Chapter 14

ACTUATORS, ROTAX, C5500 SERIES

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Introduction

- 1. These actuators are for general application in aircraft having a 28-volt d.c. supply. They are rotary types with angular travel of the output shaft controlled by two incorporated limit switches; in certain actuators within the series the wiring is so arranged that these provide an external indication, when the output shaft is in the fully clockwise or anti-clockwise position.
- 2. Since the actuators within the C5500 series vary considerably, this chapter gives a general description only; for details of various features of individual actuators and diagrams of internal connections, reference must be made to the relevant Appendices to this chapter.

DESCRIPTION

3. The actuators in the C5500 series are of in-line construction, and include a reversible motor which can be operated within a voltage range of 18 to 29 volts d.c. Generally speaking, the machines comprise four main assemblies, viz., motor, solenoid brake, gear housing and switch housing. The switch housing is a composite assembly which includes output shaft, supply cable or external plug, and two plain bearings; in certain actuators a clutch is also incorporated.

Solenoid brake

- 4. A coil connected in series with the motor armature is wound on a bobbin and interposed between a plunger and a steel plate; the latter is known as the brake anvil, and encloses the end of the brake housing. A cavity in the anvil and another in the plunger house each end of a helical spring which passes through the bore of the bobbin. The plunger is faced with a surface of Langite, and, being free to move under the influence of the spring, exerts lateral pressure on a non-magnetic steel disc which is coupled to the armature shaft.
- 5. When the brake coil is energized the brake plunger is withdrawn from contact with the steel disc against the influence of the brake spring. The brake will therefore be automatically applied when the coil is deenergized, i.e., when the motor is switched off.

Motor

- 6. The motor is a 2-pole, 2-brush machine, split series wound; one field is used for each direction of rotation. A moulding interposed between the brake and the motor yoke contains the brush boxes, and houses a ball bearing which supports the brake disc, in the bore of which is the commutator end of the armature shaft. The driving end of the armature shaft is located in a pinion borne by a ball bearing housed in the gear housing assembly.
- 7. The brake housing and moulding are normally enclosed by a screw-on-cap, locked in position by a wire clip held in a retaining grove. One end of the clip passes through the cap and enters a locating hole drilled through the threaded part of the motor casing. In some earlier actuators, the cover is retained by a clip which passes over the end of the cover.

Gear housing

8. This housing contains a multiple stage spur gear train assembled about three lay shafts, of which two (outer) are fixed. The third (central) lay shaft is secured to a pinion which is integral with the output shaft. The gearing produces a step-down ratio, armature to output shaft, which varies with the number of stages employed.

Switch housing

- 9. A casting, secured to the gear housing by four screws, contains the limit switch assembly and provides a mounting for the supply plug, or cable and gland entry or grommet, whichever may be required for the actuator.
- 10. The casting is bored out, on the motor axis, to provide an end plate in which a plain bearing is housed. This bearing carries the output shaft where it emerges from the gearbox. The hollow part of the casting houses the limit switches, with the output shaft passing through the centre. Enclosing the housing is an end plate which supports the output shaft at its driving end in a plain bronze bearing. The end plate provides the means for mounting the actuator, and on its external face it has a spigot which is marked by two saw cuts. These markings indicate

the extremities of travel of a datum line cut in the end of the output shaft. In some actuators, a visual indicator is fitted over the shaft so that it shows the stop position through a special adapter housing.

Limit switches

11. There are normally two limit switches in the actuators. These switches are mounted on, and form part of, the switch plate assembly. The output shaft passes through the plate assembly and supports the two cams which operate the limit switches when the output shaft is in the fully clockwise or anti-clockwise position.

Electrical connection

12. Electrical connection to these actuators is made either by means of a plug secured to a mounting integral with the switch housing, or by a length of cable entering the switch housing through a grommet or screwed gland nut; details will be found in the appropriate Appendix.

INSTALLATION

- 13. Steel inserts are normally provided in the drive end plates for mounting purposes, some being tapped 2 B.A. and others 4 B.A.; the depth of tappings is usually 0.218 in. The units can be mounted in any attitude.
- **14.** These actuators should be serviced in accordance with the general chapter in A.P. 4343, Vol. 1, Sect. 17, Chap. 1, and the instructions contained in the relevant Servicing Schedule.

Brushgear

- 15. Service the brushgear in the following manner:—
 - (1) Release the wire clip locking the end cap.

- (2) Remove the end cap, thus exposing the brushgear.
- (3) Unscrew the ch/hd, screw at each brush box that secures the brush spring retaining clip. Care should be taken when lifting out the brushes not to lose the small helical brush springs.
- (4) The minimum length beyond which brushes should not be used is 0·125 in. Brushes should be renewed at periods prescribed in the relevant Servicing Schedule, and whenever examination reveals that they will not remain serviceable for the period that must elapse before the next servicing.
- (5) Check the brush spring pressure; this should be 2.5 oz. (71 gm.), when the spring is compressed from a free length of 0.4 in. to its working length of 0.172 in.
- (6) Reassemble the brush gear and tighten the screws securing the brush spring retaining clips. Fit the motor cover and secure with the wire clip making sure that the end of the clip enters a locking hole.

Lubrication

16. The ball bearings of the actuator are lubricated with grease XG-275 during manufacture and repair, and should not normally require lubricating during servicing periods.

∢ Testing

17. If the serviceability of the actuator is suspect, it may be tested as laid down in Appendix A.

Appendix A

STANDARD SERVICEABILITY TEST FOR ACTUATORS, ROTAX, C5500 SERIES

Introduction

1. The following tests may be applied to the actuator before it is put into service, or at any time when its serviceability is suspect.

Test equipment

- 2. The following test equipment is required:—
 - (1) Tension gauge (Ref. No. 1H/58).
 - (2) Rotary actuator test rig (Ref. No. 4G/6591).
 - (3) Insulation resistance tester, Type C (Ref. No. 5G/152).

Testing

Brushgear

3. Check the brush length and brush spring pressure; the brush length should not be less than 0.125 in., and the spring pressure should be 2.5 oz. (71 gm.), when the spring is compressed from a free length of 0.4 in. to its working length of 0.172 in.

Performance

4. Set the actuator on the test rig, using the appropriate fittings as indicated in Table 1, and ensure that it operates within the limits given in Table 2. The tests should be made for each direction of rotation, and at 28 volts.

