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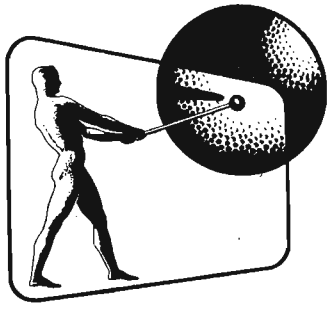

G.B.-Bell & Howell

MODEL 609

16mm Arc Projector

SERVICE MANUAL
SPARE PARTS LISTS
CARE & MAINTENANCE

RANK PRECISION INDUSTRIES LTD.
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Introduction

We have pleasure in presenting for service purposes the following information:-

(1) Service Instructions covering the majority of assemblies and parts of the Model 609 Projector.

As there are many assemblies and parts which are common to both the Model 609 and Model 621 Projectors, these instructions where applicable are cross referenced to the Model 621 Service Manual.

(2) G.B. Bell & Howell Model 609 Arc Projector. Spare parts List and Exploded Views.

(3) G.B. Bell & Howell Model 621 Service Manual which covers most of the gear case and some other assemblies which are common to both the Model 609 and Model 621 Projectors.

(4) Circuit Diagram for the Model 609 Mechanism head and Take up Assembly.

(5) Circuit Diagram for the Model 609 Amplifier.

(6) Circuit Diagram for the Model 609 Arc Rectifier.

(7) Spare Parts Catalogue for the G.B. Kalee Universal Arc Lamp.

The Model 609 Arc Lamp is identical in most respects to the G.B. Kalee Universal Arc Lamp, and the Spare Parts Catalogue which is issued, will for all practical purposes be most useful when ordering spare parts and also for maintenance purposes. In the main, the only differences will be the dowser assemblies, and the inclusion of a pilot lamp in the Model 609 Arc Lamp. We hope to publish shortly a leaflet covering more fully these variations.

THE

G.B.-Bell & Howell

MODEL 609

16 mm ARC PROJECTOR

SERVICE INSTRUCTIONS

SECTION 1

DISASSEMBLY PROCEDURE

Disassembly Procedure

THE PROJECTOR HEAD.

(1) REMOVAL OF MOTOR UNIT

a. Remove the cover plate No. 50149 (Fig.9) at the rear side of the casting. Disconnect the motor wires from the terminal strip.

b. Remove the four screws (2) No. M50137 & (2) No. 1587 (Fig.4) holding the motor unit to the front of the gear case. The motor can now be taken from the Projector Head. The drive coupling No. M025119 (Fig.4)connecting the rear end of the motor shaft to the cooling fan shaft should be removed. The gate operating block No. 5160 (Fig.4) which is located in the channel at the back of the lens carrier should be removed to avoid any possibility of this part being lost.

2. REMOVAL OF GEAR CASE AND BLOWER ASSEMBLY

a. The 470 ohm Motor resistance assembly No.04758R (Fig.7) which is housed below the fan housing No.15709 (Fig.7) should be disconnected from the main terminal strip.

b. Lay the Projector on its side and remove the cover plate No. 50136 (Fig.9) from the base of the soundhead assembly.

c. Remove the three screws and lock washers which are located inside the soundhead directly beneath the gear case.

d. The gear case and blower assembly is now free of the soundhead assembly.

3. REMOVAL OF GEAR CASE FROM FAN HOUSING ASSEMBLY.

a. The film guide rail No. 5641 (Fig.1) will be freed by the removal of the two screws No. 5267 (Fig.1) situated at the top and bottom of this part. There is a small spacing washer No. 4258 under the head of each screw. Remove and handle carefully to prevent loss of the washers when the screws are removed.

b. With the removal of the two fillister head screws No. 5266 (Fig.1) situated at the rear of the gear case, immediately above and below the blower shaft, the gear case can now be separated from the blower case. Care should be taken when parting these two assemblies to avoid the possibility of damage to the fibre gear No.03135 (Fig.3). Move the gear case slightly until the counter gear breaks mesh with the pinion gear No. 21328 (Fig.7) fitted to the fan shaft, and until the dowel pin No. 9171 (Fig.7) on the rear side of the fan case is free from the dowel hole.

4. DIS-ASSEMBLY OF MOTOR UNIT.

a. Remove the two screws No.10349 (Fig.4) holding the cover No. 50132 (Fig. 4) on the front end of the motor. Use a 3BA Allen key and loosen the two Allen set screws in the motor extension shaft No. M50140 (Fig. 4). The shaft can now be removed.

b. The motor governor No.M50139 is locked to the shaft by the two 4BA Allen set screws. In addition there is a hexagon nut No. 9117 (Fig. 4) which is locked in place by two prongs of the locking washer No.10390 (Fig.4) behind it. Firstly straighten these prongs, hold the governor carefully, and remove the hexagon nut. The two Allen screws in the hub of the governor should now be loosened and the governor removed. Remove spacer No. 15721 (Fig.4) immediately behind the governor hub. Remove the three governor brushes No.4664(Fig.4) from the brush holders

in the motor cap. Note that these brushes must fit freely in the holders.

5. REMOVAL OF BRUSH BOX HOUSING.

a. Before removing the brush box assembly No. M50131 (Fig.4) from the body of the motor, the two motor brushes should be removed.

b. Remove four screws No. 9718 (Fig.4) securing the brush holder casting to the motor body. Ease the complete assembly away from the motor housing. Note the manner in which the wires leave the field, and the way they are placed to avoid contact with any moving part. It will not be possible to disconnect the three field coil leads from this assembly.

c. The armature No. M50133 (Fig.4) can now be withdrawn from the motor. Note the spacer No. 15721 (Fig.4) which is on the front end of the armature shaft, and the spring washer No. 15706 (Fig. 4) which is left in the ball race housing of the motor casting. Care should be taken that these items are fitted correctly when re-assembly takes place.

6. REMOVAL OF MOTOR FIELD.

a. To remove motor field M50134 (Fig.4) unscrew the four field retaining nuts No.5201 (Fig.4) and withdraw the field from the motor housing. Note the manner in which the wires leave the field, and the way they are placed to avoid contact with any moving part.

DIS-ASSEMBLY OF GEAR CASE.

7. REMOVAL OF FILM GUIDES AND LENS CARRIER

a. Remove the pressure plate assembly by pulling on the movable visible metal frame.

b. To remove the lens carrier assembly, it is necessary at first that the film guides No. 11761 (Fig.2) be removed. Unscrew the four screws No. 7493 (Fig.2) holding these two items, and slip the upper and lower film guides from position. These guides are the same, and can be interchanged.

c. The lens carrier retainers No. 11799 (Fig. 1) are now accessible, and must be unscrewed. Lift straight up on the lens carrier assembly to remove it.

8. REMOVAL OF SPROCKET GUARDS, FILM ROLLER, TENSION CLIPS AND APERTURE PLATE.

a. To remove the upper and lower sprocket guards No. 04946 (Fig.2) unscrew the two screws No. 11757 (Fig.2) which are located in the centre of each guard, and in the end of the sprocket shafts. As the guards are removed note the spring clips No. 16243 (Fig.2) and washers No.16244 (Fig.2) located beneath the hinge part of the guard.

b. Remove the upper and lower film strippers No.11762 (Fig.2). These parts are interchangeable.

c. Unscrew the two fillister head screws No. 5021 (Fig.1) holding the upper No. 03462 (Fig.1) and lower No. 03463 (Fig.1) film tension clip assemblies. These two clips are situated on the film gate thrust spring No. 4255 (Fig.1) which is also held in place by the same two screws.

d. The back edge of the film gate thrust spring rests against the inner edge of the aperture plate No.11852 (Fig.1) and thus holds it in position on the gear case assembly. When the film gate thrust spring has been removed the aperture plate can be separated from the gear case.

9. REMOVAL OF FRAME SHAFT AND KNOB

a. On the back of the aperture plate are two prongs which fit over the eccentrice of the framer shaft and knob assembly No. 03464 (Fig.1). After the aperture plate has been removed, the framer shaft and knob assembly can be withdrawn from the outside of the gear case casting.

10. REMOVAL OF SPROCKETS.

a. Each of the sprocket assemblies

No. 03461 (Fig.2) is locked in place by two Allen set screws, which are located in the hub of the upper and lower sprocket gears. Use a 2BA Allen key to loosen these screws. The sprockets can be slipped from the end of the shaft. Note that the end of the sprocket stem locates in the hub of the gear. Remove the thrust washer No. 6419 (Fig.2) located between the end of each sprocket and gear.

