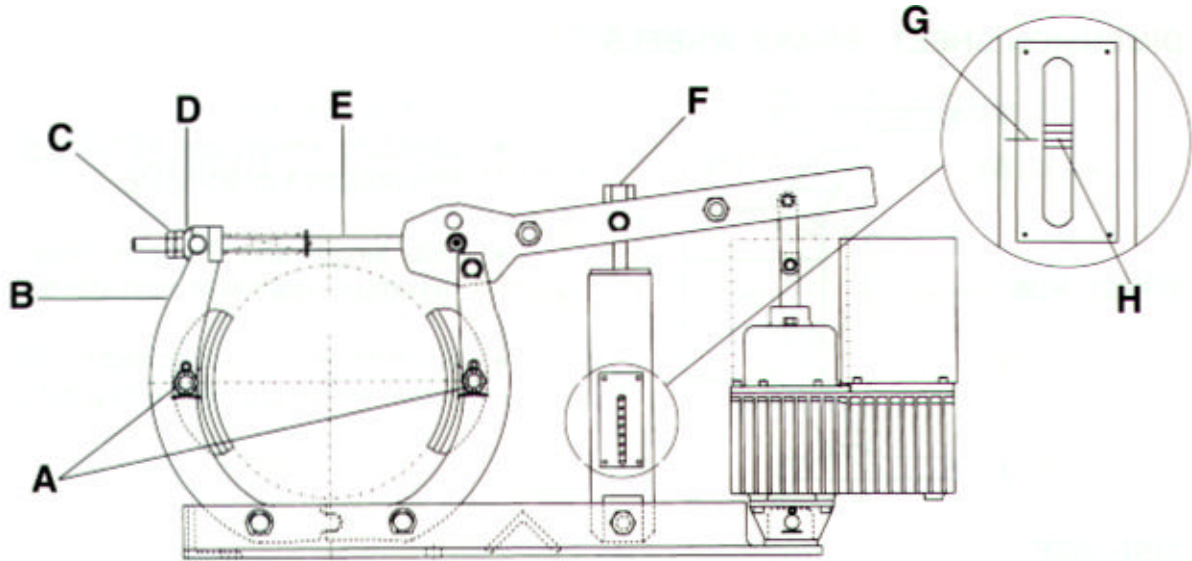
### NON-AISE SIZE

+A	B	C	D	E	*MAX BORE	*MAX SPEED	WK <sup>2</sup> LB. FT <sup>2</sup>	WEIGHT LBS.
-.50	3.00	1.56	6.0	3.25	2.00	7375	.44	10
-.75	4.25	2.50	11.0	5.00	3.00	3600	5.9	60
-1.25	4.25	3.25	14.0	5.00	3.62	3500	24.2	121

- \* Consult factory if your requirements exceed maximum bore diameter or maximum speed.
- + "A" dimension for Non-AISE sizes extends to the left of brake wheel centerline (this is noted by minus value).

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### INSTALLATION



#### NOTE:

The pivoting shoes on these brakes are self-aligning around the brake drum. Shoe arms are interlocked to provide self-centering. Height adjustments should be within .010", as shown in the dimension table. The brake must be centered within .010" of the center line of the drum. Care should be taken in mounting the brake so that the shoes are parallel to the drum, assuring that the maximum lining area is in contact with the drum.

Check the brake to ensure that it neither has been damaged nor is missing any parts. The linings should not be contaminated, and the brake drum should be clean.

#### INSTALLATION TYPE I: BRAKE TO BE SLIPPED OVER DRUM

- 1.0 Back off nuts "C" to allow clearance between brake shoes and drum. Loosen shoe bolts "A".
- 1.1 Slip brake around drum. Bolt down brake at (4) base mounting slots. Base should be snug to mounting surface, but not tight.
- 1.2 Tighten nuts "C" just until shoes make full contact with drum. Fully tighten shoe bolts "A". Fully tighten mounting bolts at base.
- 1.3 Continue tightening nuts "C" until actuator push rod height is at dimension "B" (2.20") as shown on page 17.
- 1.4 Confirm that proper torque setting has been maintained. Center groove of lower spring seat "H" should be in line with mark on torque data plate "G". Spring adjustments can be made by turning adjusting bolt "F" as required.
- 1.5 Assuming that actuator wiring has been completed, energize brake. Confirm that shoe clearances at drum are equal. If they are not, loosen brake mounting bolts and re-center brake. Re-tighten mounting bolts and re-check shoe clearance.