TABLE 1
Actuator fittings

Type	Adapter	Drive coupling
C5510/3	8	1
C5511/2	5	2
C5512/2		
C5513/2		
C5514/4		
C5517/2	5	2
C5519	6	3
C5520	5	3
C5521		
C5523/2		
C5524/2	6	3
C5527		
C5530/1	6	3
C5536	6	3
C5537/1	2	7

TABLE 2
Test data

	Angular		Fime of travel (sec.) (max.)		Current (amp.) (max.)				
Туре	travel I (deg.)	No load	Normal load N (30 lb. in.)			Normal load (30 lb. in.)	Normal load		
C5510/3	90	1.5	2.25		1.5	1.8			
C5511/2	180	3.0	4.5		1.5	1.8			
C5512/2	90	1.5	2.25		1.5	1.8			
C5513/2	90	1.5	2.25		1.5	1.8			
C5514/4	90	12.5	13		1.5	1.65			
C5517/2	90	1.5	2.25		1.5	1.8			
C5519	90	12.5	13		1.5	1.65			
C5520	60	8.33	8.67		1.5	1.65			
C5521	180	25	26		1.5	1.65			
C5523/2	90	1.5	2.25		1.5	1.8			
C5524/2	90	0.65		1.5	1.6		2.25		
C5527	Cont.	1·5 p 90 d			1.5	1.8			
C5530/1	90	0.65		1.5	1.6		2.25		
C5536	90	0.65		1.5	1.6		2.25		
C5537/1	90	1.1	1.5		1.5	2.0			

5. The actuator must operate on 18 volts against a normal load.

Insulation resistance

6. The insulation resistance, measured with a 250-volt insulation resistance tester between all live parts and the frame, should be not less than 50,000 ohms.

ACTUATOR, ROTAX, TYPE C5510/3

LEADING PARTICULARS

Actuator, Type C5510/3			 	***		Ref. No. 5W/3350
Normal voltage			 			28 volts d.c.
Operating voltage range			 			18 — 29 volts d.c.
Current at normal load			 10.00			1.8 amp.
Speed of rotation at norm	al load	l	 		2	2:25 sec. per 90 deg.
Normal load			 			30 lb. in.
Maximum load			 			60 lb. in.
Maximum static load			 			90 lb. in.
Ambient temperature ran	ge		 		-40 de	g. C. to +90 deg. C.
Rating			 			Intermittent
Ratio of gear train			 	55.5		2,334: 1
Brush grade			 	E	.G. 14	(Ref. No. 5W / 643)
Brush length (new)			 20.00	60.6	2.13	0·226 in.
Minimum brush length	20.2	STATE OF	 	x3. K		0·125 in.
Brush spring pressure			 			2·5 oz. (71 gm.)
Operational ceiling	*** **		 	KO 61		50,000 ft.
Overall dimensions—						
Length			 			7·180 in.
Mounting flange diame	eter		 			2·55 in.
Weight	ener:		 	NO 10		2 lb. 4 oz.

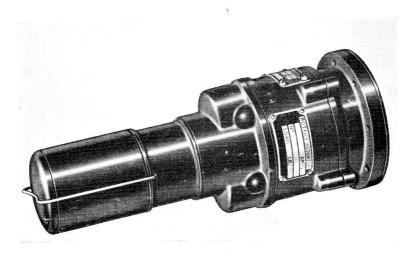


Fig. 1. Type C5510/3 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 90 deg. by the two internal limit switches; a visual indicator enables the shaft stop position to be seen through a special adapter housings.
- 2. The gearbox has an eight-stage single spur gear train arranged on one central and two outer lay shafts; the final stage has two gears which drive the output shaft in tandem.
- 3. Electrical connection is made by a 2 ft. length of Quinprensheath 6 cable, which is taken through a gland entry secured to the housing. The internal connections are as shown in fig. 2.
- 4. The actuator is provided with four equi-

spaced mounting holes, tapped 4 B.A. on a 2·150 in. P.C.D., concentric with the output shaft. The output shaft has 36 serrations on a 0·312 in. nominal diameter.

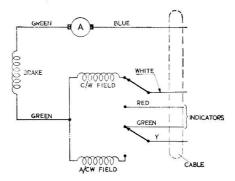


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5511/2

LEADING PARTICULARS

Actuator, Type C5511/2		 				Ref. No. 5W/429
Norma! voltage		 				28 volts d.c.
Operating voltage range		 * * *				18 — 29 volts d.c.
Current at normal load		 				1.8 amp.
Speed of rotation at norm	al load	 				25 sec. per 90 deg.
Normal load		 				30 lb. in.
Maximum load		 				60 lb, in.
Maximum static load		 				90 lb. in.
Ambient temperature ran	ge	 	* * *	4	10 deg.	C. to +90 deg. C.
Rating		 				Intermittent
Ratio of gear train		 				2,334: 1
Brush grade		 				(Ref. No. 5W/643)
Brush length (new)	21.4	 				0·226 in.
Minimum brush length	20.2	 				0·125 in.
Brush spring pressure		 				2.5 oz. (71 gm.)
Operational ceiling		 				50,000 ft.
Overall dimensions—						,
Length		 				6.081 in.
Width		 				2·362 in.
Height						2·315 in.
Weight		1414.0			3.64	1 lb. 2 oz.

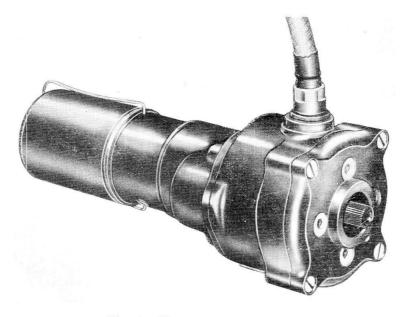


Fig. 1. Type C5511/2 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 180 deg. by the two internal limit switches; on the external face of the end plate is a spigot marked by two sawcuts, which indicate the extremities of travel of a datum line cut in the end of the output shaft.
- 2. The gearbox has an eight-stage single spur gear train arranged on one central and two outer lay shafts; the final stage has two gears which drive the output shaft in tandem.
- 3. Electrical connection is made by a 15 in. length of Quinprenmet 6 cable which is taken through a gland entry screwed to the housing; the internal connections are as shown in fig 2.

4. The actuator is provided with four mounting holes in the drive end plate. They are tapped 4 B.A. to a depth of 0.218 in., and are equispaced on a 1.25 in, P.C.D. with a 0.936 in, dia. spigot for locating to the associated equipment.