11. REMOVAL OF SHUTTER AND SHUTTLE

a. To remove the hexagon nut No. 5112 (Fig.3) from the shuttle shaft a special off set wrench should be used to hold the cam shaft below the flicker shutter while the hexagon nut is removed.

b. In the event of a suitable wrench not being available, it is possible to remove the nut if the shutter can be held still by an alternative method. Every care must be taken to avoid damage to the flicker shutter and shuttle shaft.

c. When the hexagon nut is removed lift off the two shutter supports No. 12789 (Fig.3) and flicker shutter No. 12788 (Fig.3). Note that the stud on the bottom of the lower shutter support engages the indents of the flat surface on the shuttle shaft, and that the stud on the bottom surface of the upper shutter support extends through the hole in the shutter, and into the recess in the top of the lower shutter support. The above assembly should be carefully observed, so that the various parts can be re-assembled in the same manner.

d. Lift up the oil baffle assemblies No. 9558 (Fig.3) and No. 01078 (Fig.3) clear the gear case. Note the manner in which the oil baffle engages the slot in the gear case casting.

e. Unscrew the two fillister head screws No. 5123 (Fig.3) holding the shuttle guide pins No. 5113 (Fig.3) in place. The shuttle No. 8933 (Fig. 3) can now be lifted clear of the shutter shaft and the guide pins removed.

12. DIS-ASSEMBLY OF THE BLOWER UNIT.

a. Remove the light baffle No. 15783 (Fig.5) which is held in place at rear of this assembly by four fillister head screws No. 16930R (Fig.5). Next remove heat filter housing No. 15782 (Fig.6) which is attached to the blower casting by three fillister head screws No. 3225 (Fig.6).

b. The fan shaft No. M50269 (Fig.7) is removed in the following manner. Remove the fan bearing cap No. M50283 (Fig.6) at the rear end of the blower shaft, thus exposing the ball race No. 10356 (Fig. 6). The shaft is locked to this ball race by a hexagon nut No. 12087 (Fig.6). Remove the nut and also the three fillister head screws No. 1361 (Fig.6) holding the fan intake casting No. 50282 (Fig.6) to the main body. This casting can now be withdrawn from the blower casting The ball race which is housed in the intake casting can now be removed. Note the preload spring No. 15705 (Fig.7) housed in this casting beneath the ball race No. 4373 (Fig.7).

c. The cooling fan No. 05002 (Fig.6) and spacer washer No. 15703 (Fig.6) can now be removed from the shaft No. M50269 (Fig.7). Note the further spacing washer No. 15704 (Fig.7) which is situated immediately behind the front ball race of the fan shaft. Care should be taken when re-assembling this shaft to ensure that these spacers are fitted in their correct positions.

d. To remove the cooling fan shaft No. M50269 (Fig.7) this should be pressed out in a forward direction.

e. If it is found necessary to remove the pinion gear No. 21328 (Fig.7) from the shaft, the utmost care should be taken to avoid any possible damage occurring to the cir-clip washer No. 21331 (Fig.7) holding the pinion gear and washers No. 5193 (Fig.7) in place. The pressure applied by the compression spring No. 21330 (Fig.7) against this washer must be relieved before the washer 21331 can be removed.

13. DIS-ASSEMBLY OF THE SOUND HEAD.

a. The motor switch No. 50426 (Fig.10) which is housed in the sound head in accessible by removing the cover plate No. 50120 (Fig.9). This is situated at the rear end of the sound head, and is held in position by four oval headed screws No. 1587 (Fig.9) The locking nut on the switch should be removed, thus enabling the switch to be partially withdrawn from the casting, so that the soldered leads can be disconnected.

14. REMOVE SOUND DRUM BEARING SHAFT ASSEMBLY AND FLY WHEEL.

a. At the back of the sound head casting is a ball bearing retaining cap No. 13656 (Fig.10) held in place by three fillister head screws No.5266(Fig.10). Remove the cap and phosphor bronze plunger No.13661 (Fig.10) together when its loading spring No. 13659 (Fig.10) will be exposed.

b. Remove the three fillister head screws No. 5266 (Fig.10) which hold the front bearing support in place. The light shield No. 12145 (Fig.10) will come off at the same time.

c. Partly withdraw the sound drum until the hexagon nut which holds the fly wheel on the shaft is accessible. The front bearing is part of the sound shaft assembly,and will lift out of position. Before the sound drum shaft assembly No. 04169 (Fig.10) can be removed from the sound head a Tommy Bar will have to be inserted in the hole in the sound shaft, and the fly wheel released by undoing the hexagonal nut. The fly wheel can then be slipped up from the end of the shaft.

d. The sound drum and shaft No. 04169 (Fig.10) should be considered a unit, and should not be taken apart. If it becomes damaged to such an extent that sound quality is affected, the entire assembly should be replaced. Any attempt to separate the sound drum from the shaft will result in loss of time, and will be followed by difficulties which cannot be overcome. These sound drum and shaft assemblies are carefully assembled, balanced, and aligned at the factory, and can be replaced only as a unit.

15. REMOVE ROLLER YOKE AND ARM ASSEMBLY.

a. It is possible to adjust or repair the roller yoke and arm assembly, but this unit requires an extraordinary amount of care. It is precisely set for run out and smoothness of operation. Before disturbing these parts,make every attempt to trace the trouble to its real source, which, in turn, may save time and difficulty.

b. The roller yoke and arm assembly No. 03690 (Fig.9) is removed by loosening two sets screws on the knurled collar, and withdrawing the entire assembly from the pivot stud. Do not remove this assembly or tamper with its critical adjustment unless it fails to function satisfactorily. Unless the roller will not revolve,it is unlikely that any adjustment whatsoever is needed.

16. REMOVE OPTICAL SLIT.

a. The optical slit assembly No. 02678 (Fig.10) is assembled at the factory. It is positioned in the sound head by means of several delicate precision instruments, and is set to ensure the maximum efficiency. Note that the tube is locked in place with the screw No. 5893 (Fig.10) and that a coating of cement has been placed over the screw head. Experience has shown us that it is not satisfactory to attempt the setting of this tube except at the Factory or with a special sound optics setting gauge.

17.REMOVAL AND DIS-ASSEMBLY OF FILM SNUBBER.

a. The film snubber assembly can be removed as a separate unit. To do so the three fillister head screws No.5266 (Fig.10)should be removed. The entire snubber assembly No. 02674 (Fig.9) can now be removed from the sound head.

DIS-ASSEMBLY OF MOTOR TAKE UP UNIT

18. REMOVAL OF THE MOTOR UNIT.

a. Remove the cover plate No.50250 (Fig. 11) at the rear of the take up casting. Disconnect four motor leads from the terminal strip. Remove the four fillister head screws No. 50156 (Fig.12) holding the motor to the main body of the take up unit. The motor assembly is now free of the main unit.

b. To remove the take up drive mechanism from the motor, three fillister head screws No. 5266 (Fig.13) holding the gear box casting to the front end of the motor should be removed. This assembly can now be eased away from the motor casting.

19. REMOVAL OF ARMATURE AND FIELD COIL FROM TAKE UP MOTOR.

a. Remove the motor brushes. Remove the two fillister head screws No.9098 (Fig.12) holding the motor brush housing to the main body of the motor. The brush housing No.02158R (Fig.12) can now be eased off. Care should be taken on re-assembly of this brush holder unit to avoid the wires connected to the brush holders coming into contact with the armature assembly.

b. Grip the armature No. 9090 (Fig.12) and remove fillister head screw No.112 (Fig. 12) holding the spiral gear No. 02519 (Fig. 12) to the front end of the armature shaft. A key way is cut into the front end of the armature shaft, into which a dowel pin fitted to the spiral gear engages. With the spiral gear removed the armature can be withdrawn from the motor.

c. To remove the motor field coil No.9092 (Fig.12)unscrew the two field retaining nuts No. 5201 (Fig.12)and withdraw the field coil from the motor housing. Note the manner in which the wires leave the field, and the way they are placed to avoid contact with any moving part.

THE

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MODEL 609

16 mm ARC PROJECTOR

SERVICE INSTRUCTIONS

SECTION 2

REASSEMBLY PROCEDURE

Reassembly Procedure

REASSEMBLE MOTOR AND GOVERNOR.

1. INSTALL MOTOR FIELD, ARMATURE AND BRUSH BOX HOUSING.

a. Insert the four field coil leads into the special outlet channel at the rear of motor casting No. 50130 (Fig.4).

b. The motor fields No. M50134 (Fig.4) should be carefully guided into place over the locating studs No. M50337 (Fig.4) and clamped in position by the four retaining nuts No. 5201 (Fig.4). Check the position of the leads at the outlet point to ensure that they will not make contact with any revolving part.

c. Solder the three wires at the front end of the field coil to their respective positions on the brush holders and speed switch No. 13788R (Fig.4).

d. Before assembling the armature No. M50133 (Fig.4) into the motor housing, check to see that the spring washer No.15706 (Fig. 4) is in position in the rear ball race housing.

e. Insert the end of the armature shaft with the ball race No.4373 (Fig.4) and cooling fan No. M50243 (Fig.4) attached through the motor field. Carefully press the armature inwards, so that the rear ball race enters its housing squarely.

f. Before placing the brush box housing No. M50131 (Fig.4) over the front end of the armature shaft, check to see that the spacer No.15721 (Fig.4) is in position on the shaft (next to the commutator).

g. Check to see that the three field wires connected to the brush box housing will not rub against the armature as the housing is pressed into position.

h. With the brush box housing in position, fasten the assembly to the motor housing with the four screws No. 9718 (Fig.4).

i. AGAIN CHECK TO SEE THAT ALL WIRES ARE CLEAR OF THE ARMATURE.

