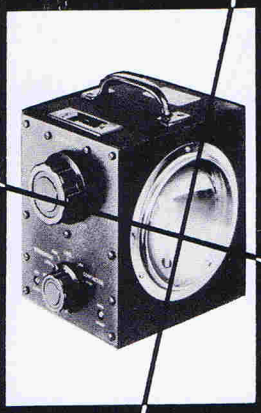
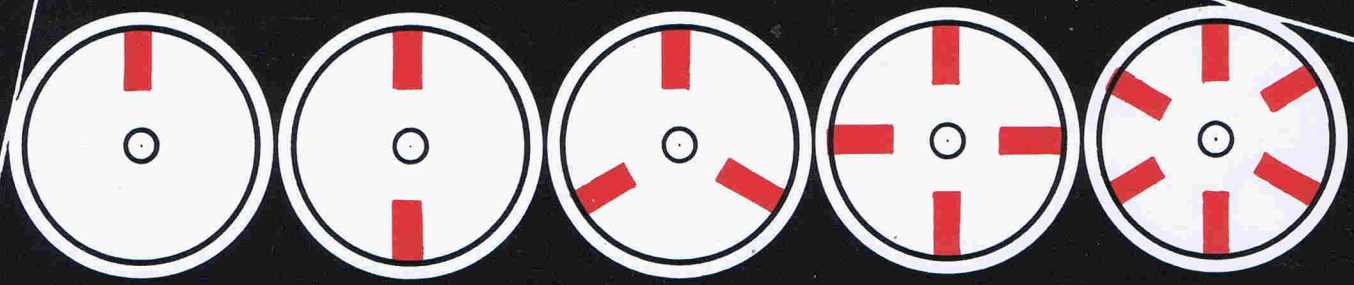
catalog ei 4b





synchronous motors

hysteresis motors and salient pole induction motors

ELINCO

electric indicator company inc., springdale connecticut, u.s.a.

purpose of this catalog

This catalog was prepared to give you physical specifications and electrical characteristics of ELINCO'S synchronous motors.

For many years ELINCO has worked with many of the country's leading engineers, in large companies and in small, assisting them in the solution of difficult problems of heat, humidity, vibration, shock, torque, acceleration, weight, mounting and special design.

No problem is too small, few are too tough. Why not let us assist you?

ELINCO

electric indicator company, inc., springdale, conn.

CAT. EI-4B-REVISED 2-56

index 1

2 synchronous motors

In the field of the smaller size fractional and subfractional horsepower motors, there are but two popular types of synchronous motors, the hysteresis and the reluctance or salient pole synchronous motor.

characteristics of hysteresis type

noise and vibration

The hystersis synchronous motor has a rotor, which is perfectly smooth and homogeneous, hence the flux path is of uniform permeability as the rotor rotates, and there is no magnetic pulsating due to slots or pole saliency. This type of motor is therefore much quieter and freer from vibration than other types of synchronous motors.

torque

Since the flux path has uniform permeability in a material that is homogeneous and with a constant hysteresis loss, there is no variation in torque throughout the 360° of angular rotation; the motor develops a constant torque and is free of any torque pulsation under conditions of constant load.

speed

The hysteresis synchronous motor rotates at constant speed regardless of load variations within the rating of the motor, however the rotor does assume a load angle which changes with variations in load or line voltages.

As the rotor does not require any pole saliencies, this type of motor can be designed for a large number of poles and low speed synchronous operation. Since the hysteresis synchronous motor does not require definite rotor poles, characteristic of a particular speed, the same rotor can be used for multi-speed units.

load inertia

The hysteresis synchronous motor is capable of synchronizing high inertia loads, being unaffected by load inertia, it need only be powerful enough to drive the frictional component of load. The hysteresis synchronous motor can pull into synchronism high inertia loads that would require a salient pole motor several times its horsepower rating.

starting torque

The hysteresis synchronous motor has a smooth and uniform starting torque throughout 360° of rotor position, has no low points of torque or tendency to cog. In some cases where very uniform tension is required it might be desirable to use this type of motor as a torque motor.

phasing

The hysteresis motor, not having definite poles on the rotor, will lock in phase in an infinite number of positions with respect to line voltage.

summary

The inherent characteristics of the hysteresis synchronous motor are:

- Freedom from noise, vibration and hunting.
- Rotates at constant speed regardless of load and voltage variation within the rating of motor.
- Can pull into synchronism high inertia loads.
- Uniform starting torque.
- Can be wound for lower speeds and greater number of poles than is practical in salient pole induction type motors.
- Can be provided as a multi-speed motor.
- Will lock in, at any position with respect to line voltage.

It is the belief of a small minority in the servo field that the hysteresis motor, with its square speed torque curve, might well be adapted to servo work. ELINCO has been doing some development work along this line, believing that a motor with constant torque from locked to synchronous speed, would give faster acceleration in servo work compared to the standard induction motor whose decreasing speed torque curve, as the motor comes up to speed, decreases possible acceleration.

salient pole induction motor

The salient pole induction has a rotor which has standard induction motor construction except that the laminations are cut out to give the pole saliency. This type of motor starts and comes up near synchronous speed as an induction motor, then pulls into synchronism and runs at synchronous speed as a reluctance motor.

speed

After synchronizing, the motor will operate at constant angular velocity; however, the rotor will assume a load angle with changes in load and voltage within the pull-out rating of the motor. Due to pole saliencies required, and the number practical in these same frames, these motors are available only as two and four pole units, although ELINCO has a six pole unit available in its "G" and "GL" frames.

4 salient pole induction motor

load inertia

Due to the fact that the salient pole induction motor operates as an induction motor until it nears synchronous speed, there is a critical point at which there is a sudden acceleration and the motor pulls in step. At this point, the torque exerted by the rotor pole must be great enough suddenly to accelerate the rotor plus load into step in the time it takes for the rotor to rotate one-half pole pitch. For this reason, this type of motor may easily start a load that it cannot pull into synchronism, and the motor will operate as an induction motor. When the load has any inertia, care must be exercised in selecting a motor with sufficient torque to pull the load into synchronism.

phasing

The big advantage of this type of motor is its ability to phase, where the motor must synchronize at fixed angular positions. On two pole units this type of motor will phase in two positions 0° and 180° apart; a unit of four poles will phase in four positions, 0°, 90°, 180° and 270° apart.

starting

This type of motor is subject to cogging effects on starting. There is a wide variation in starting torque depending on rotor position. ELINCO motors are designed to start the load at minimum torque points.

noise and vibration

Due to the salient pole construction, this type of motor is inherently noisier and vibrates considerably more than the hysteresis type. Since the cause is magnetic, rather than mechanical, it must be expected in this type of motor. ELINCO designs minimize noise and vibration.

multi-speed

Due to pole saliency required for each speed, this type of motor cannot be provided as a multi-speed unit.

summary

The characteristics of salient pole induction motors are:

- Although the hysteresis motor quickly damps the hunting to a minimum, there are applications where only minute hunting is permissible. On such applications the salient pole motor should be used.
- Rotates at constant speed, regardless of load and voltage change within the rating of the motor, the angular change due to load and voltage variation is the same as the hysteresis synchronous motor.
- Wide variation in starting torque, dependent on rotor position.
- Can phase in at definite positions with respect to shaft.
- Inherently noisier and possessing more vibration than the hysteresis type.
- The load inertia that can be pulled in synchronism is limited.
- Can be supplied only as a single speed motor.

theory of the hysteresis motor 5

The hysteresis synchronous motor is so named because it utilizes the phenomenon of hysteresis to produce mechanical torque. In its simplest form, the rotor of a hysteresis motor is a smooth cylindrical tube of high hysteresis loss permanent magnet material without windings or slots. It is placed within a slotted stator carrying distributed windings designed to produce, as nearly as possible, a sinusoidal space distribution of flux. In single phase motors, the stator windings usually are the permanent-split-capacitor type. The capacitor value is selected to result in approximately balanced 2 phase conditions within the motor windings. The stator then produces a rotating field, approximately constant in space wave form and rotating at synchronous speed.

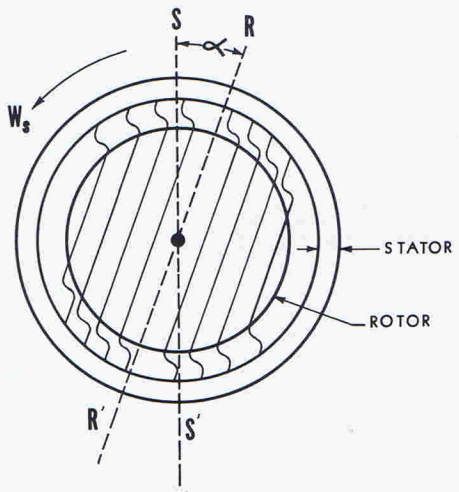


figure one

Instantaneous magnetic conditions in the air gap are indicated in Figure 1 for a 2 pole stator. The axis SS′ of the stator m.m.f. wave revolves at synchronous speed because of hysteresis, the magnetization of the rotor lags behind the inducing m.m.f. wave, and therefore the axis RR′ of the rotor flux wave lags behind the axis of the stator m.m.f. wave by the hysteresis lag angle " ". If the rotor is stationary, starting torque is produced proportional to the product of the fundamental components of the stator m.m.f. and rotor flux and the sine of the torque angle " ". The rotor then accelerates if the counter torque of the load is less than the developed torque of the motor. When the rotor is turning at less than synchronous speed, each particle of the rotor is subjected to a repetitive hysteresis cycle at slip frequency. While the rotor is accelerating, the lag angle " " remains constant if the flux is constant, since the angle " " depends merely on the hysteresis loop of the rotor and is independent of the rate at which the loop is traversed.

The motor therefore develops constant torque right up to synchronous speed, as shown in the ideal speed torque, Figure 2. This feature is one of the advantages of the hysteresis motor in contrast to a reluctance motor which must snap its load into synchronism from the induction motor torque speed characteristic. Hysteresis motors can synchronize any load they can accelerate, regardless of the inertia. After reaching synchronism the motors continue to run at synchronous speed and adjust their torque angle to develop torques required by the loads.

There are deviations from the ideal speed torque curves for several reasons. In a single phase capacitor motor, a true two phase conditions occurs only at one load point. It is not always possible to obtain a true sinusoidal winding distribution tooth pulsation loss in the rotor etc., so that speed torque curves A and B can be obtained. Therefore there is some flexibility in design possible to obtain curves A or B; curve A, when starting torque is not required; curve B, when a high starting torque is required.