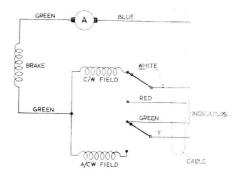


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5512/2

LEADING PARTICULARS

Actuator, Type C5512/2	2	*****						Ref. No. 5W/
Normal voltage		****				#15000 F	****	28 volts d.c.
Operating voltage range	2							18 — 29 volts d.c.
Current at normal load			****	****		****		1.8 amp.
Speed of rotation at no	rmal .	load			****		2	·25 sec. per 90 deg.
Normal load								30 <i>lb. in.</i>
Maximum load	24.044	*****				*****		60 lb. in.
Maximum static load			****	*****		****	*****	90 lb. in.
Ambient temperature n	ange		****	****			-40 deg	g. C. to +90 deg. C.
Rating				*****				Intermittent
Ratio of gear train								
Brush grade	****		*****	****		E	E.G. 14	(<i>Ref. No. 5W</i> / 643)
Brush length (new)								0·226 in.
Minimum brush length				* * * * *				0·125 in.
Brush spring pressure								$2.5 \ oz. \ (71 \ gm.)$
Operational ceiling		00000		111111	****	****	(6.6.6)	50,000 ft.
Overall dimensions—								
Length		33000			*****		****	6·333 in.
$Width \dots \dots$				****		*****		2.625 in.
Height	(5.5.5.5.)	*****						4·406 in.
Weight		55555	• • • • • • • • • • • • • • • • • • • •		*****	****		2 <i>lb</i> .

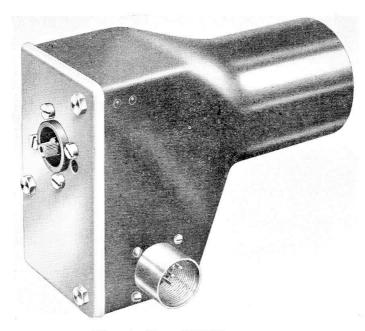


Fig. 1. Type C5512/2 actuator

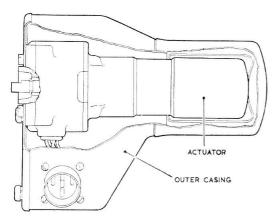


Fig. 2. Partly sectioned view of actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter, but is completely encased within an outer flame-proof metal casing (consisting of a main case screwed to a front cover plate), with only the output shaft and mounting spigot protruding (fig. 2). The complete actuator is removable from the case as a unit.
- 2. The rotary movement of the output shaft is limited to 90 deg. by the two internal limit switches. The gearbox has an eight stage single spur gear train arranged on one central and two outer lay shafts; the final stage has two gears which drive the output shaft in tandem.
- 3. Electrical connection is made by a five-pole Breeze plug (Ref. No. 5X/6016, mounted on the right-hand side of the case (looking on the output shaft end); the internal connections are as shown in the circuit diagram in fig. 3.
- **4.** The actuator is provided with four mounting holes, tapped 3 B.A., on the front

- surface, equispaced on a 1·25 in. P.C.D. concentric with the output shaft, and corresponding clearance holes through the front cover plate of the outer case.
- 5. When the actuator is supplied from Stores, four transit screws are inserted in these holes, securing the outer case to the actuator. To mount the actuator, remove the three hex/hd. screws which secure the front cover plate of the outer case to the main part of the case, and draw the cover from the main case with the actuator secured to the cover by the transit screws and attached to the main case by the leads to the plug.
- 6. Remove the transit screws, and locate the actuator with the outer case cover plate between the actuator and its mounting. Secure the actuator with four mounting screws, and finally fit the outer case to the cover plate by replacing the three screws.
- 7. The output shaft has 36 serrations in a 0.312 in, nominal diameter, with a flat extending 0.25 in, from the end of the shaft.

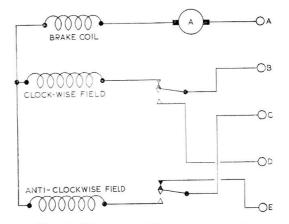


Fig. 3. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5513/2

LEADING PARTICULARS

Actuator, Type C	5513/2		****	V1003				****		Ref. No. 5	W/
Normal voltage									*****	28 volts e	1.c.
Operating voltage	range				****		*14.4.4.6	con	18 —	29 volts c	i.c.
Current at norma	l load	****	*****	****	****	2000		*****		. 0	
Speed of rotation	at nor	mal lo	ad			****		2.2	25 sec	. per 90 a	leg.
Normal load							total	****		30 <i>lb</i> .	
Maximum load							(4.4.4.4.4)			60 lb.	in.
Maximum static	load	****	****			****		*****		90 lb.	in.
Ambient tempera	ture re	ange			0073			40 deg.	C. to	+90 deg.	
Rating					17777					Intermitt	
Ratio of gear tra	iin	200.00			******			****		2,33	4:1
Brush grade				****	*****		E			Vo. 5W/6	
Brush length (new									, , ,	0.226	
Minimum brush										0.125	2000000000
Brush spring pres	45									oz. (71 g)	
Operational ceilin	g		00.000000			#1 CO				50,000	
Overall dimension	1S									,	,
Length							*****			6.333	in.
Width											in.
Haight						****				4.406	
Wajaht		****			****	****					lb.
O .										_	

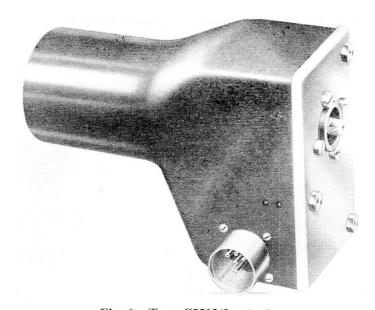


Fig. 1. Type C5513/2 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter, but is complete encased within an outer flame-proof metal casing (consisting of a main case screwed to a front cover plate), with only the output shaft and mounting spigot protruding. The complete actuator is removable from the case as a unit.
- 2. The rotary movement of the output shaft is limited to 90 deg. by the two internal limit switches. The gearbox has an eight stage single spur gear train arranged on one central and two outer lay shafts; the final stage has two gears which drive the output shaft in tandem.
- 3. Electrical connection is made by a five-pole Breeze plug (Ref. No. 5X/6016), mounted on the left-hand side of the case (looking on the output shaft end); the internal connections are as shown in the circuit diagram in fig. 2.
- **4.** The actuator is provided with four mounting holes, tapped 3 B.A., on the front surface, equispaced on a 1.25 in. P.C.D. concentric with the output shaft, and corresponding clearance holes through the front cover plate of the outer case.
- 5. When the actuator is supplied from Stores, four transit screws are inserted in these holes, securing the outer case to the

- actuator. To mount the actuator, remove the three hex/hd. screws which secure the front cover plate of the outer case to the main part of the case, and draw the cover from the main case with the actuator secured to the cover by the transit screws and attached to the main case by the leads to the plug.
- 6. Remove the transit screws, and locate the actuator with the outer case cover plate between the actuator and its mounting. Secure the actuator with four mounting screws, and finally fit the outer case to the cover plate by replacing the three screws.
- 7. The output shaft has 36 serrations in a 0.312 in. nominal diameter, with a flat extending 0.25 in. from the end of the shaft.

