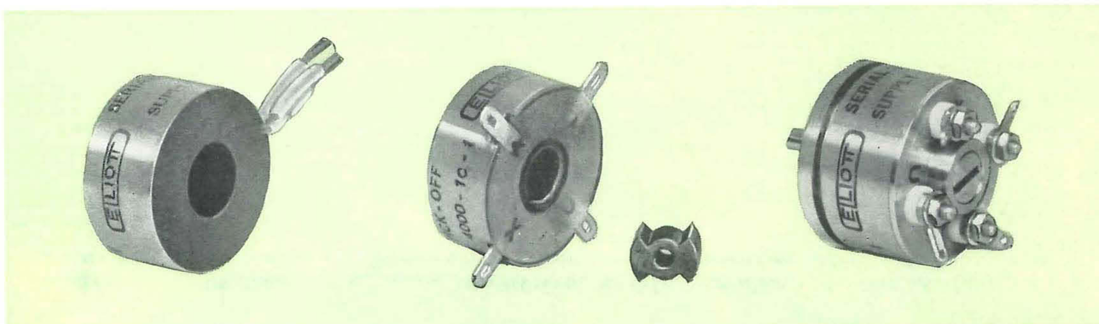
ELLIOTT

ANGULAR DISPLACEMENT A.C. PICK-OFFS



DESCRIPTION

The Elliott A.C. Pick-off is a data transmission element which when energised from an A.C. supply gives a linear output voltage proportional to angular shaft displacement. Two basic electrical types are available operating over $\pm 30°$ and having two stable zeros per revolution: one has the windings connected in a bridge formation, the 4000 series, the other has separated input and output windings, the 4300 series.

A.C. Pick-offs are supplied either as open stators—permitting separate mounting of the rotor on an external shaft—or as enclosed units containing bearings, shaft and rotor, with an accurate front mounting plate. Electrical connections are normally made to solder tags but units with flexible leads can be supplied.

SPECIAL FEATURES

Ruggedly constructed out of high grade stainless steel with the stator windings potted in epoxy resin, the A.C. Pick-off is designed to withstand the extremes of temperature, vibration and climatic conditions likely to be experienced with Service use, and is also unaffected by most of the aviation fuels currently in use.

The A.C. Pick-off offers many advantages over the D.C. potentiometer. Principally, by eliminating slip rings and brushes, the frictional forces are reduced to a minimum, the resolution is infinite, and wear problems usually encountered are negligible.

OPERATION

4000 Series A.C. Pick-off: This series is an improved design of the earlier W117 and W121 types, having exactly the same electrical performance and mechanical outline, so making the units completely interchangeable.

Although the standard operating frequencies are 400, 1200 and 2400 c.p.s. the units will give satisfactory performance at all frequencies from 400 to 3000 c.p.s.

To achieve the performance figures detailed in the specification it is necessary to load the Pick-off with a parallel resistive and capacitive component (the optimum load) as shown in the wiring diagram.

The residual voltage at the zero or datum position consists of a quadrature component which is generated by ohmic dissimilarities in the bridge windings and harmonics of the fundamental frequency. For optimum discrimination near the datum position it may be necessary to balance out the quadrature component with an external balancing resistor connected between one input and one output terminal, as indicated on the inspection slip accompanying each unit. A resistor of the value required is sent with each unit where required.

Where a number of A.C. Pick-offs are used, each unit should be excited from a separate winding of the supply transformer.

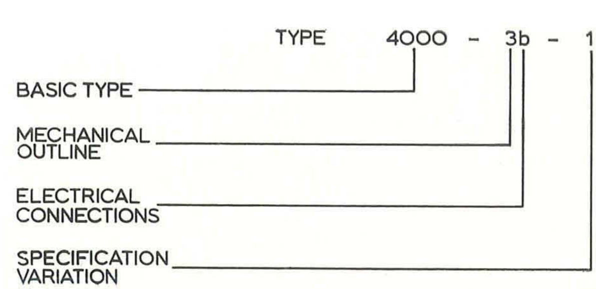
4300 Series A.C. Pick-off: This series has recently been introduced to satisfy the need for a 26 volt 400 c.p.s. operation A.C. Pick-off, which is mechanically exactly the same as the 4000 series unit.

Although the Pick-off is recommended to work into a high impedance load for optimum performance, it will be quite satisfactory with resistive loads of a value which reduce the output voltage to half its open circuit amplitude. This does not degrade the linearity characteristic.