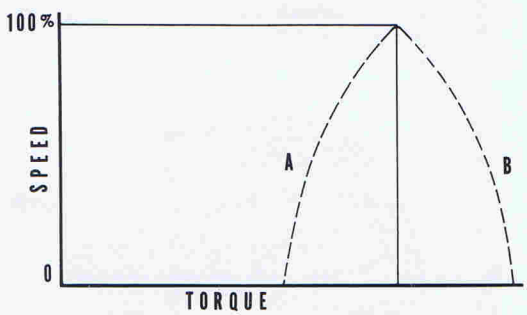


figure two

figure 3

figure 4

figure 5

figure 6

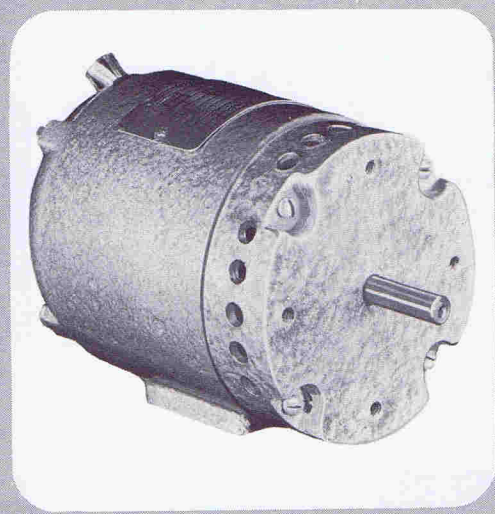


figure 7

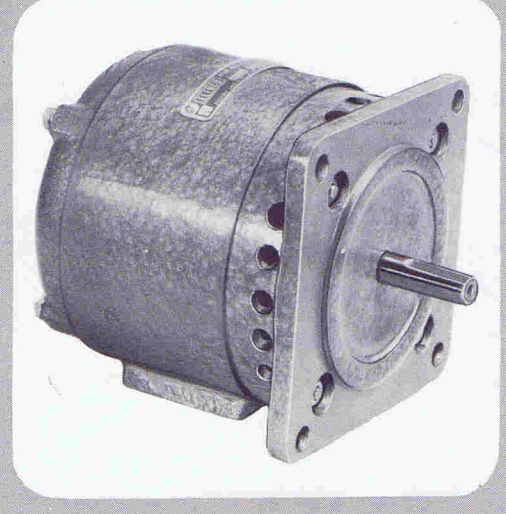


figure 8

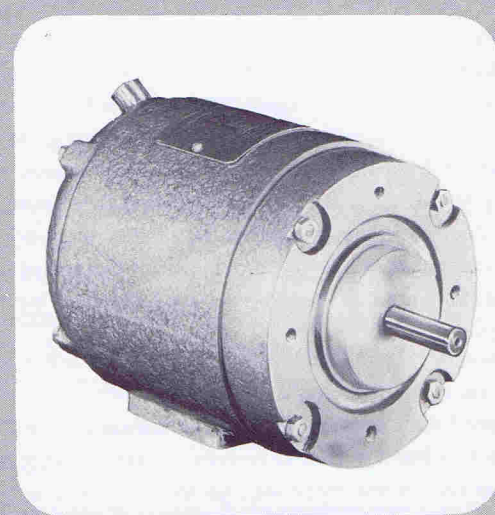


figure 9

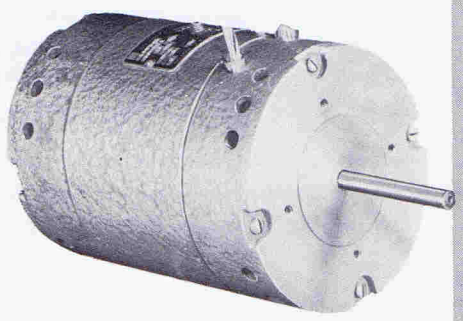


figure 10

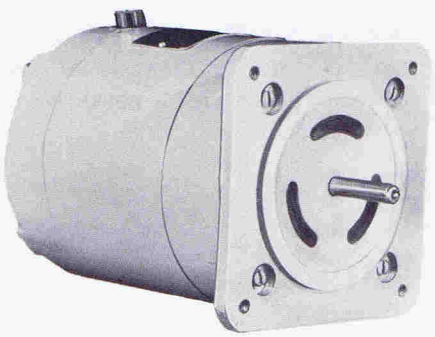
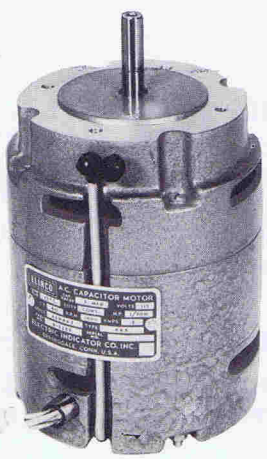


figure 12



outline frame dimensions
found on pages 14-15-18-19 and 20

figure 11

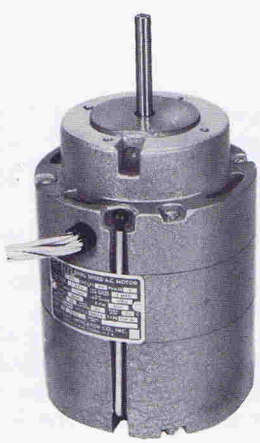


figure 13

8 general electrical characteristics

for hysteresis and salient pole synchronous motors

voltage

All frames, both in hysteresis and salient pole motors, can be wound for a wide variety of voltages up to 400 volts.

frequency

Hysteresis synchonous motors are available or can be developed, in each frame, in any desired frequency from 15 cycles to 400 cycles.

Salient pole synchronous motors are available or can be developed in each frame in any desired frequency from 15 cycles to 240 cycles.

NOTE:
Special laminations are in the process of development which will extend frequency ranges to 1000 cycles.

windings

Motors can be wound for one, two or three phase operation, with class H insulation and other special features. Many units for special application are not shown in the catalog. If the motor you require is not shown, send us your specifications.

speed

hysteresis motors

The following speeds are available by frames:

	60 Cycles	400 Cycles	Poles
"BSH", "FSH" or "FBSH" frame	1200 RPM	8000 RPM	6
	1800 RPM	12000 RPM	4
	3600 RPM		2
"AH", "AHKK" "ALH", "ALHKK" "GH", "GHKK" or "GL", "GLHKK" frame	600 RPM	4000 RPM	12
	900 RPM	6000 RPM	8
	1200 RPM	8000 RPM	6
	1800 RPM	12000 RPM	4
	3600 RPM		2

salient pole motors

	60 Cycles	Poles
"BS", "FS" or "FBS" frame	1800 RPM	4
	3600 RPM	2
"AP", "APKK", "ALP" "ALPKK", "G", "GKK" "GL" or "GLKK" frame	1200 RPM	6
	1800 RPM	4
	3600 RPM	2

NOTE:
Synchronous speeds will vary directly with frequency.
Dual speed hysteresis 60 or 400 cycle motors can be supplied in any combination of the above single speeds. Three and five speed motors are listed on page 15.

NOTE:
Additional speeds will soon be available from current development.

horsepower ratings at rated torque

hysteresis motors

"BSH" or "FSH" frame	1/500 to 1/200 HP
"FBSH" frame	1/250 to 1/100 HP
"AH" or "AHKK" frame	1/300 to 1/50 HP
"ALH" or "ALHKK" frame	1/250 to 1/30 HP
"GH" or "GHKK" frame	1/75 to 1/12 HP
"GLH" or "GLHKK" frame	1/50 to 1/8 HP

salient pole motors

"BS" or "FS" frame	1/500 to 1/250 HP
"FBS" frame	1/250 to 1/125 HP
"AP" or "APKK" frame	1/300 to 1/75 HP
"ALKK" or "ALPKK" frame	1/250 to 1/50 HP
"G" or "GKK" frame	1/75 to 1/15 HP
"GL" or "GLKK" frame	1/50 to 1/10 HP

for hysteresis and salient pole synchronous motors

shafts

Cold rolled steel shafts as dimensioned are standard, but may be furnished to other dimensions or material, and with special features (spline, slot, flat or double end shafts, etc.).

special treatments

Humidity	Stainless steel shaft	Stainless steel bearings
Minimum Noise level	High temperature	Fungus
Special shafts	Special mountings	Shock requirements

frame outline and mounting data

Figure 1 — "GH" frame, with control box
Figure 2 — "GGH" frame, with control box
Figure 3 — "BS" and "BSH frame, base or face mounted
Figure 4 — "FS" and "FSH" frame, flange or face mounted
Figure 5 — "FBS" and "FBSH" frame, base, face or flange mounted
Figure 6 — "ASP", "ALP", "ASH" and "ALH" frame, base mounted
Figure 7 — "ASPJRN", "ALPJRN". "ASHJRN" and "ALHJRN" frame, face or base mounted
Figure 8 — "ASPNRN", "ALPNRN", "ASHNRN" and "ALHNRN" frame, face or base mounted
Figure 9 — "ASPFRN". "ALPFRN", 'ASHFRN" and "ALHFRN" frame, face or base mounted
Figure 10 — "GP", "GLP", "GH" and "GLH" frame, base mounted
Figure 11 — "GJRN", "GLJRN", "GHJRN" and "GLHJRN" frame, face mounted
Figure 12 — "GNRN", "GLNRN", "GHNRN" and "GLHNRN" frame, face and base mounted
Figure 13 — "GFRN", "GLFRN", "GHFRN" and "GLHFRN" frame, face mounted
Figure 14 — "AHKK", "ALHKK", "APKK", "ALPKK", "AHBB", "ALHBB", "APBB" and "ALPBB" frame, face mounted
Figure 15 — "GHBB", "GLHBB", "GBB", "GLBB", "GHKK", "GLHKK", "GKK" and "GLKK" frame, face mounted
Figure 16 — "BALJ" frame, flange or base mounted
Figure 17 — "BAL" frame, base mounted

weight

"BS", "FS" "BSH" and "FSH" frame	19 ounces
"FBS" and "FBSH" frame	30 ounces
"ASP" and "ASH" frame	3¼ pounds
"APKK", "APBB", "AHKK" and "AHBB" frame	3½ pounds
"ALP" and "ALH" frame	4½ pounds
"ALPKK", "ALPBB", "ALHKK" and "ALHBB" frame	4½ pounds
"G" and "GH" frame	7¼ pounds
"GKK", "GBB", "GHKK" and "GHBB" frame	7½ pounds
"GL" and "GLH" frame	10½ pounds
"GLKK", "GLBB", "GLHKK" and "GLHBB" frame	10½ pounds
"GGH" frame	18½ pounds

ambient temperature

Standard units designed to operate from −40° to +55°C. Many units specially designed for higher ambients with Class A insulation. For high operating temperatures special units can be wound with Class H insulation and furnished with suitable bearing lubricants.

frame material

Cast aluminum

finish

Anodized per Army-Navy specifications, dichromate seal, all frames finished in blue mottletone baked synthetic enamel. Army olive drab, navy gray, high gloss glack enamel or dull black enamel are also available. Other colors may be furnished on request.

rotor moment of inertia

	Total Oz. In.^{2}	Gm Cm^2		Total Oz. In.^{2}	Gm Cm^2
"BSH" or "FSH"	0.526	76	"ALH"	3.40	610
"FBSH"	0.927	167	"GH"	13.51	2430
"AH"	2.68	482	"GLH"	19.64	3540

bearings

Double shielded ball bearings, factory greased per MIL specifications. Sleeve bearings may be furnished on "A" or "G" frames on request, in accordance with frame outline drawings figures 12 and 13 found on page 20.

ventilation

All standard "A" and "G" frames are provided with an internal cooling fan. Totally enclosed "A" and "G" frame motors can be supplied at reduced horsepower ratings. "BSH", "FSH" and "FBSH" frames are totally enclosed.