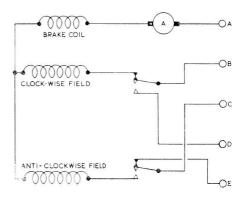


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5514

LEADING PARTICULARS

	Actuator, Type C551	4/4					R_0	ef. No	. 5W/3	397	
	Normal voltage							28	volts a	l.c.	
	Operating voltage rang	ge						18 - 29	volts a	l.c.	
1	Current at normal loa	d				*****	1000		1·65 an	np.	A
4	Speed of rotation at		load	1			13		er 90 d		•
	Normal load								30 <i>lb</i> .		
	Maximum load								60 <i>lb</i> .		
	Maximum static load	11111									
	12 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1,000	****	****	*****	40	1		90 <i>lb</i> .		
	Ambient temperature	range	****	***	* * * * *	-40	deg. C.	to +9	0 deg.	(.	
	Rating					****	*****	Ir	itermitte	ent	
	Ratio of gear train							21	,006.27	: 1	
	Brush grade			*****		E.G.	.14 (Re		5W/64		
	Brush length (new)	*****							0.226		
			*****	****		*****	*****				
	Minimum brush lengt.	rı		* * * * *		3300	****	A	_	in.	
	Brush spring pressure								. (71 <i>gi</i>		
4	Commutator diameter	(new)		****			*****	0.350	-0.352	in.	
2.3%	Commutator diameter	(minin	ит	permissib	le)				0.335	in.	
	Operation ceiling	0000						60000A	50,000		,
	Overall dimensions—								,	,	
	Lanath								6.108	in.	

	Width			****			****			in.	
	Height			****		X			3.265	in.	
	Weight	1000		****	1000	****	***		1 <i>lb.</i> 4 a	OZ.	

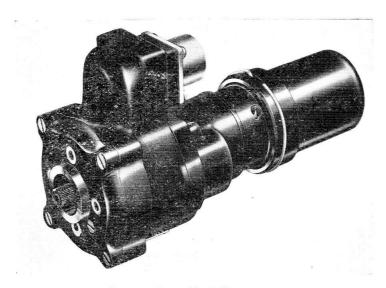


Fig. 1. Type C5514/4 actuator

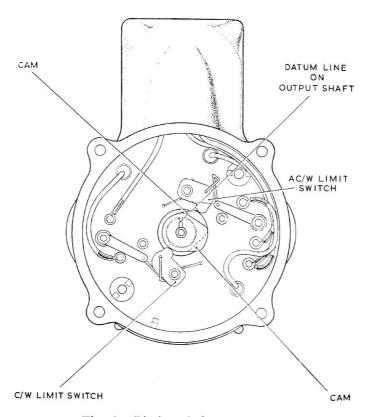


Fig. 2. Limit switches and cams

- 1. The actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 90 deg. by the two internal limit switches; on the external face of the end plate is a spigot marked by two sawcuts which indicate the extremities of travel of a datum line cut in the end of the output shaft. (fig. 2).
- 2. The gearbox contains a ten-stage spur gear train assembled about three layshafts, of which two (outer) are fixed. The third (central) lay shaft is secured to a pinion integral with the output shaft.
- 3. Electrical connection is made by a four-pole plug (Ref. No. 5X/6006), which is mounted above the actuator but in line with its axis. The internal connections are as shown in fig. 3.

4. The actuator is provided with four mounting holes in the drive end plate. They are tapped 4 B.A. to a depth of 0.218 in. on a 1.25 in. P.C.D. with a 0.936 in. dia spigot for locating to the associated equipment.

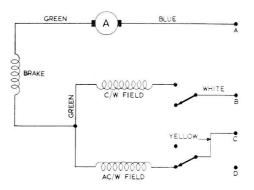


Fig. 3. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5517/2

LEADING PARTICULARS

Actuator,	Гура С	5517/2						2.53	Ref. I	No. 5W/389
Normal vo	ltage			en e	x ***			40.4	2	28 volts d.c.
Operating	voltage	range		20.0	0.0	5.49				29 volts d.c.
Current at				1. 1						1·8 amp.
Speed of re	otation c	it norn	ial load					2:	25 <i>sec</i> .	per 90 deg.
Normal loc						2.12				30 lb. in.
Maximum	load							10 F		60 lb. in.
Maximum	static le	oad								
Ambient te	mperati	ure ran	ge					40 deg.	C, to	+90 deg. C.
Rating										Intermittent
Ratio of ge	ar train		5.43		* * *					2,334: 1
Brush graa	le e						$\dots E$.	$G_{\rm e}$ 14 ((Ref. N	O.5W/643)
Brush lengi	'h (new)						5.77			0.226 in.
Minimum i	brush le	ength	4.14							
Brush sprii	ig press	ure		* * *					2.5	oz. (71 gm.)
O perationa 1 4 1	l ceiling	3			* * *					50,000 ft.
Overall dir	nension	S								
Length									VIV.	6.081 in.
Width	• • •		2.52							2·362 in.
H eight										2.315 in.
Weight							10.00			1 <i>lb</i> . 2 <i>oz</i> .

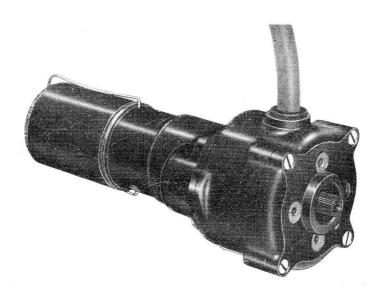


Fig. 1. Type C5517/2 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 90 deg, by the two internal limit switches.
- 2. The gearbox has an eight stage single spur gear train arranged on one central and two outer lay shafts; the final stage has two gears, one on each outer lay shaft, which drive the output shaft in tandem.
- 3. Electrical connection is made by a 15 in. length of Quinprensheath 6 cable which is taken through a rubber grommet from the switch housing; the internal connections are as shown in fig. 2.
- 4. The actuator is provided with four mounting holes in the drive end frame. They

are tapped 4 B.A, to a depth of 0.218 in., and are equispaced on a 1.25 in, P.C.D. The output shaft has 36 serrations cut into a 0.312 in, nominal diameter.

