# Chapter 25

# ACTUATOR, ROTAX, TYPE A0216

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## TABLE



## LIST OF ILLUSTRATIONS



## APPENDIX



### Introduction

**1.** The actuator, Type A0216, is designed for operation from a 24V d.c. supply to push or pull loads of up to 80 lb. The unit is powered by a two-pole, split-series field motor which will operate at voltages varying from 18V to 29V d.c.

**2.** In this chapter, instructions for dismantling, repair, reassembly and testing are given and the chapter should be read in conjunction with instructions given in A.P.4343, Vol. 6, Sect. 17, Chap. 2.

### Tools for dismantling and re-assembly

**3.** For dismantling and re-assembly, the following tools (Rotax numbers) or their equivalents, are necessary:—

| *Ref. No.* | *Part No.* | *Description* |
|---|---|---|
| — | NT.2000 | Press tool for fitting brakeplate to ballrace |
| — | NT.2001 | Punch and base for extracting brake plate and ballrace from commutator end housing |
| — | NT.2002 | Switch checking jig |
| — | NT.2446 | Assembly and dismantling tool for ballrace to or from screwshaft |
| — | NT.2447 | Spanner for nut on switch rod |
| — | NT.2474 | Punch and base for assembling ballrace to commutator end housing |
| — | NT.2475 | Punch and base for extracting ballrace from commutator end housing |
| — | NT.2479 | Mandrel for brush bedding |
| — | NT.2481 | Brake, solenoid gauge |
| — | NT.2482 | Armature pinion extractor |
| — | NT.2883 | Ram and shackle alignment jig |
| — | NT.2448 | Screwshaft retaining jig |
| 5W/2383 | NT.864 | Rack press (for punch and base tools) |
| — | NT.2005 | Crank screwdriver |
| — | NT.2882 | Tool to extract ballrace from armature |
| — | NT.2886 | Final checking gauge for ram position |
| — | NT.3600 | Block for assembling spring assembly to brush box |
| — | NT.3111 | Position gauge for rear cover assembly |
| — | NT.2581 | Bench block for driving pin and armature |
| Test equipment | | |
| — | NT.2069/1 | Final test rig |
| — | NT.375/1 | Dynamometer test rig (for motor only) |
| — | NT.3198/1 | Panel for beam rig (NT.2069/1) |

**Note . . .**

*Work undertaken on the unit under the following instructions will be facilitated by reference to fig.* 1.

## DISMANTLING

**4.** Remove the six round-head screws securing the endplate and coupling. Free the endplate ensuring that the spring on the switch operating rod is not damaged during the operation.

**5.** Disconnect the leads from the terminal block and switch.

**6.** Remove the complete plug assembly.

**7.** Remove the switch and terminal block.

**8.** Prior to removing the collar from the operating rod it will be necessary to remove the collar retaining pin. When carrying out this instruction, ensure that the operating rod does not become bent or damaged.

**9.** Unscrew the screws retaining the intermediate plate assembly and lift the plate clear.

**Note . . .**

*It is not possible to dismantle the gearing and a new set must be used if there is any damage to the existing set.*

**10.** Remove the motor from the ram housing.

**11.** Unscrew the securings of the cover plate to the ram housing. Withdraw the cover and remove the locknuts (using tool NT.2447) and stop brackets, by turning them to the end of the rod nearest the ram coupling. Withdraw the rod from the switch end of the ram housing, ensuring that the rod is not distorted during the operation.