2. INSTALL MOTOR BRUSHES.

a. Insert the motor brush No.12918(Fig.4) and spring No. 12909 (Fig.4) into the square hole of the brush holder. If the brush is not new be sure the concave contact surface of the brush will fit the curve of the commutator. The brush and spring are held in place with the motor brush cap No.11888 (Fig. 4).

3. INSTALL GOVERNOR.

a. Assemble the three governor brushes No. 4664 (Fig.4) ensuring their free movement in the holders.

b. Slip spacer No. 15721 (Fig.4) on to the end of the armature shaft followed by the governor No. M50139 (Fig.4).

c. Place the locking washer No. 10390 (Fig.4)over the threaded portion of the armature shaft,and screw the hexagon nut No.9117 (Fig.4) on to the shaft. Insert a suitably shaped piece of flat metal into slot cut in rear end of the armature shaft to hold it from turning, and tighten the nut securely.

d. With the hexagon nut securely tightened, at least two of the prongs on the lock washer No. 10390 (Fig.4) should be bent up against the sides of the nut to prevent it from coming loose. Using a 4BA Allen Key, tighten the two Allen set screws in the hub of the governor.

e. Place the motor extension shaft No. M50140 (Fig.4) over the end of the armature shaft and lock in position with the two 3BA Allen set screws. The motor end cover No. 50132 (Fig.4) can now be fastened in place by the two screws No. 10349 (Fig.4).

REASSEMBLE GEAR CASE.

The instructions relating to the dis-assembly of the gear case have dealt only with the refitting of minor components. If during dis-assembly it was found necessary to completely strip the gear case for cleaning or the replacement of worn parts, the re-assembly of certain components will entail the use of some special tools and fixtures.

These tools are the same as those used on the Model 621 Gear Case, and their application is fully explained in the Model 621 Service Manual. These instructions can in the main be applied to the Model 609 Gear Case.

There is however a variation in the design of the two gear cases and the instructions dealing with the timing of the fibre counter gear with the cam on the shutter shaft (Page 23 Section 5 Paragraph B) must not be applied to the Model 609 Gear Case. The instructions for the timing on the Model 609 Assembly is as follows. "The index slot on the cam of the shutter shaft must be diametrically opposite the index hole in the counter gear", (not adjacent as in the Model 621 Instructions). Failure to observe most carefully this procedure will give mistiming of the shuttle and shutter resulting in image "ghost".

4. ASSEMBLY OF SPROCKETS AND GUARDS.

a. Oil the shafts No. 11758 (Fig.2) and check that the gears revolve freely.

b. Place the thrust washer No.6419 (Fig. 2) over the end of the shaft and into the gear. Thoroughly oil the sprocket shaft, and felt oiler on the inside of the sprocket. Ease the sprocket No. 03461 (Fig.2)carefully over the shaft into the gear.

c. Place the sprocket guard No. 04946 (Fig.2) spring clip No. 16243 (Fig.2) and spacer No. 16244 (Fig.2) in position on the end of the sprocket shaft, and fasten in place with the special fillister head screw No. 11757 (Fig.2). The spring clip supplies the necessary tension to automatically close the guard, and hold it so during the operation of the machine.

d. Before locking the sprocket to the gear, a .002" piece of shim steel should be placed between the back of the sprocket gear hub and the spacing washer. The end of the shim should be "U" shaped to fit round the sprocket shaft.

e. With the shim in position, tighten the two 2 B.A. Allen set screws No. 11859 (Fig.2) located in the hub of the sprocket gear. These two screws should be tightened a little at a time to avoid bending. Remove the .002" shim. The sprocket and gear must revolve freely.

f. All sprockets are assembled in the same manner, and the parts involved are the same.

g. Assemble the upper and lower strippers No. 11762 (Fig.2) into place. Fasten with fillister head screws No. 7493 (Fig.2).

5. ASSEMBLE APERTURE PLATE AND FILM TENSION CLIPS.

a. Insert the framer shaft No. 03464(Fig 1)into the hole at the side of the gear case. Lay the aperture plate No. 11852 (Fig.1) in position on the gear case, and see that the two prongs that extend to the back side of aperture plate engage the eccentric cam on framer shaft.

b. The film gate thrust spring No. 4255 (Fig. 1) is next placed in position; then the upper and lower film tension clips No. 03462 (Fig. 1) & No. 03463 (Fig. 1) are placed in their respective positions. Fasten the clips and thrust spring to the gear case with the two fillister head screws No. 5021 (Fig. 1).

c. The back edge of the film gate thrust spring rests against the inner edge of the aperture plate. It will thus hold it in position on the gear case during the remainder of the assembly. The aperture plate will be solidly secured by two large headed screws No. 5267 (Fig. 1) when the completed gear case assembly is fastened to the blower housing assembly.

6. ASSEMBLE SHUTTLE AND SHUTTER INTO GEAR CASE.

a. The shuttles are made in six types, in order to assure greater ease in good fitting. Each shuttle is marked either 00, 0, 1, 2, 3 or 4. For replacement, a shuttle bearing the same number as that of the shuttle removed should be used whenever possible.

b. Insert the two shuttle dowel pins No. 5113 (Fig. 3) into the shuttle slides. These dowel pins should have the minimum amount of play in the shuttle slides, but must slide freely.

c. Place the shuttle No. 8933 (Fig. 3) over the cam on the shuttle shaft No. 5322 (Fig. 3) so that the V-shaped heel of the shuttle engages the grooved cam section of the counter gear and shaft assembly No. 03135 (Fig. 3) fitting the two dowel pins into the half-round milled grooves in the casting.

d. Press the two dowel pins out towards the sides of the casting as far as possible, and lock in place with the two large fillister head screws No. 5123 (Fig. 3).

e. Turn the mechanism by revolving the counter gear shaft. All parts should revolve freely and evenly. Care must be taken that the V-shaped heel on the shuttle is not too tight in the cam groove of the counter gear and shaft assembly, and that the shuttle operates freely around the cam of the shuttle shaft on the dowel pins. The play in all three parts should be held to an absolute minimum, but all parts must work freely and evenly.

f. Before fitting the oil baffle assembly No. 9558 & No. 01078 (Fig. 3) into place, saturate all felts of the lubricator with oil. Lay the entire assembly into place in the gear case, and make certain that the tip on the end of the oil baffle fits into the slot in the casting, which is immediately above the framer knob.

g. Place one of the shutter supports No. 12789 (Fig. 3) over the end of the shuttle shaft, so that the round extruded stud of the support engages the index slot in the surface of the shuttle shaft. Lay the shutter No. 12788 (Fig. 3) in place and assemble the second shutter support No. 12789 (Fig. 3) on the top of the shutter so that the extruded stud of this support passes through the hole in the shutter and engages the slot on the top of the lower shutter support.

h. Hold the cam part of the shuttle shaft with a special offset wrench, and assemble the hexagon nut No. 5112 (Fig. 2) on to the end of the shaft. As stated in the dis-assembly instructions, in the event of a suitable wrench not being available, this operation can be carried out by alternative methods, but every care must be taken to ensure that no damage occurs to the shutter, or shuttle shaft assemblies. Tighten the nut securely. Revolve the shutter, and see that it does not strike the oil baffle or the casting at any point.

7. REASSEMBLE BLOWER UNIT.

INSTALL FAN SHAFT AND BALL RACE.

a. The fan shaft No. M50269 (Fig. 7) with the pinion gear No. 21328 (Fig. 7) pinion washers, and ball race No. 4373 (Fig. 7) assembled, should be guided into the front ball race housing of the blower case.

b. The ball race should be carefully pressed or tapped into its housing, so that it seats evenly, and is not tilted.

8. INSTALL FAN.

a. The fan is not secured to the shaft by set screws, but is held in position by the two spacers at each end of the fan hub.

b. Before placing the fan No. 05002 (Fig. 6) on the shaft, check to ensure that the spacer No. 15704 (Fig. 7) is in position on the shaft, immediately behind the front ball race. Next place the fan No. 05002 (Fig. 6) on the shaft. The open end of the fan should face the rear end of the blower casting (the air intake end). Place the longer spacer No. 15703 (Fig. 6) over the shaft against the hub of the fan.

9. INSTALL REAR BALL RACE.

a. Place the fan intake casting No. 50282 (Fig. 6) in position against the blower casting and secure with three fillister head screws No. 1361 (Fig. 6).

b. Before fitting the rear ball race, place the preload spring No. 15705 (Fig. 7) in position at the bottom of the ball race housing. Place the ball race No. 10356 (Fig. 6) over the threaded end of the shaft and press it squarely into its seating.

c. Grip the fan shaft between the preload spring and the front ball race, with a suitably shaped pair of pliers, and screw the hexagon nut No. 12087 (Fig. 6) on to the end of the shaft.

d. With the hexagon nut securely tightened, the rear bearing cap No. M50283 (Fig. 6) can be screwed into position. Check to see that the shaft is revolving freely.