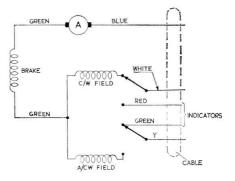


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5520

LEADING PARTICULARS

	Actuator, Type C552	0		const		****	<i>I</i>	Ref. No	5W/6	589	
	Normal voltage	8000			1888	(****	1.000	28	volts c	d.c.	
	Operating voltage rang	ge	*****			27.555.		18-29	volts a	l.c.	
	Current at normal load		(12002)		*****				1.65 an	np.	A
	Speed of rotation at	nərmal	load	EXC. (4)	****	December 1	8.67	sec p	er 60 d	eg.	
	Normal load	****					20172	51755	30 <i>lb</i> .	in.	
	Maximum load		and the same of th	execution (*****	****			60 <i>lb</i> .	in.	
	Maximum static load	****				*****			90 lb.	in.	
	Ambient temperature	range	12.000			_40 de	g. C	to +6	0 deg.	C.	
	Rating	****	(*****		National Contract of the Contr	****	K00000	I_{F}	itermitt	ent	
	Ratio of gear train	*****		*****	*****	****	*****	21	,006.27	: 1	
	Brush grade		••••			E.G. 1	4 (R	ef. No.	5W/64	43)	
	Brush length (new)		****	excess:	****	****	*****		0.226	in.	
	Minimum brush lengt	h		000000		****	****	****	0.125	in.	
	Brush spring pressure							2·5 oz	. (71 <i>gi</i>	n.)	
4	Commutator diameter	(new)		COCK				0.350-	-0.352	in.	
	Commutator diameter	(minin	ит ре	ermissib	ole)	88.68			0.335	in.	>
	Operational ceiling								50,000	ft.	
	Overall dimensions—										
	Length	*****					****		6.101	in.	
	Width						*****	****	2.362	in.	
	Height				*****		*****		3.265	in.	
	Weight	****			****		****	*****	1 <i>lb</i> . 4	OZ.	

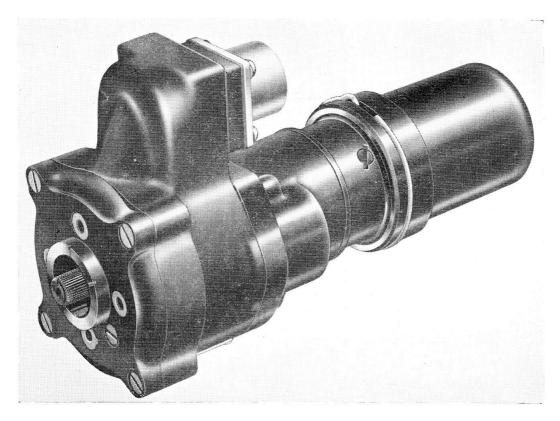


Fig. 1. Type C5520 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 60 deg. by the two internal limit switches; on the external face of the end plate is a spigot marked by two sawcuts, which indicate the extremities of travel of a datum line cut in the end of the output shaft (fig. 2).
- **2.** The gearbox contains a ten-stage (pur gear train assembled about three lay shafts, of which two (outer) are fixed. The third

(central) lay shaft is secured to a pinion integral with the output shaft.

- 3. Electrical connection is made by a four-pole plug (Ref. No. 5X/6006), which is mounted above the actuator but in line with its axis. The internal connections are as shown in the circuit diagram in fig. 2.
- **4.** The actuator is provided with four mounting holes in the drive end plate. They are tapped 4 B.A. to a depth of 0.218 in., and are equispaced on a 1.25 in. P.C.D.

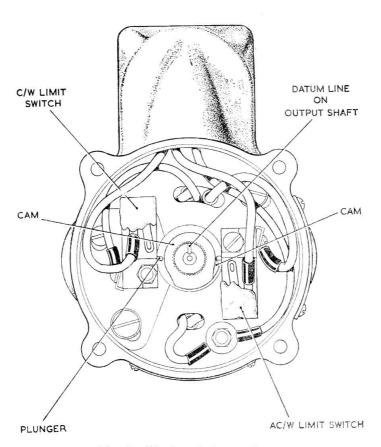


Fig. 2. Limit switches and cams

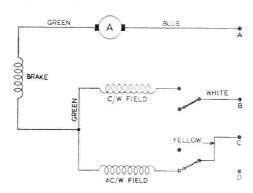


Fig. 3. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5521

LEADING PARTICULARS

	Actuator, Type C	C5521						R	ef. No.	5W/28	37	
	Normal voltage				A11.1.1	*****			28	volts d	.c.	
	Operating voltage	range	2		3355	****		****	18 - 29	volts d	.C.	
4	Current at normal	l load			1000	*****		*****		1.65 am	ip.	1
1	Speed of rotation	at nor	mal le	oad	11111	*****		13		r 90 de		
	Normal load							****		30 lb. i		
	Maximum load				*****				*****	60 lb. i		
	Maximum static le				1000			2000		90 lb. i		
	Ambient temperat		inge				-40 c	leg. C		90 deg.		
	Rating		O							termitte		
	Ratio of gear train									,006.27	5 5 5	
	Brush grade			• • • • • •						5W/64		
	Brush length (new				*****					0.226 i	-	
	0				A = = =	*****	*****	*****	*****			
	Minimum brush l	0			* * (* * *)	*****		****	~		in.	
	Brush spring press				*****					(71 gn	1.)	
4	Commutator diam	ieter (n	iew)						0.350-	-0·352 i	in.	
	Commutator diam	ieter (i	ninim	um p	ermissib	le)				0.335	in.	•
	Operational ceiling	g						*****	****	50,000	ft.	
	Overall dimension	S								, a	,	
	Length		1000		••••			40000	*****	6·109 i	in.	
	Width										n.	
	Haight				••••			10305	200000	3.265 i		
					•••••			******	*****			
	Weight			• • • • •	*****				William .	1 lb. 2 ϵ	Z.	