**12.** Using the extractor tool NT.2482, remove the pinion from the armature shaft.

**13.** Disconnect all leads from the brushgear and remove the brushes from the machine.

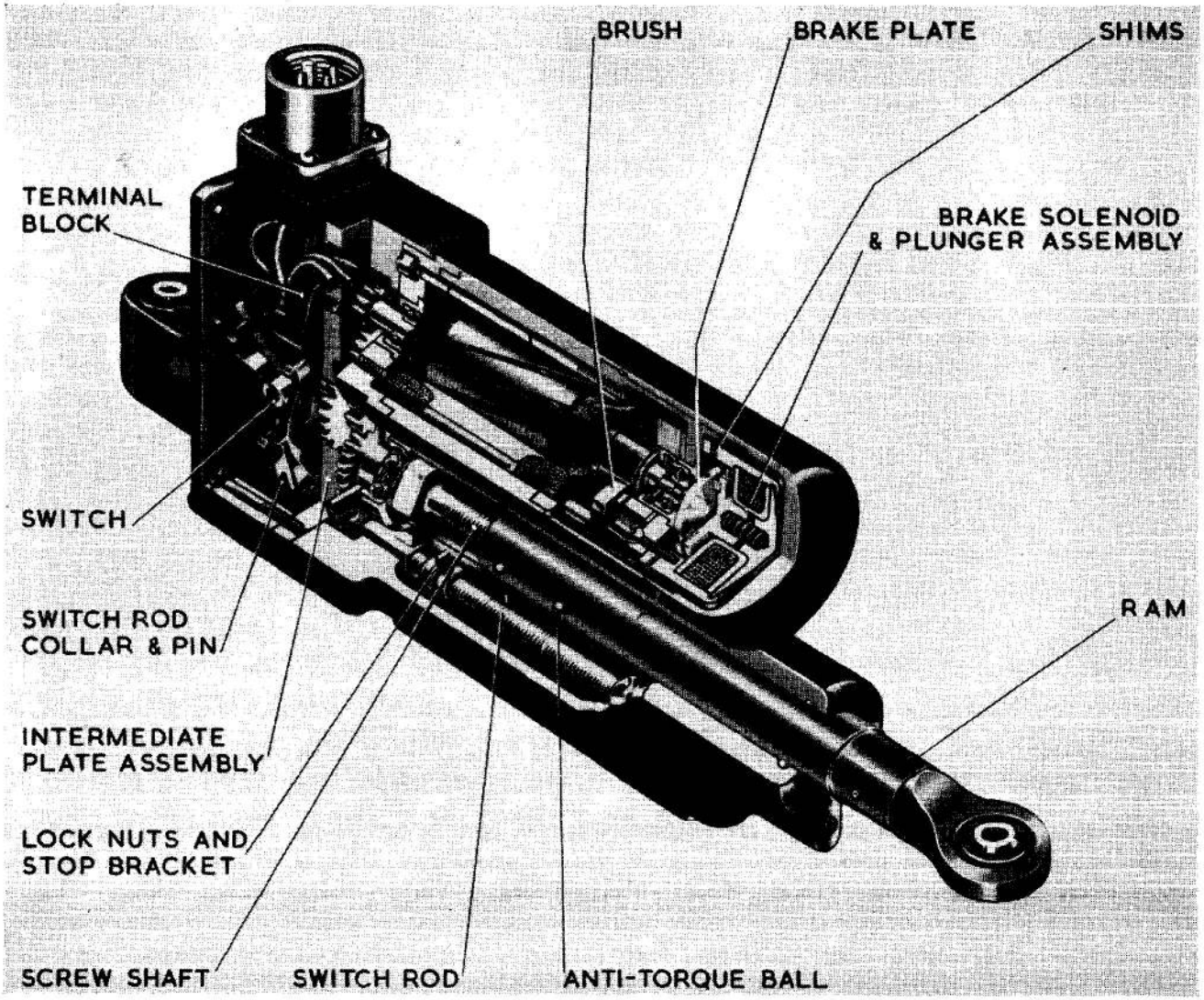


**Fig. 1.** Sectional view of actuator

**14.** Withdraw the two long draw bolts from the drive end of the actuator and remove the armature, with the commutator end frame from the field coil and yoke assembly. Extract the ballrace with tool NT.2882.

**15.** Using a "cranked" screwdriver NT. 2005, remove the two counter-sunk screws securing the brake solenoid to the commutator end frame. Ensure that the spring does not throw the solenoid when the screws are loosened. Note the position and number of shims between the brake solenoid and end frame.

**16.** Withdraw the armature from the brake plate and the plate from the ballrace using NT.2001.

**17.** Remove the brushgear as a complete unit from the end frame.

**18.** Withdraw the circlip retaining the ballrace in the commutator end frame using tool NT.2475; this action will also free the shims and grease retaining plate.

**19.** Remove the ballrace and grease retaining plate using extractor NT.2475.

**20.** Tap the drive end frame from the yoke. It is not necessary to disconnect the leads unless a component renewal is required.

**Note . . .**

*The field coils and pole pieces must not be separated from the yoke.*

**21.** Remove the caulking from the countersunk screws retaining the ballrace plate in the ram housing and remove the six screws. Unscrew the screwshaft from the ram and withdraw the screwshaft from the housing. If the ballrace is a tight fit in the housing, a direct inward pressure on the ram, when half extended, will free it. When removing the screwshaft, ensure that the ram does not recede too far into the housing, resulting in the loss of four ball bearings placed in recesses, two on either side of the outer surface of the ram.

**22.** Unless new parts are required it is not necessary to remove the ballrace and locknut from the screwshaft. When new parts are required, a suitable jig NT.2448 should be used to uncaulk the grub screw and remove the locknut respectively. To press the ballrace from the shaft, use jig NT.2446 and push clear.

**23.** Only when it is necessary to replace components must the ram be removed from its housing. To remove the ram, file off the head of the pin locking the shackle to the ram and tap clear. Unscrew the shackle from the ram and note the number and position of the shims between them. Withdraw the sealing ring and discard it, using a new one at re-assembly.