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### INSTALLATION (CONT'D)

#### INSTALLATION TYPE II: BRAKE REQUIRES PARTIAL DISMANTLING

- 2.0 Back off nuts "C" to end of tie rod "E". Slide outer tie rod block "D" to end of tie rod "E".
- 2.1 Swing tie rod "E" up to a vertical position, and spread shoe arms "B" out as far as possible. Brake may now be slid under the drum shaft for mounting.
- 2.2 After brake has been slid under drum shaft, re-attach outer shoe arm "B" to outer tie rod block "D" and tie rod "E".
- 2.3 Continue brake installation per steps 1.1 through 1.5.

#### INSTALLATION TYPE III: BRAKE WITH SELF-ADJUST OPTION (Ref. Page 6)

- 3.0 For brakes with the self-adjust option, installation is essentially the same as Installation Types I and II. Due to the self-adjust mechanism, however, brake adjustment at tie rod is as follows.
- 3.1 Remove shoulder bolt (Item 01).
- 3.2 Rotate clutch hub (Item 02) to adjust brake as required.
- 3.3 Re-install shoulder bolt (Item 01).

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### MAINTENANCE INSTRUCTIONS

#### Maintenance Operation

1. Check the working stroke of the Electro-Thrust actuator. As linings wear, the brake lever arm will drop and the stroke must be periodically reset before the actuator push rod bottoms out; otherwise, the brake will slip. Wear is more rapid when the linings are new. Actuator push rod height must be maintained at dimension "B" (Ref. Pg. 17).
2. Check to see that the actuator fluid level is correct.
3. With brake set and actuator push rod at dimension "B", check for proper spring length location. Springs are preset at factory but may require minor adjustment.
4. With the brake released, check for equal clearance between the linings and brake drum. If necessary re-position brake assembly.

#### Other Points

All pivot pins should be greased during scheduled maintenance.

#### Action Required

- 1.1 If necessary, reset the stroke by adjusting nuts "C." As linings wear, nut "C" will have to be tightened to reset actuator stroke to dimension "B". Ensure that inner nut "C" is locked on completion.
- NOTE: If a self-adjust mechanism is purchased, the brake will automatically compensate as lining wears.
- 2.1 Fill using proper fluid. Actuator should be filled to the lower edge of the inlet opening with the actuator vertical and in the retracted position. After filling, move the unit by hand to force any trapped air to the top of the actuator.
  - 3.1 Reset, if necessary, by means of adjusting bolt "F."
  - 4.1 Self-centering arms are inter-locked. Arms should not bind at pivot point. Unequal lining wear is an indication that the brake is not centered.

#### Shoe Replacement

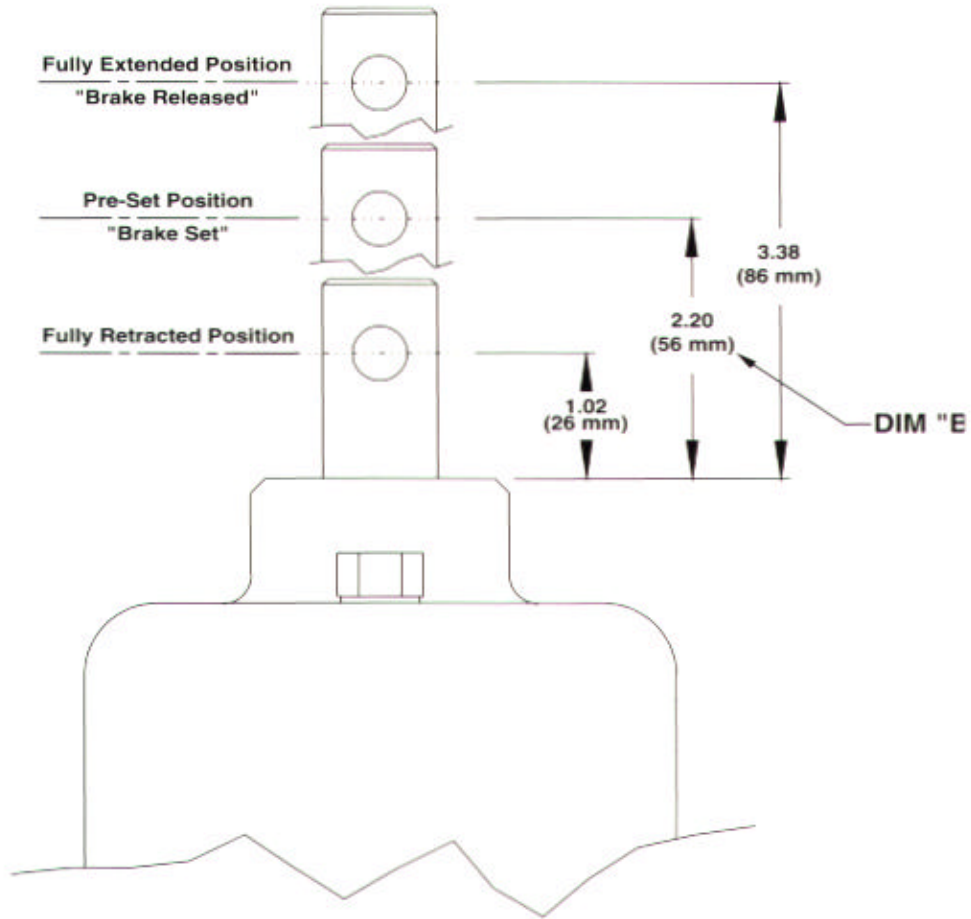
Back off outer nuts "C," allowing the arms to move. Remove pins "A" and remove shoes. Fit new shoes and replace pins "A." Adjust nut "C" as noted above.



# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

## MAINTENANCE INSTRUCTIONS (CONT'D)

### ELECTRO-THRUST ACTUATOR STROKE DIMENSIONS - FOR ALL BRAKE SIZES

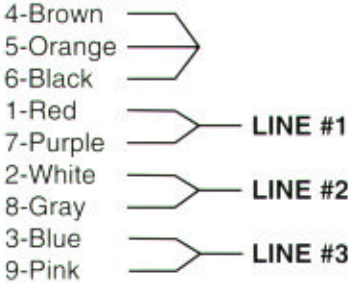


# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

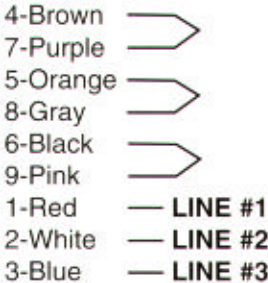
## TYPICAL WIRING DIAGRAMS

### AC CIRCUIT

LOW VOLTAGE  
200V - 230V 3PH 60HZ



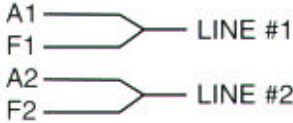
HIGH VOLTAGE  
460V 3PH 60HZ



AC MOTOR DATA			
MOTOR FRAME	MOTOR H.P.	FULL LOAD AMPS	
		200/230	460
56 C-FACE	1/4	1.2-1.1	.55
56 C-FACE	1/3	1.3-1.4	.70
56 C-FACE	1/2	1.9-1.8	.90
56 C-FACE	3/4	2.6-2.4	1.2
NOTE: POLARITY IS NOT CRITICAL. MOTOR CAN RUN IN ANY DIRECTION			

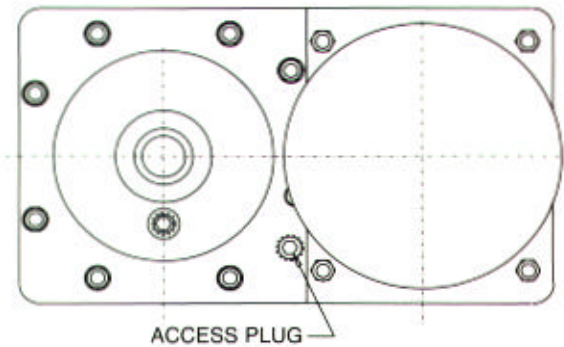
### DC CIRCUIT (SHUNT WOUND)