10 single speed motors — single phase 60 cycles 115 volts

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

Style	Motor Type No.	Speed	Nominal HP Rating	Full Load Power Input	Rated Torque In Oz.	Pull Out Torque In. Oz.	Starting Torque In. Oz.	Pull In Torque In. Oz.	Cap Value Mfd.	Cap Voltage	Frame Figure No. Page No.
BSH*	830	1200	1/500	14.0	1.6	2.0	2.0	1.6	1.0	220	figs 3-4, page 18
BSH*	698	1800	1/350	16.0	1.6	2.7	1.6	2.7	1.0	220	figs 3-4, page 18
BSH*	763	3600	1/200	15.0	1.4	1.75	1.7	1.5	1.0	220	figs 3-4, page 18
FBSH	831	1200	1/250	30.0	3.2	4.0	4.0	3.4	2.0	220	fig 5, page 18
FBSH	583	1800	1/125	31.0	4.4	5.0	6.0	4.0	2	220	fig 5, page 18
FBSH	586	3600	1/100	34.0	2.9	4.0	4.8	3.0	2	220	fig 5, page 18
AH	832	600	1/300	40.0	5.6	7.0	9.0	6.8	2.0	220	figs 6-7-8-9-14 pages 18-19-20
AH	748	900	1/250	38.0	4.5	7.3	10.7	6.7	3.0	220	figs 6-7-8-9-14 pages 18-19-20
AH	833	1200	1/150	40.0	5.5	7.0	8.0	6.8	2.0	220	figs 6-7-8-9-14 pages 18-19-20
AH	834	1800	1/60	45.0	9.3	12.0	13.0	11.5	3.0	220	figs 6-7-8-9-14 pages 18-19-20
AH	762	3600	1/50	41.0	5.2	8.0	8.6	7.0	3.0	220	figs 6-7-8-9-14 pages 18-19-20
ALH	541	600	1/250	42.0	6.8	8.0	11.0	7.4	2	220	figs 6-7-8-9-14 pages 18-19-20
ALH	776	900	1/175	50.0	6.5	10.5	12.0	7.5	4	220	figs 6-7-8-9-14 pages 18-19-20
ALH	542	1200	1/75	40.0	11.0	14.0	15.0	13.0	3	220	figs 6-7-8-9-14 pages 18-19-20
ALH	724	1800	1/40	52.0	14.0	16.0	19.0	17.0	3	220	figs 6-7-8-9-14 pages 18-19-20
ALH	693	3600	1/30	65.0	9.6	14.5	13.5	11.5	5.0	220	figs 6-7-8-9-14 pages 18-19-20
GH	835	600	1/75	65.0	22.5	26.0	30.0	24.0	5.0	220	figs 10-11-12-13-15 pages 19-20
GH	836	900	1/50	65.0	22.5	28.0	35.0	26.0	6.0	220	figs 10-11-12-13-15 pages 19-20
GH	377	1200	1/30	86.0	28.0	32.0	34.0	30.0	8.0	220	figs 10-11-12-13-15 pages 19-20
GH	368	1800	1/15	100.0	37.0	40.0	42.0	38.0	5.0	220	figs 10-11-12-13-15 pages 19-20
GH	780	3600	1/12	138.0	23.0	28.0	40.0	27.0	7.0	330	figs 10-11-12-13-15 pages 19-20
GLH	837	600	1/50	65.0	33.5	38.0	40.0	35.0	6	220	figs 10-11-12-13-15 pages 19-20
GLH	630	900	1/30	76.0	35.0	41.0	51.0	38.0	4.0	330	figs 10-11-12-13-15 pages 19-20
GLH	797	1200	1/15	120.0	56.0	65.0	75.0	59.0	8.0	330	figs 10-11-12-13-15 pages 19-20
GLH	714	1800	1/10	146.0	56.0	69.0	90.0	63.0	7.0	330	figs 10-11-12-13-15 pages 19-20
GLH	420	3600	1/8	190.0	33.5	42.0	50.0	40.0	8.0	330	figs 10-11-12-13-15 pages 19-20

(1) Class H
*Also furnished in "FSH" Frame.

two phase 60 cycles

Style	Motor Type No.	Volts	Speed	Nominal H.P. Rating	Full Load Power Input	Rated Torque In. Oz.	Pull Out Torque In. Oz.	Starting Torque In. Oz.	Pull In Torque In. Oz.	Frame Figure No. Page No.
ALH	349	220	900	1/125	40	7.2	9.3	12.0	9.0	figs 6-7-8-9-14 pages 18-19-20
ALH	425	55	900	1/150	27	7.5	11.0	14.7	9.6	figs 6-7-8-9-14 pages 18-19-20
ALH	450	27.5	900	1/150	50	7.4	10.2	12.8	9.6	figs 6-7-8-9-14 pages 18-19-20

DEFINITION OF TERMS

PULL OUT: The torque at which the motor begins to slip out of synchronism at rated voltage and frequency.

PULL IN: Torque at which the motor pulls into synchronism at rated voltage and frequency.

PULL UP: Minimum torque of motor between locked and pull in torque, i.e., lowest torque between 0 speed and near synchronous speed.

LOCKED TORQUE: Torque at which the motor will start to rotate.

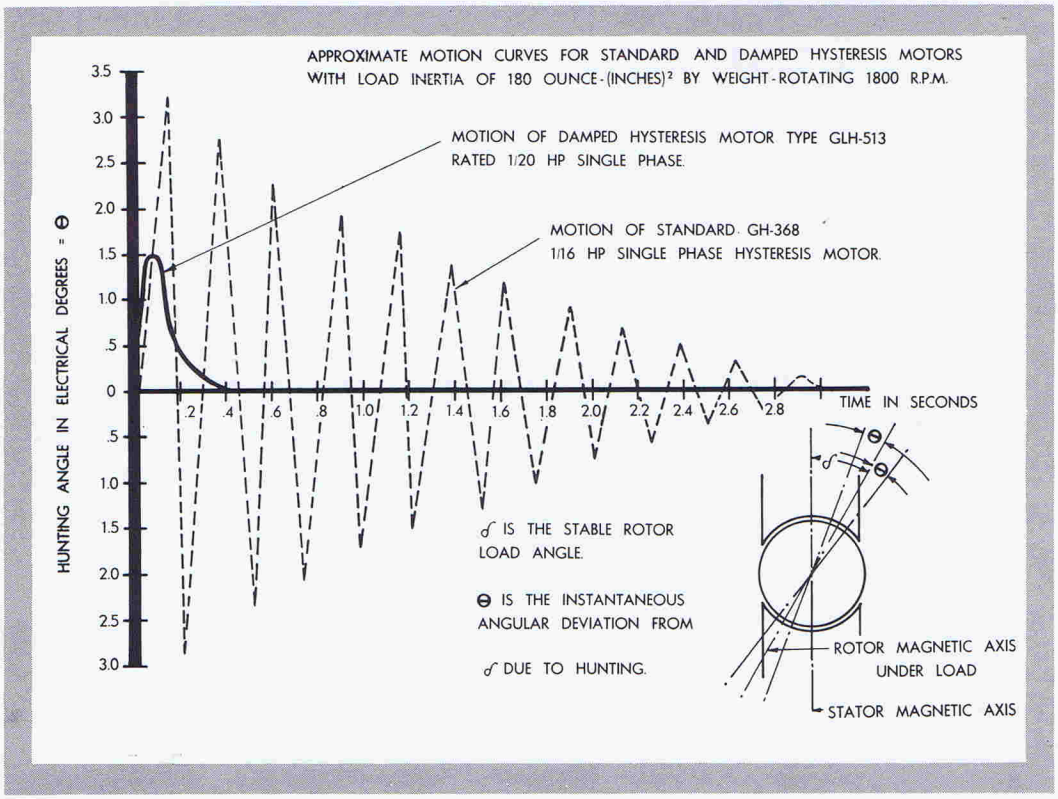
12 stabilized hysteresis motors

for large inertia loads 115 volts 60 cycles

Earlier designs of hysteresis motors, with their soft rotor couplings and low synchronous torques, showed little tendency to hunt. As design techniques were improved (from 1/40 HP in 1947 to 1/8 HP in 1954 in the same motor size), difficulties with hunting became proportionately greater. In 1950 ELINCO announced a high torque hysteresis motor with fully damped motion for large inertia loads.

The curve below shows the comparison between a standard 1/16 HP hysteresis motor and the newer non-hunting unit. It may be seen that the non-hunting motor not only radically reduces the duration of any oscillation but cuts the magnitude of the initial swing about 50%.

The standard motor is capable of damping out after one oscillation a connected load inertia of approximately 9 oz. in.^{2} by weight, as against a value of 180 oz. in.^{2} for the motor with damped motion.



Such motors have a natural application for all sound and optical work, for goniometer drives, and wherever an excellent degree of motional stability is required. They will permit the use of higher basic motor speeds for a given load inertia without increase in flutter, thereby permitting greater power output for fixed motor size. These units are at present available in our "GLH" frame with ratings as shown below. Units in other frames and other speed and voltage ratings as well as multiple speed units will become available as development proceeds. For the same frame size, the non-hunting feature reduces HP approximately 30% mainly in its effect on pull-in torque.

Motor Type	Nominal Speed	HP Rating	Power Input At Rated Load	Starting Torque Rate	Pull In Torque Inch. Oz.	Pull Out Torque In. Oz.	Max. Load Inertia for Crit. Damp	Cap Value Mfd.	Cap Voltage	Frame Figure No. Page No.
GLH-512	3600	1/15	150	18.5	87.5	21.6	32	180 oz. in. by weight	10	330	figs 10-11-12-13-15 pages 19-20
GLH-513	1800	1/20	106	28.0	43.2	33.6	40.0	180 oz. in. by weight	6	330	figs 10-11-12-13-15 pages 19-20