**Note . . .**

*The rack press NT.864 should be available for use with all punch and base tools.*

## INSPECTION AND REPAIR

**24.** All components should be inspected for electrical and mechanical faults, and any repair which is possible and practicable should be carried out; a schedule of fits, clearances and repair tolerances will be found in Appendix 1 to this chapter. Table 1 is a fault-chart which indicates possible remedial action: any components beyond repair must be renewed.

**Table 1**

**Fault diagnosis chart**

| Item | Inspection | Action if faulty |
|---|---|---|
| 1 ARMATURE | Insulation resistance to shaft. This must be compared with the other items, against the final figure of the complete machine which is 500,000 ohms. Use a 250-volt insulation resistance tester. | Prolonged drying at 110 deg. C. when thoroughly clean. Paint end of commutator with grey insulating enamel. If still unsatisfactory, reject armature as unserviceable. |

**Table 1**—*continued*

| Item | Inspection | Action if faulty |
|---|---|---|
| 1 ARMATURE —*continued* | Condition of insulating materials. | Renew armature if tape is damaged. The general condition can be improved by soaking in varnish S.110 for 30 minutes then bake for four hours at 80 deg. C. Raise temperature to 140-150 deg. C. and continue baking for seven hours. |
| | Commutator for loose conductors. | Reject for rewinding or renewal of armature. |
| | Dirty commutator | Clean with a soft cloth moistened with benzine. |
| | Commutator for score marks, proud mica and burnt segments. | Place in lathe and skim commutator, the minimum rectified diameter of which is 0·531 in. Undercut mica to a depth of 0·010 in. |
| | Concentricity of commutator to shaft. (See note which also covers this in para. 29). | Renew if out of true by more than 0·001 in. when measured on the commutator. Maximum variation between adjacent segments is 0·0002 in. |
| | Fouling of armature against poles. | Check concentricity of shaft, side play of ballraces, and possibility of loose or damaged pole pieces. |
| | " Short " or " Open " circuited conductors can be checked by using either the voltate drop method or "Growler". | Reject if " Open " circuits are detected. Examine commutator for "Short" circuits, if any are detected remove them. If none can be detected on the commutator the "Short" must be internal. Reject armature. |
| | Resistance of windings is 1·18 ohms ± 10 per cent at 20 deg. C. | Recheck as for "Open" or "Short" circuited conductors. |
| 2 BRUSH GEAR | Condition of each part. | If mis-shapen or damaged in any way renew. |
| | Brushes for wear. Measure its free length, this should not be less than 0·200 in. | Renew brush before minimum length is reached to ensure proper functioning until next overhaul. |
| | New brushes should be bedded to the commutator. (See para. 55). Ensure that all parts are free from carbon dust. | |
| | Fit of brushes in brush boxes. | If brushes are a tight fit, or very loose fit, in their boxes determine the fault and correct or renew the part. For example carbon dust collecting in the corners of the brush box will give a tight fit to the brush. |

**Table 1**—*continued*

| | Item | Inspection | Action if faulty |
|---|---|---|---|
| 2 | BRUSH GEAR —*continued* | Spring tension 2½ to 3½ oz. measured when the end of the arm leaves the top of the brush box. | Renew the complete brush box and spring assembly. |
| 3 | FIELD | Insulation resistance of each coil and leads to the frame. (Link all leads together and use a 250-volt insulation resistance tester. See Armature). | Prolonged drying when clean. If no improvement is shown renew the assembly. |
| | | Condition of field assembly as a whole.<br>**Note. . .** *The field coils and pole shoes with the yoke are varnished and baked in an assembled condition, they should not, therefore, be separated.* | Damaged field coils, pole-pieces, or yoke entails renewal of the complete assembly. To improve the insulation properties of the coils it is permissible to soak the assembly in varnish S.110 for approximately 30 minutes and bake at 80 deg. C. for two hours. Increase the temperature to 140-150 deg. C. and bake for four hours. Clean off all surplus varnish from mating surfaces and pole pieces. |
| | | Resistance of windings, 2·3 ohms ± 10 per cent at 20 deg. C. for each coil. | Renew complete assembly. |
| 4 | INSULATORS AND TERMINAL BLOCKS | Cracks or any mechanical damage. Where threaded inserts are included the threads must also be examined. | Renew. |
| 5 | BRAKE SOLENOID | Examine the coil assembly for any mechanical damage such as frayed leads or craked insulation. | Reject the assembly. Do not attempt to remove the coil from the housing. |
| | | Check the coil resistance, 0·720 ohms to 0·760 ohms ± 10 per cent at 20 deg. C. | Renew complete assembly. |
| 6 | BRAKE PLUNGER AND BRAKE PLATE | Ensure an even mating surface between the two items. | Renew either or both as required. |
| | | The plunger should move freely in the solenoid and not "bind" in any way, | Determine the cause of stiffness. A slight smear of grease may be sufficient to give free movement. |
| 7 | BRAKE SPRING | Compress the spring 0·134 in. from a free length of 0·602 in. The force required to do this should be 26 to 29 oz. | Renew. |