10. INSTALL HEAT FILTER HOUSING AND LIGHT BAFFLE.

a. Place the heat filter housing No. 15782 (Fig. 6) in position against the blower casting, and fasten in place with three fillister head screws No. 3225 (Fig. 6).

b. Next place the light baffle No. 15783 Fig. 5) in position and fasten to the heat filter housing with four fillister head screws No. 16930R (Fig. 5).

SOUND HEAD.

11. ASSEMBLE SOUND SHAFT AND FLYWHEEL.

a. Extreme care must be used to prevent any dirt lodging in the 6mm radial bearing No. 12246 (Fig. 10) fitted to the rear end of the sound shaft. If the bearing does not revolve freely, wash the bearing in spirit. Lubricate with a very light oil.

b. Insert the end of the sound drum shaft No. 04169 (Fig. 10) through the opening in the front of the sound head casting, and slip the flywheel over the end of the shaft. Lock the flywheel securely to the shaft with the hexagon nut. Insert the end of the shaft into the rear ball race, previously installed.

c. The collar on the sound drum end of the shaft is fastened to the casting with three fillister head screw No. 5266 (Fig. 10). One of these screws also holds the light control shield (No. 12145 (Fig. 10) in position. This shield prevents extraneous light from striking the photo cell, and should be adjusted so that it does not intercept the scanning beam.

d. Before fitting the rear flywheel shaft bearing cap No. 13656 (Fig. 10) in position, ensure that the loading spring No. 13659 (Fig. 10) and phosphor bronze plunger No. 13661 (Fig. 10) are in place in the cap. The bronze plunger must make clean contact with the polished pip on the end of the flywheel shaft. The purpose of this assembly is to discharge automatically to earth, the static electricity generated in the flywheel assembly whilst it is rotating.

e. Secure the rear bearing cap No. 13656 (Fig. 10) in position by three fillister head screws No. 5266 (Fig. 10). Properly assembled, the sound drum shaft must revolve with absolute freedom and with no high spots or

indications of sluggishness. It must be perfectly balanced.

12. REASSEMBLE TAKE UP UNIT.

INSTALL MOTOR FIELD.

a. Insert the two field coil leads through the outlet hole at the top of the motor casting No. 4966R (Fig. 12).

b. The motor fields No. 9092 (Fig. 12) should be carefully guided into place over the two locating studs No. 5200 (Fig. 12) and clamped in position by the two retaining nuts No. 5201 (Fig. 12).

13. FIT MOTOR TO MAIN CASTING.

a. Before completing the assembly of the motor unit, it is advisable to secure the motor casting to the main body of the take-up unit No. 50249 (Fig. 11).

b. First guide the two leads attached to the motor brush holders between the outside of the fields and the motor casting, thence through the outlet hole at the top of the motor casting together with the field coil leads.

c. The four leads must now be guided through the special outlet channel of the main casting, and up on to the terminal strip No. 025091 (Fig. 11). At this point the motor should be secured to the main body by four fillister head screws No. 50156 (Fig. 12).

14. INSTALL ARMATURE SHAFT FRONT BEARING.

a. If during disassembly, it was found necessary to remove the front armature shaft bearing No. 10356 (Fig. 12) from its seat, the new race should be carefully pressed or tapped into place so that it seats evenly and is not tilted.

b. Use a spanner wrench which fits the two slots in the top of the bearing retainer No. 9093 (Fig. 12) and tighten it securely.

15. INSTALL ARMATURE AND SPIRAL GEAR.

a. Before installing armature into the motor housing, check to see that the field wires are properly placed, so that there is no possibility of their rubbing on the armature.

b. Insert the long (grooved) end of the armature shaft through the motor field, and through the front bearing.

c. Place the spiral gear No. 02519 (Fig. 12) over the end of the shaft. The dowel pin fitted to the gear engages in the grooved section of the shaft. Hold the armature and secure the gear with the large fillister head screw No. 112 (Fig. 12).

16. INSTALL MOTOR BRUSH CAP.

a. As the motor brush cap No. 02158R (Fig. 12) is pressed into place over the rear armature shaft bearing No. 10356 (Fig. 12), (this bearing is locked to the shaft by a special fillister head screw No. 112 (Fig. 12), the leads attached to the brush holders must be carefully placed to avoid their making contact with the armature.

b. Secure the motor brush cap in position with two long fillister head screws No. 9098 (Fig. 12).

c. Rotate armature shaft to check that its movement is free.

17. ASSEMBLE COVER PLATE AND TAKE UP DRIVE AND MOTOR BRUSHES

a. Solder the four leads from the motor to their respective positions on the terminal strip. Fit the cover No. 50250 (Fig. 11) in position and secure with four long fillister head screws No. 50255 (Fig. 11).

b. The take up drive casting No. 11375 (Fig. 13) must be placed carefully into position over the spiral gear attached to the motor armature shaft. This unit is secured to the motor body by three fillister head

screws No. 5266 (Fig. 13).

c. Insert the motor brush No. 12918 (Fig. 12) and spring No. 12909 (Fig. 12) into the square hole of the brush holder. If the brush is not new be sure the concave surface of the brush will fit the curve of the commutator. The brush and spring are held in place with the motor brush cap.

18. ASSEMBLE GEAR CASE TO FAN UNIT.

a. Carefully place the gear case assembly into position on the face of the fan unit, so that the dowel pin No. 9171 (Fig. 7) on the fan housing engages the corresponding hole in the gear case.

b. Inasmuch as the fibre counter gear No. 03135 (Fig. 3) and the fan shaft pinion gear No. 21328 (Fig. 7) must be meshed when the gear case is assembled to the fan housing, care must be taken that the teeth of the fibre gear are not damaged during the assembly. At no time is it necessary to force the gear case into place, and under no circumstances should it be done. In the event that some difficulty is encountered making the assembly, the gear case should be carefully moved to mesh the fibre gear and pinion gear.

c. When the dowel pin in the blower case has been fitted to the hole in the gear case, it is certain that the fibre and pinion gears are properly meshed, and that the gear case is in its correct position. Fasten the units together by the two fillister head screws No. 5266 (Fig. 1) situated immediately above and below the driving shaft aperture of the gear case.

d. The two large fillister head screws No. 5267 (Fig. 1) are used to hold the guide rail and the aperture plate in place, and to secure the gear case to the blower housing. Place the two spacing washers No. 4285 (Fig. 1) into the large holes at the outside corners of the aperture plate No. 11852 (Fig. 1) and lay the film guide No. 5641 (Fig. 1) along the edge of the aperture plate. Press the guide rail inwards so that the fingers of rail rest against the inside edge of the slots in aperture plate. Screw the two large head screws No. 5267 (Fig. 1) firmly into place.

e. The aperture plate should move up and down when the framing knob No. 03464 (Fig. 1) is turned. The spacing washers are used to prevent the aperture plate from binding when the screws which hold the film guide rail in place are tight.

19. ASSEMBLE MOTOR UNIT TO GEAR CASE.

a. With the drive coupling shaft No. M025119 (Fig. 4) in position, place the motor unit against the front of the gear case. The two dowel pins fitted to the front of the gear case must locate in the corresponding two holes of the motor mounting plate.

b. Secure the motor in position by four screws (two fillister head No. M50137 (Fig. 4) and two oval head No. 1587 (Fig. 4). As the motor is placed in position be sure that the coupling engages accurately in the keyway of the motor armature shaft.

20. INSTALL LENS CARRIER AND FILM GUIDES.

a. Place the gate operating block No. 5160 (Fig. 4) into the milled slide on the back of the lens carrier No. 11750 (Fig. 1). Note that one side of this block has rounded corners. The block should be placed into the slide, so that the rounded corners rest against the lens carrier casting. Lay the lens carrier assembly No. 11750, (Fig. 1), and the gate operating block No. 5160 (Fig. 4) into the milled channel of the gear case, so that the hole in the gate operating block engages the stud on the gate lever No. M025069 (Fig. 4). Place the two lens carrier retainers No. 11799 (Fig. 1) in position, so that the three prongs on the edge of each retainer holds the lens carrier in place. Fasten in place with the four pilot screws No. 15203 (Fig. 1).

21. INSTALL AND ADJUST FILM GUIDES.

a. The film guides No. 11761 (Fig. 2) are

held in place below the upper sprocket and above the lower sprocket each by two fillister head screws No. 7493 (Fig.2).

b. The clearance between the film guide and sprocket should be from .012 to .014 inches, and under no circumstances should it be set at less than the .012 inch minimum. To adjust, loosen the two screws that hold the film guide in place, and fit two thicknesses of film around the sprocket. The film guide should just clear the two thicknesses of film, and the film should not be pinched between the sprocket and the film guide (two thicknesses of film are equivalent to approximately .012 inches).