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

60 cycles 115 volts

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

Style	Motor Type No.	Speed	Nominal HP Rating	Full Load Power Input	Rated Torque In. Oz.	Pull Out Torque In. Oz.	Starting Torque In. Oz.	Pull In Torque In. Oz.	Cap Value Mfd.	Cap Voltage	Frame Figure No. Page No.
BSH	388	1800	1/1200	14.0	.5	.5	1.1	1.5	1.5	220	fig 3 or 4 page 18
		3600	1/600	14.0	.5	.5	.7	.5	1.5	220	
ALH	782	600	1/300	50	5.6	6.7	6.1	6.1	5	220	figs 6-7-8-9-14 pages 18-19-20
		1800	1/100	50	5.6	8.5	6.7	7.8	5	220	
ALH	594	600	1/400	45	4.2	5.6	5.6	3.8	3	220	figs 6-7-8-9-14 pages 18-19-20
		3600	1/90	54	3.1	4.4	5.4	3.6	4	220	
ALH	287	900	1/150	41.0	7.5	7.7	7.5	7.2	4.0	220	figs 6-7-8-9-14 pages 18-19-20
		1800	1/75	41.0	7.5	11.2	7.5	9.8	4.0	220	
ALH	728	900	1/200	31	3.7	7.2	6.4	6.4	4	220	figs 6-7-8-9-14 pages 18-19-20
		3600	1/50	55	4.7	10.4	6.4	9.3	4	220	
ALH	877	1200	1/100	55	8.4	10.0	9.5	9.0	5	220	figs 6-7-8-9-14 pages 18-19-20
		3600	1/40	70	7.0	9.0	9.0	8.5	5	220	
ALH	719	1800	1/75	48	7.5	9.3	6.8	7.4	3	220	figs 6-7-8-9-14 pages 18-19-20
		3600	1/75	56	3.8	5.5	3.5	4.7	3	220	
GH	366	600	1/200	64.0	8.4	10.4	8.0	10.4	6.0	220	figs 10-11-12-13-15 pages 19-20
		1200	1/75	61.0	11.1	21.6	11.2	20.0	6.0	220	
GH	486	600	1/200	60.0	8.4	10.4	8.0	8.8	6.0	220	figs 10-11-12-13-15 pages 19-20
		1800	1/40	73.0	14.	25.6	20.0	24.8	5.0	220	
GH	530	600	1/200	74	8.4	12.5	20.8	16.0	6	220	figs 10-11-12-13-15 pages 19-20
		3600	1/60	98	4.7	12.8	15.7	7.4	6	220	
GH	759	900	1/100	62.0	11.2	14.4	12.8	13.1	5.0	220	figs 10-11-12-13-15 pages 19-20
		1800	1/40	77.0	14.	27.2	19.2	22.4	5.0	220	
GH	455	900	1/100	59.0	11.2	14.4	15.2	13.8	5.0	220	figs 10-11-12-13-15 pages 19-20
		3600	1/40	123.0	7.	14.4	8.0	14.4	8.0	220	
GH	519	1200	1/60	67	14.	16.8	26.	16.0	6	220	figs 10-11-12-13-15 pages 19-20
		1800	1/40	90	14.	19.2	21.6	16.0	5	220	
GH	849	1200	1/75	85.0	21.	31	34.	26.0	6	330	figs 10-11-12-13-15 pages 19-20
		3600	1/25	115.0	11.2	17	16.	16.0	6	330	
GH	394	1800	1/20	94.0	22.4	28.8	25.6	25.6	6.0	220	figs 10-11-12-13-15 pages 19-20
		3600	1/20	132.0	14.	19.2	16.0	17.6	10.0	220	
GLH	578	600	1/100	74	16.8	19.2	26.4	15.2	6	220	figs 10-11-12-13-15 pages 19-20
		3600	1/50	129	5.6	17.6	11.2	5.6	6	220	
GLH	816	1200	1/20	140	42	59	53	48	6	220	figs 10-11-12-13-15 pages 19-20
		3600	1/20	140	14	20	22	20	6	220	

14 dual speed odd frequency motors — single phase

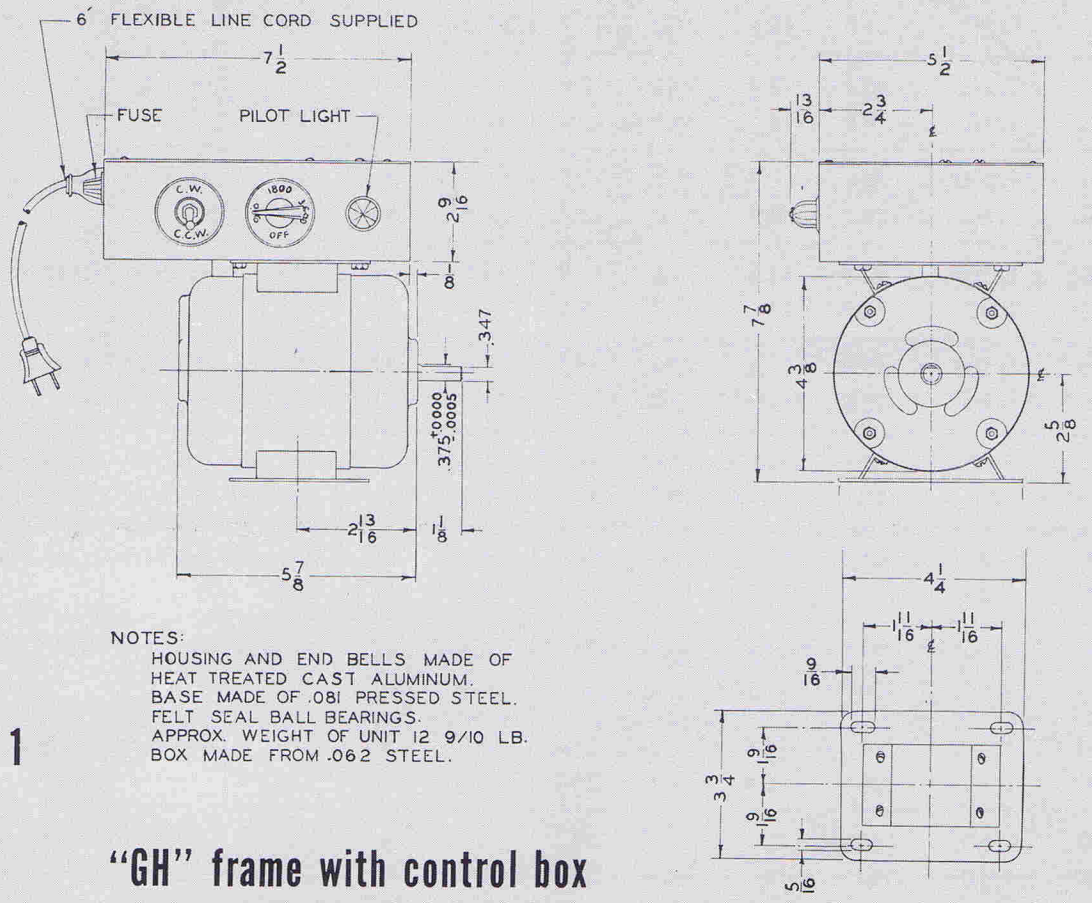
SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

Style	Motor Type No.	Cycles	Volts	Speed	Nominal HP Rating	Full Load Power Input	Rated Torque In. Oz.	Pull Out Torque In. Oz.	Starting Torque In. Oz.	Pull In Torque In. Oz.	Mfd. Cap Value	Cap Voltage	Frame Figure No. Page No.
ALH	792	50	115	750	1/200	46	7.5	10.5	11.0	10.2	4	115	figs 6-7-8-9-14 pages 18-19-20
				1500	1/100	42	7.5	10.2	11.0	10.2	4	115	
ALH(1)	671	400	115	4000	1/75	110	3.4	4.5	4.0	4.2	.75	330	figs 6-7-8-9-14 pages 18-19-20
(1) Class H				12000	1/25	110	3.4	4.8	4.2	4.6	.75	330	
GH	431	50	115	750	1/125	70	10.8	14.5	13.6	12.9	6.0	220	figs 10-11-12-13-15 pages 19-20
				1500	1/30	99	22.0	30.5	23	29	6.0	220	

three and five speed synchronous motors

MOTOR CAN BE SUPPLIED WITH OR WITHOUT CONTROL BOX.
SQUARE FLANGE FACE MOUNT END BELL CAN BE SUPPLIED UPON REQUEST.

NOTE:
HOLES IN END BELLS ARE FOR VENTILATION AND MUST NOT BE BLOCKED WITHOUT APPROVAL OF OUR ENGINEERING DEPT.



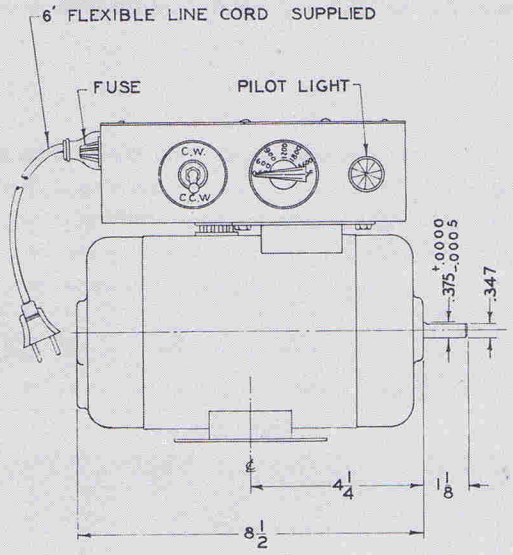
NOTES:
HOUSING AND END BELLS MADE OF HEAT TREATED CAST ALUMINUM.
BASE MADE OF .081 PRESSED STEEL.
FELT SEAL BALL BEARINGS.
APPROX. WEIGHT OF UNIT 12 9/10 LB.
BOX MADE FROM .062 STEEL.

figure 1

"GH" frame with control box

Motor Type	Speed	Nominal HP Rating	Full Load Power Input	Starting Torque In. Oz.	Rated Torque In Oz.	Pull In Torque In. Oz.	Pull Out Torque In. Oz.	Cap Value Mfd.	Cap Voltage	Frame Figure No. Page No.
GH-371	900	1/100	59	15.20	11.2	13.70	14.40	5	220	Figure 1
3 Speed	1800	1/60	77	12	9.4	16.00	16.80	5	220	page 14
	3600	1/50	120	8.00	5.6	14.40	14.40	8	220	
* GGH-492	900	1/50	125	28	22.5	24	25.6	10	220	Figure 2
† 3 Speed	1800	1/30	174	21.6	18.6	32	37.0	10	220	page 15
	3600	1/20	250	14.4	14.1	24	30.4	16	220	
GGH-449	600	1/200	64	10.5	8.0	10.40	10.4	6	220	Figure 2
5 Speed	900	1/100	59	15.2	11.2	13.5	14.4	5	220	page 15
	1200	1/75	61	12.	11.2	20	21.6	6	220	
	1800	1/60	77	11.2	9.5	16	16.8	5	220	
	3600	1/40	123	8.00	7.1	14.40	14.4	8	220	

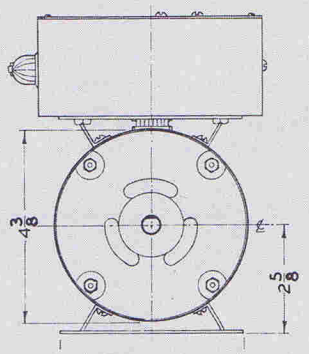
*This motor must be externally cooled if used for continuous duty.



MOTOR CAN BE SUPPLIED WITH OR WITHOUT CONTROL BOX.
SQUARE FLANGE FACE MOUNT END BELL CAN BE SUPPLIED UPON REQUEST.

NOTES:
HOUSING AND END BELLS MADE OF HEAT TREATED CAST ALUMINUM.
BASE MADE OF .081 PRESSED STEEL.
FELT SEAL BALL BEARINGS.
APPROX. WEIGHT OF UNIT, 18 1/2 LB.
BOX MADE FROM .062 STEEL.

NOTE
HOLES IN END BELLS ARE FOR VENTILATION AND MUST NOT BE BLOCKED WITHOUT APPROVAL OF OUR ENGINEERING DEPT.