**Table 1**—*continued*

| Item | | Inspection | Action if faulty |
|---|---|---|---|
| 8 | GEARING | Cracked gears.<br>Score marks or burrs. | Renew. See note below.<br>If slight, stone clear with a No. 26 India Oil Stone. |
| | | Turn train of gears on inermediate plate, at no position must binding occur. | Renew complete assembly. |
| | | Shape of teeth. If it is not possible to recognise the involute curvature of the teeth, the gears are unserviceable. | Renew. Owing to the construction of the intermediate gears and the intermediate plate it is not possible to renew any one gear. A new plate and gears must be fitted. |
| 9 | HOUSINGS | Cracked strained or mis-shapen housings | Renew. |
| | | Stripped threads. | Drill clear, re-bush and tap to required size. |
| 10 | BALLRACES | Cleanliness | Clean with benzine. |
| | | Roughness in turning. | Renew. |
| | | Excessive side play. | Renew. |
| | | Excessive end play. | Renew. |
| 11 | COVER GASKET | Whether damaged or not, renew at every overhaul period. | Renew. |
| 12 | RAM AND SCREW | Any discrepancy which prevents these two items working freely and smoothly. | Renew. Note the ram should not be removed from the housing unless it is faulty as removal necessitates the withdrawal of shackle and locking pin from the ram. |
| 13 | SHACKLES | Any indication of strained or damaged shackles. | Remove from the respective unit and renew. Note each shackle is secured with a pin. These pins must be removed and all burrs cleared before any attempt is made to unscrew the shackle from the corresponding part. It is advisable to renew both the shackle and housing or ram. |
| 14 | SEALING RING | Whenever the ram is taken from the housing, the sealing ring must be renewed. | Renewal as and when the ram is withdrawn from housing. |
| 15 | SWITCH OPERATING ROD | This must be a free fit in the housing and when assembled with the switch and springs should always return easily to neutral position. | Remove burrs if any. Slightly lubricate. Straighten rod if out of true. |

**Table 1**—*continued*

| Item | Inspection | Action if faulty |
|---|---|---|
| 15 SWITCH OPERATING ROD —*continued* | Thread for damage. Damaged threads may give rise to difficulty in setting the ram travel. | If seriously damaged renew rod. Slight damage can be corrected by running a die (4 B.A.) over the thread. |
| 16 OPERATING ROD SPRING | When compressed to 0·406 in. the force exerted should be 2·4 lb. ± 0·25 lb. | Renew. |
| 17 SWITCH | Fit switch securely to the jig NT.2002, engaging the pin with the switch cam. Set the pin centrally in the slot of the cam and note the reading on the disc. Rotate the disc. The switch must break with a snap action before the pin has moved 0·093 in. Repeat in reverse direction. | Return unit to repair department and fit a new one. |
| | Contacts must not be badly burnt or pitted. | |
| | Examine for any damage, mechanical or otherwise. | Return unit to repair depot and fit a new one. |

## ASSEMBLY

### Motor

**25.** When new brushes are required, a mandrel, NT.2479 should be used to ensure correct pre-bedding. The tool is a dummy armature, having a strip of 00 emery cloth in the position corresponding to that of a commutator. When the mandrel is revolved, the contact surfaces of the brushes are worn to conform with the shape of the commutator. The tool should be used in conjunction with the brushgear and ball bearing Place the mandrel in its correct position and identify and spring-load the brushes in their respective boxes. Revolve the mandrel, with a suitable compressed air supply, in both directions of shaft rotation, checking periodically that pre-bedding is proceeding satisfactorily. The operation must not be prolonged as the effective life of the brushes will be reduced.

**Note . . .**

*Final brush bedding must be left until testing.*

**26.** Assemble the drive end frame to the yoke and fit the terminal tag to the leads. Press the end frame home to the yoke with the bolt holes in line with the space between the coils.

**27.** Fit the brake plate to the armature, ensuring that there is no " play " between the shaft and the brake. When new components are required, it is essential that the depth of the ballrace " Y " should be greater than the distance " X " shown in fig. 2.