22. INSTALL MOTOR, GEAR CASE AND BLOWER ASSEMBLY ON SOUND HEAD.

a. Place the motor and gear case assembly on the sound head, so that the two dowel pins No. 50110(Fig.10) engage the two dowel holes in the bottom of the gear case. At the same time guide the two leads from the motor resistence assembly No. 04758R(Fig.7)attached to the blower casting through the two holes at the rear of the sound head casting. Hold the gear case in position on the sound head, and secure with three fillister head screws, and lock washers on the inside of the sound head casting, immediately below the gear case.

b. Insert the four motor field leads through the special cover, and into the sound head casting. The special cover can now be secured to the sound head casting with the two fillister head screws. Connect the four motor field leads and the two resistance leads to their respective positions on the main terminal strip.

c. Secure the terminal cover plate No. 50149 (Fig.9) in position with three oval headed screws No. 50244 (Fig.9)

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16 mm ARC PROJECTOR

SERVICE INSTRUCTIONS

SECTION 3

ADJUSTMENTS

Adjustments

a. GENERAL

1. It is important that the projector be carefully tested, and that certain adjustments to various components be made upon completion of repairs which have included any disassembly and re-assembly. Besides the following specific adjustments, the final inspection of a repaired machine should include the running of a spool of sound reproduction.

b. ADJUST PRESSURE PLATE.

1. Adjustment may be necessary to ensure that the proper tension is applied to the film. This adjustment can be made only after the gear case has been securely fastened to the blower housing and all screws securely tightened.

2. Close the gate by moving the gate lever down as far as it will go.

3. Loosen the locking screw located in the top side of the lug on the front plate, in which the gate operating lever pivots. With a suitable lever inserted into one of the holes of the eccentric bush, turn the bush until the gate shoe just comes into contact with the aperture plate. Observe the shoulder of the two studs on the back of the gate shoe. When the separation between the stud shoulders and the retaining plate is approximately..002 inch, the adjustment is correct. The lens carrier must be closed all the way. Tighten locking screws to lock adjustment.

4. Too little or too much pressure may result in an unsteady projected picture.

c. SPEED.

1. Speed adjustment necessary must be very accurate in order to obtain satisfactory sound quality, and the only accurate method of checking the speed is with a tachometer. When using a tachometer, the reading is taken from the hand setting knob on the motor extension shaft. At 16 frames per second, (silent speed), the reading is 3,500 revolutions per minute. At 24 frames per second, (sound speed), the reading is 5,250 revolutions per minute.

2. A somewhat simpler method of timing necessitates the use of an endless film loop exactly 80 frames long (2 feet long). At sound speed the loop will pass through the mechanism 18 times per minute. Count the splice as it passes a pre-determined point. At silent speed, the loop will pass through the mechanism 12 times per minute.

3. The speed is adjusted by means of the set screw located on each set of contact points on the governor. These contacts operate under spring tension, one set of points being for silent, the other for sound speed. The set of points with the weaker spring controls silent speed, and the strong spring controls sound speed

4. By turning the set screws, which adjust the gap between the contact points (increasing the gap), the correct speed can be obtained.

d. SPROCKET SYNCHRONIZATION.

1. To ensure satisfactory sound reproduction, it is essential that the sprocket on the sound head is correctly set in relation to the second sprocket of the gear case, so when film is laced it is held under tension over the sound reproducing drum by the oscillatory stabilizer. When the two sprockets are correctly oriented, and with a length of film laced through the sound head, the stabilizer should rest under tension approximately midway between the two stop pins on the sound head casting. This setting can be obtained in the following manner.

2. Loosen the special screw which holds the film guard to the third sprocket, so that the sprocket can be pulled forward slightly (it may be necessary to remove the stripper), thus disengaging the second and sound sprocket gears and making it possible to turn the sound sprocket independently of the second sprocket. If the teeth on the third sprocket are not in position to give the desired setting of the stabilizer with film laced, pull out the sound sprocket enough to permit its rotation, and turn to alter the mesh of the two gears until the desired setting is obtained. When this has been achieved, press the sprocket back into position tightening the screw, and replace the stripper.

e. SNUBBER TENSION.

1. The three screws that fasten the snubber to the sound head casting must be left loose while the tension of the snubber is being set.

2. Note that by turning the bearing part of the snubber that extends into the sound head, the tension of the snubber can be increased or decreased as desired. Turn the bearing until the snubber can be raised about 1/16 of an inch from the snubber stop before any tension is felt on the snubber. This means that the torsion spring in the snubber is at rest when the snubber is in position, but upon raising the snubber about 1/16 of an inch, the torsion spring begins exerting pressure on the snubber. As the snubber is raised, the tension will build up strong enough to take care of all conditions.

f. YOKE AND ARM ASSEMBLY (OSCILLATORY STABILIZER).

1. Make an endless loop of "buzz track" sound film, which should be threaded through the second sprocket, the yoke and arm assembly (oscillatory stabilizer) and the third sprocket.

2. With the mechanism running and the amplifier and the speaker turned on, the "stabilizer" should be positioned on the shaft on which it pivots, by moving it in or out as necessary, until the least amount of sound is audible. The "buzz track" sound film has a low frequency along one edge of the sound track and a high frequency on the other edge of the sound track. It is when the "stabilizer" is positioned so that it centres the sound track on the scanning beam that the minimum sound reproduction is audible from both tracks. Thus positioned, the stabilizer is correctly adjusted.

3. In conjunction with this setting, another adjustment must be made. The spring tension of the "stabilizer" should be adjusted by turning the bearing retaining sleeve in which the two set screws are mounted so that the "stabilizer" comes to rest in its operating position within 2½ seconds after the mechanism has been started.

4. Only by making these two critical adjustments correctly can the sound reproduction is absolutely true, since it depends upon the oscillatory stabilizer functioning perfectly.

g. FILM RUNNING TEST.

1. Upon completion of repairs and after all the necessary adjustments have been made, it is always advisable to run film through the machine in order to check the mechanical and sound operation of the projector. The film should be in good condition and one on which the sound is known to be satisfactory.

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MODEL 609

16 mm ARC PROJECTOR

SECTION 4

SPARE PARTS LIST

MODEL 609 SPARE PARTS LIST.

Part No.	Description.
01078	Lubricator Assembly.
01477	Oiler Assembly.
02158R	Take up Motor Cap Assembly.
02159R	Worm Assembly, Take-up.
02247	Roller Assembly, Idler.
02674	Snubber Assembly.
02678	Optical Slit Assembly.
02682	Spindle Assembly, Reel.
03037	Lock, Lens.
03135	Gear and Shaft Assembly, Counter.
03318R	Arm & Bearing Assy. Take-up.
03320R	Spindle & Take up Pulley Assembly.
03461	Sprocket Assembly.
03462	Clip Assy, Film Tension (Upper).
03463	Clip Assy, Film Tension (Lower).
03464	Shaft & Knob Assembly.
03466	Wheel Assembly, Sprocket Worm (L.H.)
03690	Stabilizer Assembly.
03692	Damper Assembly, Exciter Lamp.
04169	Bearing and Shaft Assembly, Sound Drum.
04758R	Resistor Assembly.
04765	Screw Assembly, Reel Arm.
04769	Shutter Assembly, Fire.
04770	Mount Assembly, Coil.
04946	Guard Assembly, Sprocket.
05002	Fan Assembly.
M025000	Holder, Governor Brush Assembly.
025067	Photo Cell Unit Assembly.
M025069	Lever Assembly, Gate Operating.
025073	Cable Assembly, Take up Motor.
025078	Socket Assembly, Exciter Lamp.

Part No.	Description.
025085	Screw Assembly, Take up Unit.
025091	Tag Board Assembly, Take up Unit.
025092	Input Plug, Take up Unit.
M025119	Coupling Shaft.
112	Fillister Head Screw.
145	Ball, Steel.
860	Race, Ball (Outer).
861	Race, Ball (Inner).
890	Gear, Idler.
891	Shaft, Idler Gear.
1361	Screw, Fillister Head.
1375	Washer, Split Retaining.
1587	Oval Head Screw.
2365	Screw 10/32 Fillister Head.
2464	Radial Bearing 6 m/m. (R. & M. Type 2LJ6).
3225	Screw, Fillister Head.
4255	Spring, Film Gate Thrust.
4258	Washer.
4373	Bearing, 8mm Radial.
4460	Fillister Head Screw.
4664	Brush, Governor.
4966R	Housing Motor Take-up.
5021	Fillister Head Screw.
5112	Hexagon Nut.
5113	Pin Dowel.
5123	Screw, Special Fillister Head.
5148	Screw.
5157	Fillister Head Screw.
5160	Block, Gate Operating.
5193	Washer, Motor Pinion.
5200	Stud, Field Retaining.
5201	Nut, Field Retaining.
5211	Fillister Head Screw.

Part No.	Description.
5238	Steel Ball (Grade 'A').
5266	Fillister Head Screw, 5/40 x 9/32.
5267	Screw.
5296	Bearing, Shutter and Counter Shaft.
5322	Shaft, Shuttle.
5618	Spring, Ball Retaining.
5641	Rail, Guide.
5843	Fillister Head Screw.
5893	Set Screw.
6201	Screw, Fillister Head.
6403	Spacer, Governor Connecting Link.
6419	Washer, Spring.
6715	Steel Ball, 1/16th.
7493	Fillister Head Screw.
7746	Screw 6/32 x 3/8 Fillister Head.
8918	Shoulder Screw.
8933	Shuttle, Double Tooth.
8988	Fillister Head Screw.
9083	Washer, Friction.
9084	Gear, Take-up Spiral.
9085	Cap end.
9086	Washer, Friction Drive.
9087	Retainer, Bearing.
9088	Washer, Star Friction.
9089	Spacer.
9090	Armature, Take-up.
9092	Field, Motor Take-up.
9093	Bearing Retainer.
9098	Fillister Head Screw.
9117	Hexagon Nut.
9171	Dowel Pin.
9208	Bearing, Roller.
9260	Ball, 1/16th Steel.
9305	Fillister Head Screw.