230 VDC

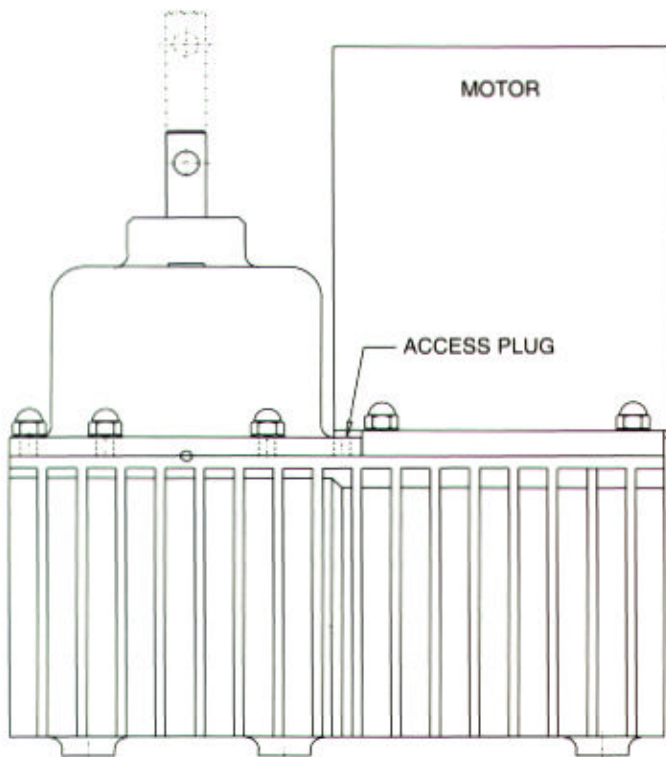


## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

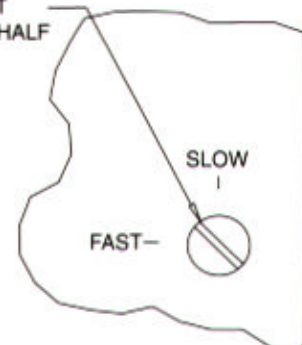
### BRAKE SETTING TIME ADJUSTMENT PROCEDURE



1. De-energize the brake (set the brake)
2. Remove access plug on top of the actuator
3. Insert a flathead screwdriver into the access hole and engage the setting adjustment valve per Detail "A"
4. Note that there is only 90° of adjustment range
5. Replace access plug and test actuator to assure proper setting and/or releasing time.
6. Re-adjust setting time if necessary



ADJUSTMENT  
SHOWN AT  
APPROX. HALF  
SPEED



DETAIL "A"  
TOP VIEW WITH ACCESS PLUG  
REMOVED

## ELECTRO-THRUST (MODEL ET) SHOE BRAKES

### SERVICING/TROUBLES-SHOOTING

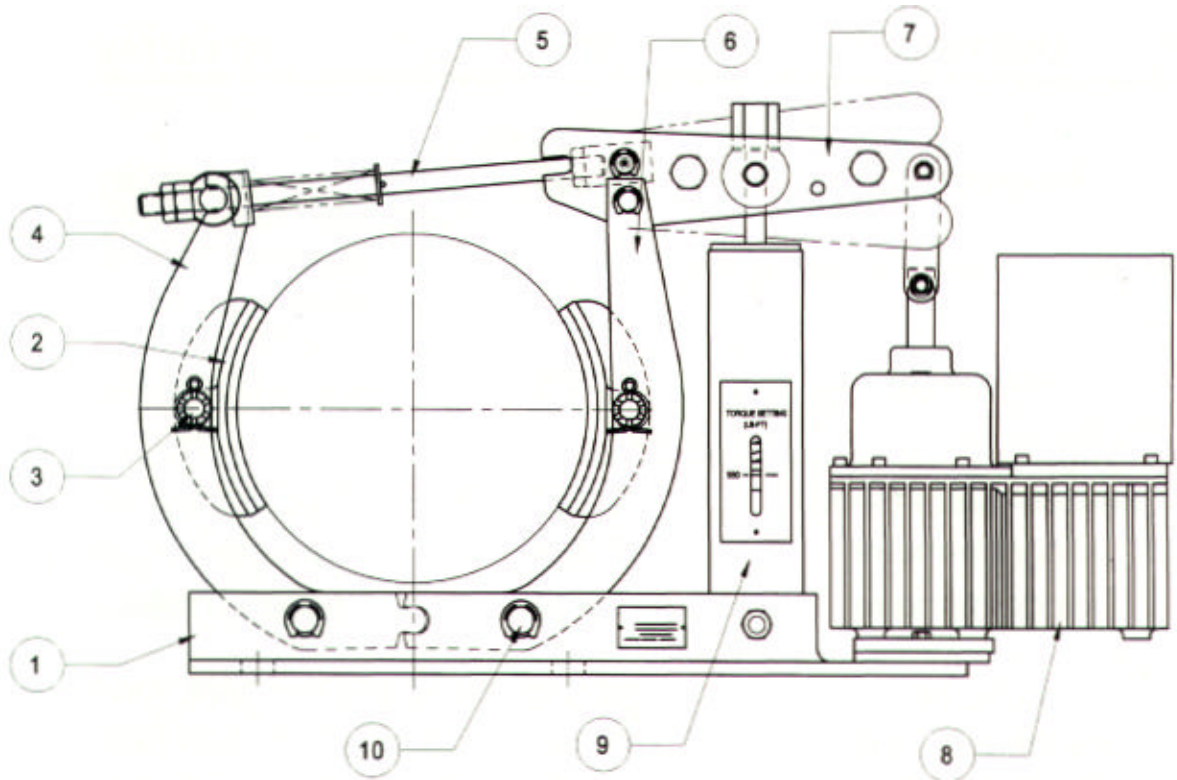
<u>Symptom</u>	<u>Possible Cause</u>	<u>Action</u>
1.0 Brake lining rubbing against drum with brake in released position.	1.1 Actuator isn't fully extended	See Item 2.0
	1.2 Not enough working stroke	Reset stroke
	1.3 Drum not running true	Check, correct as necessary
	1.4 Brake movement seized or blocked	Free all pivot points
	1.5 Clearance not equal; one shoe rubbing on drum	Re-center brake on drum

