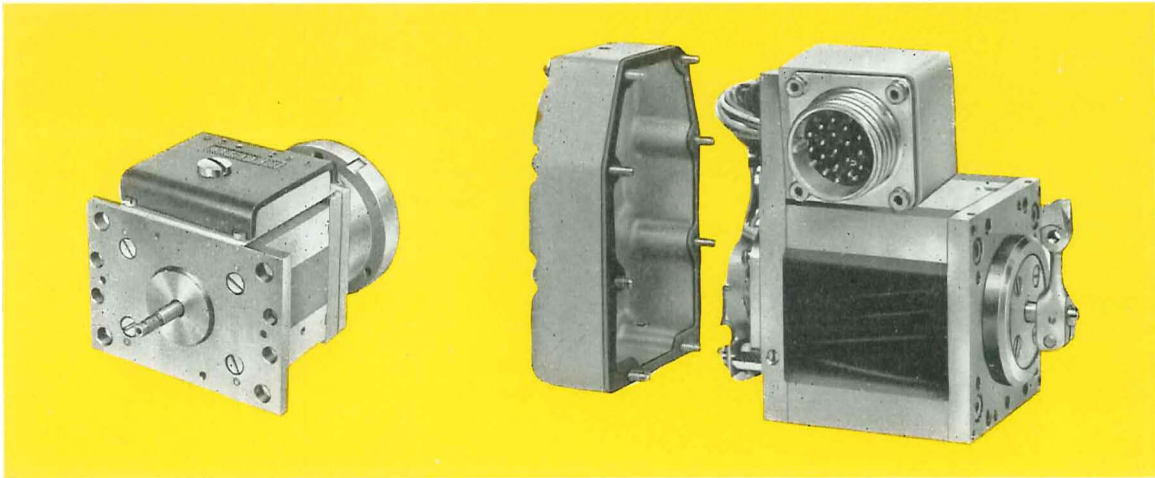




TORQUE MOTORS



DESCRIPTION

The torquemotor is a D.C. operated electro-mechanical transducer which has been developed to a very high degree of precision and reliability. Based on original work at the Royal Aircraft Establishment Elliott torquemotors are light and compact providing high output torque with good linearity,

low hysteresis and excellent frequency response.

Units are available with a wide range of characteristics. Examples include torquemotors for both high temperature and corrosive environments, variants with integral feedback arrangements and windings for use with transistor, valve and magnetic amplifiers.

OPERATION

The output shaft is driven by an armature which works in a polarised magnetic bridge formed by two permanent magnets and two soft iron wound cores or yokes. The coils may be connected in series, parallel or push-pull. Any control current passing

through the coils will unbalance the bridge and apply a torque to the armature. The resulting direction and angle of rotation depend on the torque applied to the output shaft and the direction and magnitude of the control current.

USES

Developed originally for operation of servovalves in aircraft and guided weapons, the torquemotor's inherent stiffness, linearity and high natural frequency makes it suitable for many other applications in re-

corders, instrumentation and industrial control systems.

For corrosive environments sealed units can be supplied with flying leads or integral multipin connectors.

PERFORMANCE

Characteristics of the basic torque motors now in production are illustrated on page 3. Torque deflection curves show the zero and rated series current performance for each torque motor. Winding impedance can be varied to suit individual applications without otherwise affecting the performance characteristics.

It is also possible to vary the gradient of the torque/deflection curve over a wide range by adjusting stiffness.

Due to the combination of low inertia and high stiffness no load natural frequencies can exceed 500 c/s. Variations in external (load) stiffness and driving circuit design, however, may have a marked effect on the upper limit of level frequency response.

Hysteresis—defined in terms of displacement with high stiffness and force with low stiffness motors—is of the order of 2% or less and units can be supplied to even lower values.

HIGH TEMPERATURE WINDINGS

These are available as standard on the 506 torque motor and can be provided on all other types. Due to the additional space required for insulation it

may not be possible to achieve the rated torque with very high impedance windings.