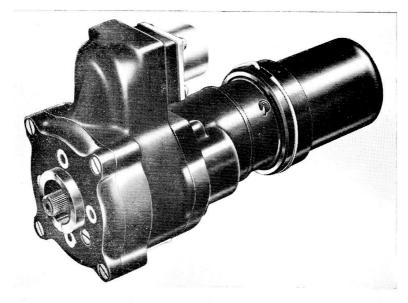


Fig. 1. Type C5521 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 180 deg. by the two internal limit switches; on the external face of the end plate is a spigot marked by two sawcuts, which indicate the extremities of travel of a datum line cut in the end of the output shaft.
- 2. The gearbox contains a ten-stage spur gear train assembled about three lay shafts, of which two (outer) are fixed. The third (central) lay shaft is secured to pinion integral with the output shaft.
- 3. Electrical connection is made by a four-pole plug (Ref. No. 5X/6006), which is mounted above the actuator but in line with its axis. The internal connections are as shown in the circuit diagram in fig. 2.

4. The actuator is provided with four mounting holes in the drive end plate. They are tapped 2 B.A. to a depth of 0.218 in., and are equispaced on a 1.25 in. P.C.D.

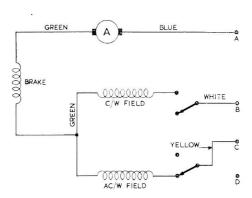


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5523/2

LEADING PARTICULARS

Actuator,	Type C	5523/2							Ref 1	No. 5W/2717
Normal ve										28 volts d.c.
Operating										
	C)									29 volts d.c.
Current at				a seems						$1.8 \ amp.$
Speed of re			ıal load					2	·25 sec	. per 90 deg.
Normal lo			3.63							30 lb. in.
Maximum								111		60 lb. in.
Maximum					***		17 515			90 lb. in.
Ambient te			ge		ne s			40 deg	. C. to	+90 deg. C.
Rating		50.5	* * *	***	***	89.4				Intermittent
Ratio of ge	ear trair	1				20.0				2,334: 1
Brush grad							$\dots E$.	G. 14	(Ref. 1	Vo. 5W/643)
Brush lengi	th (new)								0.226 in.
Minimu m	brush le	ength			101010					$0.125 \ in.$
Brush sprii	ig pres.	sure	414-41						2.5	oz. (71 gm.)
O perationa 4 6 1	l ceilin	g		9.404				11.00		50,000 ft.
Overall dir	nension	1.S								20,000 /
Length										6.081 in.
Width	•••	•••								2·362 in.
Height										2·315 in.
Weight				• • •			***	14.414		
vv eight				* * *	* * *		111.4			1 lb. 5 oz .

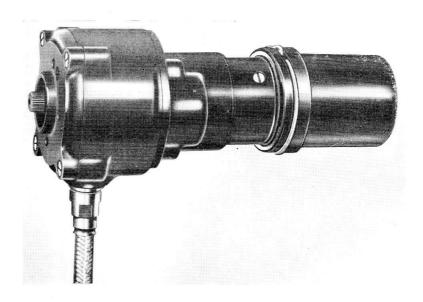


Fig. 1. Type C5523/2 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 90 deg, by the two internal limit switches.
- 2. The gearbox has an eight-stage single spur gear train arranged in one central and two outer lay shafts; the final stage has two gears, one on each outer lay shaft, which drive the output shaft in tandem.
- 3. Electrical connection is made by a 35 in. length of Quinprenmet 6 cable which is taken through a gland entry screwed to the housing;

 the cable ends in a 5-pole socket (Ref. No. 5X/6019, superseded by 5X/6376/B).

 The internal connections are as shown in the circuit diagram in fig. 2.

4. The actuator is provided with four mounting holes in the drive end frame. They are tapped 4 B.A. to a depth of 0.218 in., and are equispaced on a P.C.D. of 1.25 in.

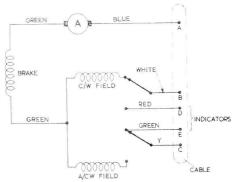


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5524/2

LEADING PARTICULARS

Actuator, Typ	e C5524/2							Ref. No. 5W/4705
Normal voltag	e							28 volts d.c.
Operating volte	age range			* 100				18 — 29 volts d.c.
Current at north	nal load							2·25 amp.
Speed of rotati	on at norn	nal load						1.5 sec. per 90 deg.
Normal load							V9. F	15 lb. in.
Maximum load		9.79					44.4	30 lb. in.
Maximum stat	ic load	(a. ella						90 lb. ın.
Ambient tempe	erature ran	1ge		***		-	-50 deg	. C to $+120$ deg. C .
Rating	50.5							Intermittent
Ratio of gear t		N 414						1,015.8: 1
Brush grade	VI. 1				****		E.G. 14	(Ref. No. 5W / 643)
Brush length (r	ıew)	e sie						0.226 in.
Minimum brus	h length	2.55						0·125 in.
Brush spring p	ressure							2·5 oz. (71 gm.)
Commutator d	iameter (n	iew)					22.0	0·350-0·352 in.
Commutator d	iameter (n	ninimun	n pern	ıissible)				0·335 in.
Overall dimen.	sions—							
Length								6·593 in.
Width							15.0	2·362 in.
Height							*15.41	3·499 in.
Weight			CONT					1 lb. 4 oz.

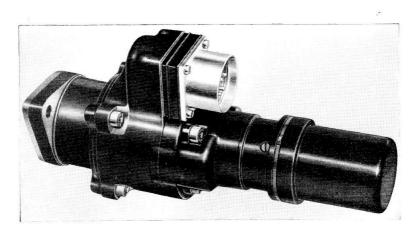


Fig. 1. Type C5524/2 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 90 deg. by the two internal limit switches.
- 2. Electrical connection is made by a four-pole plug (Ref. No. 5X/6006), which is mounted above the actuator but in line with its axis. The internal connections are as shown in the circuit diagram in fig. 2.
- 3. Two holes 0:196 in dia. on a 2:25 in. P.C.D. are provided in the flange of the drive end housing for mounting purposes. The internal register of the drive end housing for locating the unit is 1:593 in. dia., and the flange thickness is 0:312 in. The

drive end of the output shaft has 36 serrations in a 0.312 in, nominal diameter.