No external balancing resistor is required for this unit.

TYPE NUMBER SYSTEM

The form of type numbering employed for both types of units is similar. Each complete number indicates the basic type, i.e., bridge-connected or separated windings, mechanical outline, method of external electrical connection and specification: details are arranged in the manner illustrated.



4000 SERIES A.C. PICK-OFF

SPECIFICATION

Grade	1	1	1	1
Excitation Frequency, c.p.s.	400	400	1,200	2,400
Excitation Voltage, volts	15	15	36	55
Excitation Current, mA (±10%)	140	140	130	105
Excitation Power, watts (max.)	1·5	1·5	1·5	1·5
Input D.C. Resistance, ohms (±10%)	55	55	55	55
Output Voltage/Degree, r.m.s. (±10%)	0·200	0·135	0·600	1·00
Linearity to ±10° (±%)	1·0	0·5	0·5	0·5
Linearity to ±30° (±%)	3·0	1·0	1·0	1·0
Zero Residual, mV (max.)	10	6	10	15
Optimum Load, R (ohms)	250	120	470	1,200
Optimum Load, C (μF)	3·0	3·0	0·3	0·05
Temperature Range, °C		−60 to +150		

Note (Grade 2 units can be supplied on request.)

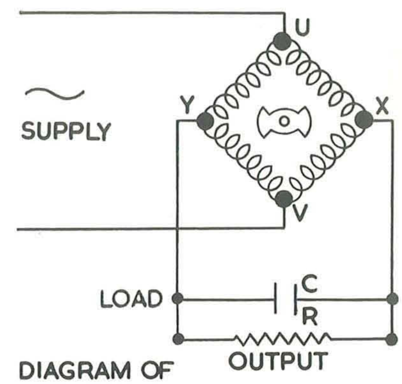
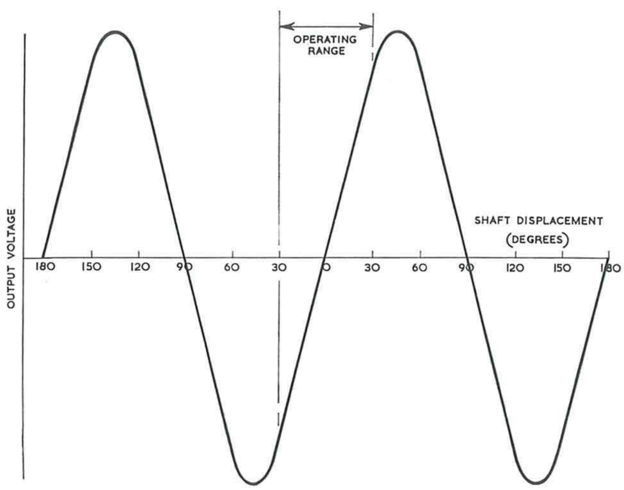
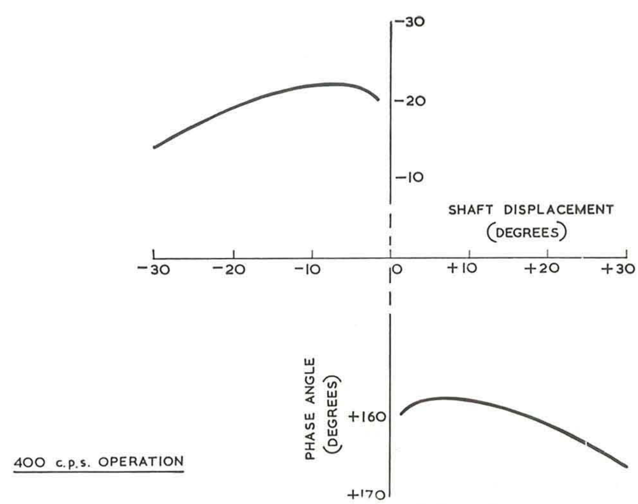