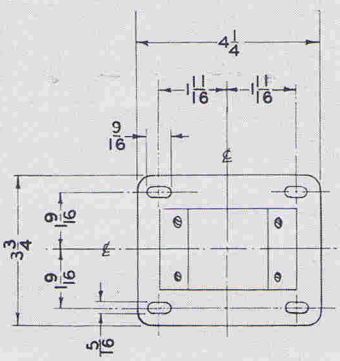


figure 2

"GGH" frame with control box

†THE GGH-492 ABOVE, GGH-657 AND THE GGH-824 PAGE 16 CAN NOT BE FURNISHED WITH CONTROL BOX.

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

ac motor-generator sets types "BAL" and "GGH"

New model subfractional A.C. motor-generator sets combine A.C. synchronous motors with A.C. permanent magnet generators.

type "BAL"

Designed as type "BAL", these units have three principal uses. First, they provided a source of odd frequency from standard frequency lines such as 15, 30, 90, 180 cycles, etc. Second, the synchronous motors are supplied with shaft extensions for driving loads. The A.C. permanent magnet generator can then be used to indicate the position of the load at any instant. Third, by fitting the unit with a rotating housing, any phase shift from 0° to 360° can be simulated in relation to another generator on the same unit, or to an external source.

Innumerable combinations can be furnished:

1. Motors with one or two generators.
2. Stationary or rotating housings.
3. Single or dual speed motors. Dual speed motors can be used to give two output frequencies using the same generator.
4. One, two or three phase motor or generator.
5. Generators with two, four, six or twelve poles.

These units can be supplied with any combination of synchronous motor in the "A" or "AL" frame listed in this catalog in single or dual speeds.

Any one or two A.C. permanent magnet generators selected, from "BS" or "FS" A.C. permanent magnet generator frame units are listed in Catalog EI-1A.

type "GGH"

This type of unit can be furnished with any combination of "G" frame synchronous motor from this catalog and any "G" frame A.C. permanent magnet generator from Catalog EI-1A. Their use can be the same as indicated for the type "BAL" units except that they cannot be supplied with rotating housings for phase shifting purposes. However, in addition to their use as load position indicating devices and odd frequency sources, they can be used for appreciable power sources in one, two or three phase at standard or odd frequencies. Separate or tapped windings can be furnished to provide various output voltages.

"BAL" frame

Frame Figure Nos. 16-17 Page 20

motor								generator					
Style	Type	Motor Type No.	Volts	HP	Freq.	RPM	Cap Value	Housing	Gen. Type No.	Volts	Poles	Phases	Output Frequency CPS
BAL	853	541	115	1/250	60	600	2	Rotating	269	6.5	2	1	10
BAL	643	547	115	1/50	60	1800	3	Rotating	15	45	2	1	30
BAL	641	699	115	1/50	60	3600	3	Stationary	15	90	2	1	60
BAL	743	287	115	1/150	60	900	4	Stationary	15	22.5	2	1	15
				1/75		1800				45			30

"GGH" frame

Frame Figure 2 page 15

motor								generator					
Style	Type	Motor Type No.	Volts	HP	RPM	Freq.	Cap Value	Gen. Type No.	Volts	Poles	Phases	Output Freq. CPS	Output VA
† GGH	657	780	115	1/12	3600	60	7	855	115	2	1	60	20
† GGH	824	780	115	1/12	3600	60	7	856	45	8	3 Delta	240	17
									66		3 Delta		8.5
									1.25		3 Wye		8.0

†See note on bottom page 15, figure 2.

60 cycles salient pole induction synchronous motors

split phase

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

Motor Type	Volts	Speed	HP Rating	Full Load Power Input	Rated Torque In. Oz.	Starting Torque In. Oz.	Pull In Torque In. Oz.	Pull Out Torque In. Oz.	Mfd. Cap Value	Cap Voltage	Frame Figure No. Page No.
GS-248	230	1800	1/30	80	18.6	40	21	32	None	—	figs 10-11-12-13-15 pages 19-20
GS-197	115	1800	1/15	100	37	45	48	48	None	—	figs 10-11-12-13-15 pages 19-20
GS-286	115	3600	1/20	140	14.4	42	18.5	18.5	None	—	figs 10-11-12-13-15 pages 19-20

capacitor start and run

BS-907	115	1800	1/350	15	1.6	2.0	2.0	2.3	1	220	figs 3-4 page 18
BS-170	115	3600	1/250	15	1.1	1.6	1.3	2.0	2	220	figs 3-4 page 18
FBS-161	115	1800	1/350	22	1.6	1.8	2.0	2.8	2.0	220	fig 5 page 18
FBS-157	115	3600	1/300	22	.93	2.4	.95	2.5	1	220	fig 5 page 18
AP-207	115	1800	1/150	35	3.7	12	5	8.5	4	220	figs 6-7-8-9-14 pages 18-19-20
AP-217	115	3600	1/150	26	1.8	3.3	2.5	4.5	4	220	figs 6-7-8-9-14 pages 18-19-20
ALP-203	115	1800	1/125	47	4.5	5	8	10	6	220	figs 6-7-8-9-14 pages 18-19-20
ALP-860	115	3600	1/50	65	5.6	6.5	9.5	17	5	220	figs 6-7-8-9-14 pages 18-19-20
G-303	115	1800	1/40	90	13.5	13.5	26	33	6.5	330	figs 10-11-12-13-15 pages 19-20

dual value capacitor

GS-572	115	1200	1/15	120	56	70	66	70	5/10	220	figs 10-11-12-13-15 pages 19-20
GS-295	115	1800	1/12	117	46.5	51	50	51	8/8	220	figs 10-11-12-13-15 pages 19-20
*GS-330	230	1800	1/25	52	22	45	28	41	1.5/3.5	330	figs 10-11-12-13-15 pages 19-20
*GS-342	230	1800	1/12	130	46	93	51	55	2/4	220	figs 10-11-12-13-15 pages 19-20
*GS-333	115	3600	1/15	130	19	22	26	27	6/24	220	figs 10-11-12-13-15 pages 19-20

single phase 30 cycles

capacitor start and run

Motor Type	Volts	Speed	HP Rating	Full Load Power Input	Rated Torque In. Oz.	Starting Torque In. Oz.	Pull In Torque In. Oz.	Pull Out Torque In. Oz.	Mfd. Cap Value	Cap Voltage	Frame Figure No. Page No.
BS-757	115	1800	1/500	9.5	1.1	2.4	1.3	2.2	2	220	figs 3-4, page 18

single phase 50 cycles

split phase

*GS-647	115	1500	1/20	72	34	40	48	54	None	—	figs 10-11-12-13-15 pages 19-20

capacitor start and run

BS-844	115	1500	1/350	15	2.0	2.3	2.3	2.5	1	220	figs 3-4 page 18
AP-328	230	1500	1/100	38	6.7	9.5	7.5	9.5	1.25	440	figs 6-7-8-9-14 pages 18-19-20
ALP-845	115	1800	1/50	45	11.2	12.5	15	16	4	220	figs 6-7-8-9-14 pages 18-19-20

three phase 60 cycles

ALP-267	115	1800	1/50	50	11.1	40	12.5	12.5	None	—	figs 6-7-8-9-14 pages 18-19-20
ALP-201	220	1800	1/75	25	7.5	10	9.5	10.5	None	—	figs 6-7-8-9-14 pages 18-19-20
*G-234	220	1800	1/20	68	28.0	144	34	36	None	—	figs 10-11-12-13-15 pages 19-20

*In "G" frame add letter "T" for thermal overload protection.

frame dimensions

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

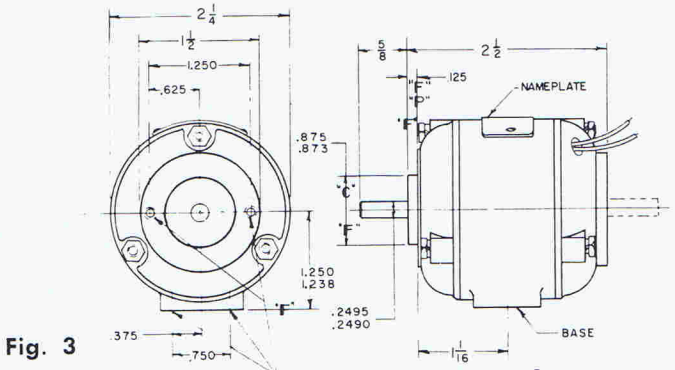
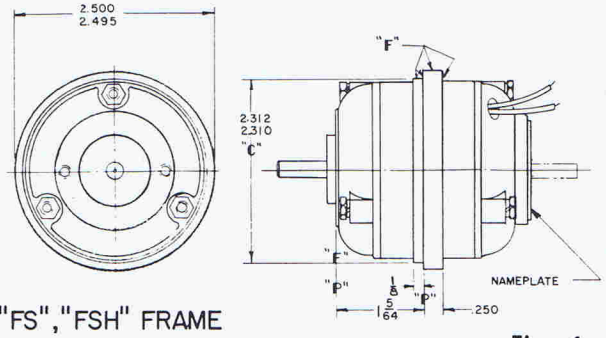


Fig. 3

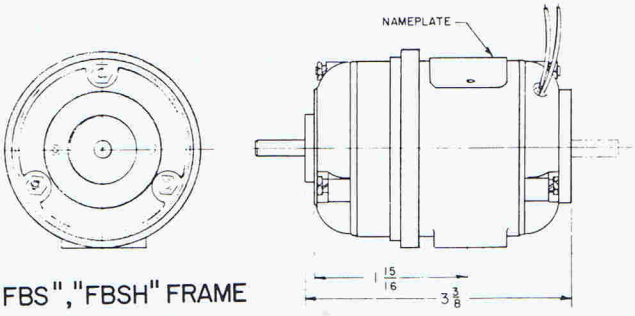
"BS","BSH" FRAME
(BASE MOUNTED)



"FS","FSH" FRAME
(FLANGE MOUNTED)

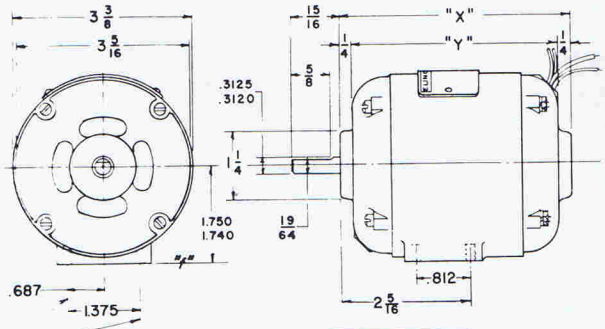
(OTHER DIMENSIONS SEE FIG. 15)

Fig. 4



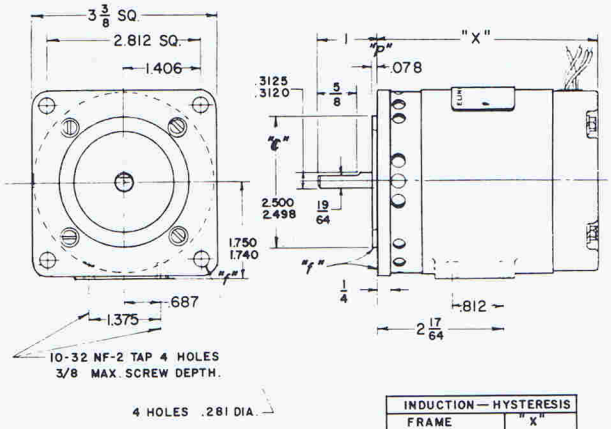
"FBS","FBSH" FRAME
(FLANGE / BASE OR FACE MOUNTED)