Part No.	Description.
9335	Screw, Fillister Head.
9414	Plate, Snubber Bearing.
9415	Snubber Bearing.
9426	Felt, Oiler.
9427	Felt, Oiler.
9558	Baffle, Oil.
9718	Fillister Head Screw.
10291	Knurled Head Screw.
10343	Plug.
10349	Fillister Head Screw.
10356	Bearing, 6mm Radial.
10390	Washer, Locking.
10529	Washer, Shim.
10565	Motor Shaft Extension Knob.
10925	Retainer Friction Block.
10926	Block Friction.
10927	Screw, Adjusting.
10928	Cap, Screw.
10929	Spring, Compression.
11054	Spring Clamp.
11055	Flat Head Screw.
11110	Spring, Compression.
11147	Washer.
11178	Screw, Round Head.
11268	Headless Set Screw.
11269	Headless Set Screw.
11277	Worm (L.H.).
11280	Collar.
11281	Socket Set Screw.
11282	Socket Set Screw.
11371R	Pin.
11372R	Plunger Spring.
11375	Housing Worm Gear.
11377	Ring. Bearing Retainer.

Part No.	Description.
11378R	Take up Spindle Drive.
11380R	Pulley Take up Drive.
11381R	Bracket Take up Tension.
11468	Take up Arm Shaft.
11713	Washer.
11750	Gate and Lens Carrier, Film.
11753	Bushing, Roller (Inner).
11754	Roller, Film.
11757	Fillister Head Screw.
11758	Shaft, Sprocket.
11761	Guide, Film.
11762	Stripper, Film.
11795	Nut, Pressure Plate Adjusting.
11796	Plate, Pressure.
11799	Retainer, Lens Carrier.
11852	Plate, Aperture.
11856	Screw, Fillister Head.
11857	Stud, Roller (Outer).
11858	Guard, Roller Film.
11859	Screw, Headless Set.
11867	Gear.
11868	Gear, Upper.
11888	Motor Brush Cap.
12071	Spring, Compression.
12075	Screw, Fillister Head.
12087	Hexagon Nut.
12145	Shield, Light Control.
12246	Bearing, 6mm Radial.
12511	Stud, Mounting.
12526	Stud, Bell Tensioner.
12719	Carrier, Pressure Plate.
12720	Yoke, Pressure Plate.
12776	Cup, Spring.

Part No.	Description.
12778	Screw, 3/56 Fillister Head.
12788	Shutter.
12789	Support, Shutter.
12909	Spring, Brush.
12918	Brush, Motor.
13499	Washer, Spacer.
13656	Cap, Bearing Retaining.
13659	Spring Compression.
13661	Retainer, Spring.
13720R	Cover, Exciter Lamp.
13788R	Switch S.P.S.T.
14842	Holder, Motor Brush Complete.
14848	Retainer Spring.
14849	Snubber Stud.
14852	Snubber Lever.
15203	Screw, Pilot.
15703	Spacer, Fan Shaft (Long).
15704	Spacer, Fan Shaft (Short).
15705	Spring, Fan Shaft, Preload.
15706	Spring, Motor Armature Preload.
15708	Cone Fan Housing Heat.
15709	Housing, Fan.
15721	Spacer, Motor Armature.
15726	Bushing, Gate Adjustment.
15731	Shield, Aperture Heat.
15742	Cable Strain Relief Plate.
15745	Guide, Rewind Film.
15747	Spring, Compression.
15753R	Plate, Patent.
15755	Screw, Shoulder.
15764	Spacer, Motor Armature.
15772	Arm, Reel.
15774	Mount, Coil.

Part No.	Description.
15778	Holder Filter.
15779	Glass Filter.
15780	Retainer, Filter Glass.
15781	Spring Filter Friction.
15782	Housing Filter.
15783	Baffle, Light.
15784	Baffle, Blower.
15822	Spring Take up Auxiliary.
16198	Bush.
16207	Spacer.
16243	Spring.
16244	Washer, Tension.
16246R	Screw 1/4-20 Fillister Head.
16930R	Screw, Fillister Head.
21328	Pinion, Motor.
21330	Screw, Compression.
M50000	Insulating Sleeve.
50025	Special Screw.
50027	Plug.
50090	Plug Holder.
50110	Dowel Pin.
50120	Sound Head end Cover.
50126	Film Rewind Bracket.
50127	Casing, Sound Head.
M50130	Housing, Projector Motor.
M50131	Housing, Projector Motor Brush.
50132	Cover, Governor.
M50133	Armature, Projector Motor.
M50134	Field, Motor.
50136	Plate, Sound Head Cover.
M50137	Fillister Head Screw.
50138	Counter Sunk Head Screw.
M50139	Governor Projector Motor.
M50140	Knob, Hand Turnover.

Part No.	Description.
50141	Case, Gear.
50149	Terminal Block Cover Plate.
M50154	Clip, Spring.
50155	Plate, Switch on/off.
50156	Screw 6-32 Fillister Head.
M50243	Fan, Projector Motor.
50244	Oval Head Screw.
50245	Tag Board, Sound Head.
50249	Take up Housing.
50250	Take up Unit Housing Cover.
50253	Take up Unit Terminal Strip Post.
50254	Take up Switch Knob.
50255	Fillister Head Screw.
50256	Rheostat.
50257	Switch, Take up Unit.
50259	Standard Washer.
M50260	Belts. Take up.
50265	Sound Head Name Plate.
50267	Take up Selector Main Plate.
M50268	Ring, Retaining.
M50269	Shaft, Fan.
50282	Intake, Fan.
M50283	Cap, Fan Bearing.
M50309	Choke R.F.
50316	Rubber Surround (Photo Cell Unit Cover).
50323	Supressor Condenser.
M50337	Field Retainer Stud.
50383	Rheostat Knob.
50426	Switch D.P.D.T.
202254	Exciter Lamp, 4 volt .75 amp.

THE

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MODEL 609

16 mm ARC PROJECTOR

SECTION 5

ILLUSTRATIONS

MODEL 609 SPARE PARTS LIST.

FIGURE 1. (GEAR CASE).

Part No.	Description.
03037	Lock, Lens.
03462	Clip Assy, Film Tension (Upper).
03463	Clip Assy, Film Tension (Lower).
03464	Shaft & Knob Assembly.
145	Ball, Steel.
4255	Spring, Film Gate Thrust.
4258	Washer.
5021	Fillister Head Screw.
5148	Screw.
5266	5/40 x 9/32 Fillister Head Screw.
5267	Screw.
5618	Spring, Ball Retaining.
5641	Rail, Guide.
9208	Bearing, Roller.
11750	Gate and Lens Carrier, Film.
11753	Bushing, Roller (Inner).
11754	Roller, Film.
11795	Nut, Pressure Plate Adjusting.
11796	Plate, Pressure.
11799	Retainer, Lens Carrier.
11852	Plate, Aperture.
11856	Screw, Fillister Head.
11857	Stud, Roller (Outer).
11858	Guard, Roller Film.
12071	Spring, Compression.
12075	Screw, Fillister Head.
12719	Carrier, Pressure Plate,
12720	Yoke, Pressure Plate.
12776	Cup, Spring.
12778	Screw, 3/56 Fillister Head.
15203	Screw, Pilot.
16198	Bush.
16207	Spacer.
50141	Case, Gear.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Gear Case Assembly