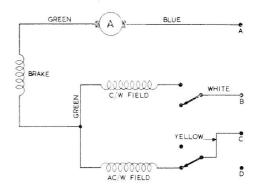


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5527

LEADING PARTICULARS

Actuator, Type C5527						2000		Ref. No. 5W/
Normal voltage								28 volts d.c.
Operating voltage range	e	****		Dara.	Antas	****	67000	18 — 29 volts d.c.
Current at normal load	!		****	****	100000	20000	*****	1.8 amp.
Speed of rotation at no	rmal l	load		11111	****	****	2	25 sec. per 90 deg.
Normal load								30 lb. in.
Maximum load				• • • • •				60 lb. in.
Maximum static load						****		90 lb. in.
Ambient temperature	range	1000	****		****		-40 deg	. C. to +90 deg. C.
Rating				*****	****	31704		Intermittent
Ratio of gear train								2,334:1
Brush grade						E	E.G. 14	(Ref. No. 5W / 643)
Brush length (new)		*****	2000					0.226 in.
Minimum brush length					******			0·125 in.
Brush spring pressure				2222				$2.5 \ oz. \ (71 \ gm.)$
Operational ceiling							11111	50,000 ft.
Overall dimensions—			0.00.00.00					23,000 jr.
7								6.081 in.
117.1.1		10000				*****		2·362 in.
11 .: 1.4								2.315 in
					*****	*****	*****	1 lb. 2 oz.
Weight		1.6.1.1.1	15.000	*****	115.10	*****	*****	1 lD . $\angle OZ$.

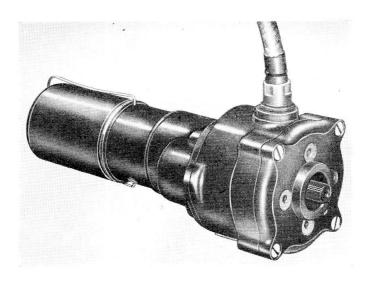


Fig. 1. Type C5527 actuator

- **1.** This actuator (fig. 1) is generally similar to that described in the main chapter, with the exception that no limit switches are fitted. The output shaft travel is controlled by external switches, and it is important that these should operate efficiently to avoid overrunning of the actuator.
- 2. The gearbox has an eight-stage single spur gear train arranged on one central and two outer lay shafts; the final stage has two gears which drive the output shaft in tandem.
- **3.** Electrical connection is made by a 6 ft. length of Triprenmet 6 cable, which is taken through a gland entry secured to the housing. The internal connections are as shown in fig. 2.
- 4. The actuator is provided with four

mounting holes in the drive end frame. They are tapped 4 B.A. to a depth of 0.218 in., and are equispaced on a 1.25 in. P.C.D. The output shaft has 36 serrations cut into a 0.312 in. nominal diameter.

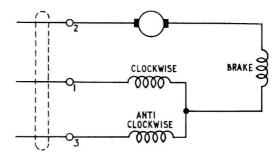


Fig. 2. Circuit diagram

ACTUATOR, ROTAX, TYPE C5530/1

LEADING PARTICULARS

Actuator, Type C	5530/1							Ref. No. 5W/5007		
Normal voltage								28 volts d.c.		
Operating voltage	range		** *		***			18 — 29 volts d.c.		
Current at normal	load							2·25 amp.		
Speed of rotation of	at norn	ial load						1.5 sec. per 90 deg.		
Normal load								15 lb. in.		
Maximum load								30 <i>lb. in</i> .		
Maximum static le	oad		exec.					90 lb. in.		
Ambient temperati	ure ran	ige				-50	deg.	C, to $+120$ deg. C .		
Rating	*** *							Intermittent		
Ratio of gear train						11 112		1,015.8: 1		
Brush grade			,		** *	<i>E</i>	$G_{.}$ 14	(Ref. No. 5W/643)		
Brush length (new)				214. 21				0·226 in.		
Minimum brush le	ength					10.000		0·125 in.		
Brush spring press	ure			24 H	474.0	N 400		$2.5 \ oz. \ (71 \ gm.)$		
Overall dimensions—										
Length				• • •				6·593 in.		
$Width \dots$								2·362 in.		
H eight				20.2	M2.5			3·499 in.		
Weight				***		0.00		1 lb. 7 oz.		

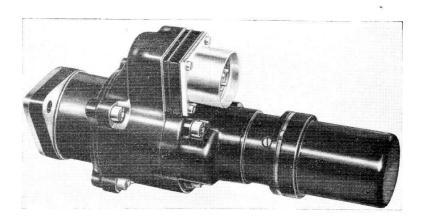


Fig. 1. Type C5530/1 actuator

- 1. This actuator (fig. 1) is generally similar to that described in the main chapter. The rotary movement of the output shaft is limited to 90 deg. by the two internal limit switches.
- 2. Electrical connection is made by a four-pole plug (Ref. No. 5X/6006), which is mounted above the actuator but in line with its axis. The internal connections are as shown in the circuit diagram in fig. 2.
- 3. Two holes 0.196 in. dia. on a 2.25 in. P.C.D. are provided in the flange of the drive end housing for mounting purposes. The drive end housing locating register is 1.593 in. dia., the thickness of the locating flange being 0.312 in. The drive end of the output shaft has 36 serrations in a 0.312 in.

nominal diameter; a mating serrated coupling is fitted to the drive end of the output shaft is provided with this actuator.

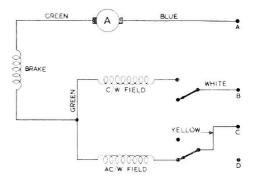


Fig. 2. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5519

LEADING PARTICULARS

Actuator,	Type C	5519				 	***	Ref. 1	Vo. 5W/880
Normal vo						 			28V d.c.
Operating	voltage	range				 			18-29V d.c.
Current at	normal	load				 			1.65 amp.
Speed of re	otation	at norn	ial load			 		13 sec.	per 90 deg.
Angular vo	iriation	of stop	positio	ns		 			± 1 deg.
Normal lo	ad					 			30 lb. in.
Maximum	load					 			60 lb. in.
Maximum	static l	oad				 			90 lb. in.
Ambient to	emperat	ure ran	ige .			 -40	deg.	C. to	+90 deg. C.
Rating						 			nt (2 cycles)
Ratio of ge	ear trair	1				 			21,006.27:1
Brush grad	le					 $\dots E.6$	G. 14	(Ref. N	lo. 5W/643)
Brush leng	th (new))				 			0.226 in.
Brush leng	th (min	imum ,	permiss	ible)		 			0·125 in.
Brush spri	ng press	sure				 		2.5	oz. (71 gm.)
Commutate	or diam	reter (n	ew)	* **		 		0.3	50-0.352 in.
Commutate	or diam	ieter (n.	inimun	ı perm	issible)	 			0·335 in.
Overall dir	nension	<i>lS</i>							
Length	* * * *					 			6·109 in.
Width						 			2·362 in.
Height						 		404.40	3 ·2 65 in.
Weight				1.29		 			1 lb. 4 oz.