DISPLACEMENT AND VELOCITY PICK-OFFS

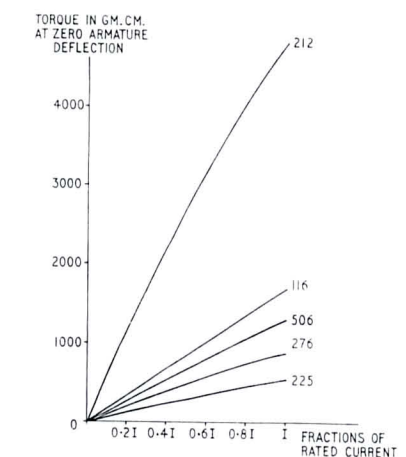
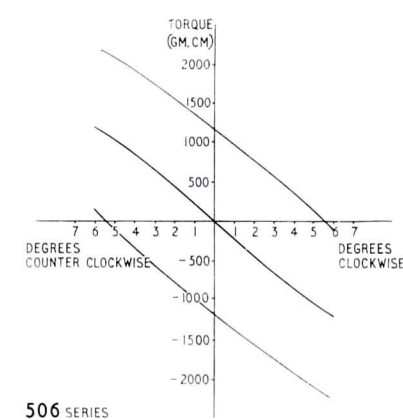
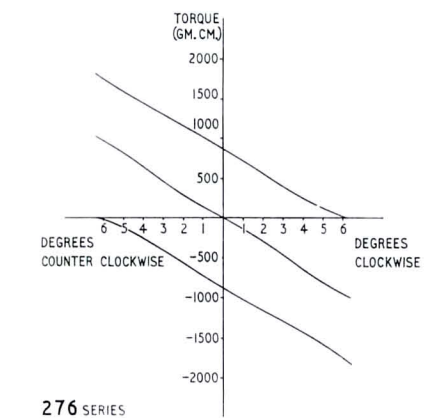
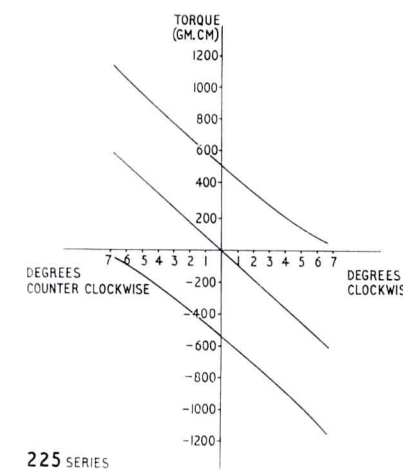
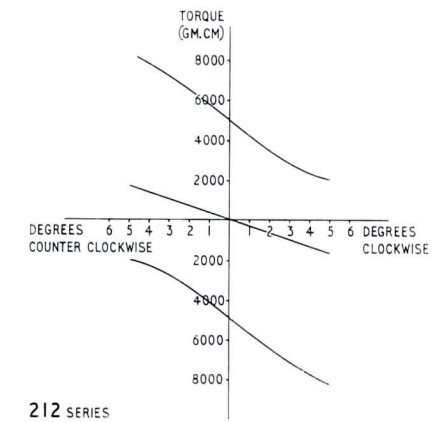
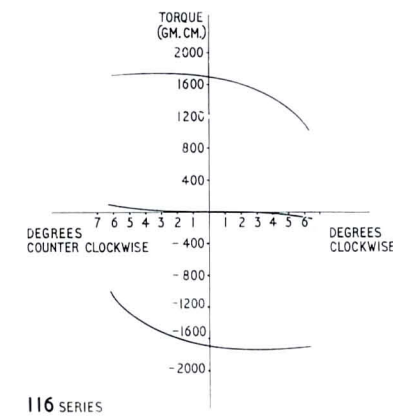
In applications where displacement or velocity feedback arrangements are required—Elliott torque-

motors can be supplied with integral single or double pick-offs of either type.