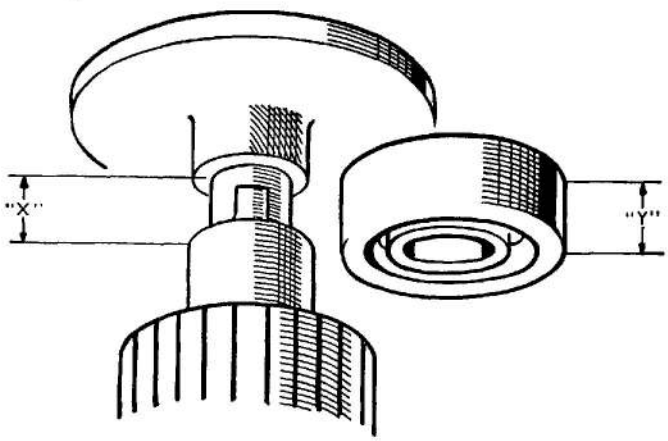


**Fig. 2. Depth of ballrace in relation to armature and bracket plate**

**28.** The inner race of the commutator end bearing is a finger-tight fit on the armature shaft. Hold the race and shaft square with each other and press them together with a direct and even finger pressure. This check should be made before assembling the bearing and the commutator end frame. Do not use a rack and pinion press to fit either of the races on the shaft or in either of the end frames.

**29.** When the ballrace is fitted in the commutator end frame (using NT.2474), half fill with grease and pack with shims to give a maximum end float of 0·003 in. If a new circlip is required to lock the shims, grease retainer and ballrace in position, the holes must be filed as shown in fig. 3.

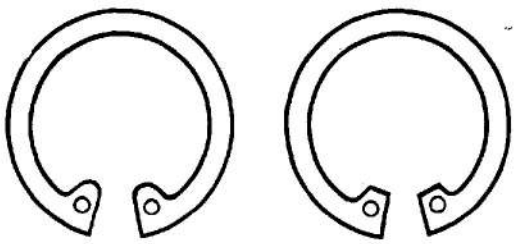


**Fig. 3. Circlip correction**

**30.** If the brush boxes have been removed from the base, shellac the screw threads and paint the heads with an insulating paint.

**31.** Assemble the spring assembly to the brush box with NT.3600 and assemble the brushgear in the commutator end frame so that the inserts for the connection screws are adjacent to the cut away portions of the frame.

**32.** Use jig NT.2000 to fit the brake plate to the ballrace and commutator end frame.

**33.** Fit the oil thrower, drive end bearing (half filled with grease) and pinion to the armature shaft to the commutator end frame and brake plate.

**34.** Temporarily assemble the field assembly to the commutator end frame and check the concentricity of the commutator. If the variation is more than 0·002 in. withdraw the armature from the ballrace and plate, turn through 180 deg. and re-locate it with the ballrace and brakeplate. If the commutator is still out of true, check the parts again separately.

**Brake solenoid**

**35.** Use gauge NT.2481 to measure the height of the brake plate with respect to the commutator end frame. Also measure the depth of the brake plunger (with the spring removed) with respect to the coil housing. Calculate the thickness of the shims and spacer necessary to give an air gap of not less than 0·008 in. with the coil energized.

**36.** Lightly smear the spring and plunger spindle with grease.

**37.** Use a "cranked" screwdriver to secure the solenoid to the end frame. To avoid damage to the brushes lift them from the brush boxes first.

**Ram housing**

**38.** Fit a new sealing ring into the recess of the ram channel, grease inside and outside the ram, place the four balls in the ram side and engage the ram with the housing.

**39.** Place the ballrace plate over the screw shaft and use jig NT.2446 to press the shaft into the ballrace. Hold the assembly in jig NT.2448 and tighten down the locknut.

**40.** To ensure the engagement of the 6 B.A. grub screw and screw shaft, hold the shaft secure, and with the locknut in position, drill (with No. 50 drill) the screwshaft so that the grub screw will be set below the nut surface. Remove the swarf, fit the grub screw and caulk into position.

**41.** Fill the ballrace one-third full of grease and liberally smear the screwshaft. Engage the ram and screwshaft, secure the ballrace plate and lock the screws.

**42.** Engage the shackle with the ram and using jig NT.2883, add or remove shims to give correct alignment of the shackle and housing. Lock the shackle with the pin and rivet over the ends of the pin.

**43.** Grease the sliding surfaces of the switch operating rod and ensure that it is a free fit in the housing. Fit the cams and locknuts, but do not tighten securely (*see*

*para.* 71) and again check for freedom of movement. The pin slot in the switch-end of the rod must face upwards towards the motor.

**44.** Grease the gears on the intermediate plate and engage with the ram housing and the greased gear of the screwshaft. Fit a lightly lubricated spring over the switch rod and secure the collar to the rod with the pin. The pin must be a tight fit with the head facing the switch.

**45.** Offer the motor to the ram housing and secure with two-4 B.A. screws. The length of the shank of this cheesehead screw is 0·937 in.