DIAGRAM OF 4000 SERIES UNIT

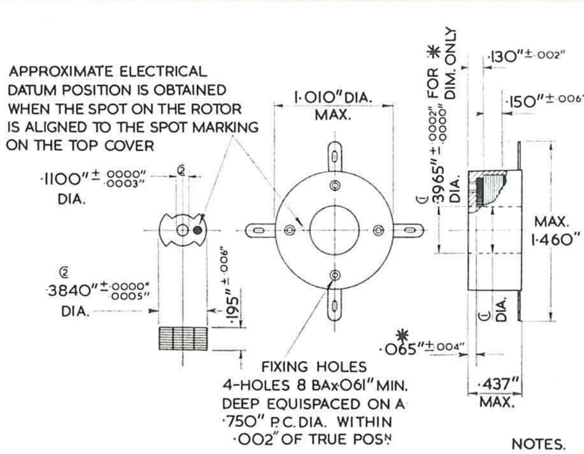
ELECTRICAL

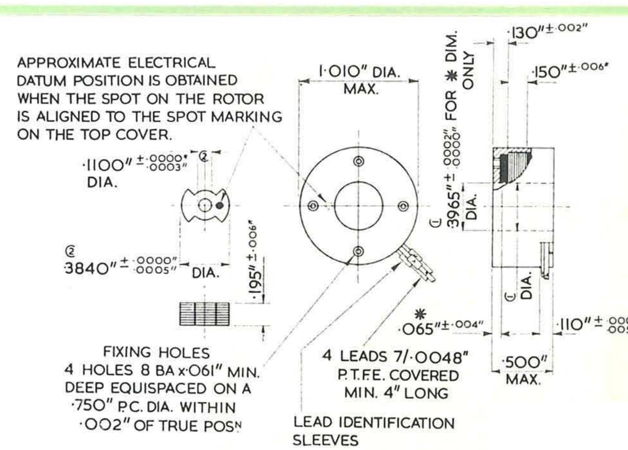


Output Voltage/Displacement Characteristic of Angular Displacement Unit



4000 Series Output Phase Angle/Displacement Characteristic





NOTES.
1. DIAS. MARKED ① ARE CONCENTRIC WITHIN ·001″ F.I.M.
2. DIAS. MARKED ② ARE CONCENTRIC WITHIN ·0005″ F.I.M.

Types 4000-1c-1 and 4300-1c-1

Types 4000-6d-1 and 4300-6d-1

For installation details of these units please apply for outline drawings.
Weight of open versions 22 gms.

4300 SERIES A.C. PICK-OFF

SPECIFICATION

Grade	1	2
Excitation Frequency, c.p.s.	400	400
Excitation Voltage, volts	26	26
Excitation Current, mA (±10%)	50	50
Excitation Power, watts (max.)	1·2	1·2
Input D.C. Resistance, ohms (±10%)	420	420
Input Impedance, ohms	450+j270	450+j270
Output Voltage/Degree, r.m.s. (±10%)	0·330	0·330
Zero Residual, mV (max.)	10	20
Linearity to ±30° (±%)	1	2
Output D.C. Resistance, ohms (±10%)	660	660
*Output Impedance, ohms	850	850
Temperature Range, °C	−60 to +150	

* Value of resistive load to reduce output voltage to half its open circuit value.

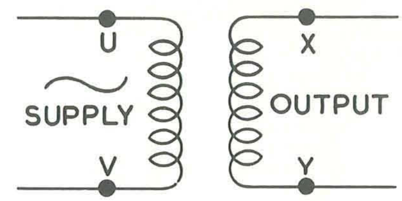
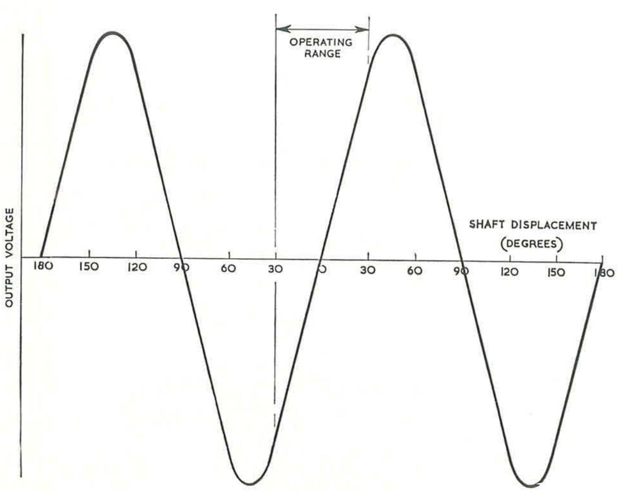
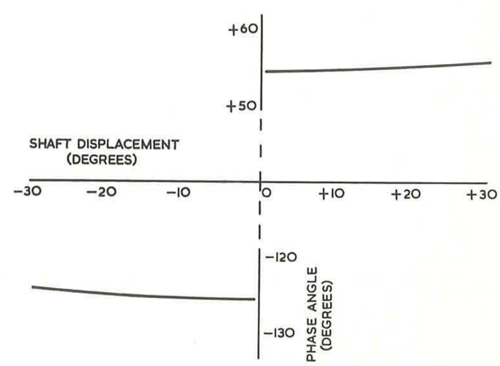