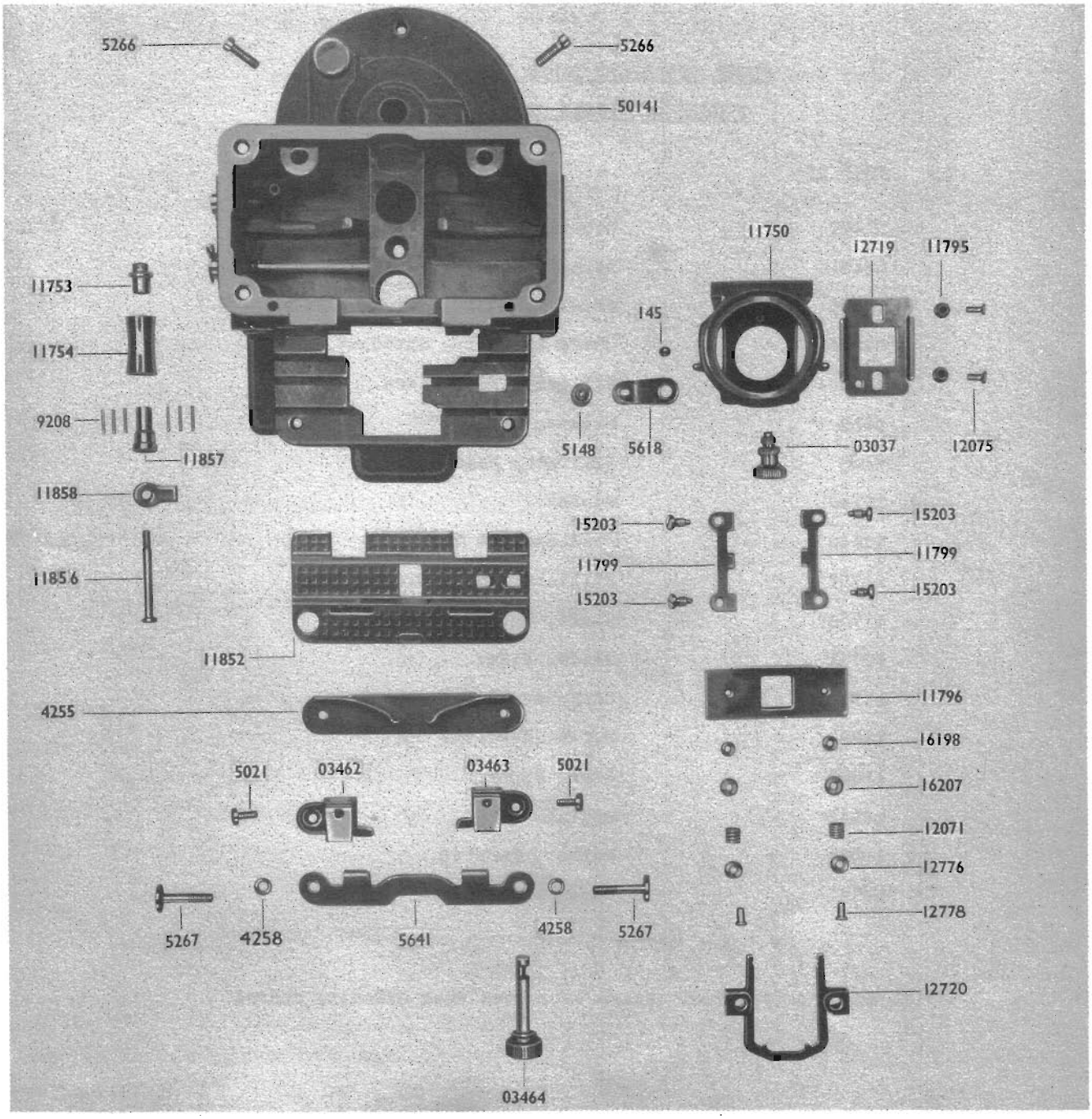


Fig. 1

MODEL 609 SPARE PARTS LIST.

FIGURE 2. (GEAR CASE).

Part No.	Description.
01477	Oiler Assembly.
03461	Sprocket Assembly.
03466	Wheel Assembly, Sprocket Worm (L.H.)
04946	Guard Assembly, Sprocket.
4460	Fillister Head Screw.
6419	Washer, Spring.
7493	Fillister Head Screw.
11147	Washer.
11269	Headless Set Screw.
11757	Fillister Head Screw.
11758	Shaft, Sprocket.
11761	Guide, Film.
11762	Stripper, Film.
11859	Screw, Headless Set.
11868	Gear, Upper.
16243	Spring.
16244	Washer, Tension.
50141	Case, Gear.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Gear Case Assembly

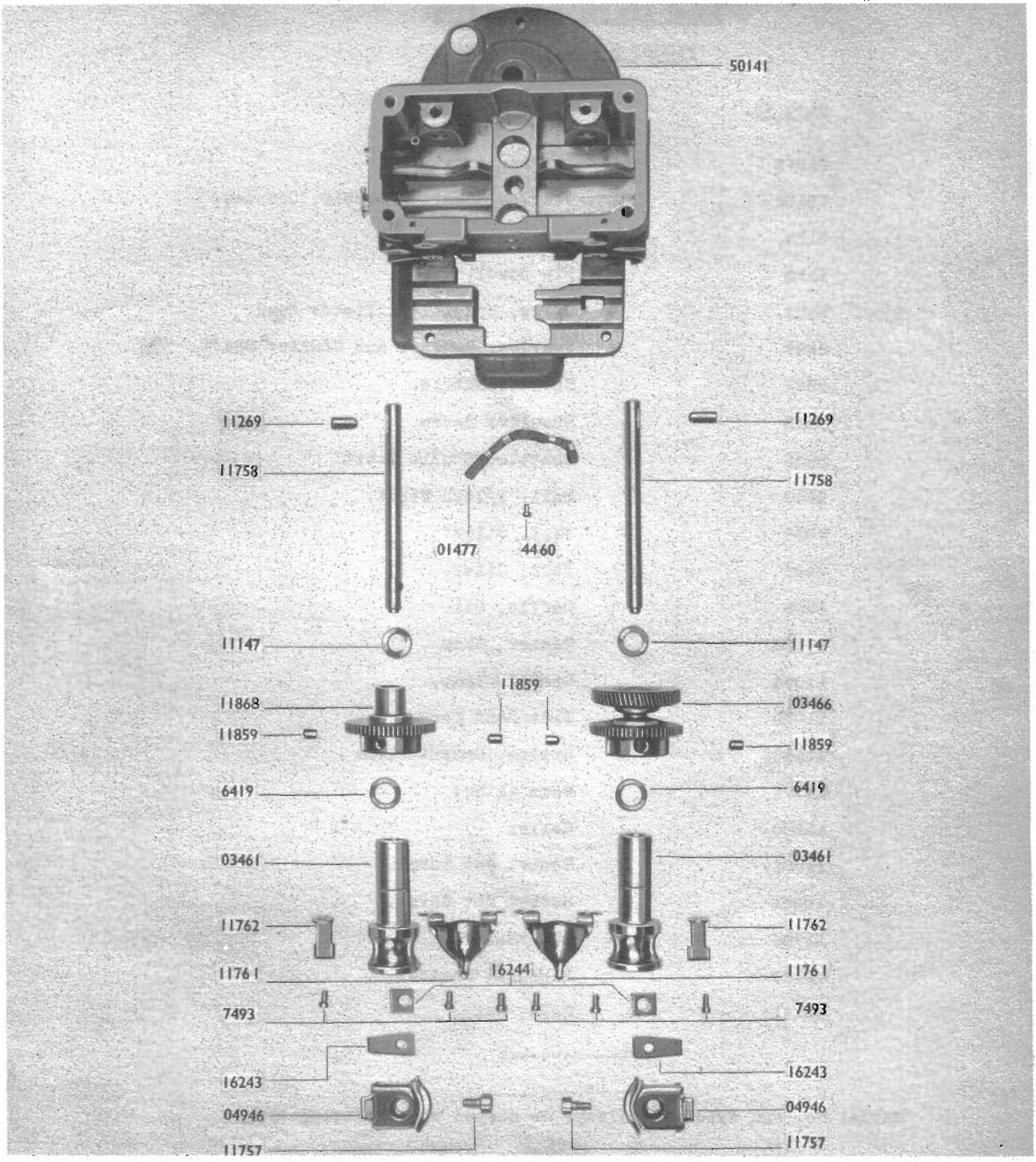


Fig. 2

MODEL 609 SPARE PARTS LIST.

FIGURE 3. (GEAR CASE).

Part No.	Description.
01078	Lubricator Assembly.
03135	Gear and Shaft Assembly, Counter.
5112	Hexagon Nut.
5113	Pin Dowel.
5123	Screw, Special Fillister Head.
5296	Bearing, Shutter and Counter Shaft.
5322	Shaft, Shuttle.
8918	Shoulder Screw.
8933	Shuttle, Double Tooth.
9260	Ball, 1/16th Steel.
9426	Felt, Oiler.
9427	Felt, Oiler.
9558	Baffle, Oil.
10529	Washer, Shim.
11054	Spring Clamp.
11055	Flat Head Screw.
11110	Spring, Compression.
11277	Worm (L.H.)
11280	Collar.
11281	Socket Set Screw.
11282	Socket Set Screw.
12788	Shutter.
12789	Support, Shutter.
50141	Case, Gear.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Gear Case Assembly