**46.** Locate the switch with the pin on the switch-rod and secure with a 4 B.A. cheese-head screw of thread length 1 in.

**47.** Connect and secure the leads to the back of the switch as shown in fig. 4, and position the leads to the terminal block. Do not secure them until the plug is fitted to the switch cover and the cover is secured to the intermediate plate with two 4 B.A. cheese-head screws. The screw shank is 1·062 in. long.

**48.** Lubricate the second return spring with grease and place it over the switch rod.

**End cover and shackle**

**49.** When fitting a new shackle, use jig NT.3111 to ascertain the requisite number of shims to give alignment of shackle and end cover. Drill a hole in the end cover for the locking pin. Assemble the end cover with a little grease in the switch operating rod recess and secure in position by six round head screws.

**50.** Move the switch operating rod by hand to ensure freedom of movement and that it returns to a neutral position under the spring's pressure.

**51.** Use gauge NT.2886 to set the ram travel to 12·281 in. ± 0·005 in. to 9·281 in. ± 0·005 in. with the actuator operating at 24V.

**52.** Ensure that the stops on the switch operating rod are not touching the sides of the slot in the ram housing.

## TESTING

**53.** For testing the actuator, it is essential that two rigs be available, one to complete torque tests on the motor and the other to complete the tension and compression load tests on the complete actuator.

**Motor only—brush bedding**

**54.** The motor is to be run in each direction, without load, to ensure that the brushes are bedded over 80 per cent of their area and over the full brush arc.

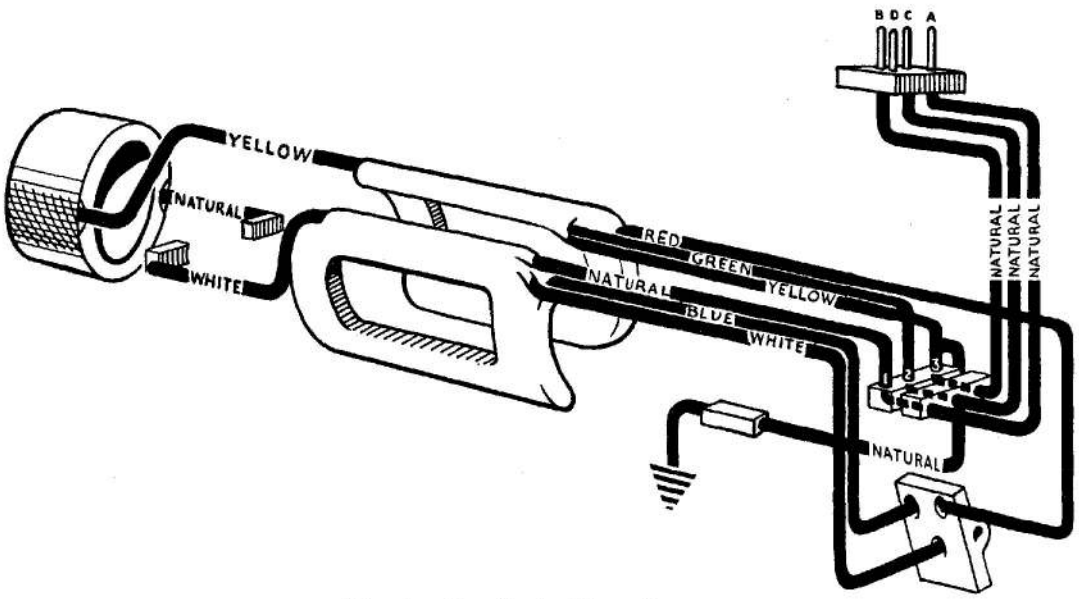


**Fig. 4. Practical wiring diagram**

**Brushgear setting**

**55.** The brushgear position is to be adjusted to the magnetic neutral position (M.N.P.), determined as follows:—

**56.** Pass a current of 2·500 amp. through the armature. The brake solenoid can be energized separately, but do not energize either of the field coils. To release the brake apply four volts across the solenoid, and decreasing the current instantly to approximately 1·300 amp.

**57.** Grip the armature by the pinion gear and turn it first clockwise, then anti-clockwise. If it is easier to turn the armature clockwise, the brushgear is placed too far in that direction and should be adjusted by moving it in the anti-clockwise direction. The brushgear is in its correct M.N.P. when the armature can be turned easily in either direction.

**Performance test on motor and brake solenoid assembly**

**58.** Check that the " pull-off " current of the solenoid does not exceed 2·500 amp.

**59.** Reduce the current gradually to 0·8 amp. At this figure the brake should still be off, but should operate before zero current is reached. To vary the current required to operate the brake increase or decrease the number of shims between the brake and the end frame.

**Note . . .**

*The air gap between the brake plunger and the brake plate must not be less than* 0·008 *in.* (*see para.* 35).