- 1. The C5519 actuator is generally similar to that described in the main chapter, except that rotary movement of the output shaft is limited to 90 deg. by two internal limit switches. A machined line on the end face of the serrated output shaft indicates the extreme clockwise and anti-clockwise travel between two machined lines on the spigot end face of the supporting end plate housing.
- 2. The gearbox contains a ten-stage spur gear train assembled about three layshafts of which two (outer) are fixed. The output shaft has the third central layshaft embodied as an integral part which projects from the gear end of the shaft and carries part of the ten stage gear train.
- 3. Electrical connection is made by a four pole plug (Ref. No. 5X/6006) which is mounted above the actuator, but in line with the horizontal axis. The internal connec-

tions are as shown in the circuit diagram in fig. 1.

4. The actuator is provided with four mounting holes in the drive end plate. They are tapped 2 B.A. to a depth of 0.218 in., and equi-spaced on a 1.250 in. P.C.D.

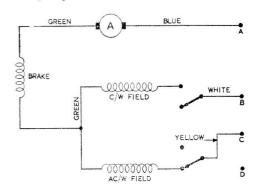


Fig. 1. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5536

LEADING PARTICULARS

Actuator, Type C5536							Ref. No. 5W/4694
Normal voltage						1.11	\dots 28 V d.c.
Operating voltage range							18-28·5V d.c.
Current at normal load							\dots 2.25 amp.
Speed of rotation at norm	ial load						1.0 sec. per 90 deg.
Angular variation of stop	positio	ons					$\pm 2 deg.$
Normal load			• • •	,			15 lb. in.
Maximum load							30 lb. in.
Maximum static load							90 lb. in.
Ambient temperature ran	ige			-50	deg. C	. to -	+120 deg. C. (max.)
Rating							Intermittent
Ratio of gear train		** *	•••				1,015.8: 1
Brush grade					$\dots E$.	G. 14	(Ref. No. 5W/643)
Brush length (new)						***	0·226 in.
Brush length (minimum	permiss	ible)					0·125 in.
Brush spring pressure							2·5 oz. (71 gm.)
Armature diameter (new)			•••				0·350–0·352 in.
Armature diameter (mini	mum pe	ermissi	ble)				0·335 in.
Overall dimensions—							
Length			• • •	• • •			6·593 in.
$Width \dots \dots$							2·362 in.
Height		• • •					3·265 in.
Weight							1 lb. 4 oz.

- 1. The C5536 actuator is generally similar to that described in the main chapter except that rotary movement of the output shaft is limited to 90 deg.; the gearbox has an eight-stage single spur gear train arranged in one central and two outer layshafts; the final stage has two gears, one on each outer layshaft, which drive the output shaft in tandem.
- 2. The adapter housing has been moved through 60 deg, from the vertical axis in an anti-clockwise direction, and incorporates the lengthened serrated output shaft. The C5536 actuator is identical to the C5524/2 actuator in the series, other than the adap-

ter housing being moved through 60 deg. in an anti-clockwise direction.

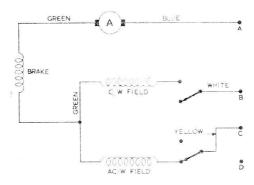


Fig. 1. Diagram of internal connections

ACTUATOR, ROTAX, TYPE C5537/1

LEADING PARTICULARS

Actuator, Type C5537/1					Ref	. No. 5W / 4254
Normal voltage				*****	****	28V d.c.
Operating voltage range					1555.00	18-29V d.c.
Current at normal load	CERTAIN.		CK1 (8			2·0 amp.
Speed of rotation at normal	load	*			1.5 se	ec. per 90 deg.
Angular variation of stop po	sitions				(8.6768)	±1 deg.
Normal load		*****				30 <i>lb. in.</i>
Maximum load					(100,000)	60 lb. in.
Maximum static load		(4.4.4.4.)				90 lb. in.
Ambient temperature range				60	deg. C	to +90 deg. C.
Rating				2000	****	Intermittent
Ratio of gear train		*****				2,334:1
Brush grade				E.G.	14 (Ref.	No. $5W/643$)
Brush length (new)	XXXX					0·211–0·226 in.
Brush length (minimum perm	issible)					0·125 in.
Brush spring pressure-						
Load when compressed to	0.172	in.			Acres	2·5 oz.
Armature diameter (new)			11111	30.00		0·350–0·352 in.
Armature diameter (minimur	n pern	ussible)				0·335 in.
Overall dimensions—						
Length	****	****			*****	6·880 in.
Width					KOOK	2·362 in.
Height	****	*****			3.29	90 in. (approx.)
Weight						1 11 0

- 1. The C5537/1 actuator is generally similar to that described in the main chapter, except that rotary movement of the output shaft is limited to 90 deg. It differs from the previous C5537 (Ref. No. 5W/4131) in having a new type limit switch fitted.
- 2. An adapter housing is fitted to the switch and intermediate housing assembly. Two indicator windows diametrically opposed at 180 deg. have been incorporated in the adapter housing, positioned on the horizontal axis of the unit.
- 3. The window apertures are provisioned for sight reading the OPEN and SHUT positons engraved on a moulded indicator, this being fitted to the serrated end of the output shaft.
- **4.** The switch and intermediate housing assemblies contain three limit switches, two of which control the required 90 deg. of angular travel, the third switch controls an external warning light.
- 5. The warning light switch is 'open' for the first 8 to 10 degrees of the full angular

travel, and closed over 80 deg. approx. The full travel is 90 deg. in an anti clockwise and clockwise direction of rotation.

6. The nine pole Plessey plug (Ref. No. 5X/6036) is fitted with aluminium gaskets and rubber 'O' rings on each pole to effect complete sealing for anti-resistant electrical fitting. The switch block springs, output shaft, and associated cams are also corrosion resistant treated.

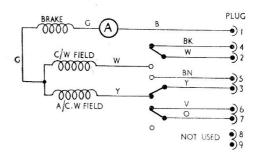


Fig. 1. Diagram of internal connections