Performance data — standard types

TYPE	116	212	225	276	506
Minimum torque at 0° for rated series current. gm.cms.	1,650	5,000	500	800	1,200
Minimum torque at 5° for rated series current. gm.cms.	1,000	1,500	50	160	300
Stiffness at zero current. gm.cm./degree	0	300	87	112	180
Typical Impedance (Low) Total D.C. resistance ohms.	192	38	9.6	106	20
Typical Rated series current (Low impedance) mA.	100	550	600	150	535
Typical Impedance (High) Total D.C. resistance ohms.	20,000	6,200	16,800	20,000	1,600
Typical Rated series current (High impedance) mA.	10	30	14	12	20
Max. Power required (series operation) for rated current. Watts.	2	6	3.5	2.3	6.5
Angular Range (Normal setting on standard motors) degrees ±	6.7	5.5	7.5	7.5	7.0
Temperature Range (Standard winding) degrees C.	-55°	-55°	-55°	-55°	-55°
.. .. (Special winding) degrees C.	+70°	+70°	+70°	+70°	+130°
.. .. (Special winding) degrees C.	+130°	+130°	+130°	+150°	
Weight gm.	370	720	130	370	370
Torque Sensitivity (High impedance winding) gm.cms./mA.	155	150	32	67	75
Deflection Sensitivity (High impedance winding) degrees/mA.	—	0.32	0.49	0.52	0.3

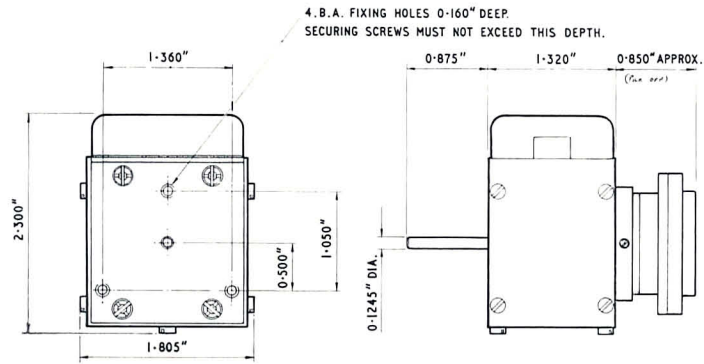
Performance



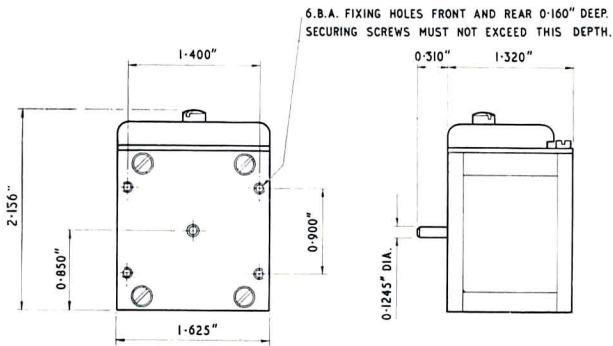
Torque motors fitted with integral displacement pick-off can be set up to give linear torque and deflection/current characteristics.

Installation Data

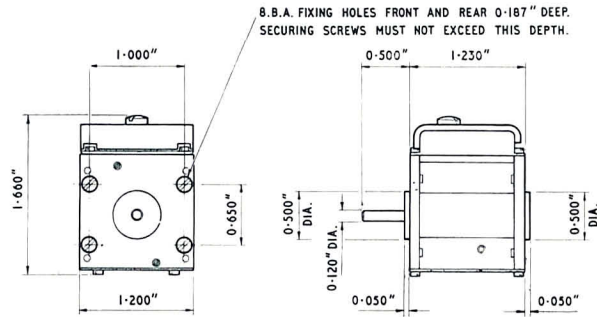
TYPE 276
with integral A.C. Pick-off



TYPE 116-506



TYPE 225



TYPE 212