DIAGRAM OF
4300 SERIES UNIT

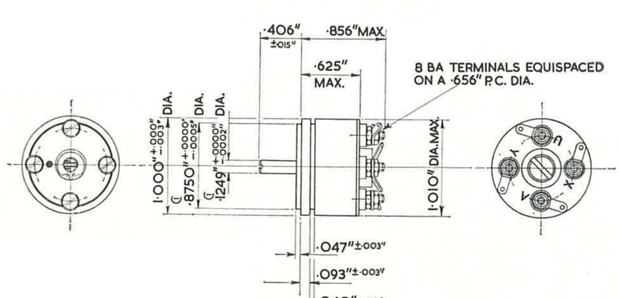
CHARACTERISTICS

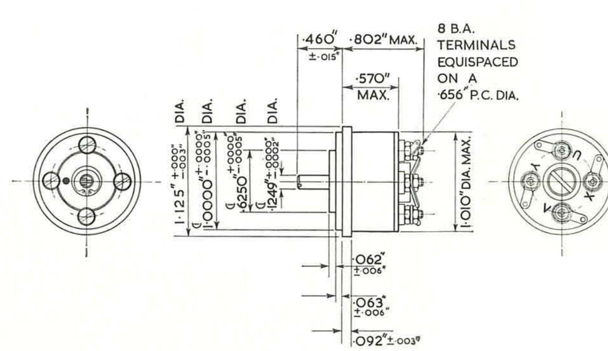


Output Voltage/Displacement Characteristic of Angular Displacement Unit



4300 Series Output Phase Angle/Displacement Characteristic





NOTES.

1. DIAMETERS MARKED ℄ ARE CONCENTRIC WITHIN ·001″ F.I.M.
2. END PLAY ·002″ MAX. WHEN MEASURED WITH A LOAD OF 100 GRAMS.
3. RADIAL PLAY ·001″ MAX. WHEN MEASURED WITH A LOAD OF 100 GRAMS.
4. STICTION TORQUE (MAX) 2GM. CM. AT 20°C.
5. APPROXIMATE ELECTRICAL DATUM POSITION IS OBTAINED WHEN THE SLOT ON THE ROTOR SHAFT IS ALIGNED TO THE SPOT MARKING ON THE FRONT FACE.
6. DO NOT EXCEED A TORQUE OF 30oz. IN. WHEN MAKING CONNECTIONS TO TERMINALS.

[redacted]

Types 4000-2b-1 and 4300-2b-1

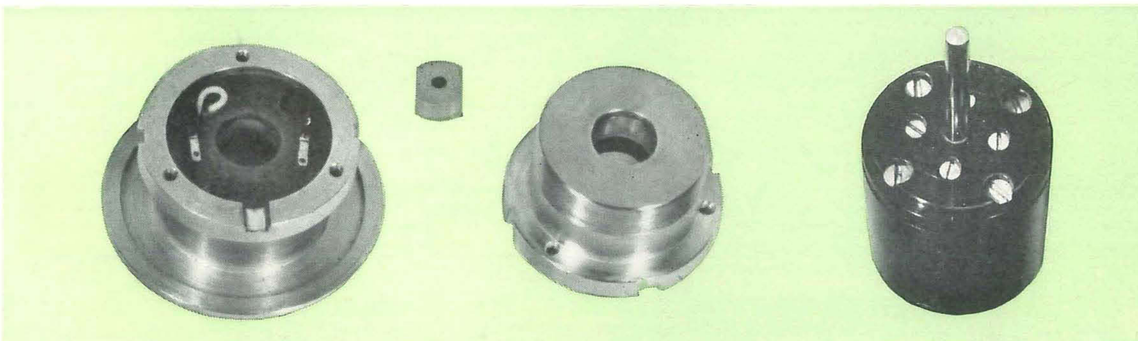
Weight of enclosed versions 50 gms.