**60.** Place the motor in the test rig and run the motor, without load, in each direction applying 24V. The current must not exceed 1·400 amp. with a speed of not less than 18000 r.p.m. Measure the speed with a stroboscope.

**61.** Maintain the 24V supply and apply a load of 3 oz. in. to the armature shaft. The current must not exceed 3·000 amp. at a speed of 7,500 r.p.m., with the motor working in either direction. On completing this test, blow out the carbon dust and make a preliminary insulation check (*see para.* 73). This check will avoid the necessity of dismantling the unit, at a later stage because of faulty insulation.

**Complete unit test—no load test**

**62.** Apply 24V and check the length of time taken for the ram to travel 3 in. The time and the current draw should be 12 sec. maximum and 1·500 amp. maximum.

**Load test**

**63.** Apply 24V and a tension load of 80 lb. to suit the unit. The time taken for the ram to travel 3 in. must not exceed 18 sec. and the current must not exceed 2·3 amp. Repeat this test with a compression load of 80 lb.

**64.** Raise the tension load to 160 lb. and check the time and current taken by the ram in travelling 3 in. The figures should be 22 sec. maximum and 3·000 amp. maximum. Repeat this test with a compression load of 160 lb.

**Inching test**

**65.** Apply 24V to the unit. With a load of 80 lb. allow the ram to travel approximately 0·100 in. This should be done approximately 100 times in quick succession. While the machine is still hot, run it through its full 3 in. travel under compression and tension loads of 140 lb. and ensure that there is satisfactory operation.

**Over-run test**

**66.** In the tests detailed in para. 69 and 70 the applied voltage should be sufficiently high to release the brake but should be reduced immediately to obtain the minimum motor speed.

**67.** Apply 24V and without load, run the actuator to its full extended length. The distance between shackle centres at the full extension is to be 12·281 in. ± 0·005 in. Note the length for comparison.

**68.** Reverse the motor and measure the full retracted length of the ram. The distance between shackle centres at full retraction is to be 9·281 in. ± 0·005 in. Note the length for comparison.

**69.** Run the motor, at the minimum speed, to the full extension of the ram. Compare the distance between the shackle centres with

that noted in para. 67. The variation must not exceed 0·030 in., with the measurement noted in para. 67 being the greater.

**70.** Reverse the motor and run it at the minimum speed to the full retracted length of the ram. Compare the distance between shackle centres with that noted in para. 68. The variation must not exceed 0·030 in., with the measurement noted in para. 68 being the smaller.

**Movement of switch rod**

**71.** Apply 29V to the unit and run it, without load, from the fully retracted to the fully extended ram position. At full extension there must be at least 0·032 in. free movement of the limit switch operating rod, i.e., the stop must not move the switch rod into a position solid against the housing. Repeat this test with the ram fully retracted.

**72.** Ensure that the stops on the switch operating rod are not touching the sides of the slot in the ram housing.

**Insulation resistance test**

**73.** On completing the tests, use an insulation resistance tester (250V) and check that the insulation resistance between any live part of the unit and the frame is not less than 500,000 ohms.

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## SCHEDULE OF FITS, CLEARANCES AND REPAIR TOLERANCES

**APPENDIX 1** — All dimensions in inches — **For Actuator, Rotax, Type A0216**

| Ref. No. on Dia. (1) | Part and Description (2) | | Dimension New (3) | Permissible Worn Dimension (4) | Clearance New (5) | Permissible Worn Clearance (6) | Remarks (7) |
|---|---|---|---|---|---|---|---|
| 1 | ARMATURE | Armature core | — | — | — | — | Providing the core gives no indication of fouling the poleshoes, or is not badly scored it can be considered serviceable. Dimensional check will be unnecessary. Max. eccentricity shall not exceed 0·0025 (0·005 clock) when checked between centres |
| 2 | | Commutator diameter | 0·5660 / 0·5710 | 0·5310 | — | — | |
| 3 | ARMATURE BEARINGS | Armature shaft commutator end dia. | 0·18745 / 0·18795 | 0·18725 | 0·0002 | 0·0005 | |
| | | Armature shaft driving end dia. | 0·18745 / 0·18795 | 0·18725 | 0·0002 | 0·0005 | |
| 4 | BRUSH LENGTH | Side play | 0·3430 / — | 0·2500 / — | — / 0·002 | — / 0·008 | Brush spring tension 3 to 4 oz. on top of brush |
| 5 | CLUTCH DISC | Flange thickness | 0·0430 / 0·0530 | 0·040 | — | — | To be checked for flatness 80 per cent minimum face contact |