Fig. 5



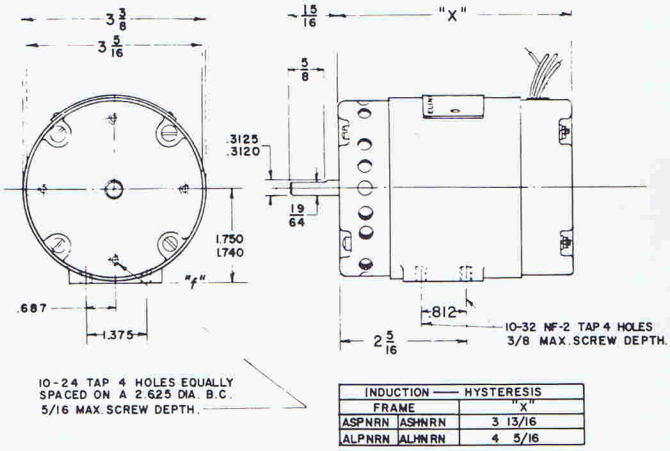
INDUCTION — HYSTERESIS			
FRAME		"X"	"Y"
ASP	ASH	3 13/16	3 5/16
ALP	ALH	4 5/16	3 13/16

Fig. 6



INDUCTION — HYSTERESIS		
FRAME		"X"
ASPJRN	ASHJRN	3 49/64
ALPJRN	ALHJRN	4 17/64

Fig. 7



INDUCTION — HYSTERESIS		
FRAME		"X"
ASPNRN	ASHNRN	3 13/16
ALPNRN	ALHNRN	4 5/16

Fig. 8

NOTE : "ELINCO" RESERVES THE RIGHT TO MAKE MINOR MODIFICATIONS THAT DO NOT AFFECT MOUNTING DIMENSIONS.

HOUSING & END CAPS ARE CAST ALUMINUM ANODIZED AFTER MACHINING.
ALL DIAMETERS MARKED "C" ARE CONCENTRIC TO SHAFT WITHIN .005 T.I.R.
ALL SURFACES MARKED "P" ARE PERPENDICULAR TO SHAFT WITHIN .005 T.I.R.
ALL SURFACES MARKED "f" ARE NOT PAINTED
DECIMAL DIMENSIONS HAVE A TOLERANCE OF ±.005 UNLESS OTHERWISE NOTED.
FRACTIONAL DIMENSIONS ARE FOR REFERENCE ONLY.
ADD SUFFIX "D" TO FRAME DESIGNATION IF DOUBLE END SHAFT IS REQUIRED.
ADD SUFFIX "E" TO FRAME DESIGNATION IF TOTALLY ENCLOSED UNIT IS REQUIRED.
ALL LEADS ARE NYLON JACKETED & FLEXIBLE. NUMBER & LENGTH WILL VARY WITH TYPE OF UNIT.
UNLESS OTHERWISE SPECIFIED UNITS WILL BE PAINTED BLUE MOTTLETONE.
FLATS ARE NOT SUPPLIED ON HYSTERESIS SHAFT EXTENSIONS UNLESS SPECIFICALLY REQUESTED.

SEE PAGE 21 FOR WIRING DIAGRAMS ON ALL UNITS

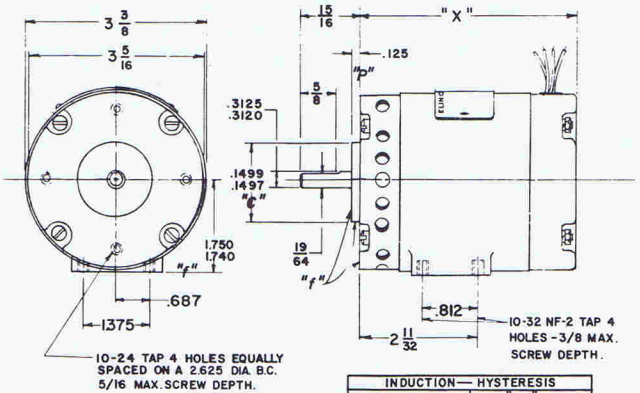


Fig. 9

INDUCTION — HYSTERESIS		
FRAME		"X"
ASPFRN	ASHFRN	3 27/32
ALPFRN	ALHFRN	4 11/32

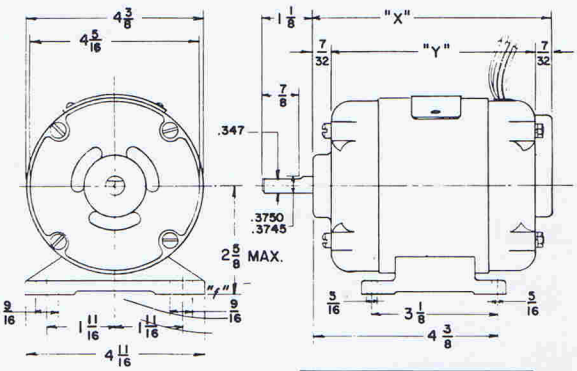
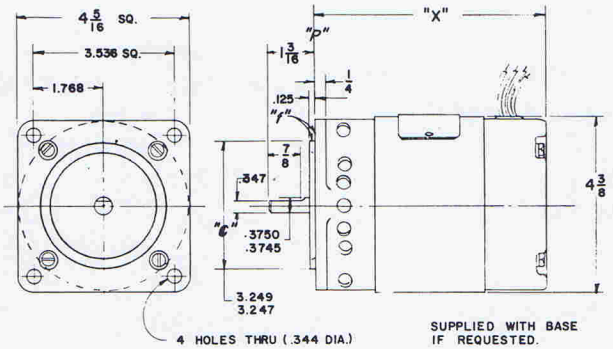


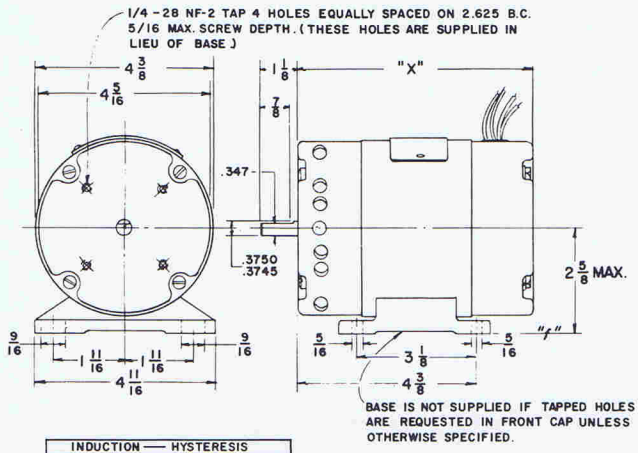
Fig. 10

INDUCTION — HYSTERESIS			
FRAME		"X"	"Y"
GP	GH	5 7/8	5 7/16
GLP	GLH	6 7/8	6 7/16



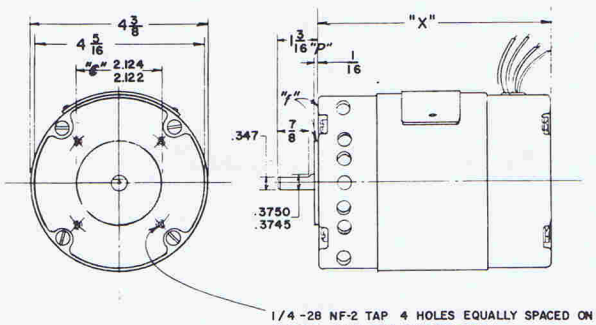
INDUCTION — HYSTERESIS		
FRAME		"X"
GJRN	GHJRN	5 13/16
GLJRN	GLHJRN	6 13/16

Fig. 11



INDUCTION — HYSTERESIS		
FRAME		"X"
GNRN	GHNRN	5 7/8
GLNRN	GLHNRN	6 7/8

Fig. 12



INDUCTION — HYSTERESIS		
FRAME		"X"
GFRN	GHFRN	5 13/16
GLFRN	GLHFRN	6 13/16

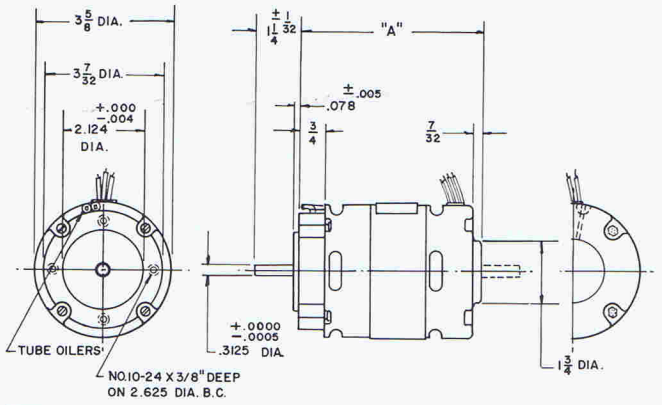
Fig. 13

NOTE : "ELINCO" RESERVES THE RIGHT TO MAKE MINOR MODIFICATIONS THAT DO NOT AFFECT MOUNTING DIMENSIONS.

HOUSINGS & END CAPS ARE CAST ALUMINUM ANODIZED AFTER MACHINING.
ALL DIAMETERS MARKED "C" ARE CONCENTRIC TO SHAFT WITHIN .005 T.I.R.
ALL SURFACES MARKED "P" ARE PERPENDICULAR TO SHAFT WITHIN .005 T.I.R.
ALL SURFACES MARKED "f" ARE NOT PAINTED.
FLATS ARE NOT SUPPLIED ON HYSTERESIS SHAFT EXTENSIONS UNLESS SPECIFICALLY REQUESTED.
DECIMAL DIMENSIONS HAVE A TOLERANCE OF ±.005 UNLESS OTHERWISE NOTED.
FRACTIONAL DIMENSIONS ARE FOR REFERENCE ONLY.
ADD SUFFIX "D" TO STYLE DESIGNATION IF DOUBLE SHAFT EXTENSION IS REQUIRED.
ADD SUFFIX "E" TO STYLE DESIGNATION IF TOTALLY ENCLOSED UNIT IS REQUIRED.
NUMBER & LENGTH OF LEADS WILL VARY WITH TYPE OF UNIT ORDERED. ALL LEADS ARE NYLON JACKETED & FLEXIBLE.
UNITS ARE PAINTED BLUE MOTTLETONE UNLESS OTHERWISE SPECIFIED.

frame dimensions

Fig. 14

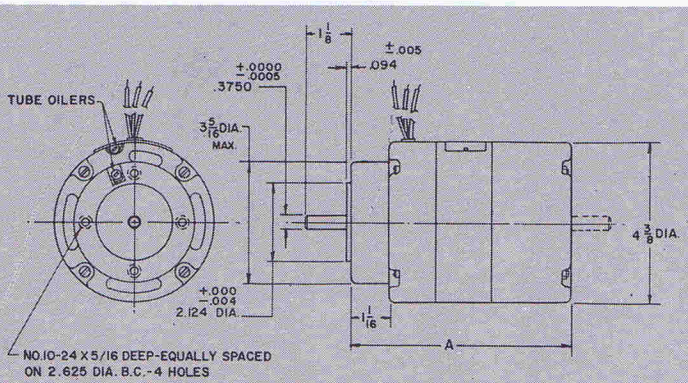


NOTES:
1. HOUSING & END BELLS ARE ALUMINUM.
2. UNIT MAY BE DESIGNED FOR EITHER VERTICAL AND/OR HORIZONAL OPERATION.
3. UNIT MAY BE SUPPLIED WITH DOUBLE END SHAFT EXTENSION IN WHICH CASE STYLE NUMBER IS FOLLOWED BY SUFFIX "D".
4. UNIT MAY ALSO BE SUPPLIED WITH A COMBINATION OF SLEEVE BEARING ON ONE SIDE & BALL BEARING ON OPPOSITE END.
5. TUBE OILERS FURNISHED ON SLEEVE BEARING MOTORS ONLY.