### SERVICING

2.0 Actuator not fully extending	2.1 Improper brake spring setting	Re-adjust spring length per data sheet
	2.2 Lack of fluid	Fill to the lower edge of the inlet opening with the actuator retracted
	2.3 Wrong fluid	Replace with correct fluid type
	2.4 Wrong voltage to actuator motor	Supply voltage must conform to voltage specified on actuator data plate

# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

## REPLACEMENT PARTS LIST



ITEM	DESCRIPTION	PART NUMBER / BRAKE SIZE						QTY.
		ET8	ET10	ET13	ET16	ET19	ET23	
1	BASE	E008187	E010293	E013194	E016215	E019163	E023142	1
2	BRAKE SHOE/LINING	E008025	E010047	E013025	E016025	E019024	E023025	2
3	SHOE BOLT	E010070	E010070	E013053	E016027	E019027	E023028	2
4	OUTER SHOE ARM (1PR)	PM0133900	PM0133500	PM0139600	PM0134000	PM0132300	E023173	1
5	TIE ROD ASSEMBLY-STD	E008221	E010309	E013228	E016132	E019191	E023181	1
5A	SELF-ADJUST TIE ROD ASSY.	E008225	E010286	E013240	E016152	E019212	E023196	1
6	INNER SHOE ARM (1PR)	E008191	E010297	E013225	E016245	E019164	E023174	1
7	FORCE ARM ASSEMBLY	E008222	E010310	E013229	E016133	E019192	E023182	1
8	ELECTRO-THRUST ACTUATOR	CONSULT FACTORY						1
8A	ACTUATOR REP. KIT*	PSD0146500	PSD0146500	PSD0146500	PSD0146500	PSD0146500	PSD0146500	1
9	SPRING CASE ASSEMBLY	E008223	E010311	E013230	E016134	E019193	E023183	1
9A	MAIN SPRING	E008167	E010266		E016221		E023150	1
10	PIN KIT**	E008224	E010312	E013231	E016135	E019194	E023184	1

\* Not shown.

\*\* Includes base pins and top pins with retaining rings.

\*\*\* See actuator tag or consult factory

When ordering give complete nameplate reading from brake assembly.

# ELECTRO-THRUST (MODEL ET) SHOE BRAKES

## CONVERSIONS TABLE

	MULTIPLY	BY	TO OBTAIN
<b>MASS</b>	kilogram (kg)	2.205	pound (lb)
<b>FORCE</b>	newton (n)	0.225	pound (lb)
<b>TORQUE</b>	newton-metre (N*m) kilogram-metre kilogram-metre	0.738 7.233 9.807	pound-foot (lb.ft.) pound-foot (lb.ft.) newton-metre (N*m)
<b>LENGTH</b>	metre (m) centimeter (cm) millimeter (mm)	39.370 0.394 0.0394	inch (in) inch (in) inch (in)
<b>POWER</b>	horsepower (hp) horsepower (hp)	0.746 3300	kilowatt (kw) foot-pound/minute (lb.ft./min)
<b>VELOCITY</b>	metre/second (m/s) metre/second (m/s)	196.850 3.281	foot/minute (fpm) foot/second (fps)
<b>INERTIA</b>	moment of inertia kg*m <sup>2</sup>	23.730	moment of inertia (lb.ft <sup>2</sup> )