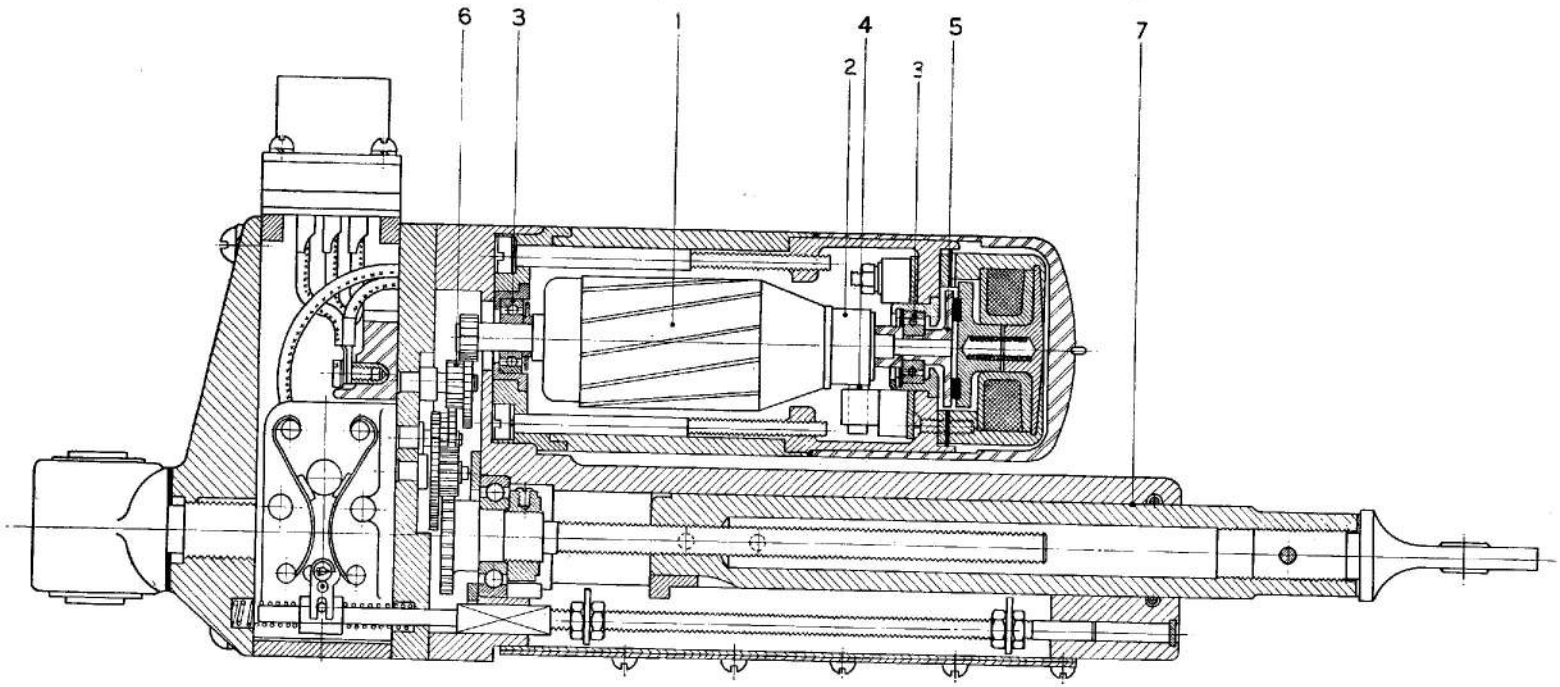


**Diagram 1. Actuator, Rotax, Type A0216**

**APPENDIX 1** (*continued*) All dimensions in inches **For Actuator, Rotax, Type A0216**

| Ref. No. on Dia. (1) | Part and Description (2) | | Dimension New (3) | Permissible Worn Dimension (4) | Clearance New (5) | Permissible Worn Clearance (6) | Remarks (7) |
|---|---|---|---|---|---|---|---|
| 6 | GEAR BOX | Planet gears<br>Annulus gears | — | — | — | — | If the gear teeth should be worn so that, when compared with a new gear, it is possible to detect that the teeth curvature has departed from the original involute form, then the gears must be renewed |
| | PLANET GEARS | Pin diameters | 0·1240 / 0·1245 | 0·12375 | 0·00125 | 0·002 | |
| | | Gear bore | 0·12475 / 0·12525 | 0·1255 | | | |
| | | Backlash between mating gears | 0·002 / 0·007 | — | — | — | |
| 7 | BODY AND RAM | Housing bore | 0·6720 / 0·6730 | 0·6740 | 0·006 | 0·008 | |
| | | Ram diameter | 0·6670 / 0·6675 | 0·6660 | | | |



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*A.P.4343D, Vol. 6, Sect. 14, Chap. 25, App. 1*
*A.L. 75, Sep. 59*