[redacted]

Types 4000-3b-1 and 4300-3b-1

ELLIOTT

VELOCITY PICK-OFFS



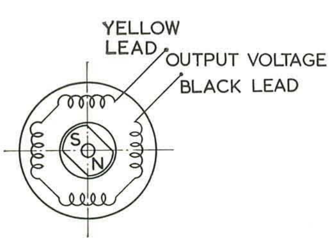
DESCRIPTION

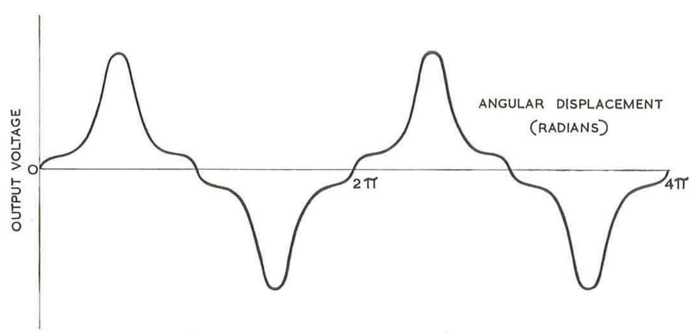
The Elliott Velocity Pick-off generates an A.C. output voltage proportional to rotor angular velocity.
The open stator type allows independent mounting of the rotor on an external shaft.
Two frame types, one for screw mounting and the other for flange mounting, can be supplied.
Electrical connections are made to solder tags under a top cover, or by flying leads. The enclosed unit has integral bearings and shaft, suitable for independent mounting.

SPECIFICATION

No load output voltage (r.m.s.) obtained over $\pm 0{\cdot}04$ radian ($\pm 2{\cdot}28°$) = 50 mV/mean radian/second ($\pm 10\%$) with rotor set in optimum position.
No load output voltage/1,000 r.p.m. (r.m.s.) = 2·25 volts ($\pm 10\%$) giving the wave form shown below.
Winding Resistance = 2,000 ohms ($\pm 10\%$).
Temperature range $-60°$C to $+150°$C.

ELECTRICAL DETAILS





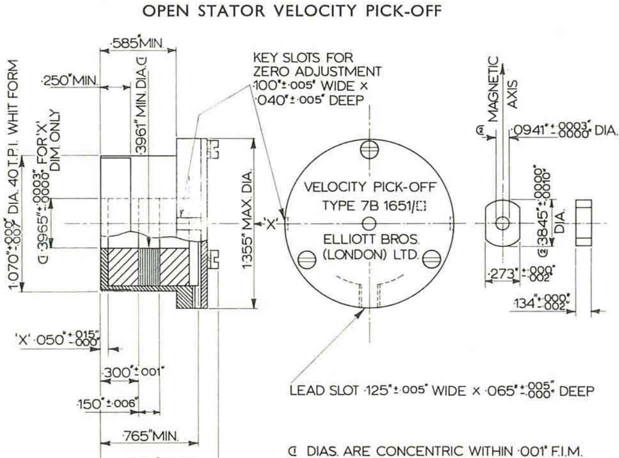
VELOCITY PICK-OFF

OUTPUT VOLTAGE/DISPLACEMENT CHARACTERISTIC

MECHANICAL DETAILS

Type 7B 1651/A and 7B 1651/B

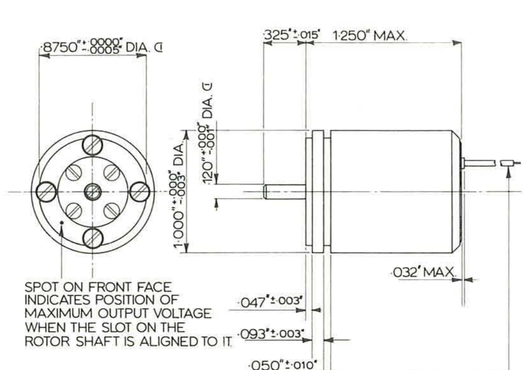
OPEN STATOR VELOCITY PICK-OFF



Weight 50 gms.

Type 4090

ENCLOSED VELOCITY PICK-OFF



NOTES:
1. DIAMETERS MARKED ℄ ARE CONCENTRIC WITHIN ·001" F.I.M.
2. END PLAY:- ·002" MAX. WHEN MEASURED WITH A LOAD OF 100 GRAMS.
3. RADIAL PLAY:- ·001" MAX. WHEN MEASURED WITH A LOAD OF 100 GRAMS.
4. STICTION TORQUE:- 5 GM.CM MAX. AT 20°C.

Weight 45 gms.

Publication W.22/1

Printed in England
June, 1964

Elliott Brothers (London) Limited · Servo Components Division
Century Works · Lewisham · London S.E.13 · Tideway 1271
A Member of the Elliott Automation Group