MOTOR TYPE	FRAME STYLE	"A"	DESCRIPTION
HYSTERESIS	AHKK	4 1/2	SELF-ALIGNING SLEEVE BEARING BOTH ENDS
	ALHKK	5	
SALIENT POLE	APKK	4 1/2	
	ALPKK	5	

MOTOR TYPE	FRAME STYLE	"A"	DESCRIPTION
HYSTERESIS	AHBB	4 1/2	BALL BEARING BOTH ENDS
	ALHBB	5	
SALIENT POLE	APBB	4 1/2	
	ALPBB	5	

Fig. 15

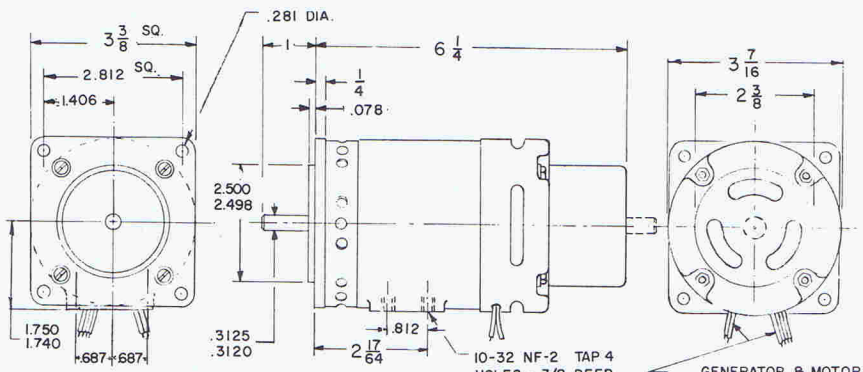


NOTES:
1. HOUSING & END BELLS ARE ALUMINUM.
2. UNIT MAY BE DESIGNED FOR EITHER VERTICAL AND/OR HORIZONAL OPERATION.
3. UNIT MAY BE SUPPLIED WITH DOUBLE END SHAFT EXTENSION IN WHICH CASE STYLE NUMBER IS FOLLOWED BY SUFFIX "D".
4. UNIT MAY ALSO BE SUPPLIED WITH A COMBINATION OF SLEEVE BEARING ON ONE SIDE & BALL BEARING ON OPPOSITE END.
5. TUBE OILERS FURNISHED ON SLEEVE BEARING MOTORS ONLY.

MOTOR TYPE	FRAME STYLE	"A"	DESCRIPTION
HYSTERESIS	GHBB	6	BALL BEARING BOTH ENDS
	GLHBB	6 13/16	
SALIENT POLE	GBB	6	
	GLBB	6 13/16	

MOTOR TYPE	FRAME STYLE	"A"	DESCRIPTION
HYSTERESIS	GHKK	6	SELF-ALIGNING SLEEVE BEARING BOTH ENDS
	GLHKK	6 13/16	
SALIENT POLE	GKK	6	
	GLKK	6 13/16	

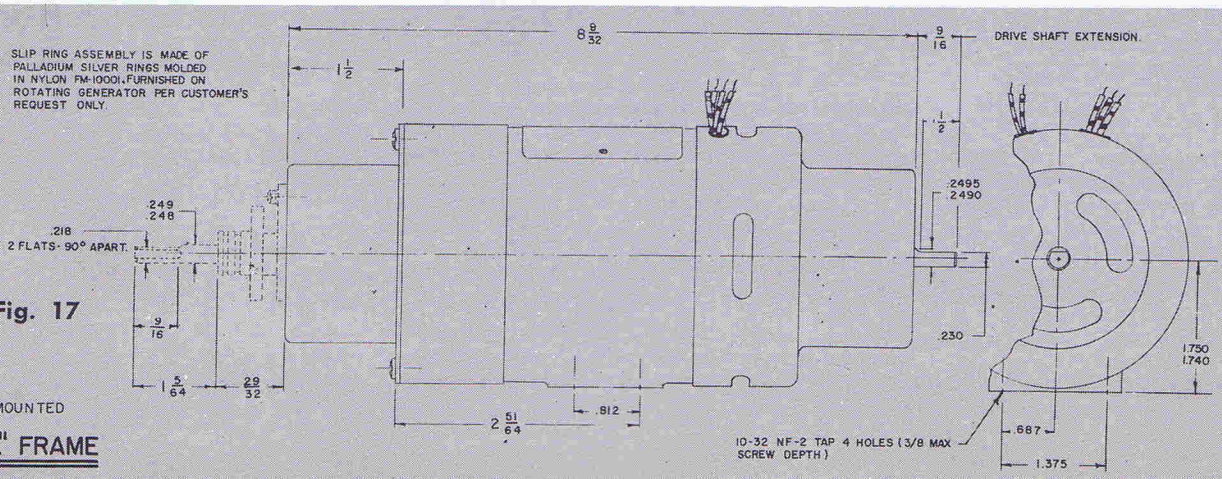
Fig. 16



FLANGE OR BASE MOUNTED

"BALJ" FRAME

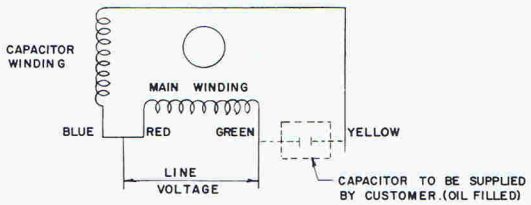
Fig. 17



BASE MOUNTED

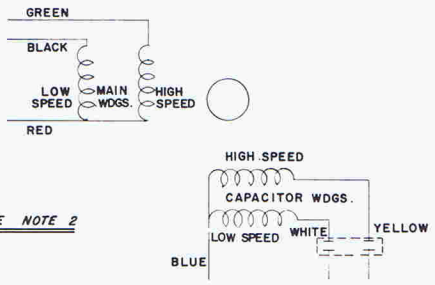
"BAL" FRAME

1 SINGLE SPEED MOTORS. FOUR LEAD CAPACITOR TYPE CONNECTION DIAGRAM. ROTATION REVERSIBLE



NOTE : CONNECTION SHOWN IS FOR CLOCKWISE ROTATION FACING THE SHAFT. TO REVERSE MOTOR INTERCHANGE RED & GREEN LEADS.

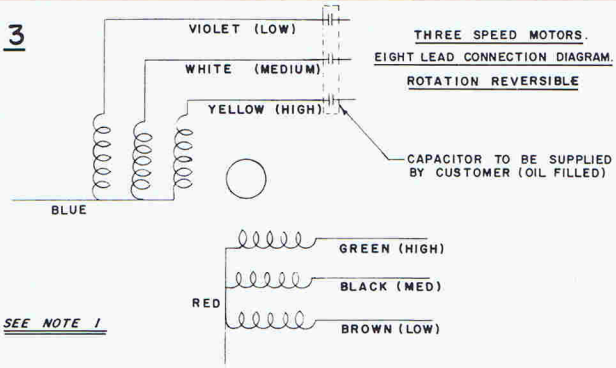
2 DUAL SPEED MOTORS. SIX LEAD CONNECTION DIAGRAM. ROTATION REVERSIBLE



SEE NOTE 2

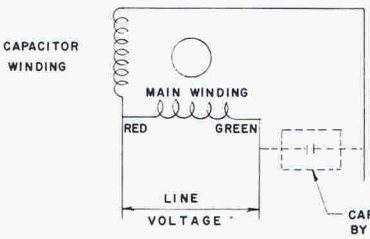
CAPACITOR TO BE SUPPLIED BY CUSTOMER (OIL FILLED)

3 THREE SPEED MOTORS. EIGHT LEAD CONNECTION DIAGRAM. ROTATION REVERSIBLE



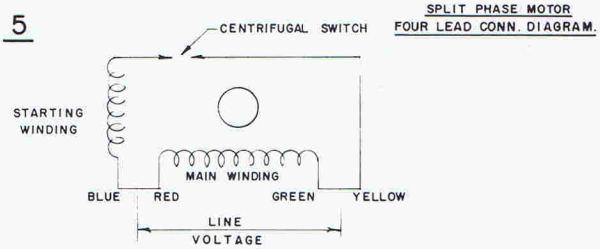
SEE NOTE 1

4 SINGLE SPEED MOTORS THREE LEAD CONN. DIAGRAM. NOT REVERSIBLE



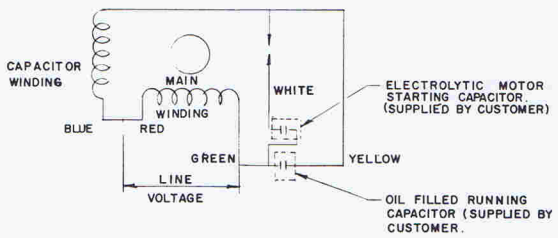
USED ON SINGLE SPEED MOTORS WHEN CUSTOMER SPECIFIES ROTATION.

5 SPLIT PHASE MOTOR FOUR LEAD CONN. DIAGRAM.



CONNECTION SHOWN IS FOR CLOCKWISE ROTATION FACING SHAFT. TO REVERSE ROTATION INTERCHANGE RED & GREEN LEADS.

6 DUAL VALUE CAPACITOR MOTOR FIVE LEAD CONNECTION DIAGRAM.



CONNECTION SHOWN IS FOR CLOCKWISE ROTATION FACING SHAFT. TO REVERSE ROTATION INTERCHANGE RED & GREEN LEADS.

NOTE 1 CONNECTIONS FOR DIAGRAM 3

HIGH SPEED : CLOCKWISE ROTATION FACING SHAFT END
CONNECT BLUE & RED TO ONE SIDE OF LINE.
CONNECT YELLOW TO CAPACITOR.
CONNECT GREEN AND CAPACITOR TO OTHER SIDE OF LINE.
COUNTER CLOCKWISE ROTATION FACING SHAFT INTERCHANGE RED AND GREEN LEADS.

MED. SPEED : CLOCKWISE ROTATION FACING SHAFT END.
CONNECT RED AND BLUE TO ONE SIDE OF LINE.
CONNECT WHITE TO CAPACITOR
CONNECT BLACK AND CAPACITOR TO OTHER SIDE OF LINE.
COUNTER CLOCKWISE ROTATION FACING SHAFT END INTERCHANGE RED AND BLACK LEADS.

LOW SPEED : CLOCKWISE ROTATION FACING SHAFT END.
CONNECT RED AND BLUE TO ONE SIDE OF LINE
CONNECT VIOLET TO CAPACITOR
CONNECT BROWN AND CAPACITOR TO OTHER SIDE OF LINE.
COUNTER CLOCKWISE ROTATION FACING SHAFT END INTERCHANGE RED AND BROWN LEADS.

NOTE 2 CONNECTIONS FOR DIAGRAM 2

HIGH SPEED : CLOCKWISE ROTATION FACING SHAFT END.
CONNECT BLUE AND RED TO ONE SIDE OF LINE.
CONNECT YELLOW TO CAPACITOR.
CONNECT GREEN AND CAPACITOR TO OTHER SIDE OF LINE.
COUNTER CLOCKWISE ROTATION FACING SHAFT END INTERCHANGE RED AND GREEN LEADS.

LOW SPEED : CLOCKWISE ROTATION FACING SHAFT END.
CONNECT RED AND BLUE TO ONE SIDE OF LINE.
CONNECT WHITE TO CAPACITORS.
CONNECT BLACK AND CAPACITORS TO OTHER SIDE OF LINE.
COUNTER CLOCKWISE ROTATION FACING SHAFT END INTERCHANGE RED AND BLACK LEADS

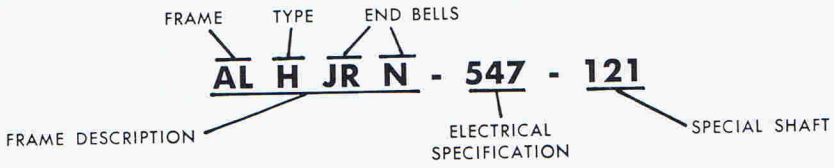
22 ELINCO designation system

frame description

Frame sizes are indicated by one of the following:

"BS" - "FS" - "FBS" - "AS" - "AL" - "G" - "GL"

example



type letter after frame size

"H" denotes hysteresis synchronous motor. Example: "ALH".

"P" in this catalog denotes salient pole synchronous motor. Example: "ALP".

end bells

The letter following the frame and type letter designation indicates end bell or mounting. "BS", "FS" and "FBS" are available only as standard frames. Standard "A" frames are "AS" or "AL" per figure 6 page 18. Standard "G" frames are "G" or "GL" per figure 10 page 19. In addition to standard frame, the "A" and "G" frames are available as flange or face mounting. "J" square flange mounting with axial ventilation. "JR" square flange mounting with radial ventilation. "FR" face mounting with radial ventilation. "NR" end bell see figure 8 page 18 can be used for face mounting without locating boss, normally used when desired to mount something to the motor that doesn't need to be too accurately located such as a blower or fan shroud.

example

"ALHJRN" — would indicate:

"AL" — Frame

"H" — Hysteresis motor

"JR" — Flange mounting shaft end

"N" — "N" type end bell rear end

"ALHJRJR" —same as above except flange mounting both end of motor

LETTER "E" Denotes totally enclosed unit.

LETTER "D" Denotes standard double end shaft — Example: "ALHJRD"-547.

LETTER "S" Used with "G" or "GL" frame indicates a centrifugal switch in motor. Used in split phase or dual value capacitor motor. Example: "GS"-247.

LETTER "T" Indicates motor supplied with thermal overload protector. Available on "G" frame with standard rear end bell.

electrical specification

This number describes complete electrical specifications of motor — such as HP, RPM, Voltage, Frequency, etc.

shaft number

If the type number is not followed by another number, then the motor has a standard shaft per catalog drawings. If type number is followed by another number this indicates a special shaft and this number completely identifies the shaft to "ELINCO" for future reference.

example

"ALH"-547 — with standard shaft

"ALH"-547-121 — with special shaft

. . . MORE ELINCO PRECISION BUILT PRODUCTS AVAILABLE

A.C. AND D.C. GENERATORS

Catalogue EI-1 describes in detail over 170 precision built A.C. and D.C. generators in the following classifications:

- D.C. Permanent Magnet Tachometer Generators
- D.C. Wound Field Generators
- D.C. Speed-Squared Generators
- D.C. Dual Field Generators
- A.C. Permanent Magnet Generators
- A.C. Sine Wave Generators

COMMUTATOR MOTORS

Included in catalogue EI-2 is a complete description of motors in the following classifications:

- Permanent Magnet Motors
- D.C. Shunt Motors
- Separately Excited Shunt Motors
- Split Field Shunt Motors
- Series Motors
- Split Field Series Motors
- Universal Motors
- Split Field Universal Motors
- Governor Motors

INDUCTION AND TORQUE MOTORS

Catalogue EI-3 describes 60 and 400 cycle induction motors in single, two and three phases. They are also available in odd frequencies, dual speed and dual voltages.

This catalogue also describes single phase induction brake motors, as well as a wide variety of torque motors.

OTHER UNITS

- Self-synchronous motors
- Rotating self-synchronous motors
- Differential motors
- One and three phase rotating transformers
- Phase shifting rotary transformers
- Low inertia A.C. induction servo motors
- A.C. induction generators
- A.C. motor driven induction generators
- A.C. motor generator sets
- D.C. Motor generator sets
- Blower motors

WRITE FOR DETAILS

ELINCO ENGINEERING FACILITIES

. . . are available to you

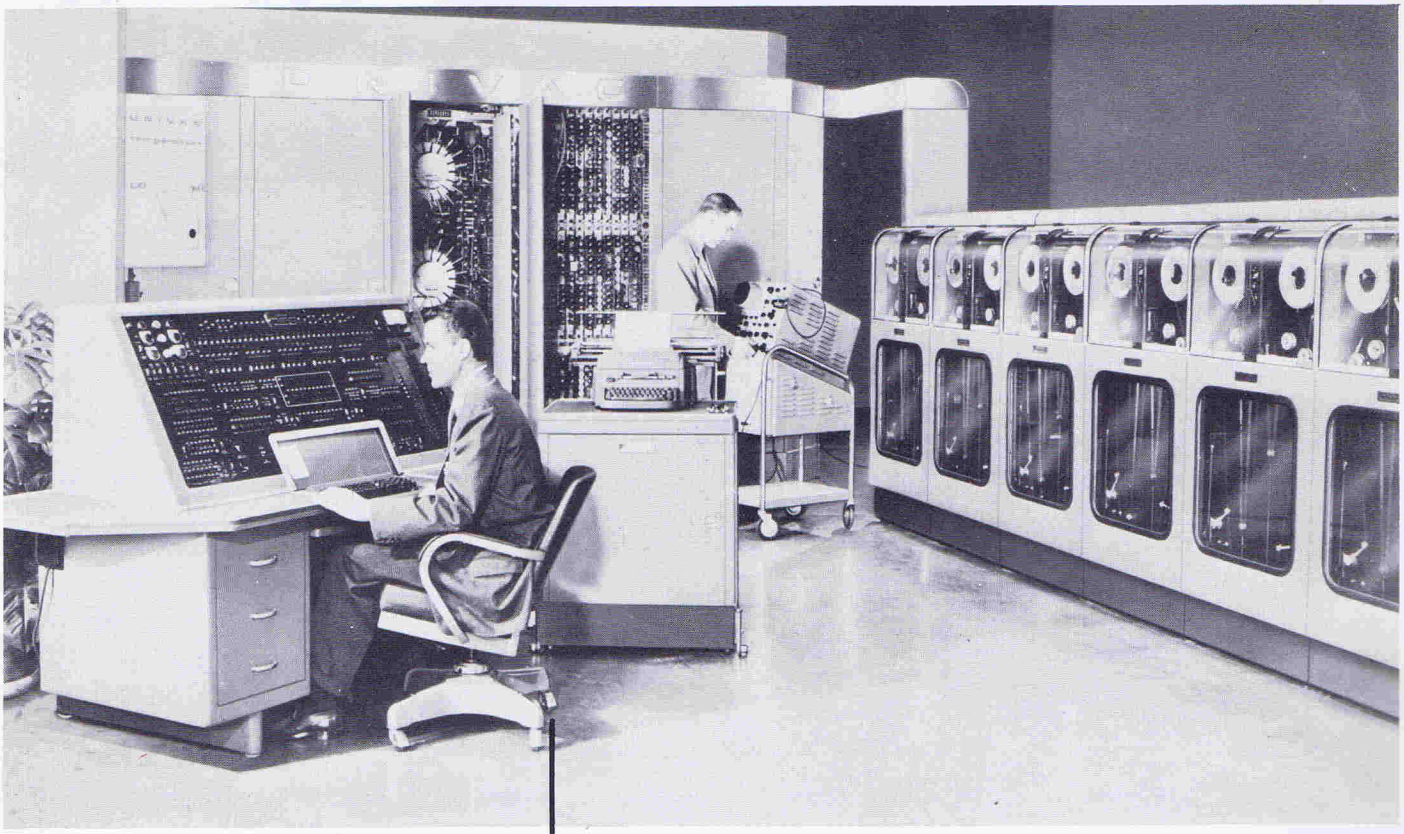
ELINCO continues to build its engineering and development facilities by steadily increasing its engineering and research staff.

ELINCO maintains a constant development program, and during the past year designed 75 new electrical rotary units to meet difficult military and commercial specifications.

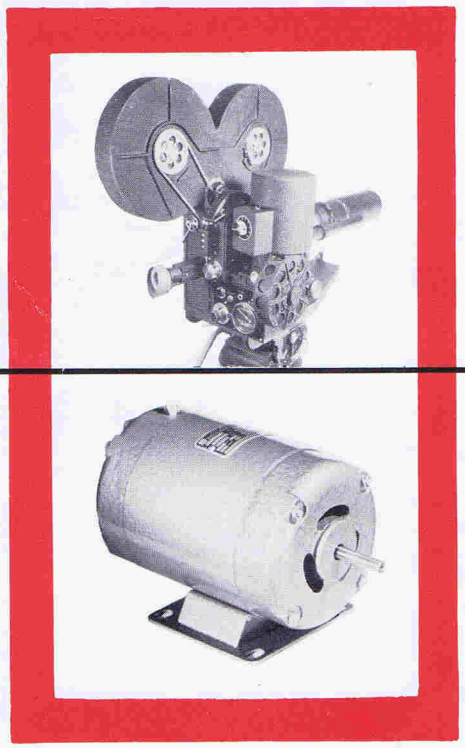
ELINCO with its engineering staff and facilities is available to your development engineers. We can help you solve the toughest problems of heat, humidity, vibration, shock, torque, acceleration, weight, mounting and special design. We have over twenty-five years of experience in the precision sub-fractional electrical rotary equipment field. Let us design units tailored to your special requirements. Send complete electrical and mechanical requirements to

ELINCO

electric indicator company, inc., springdale, conn.



Standards of Excellence



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AKELEY'S SOUND CAMERA
(as used on the Edward R. Murrow Program)

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