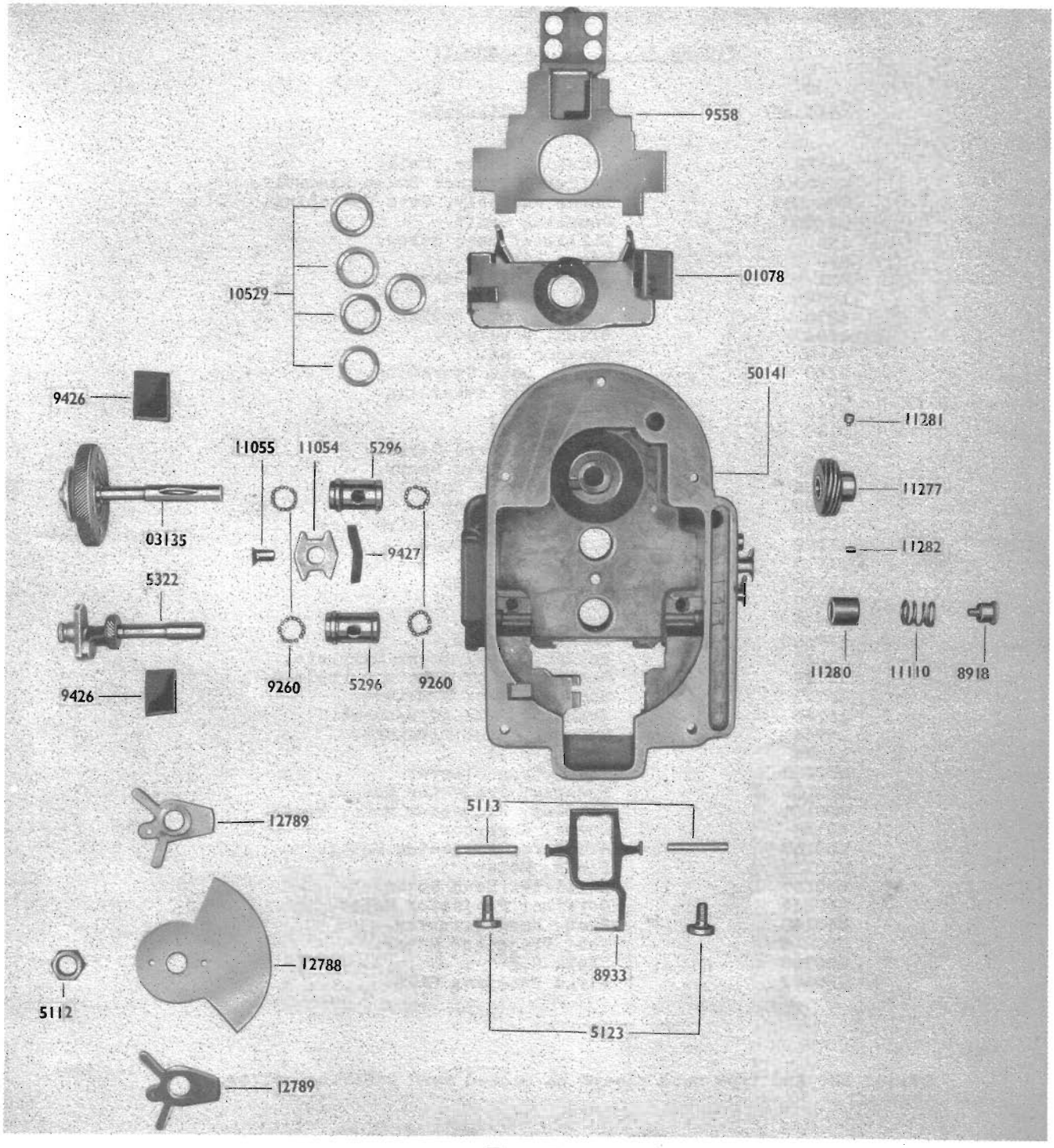


Fig. 3

MODEL 609 SPARE PARTS LIST.

FIGURE 4. (MOTOR ASSEMBLY).

Part No.	Description.
04770	Mount Assembly, Coil.
M025000	Holder, Governor Brush Assembly.
M025069	Lever Assembly, Gate Operating.
025377	Coupling Shaft.
112	Fillister Head Screw.
890	Gear, Idler.
891	Shaft, Idler Gear.
1587	Oval Head Screw.
4373	Bearing, 8mm Radial.
4664	Brush, Governor.
5112	Hexagon Nut.
5160	Block, Gate Operating.
5201	Nut, Field Retaining.
6715	Steel Ball.
9117	Hexagon Nut.
9718	Fillister Head Screw.
10349	Fillister Head Screw.
10356	Bearing, 6mm Radial.
10390	Washer, Locking.
10565	Motor Shaft Extension Knob.
11178	Screw, Round Head.
11713	Washer.
11888	Motor Brush Cap.
12909	Spring, Brush.
12918	Brush, Motor.
13788R	Switch S.P.S.T.
14842	Holder, Motor Brush Complete.
15706	Spring, Motor Armature Preload.
15721	Spacer, Motor Armature.
15726	Bushing, Gate Adjustment.
15764	Spacer, Motor Armature.
15774	Mount, Coil.
M50000	Insulating Sleeve.
M50130	Housing, Projector Motor.
M50131	Housing, Projector Motor Brush.
50132	Cover, Governor.
M50133	Armature, Projector Motor.
M50134	Field, Motor.
M50137	Fillister Head Screw.
M50139	Governor Projector Motor.
M50140	Knob, Hand Turnover.
M50243	Fan, Projector Motor.
M50309	Choke R.F.
M50337	Field Retainer Stud.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Motor Assembly

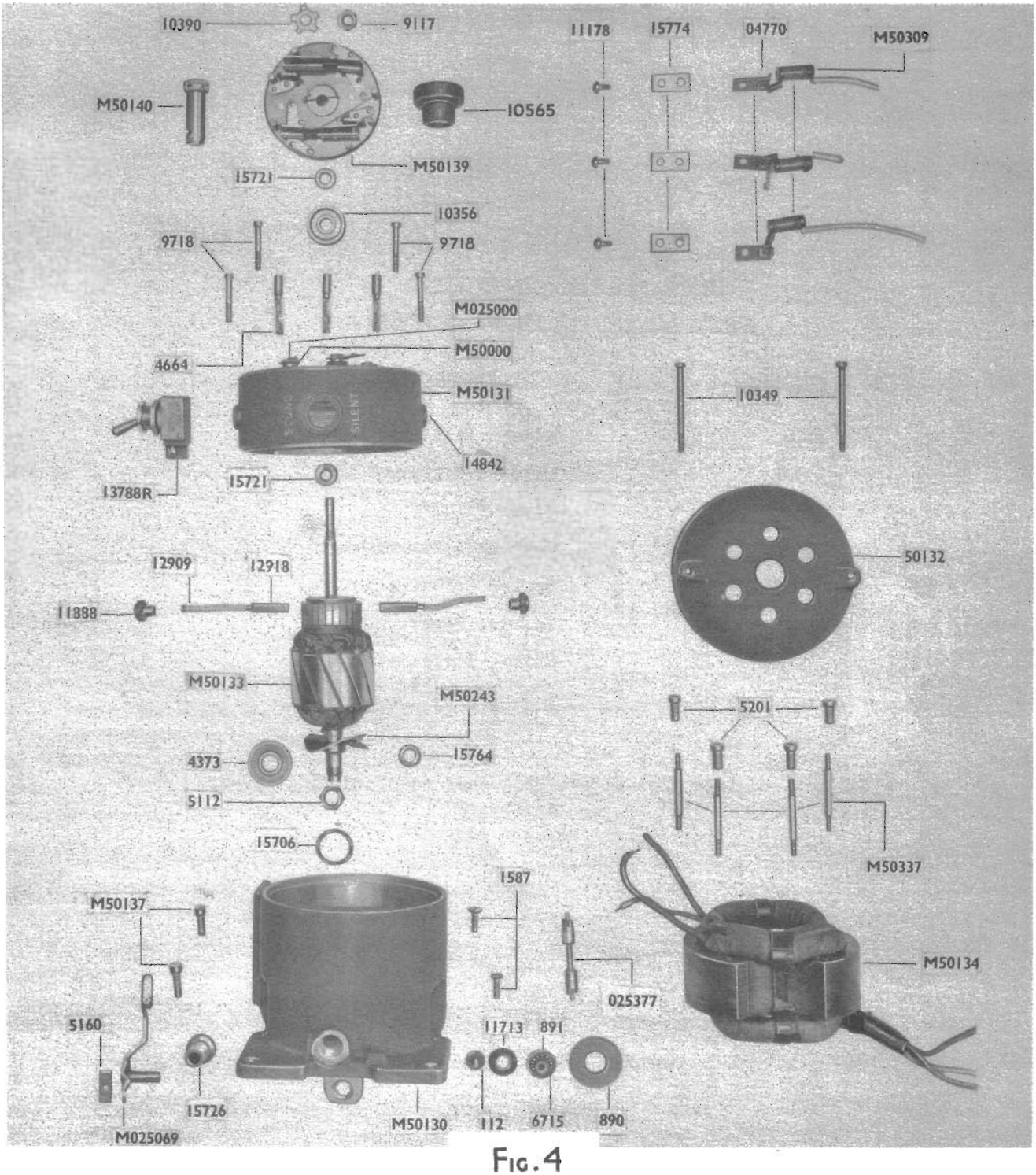


Fig. 4

MODEL 609 SPARE PARTS LIST.

FIGURE 5. (HEATER FILTER ASSEMBLY).

Part No.	Description.
6201	Screw, Fillister Head.
15778	Holder, Filter.
15779	Glass Filter.
15780	Retainer, Filter Glass.
15781	Spring Filter Friction.
15783	Baffle, Light.
16930R	Screw, Fillister Head.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector
Heat Filter Assembly

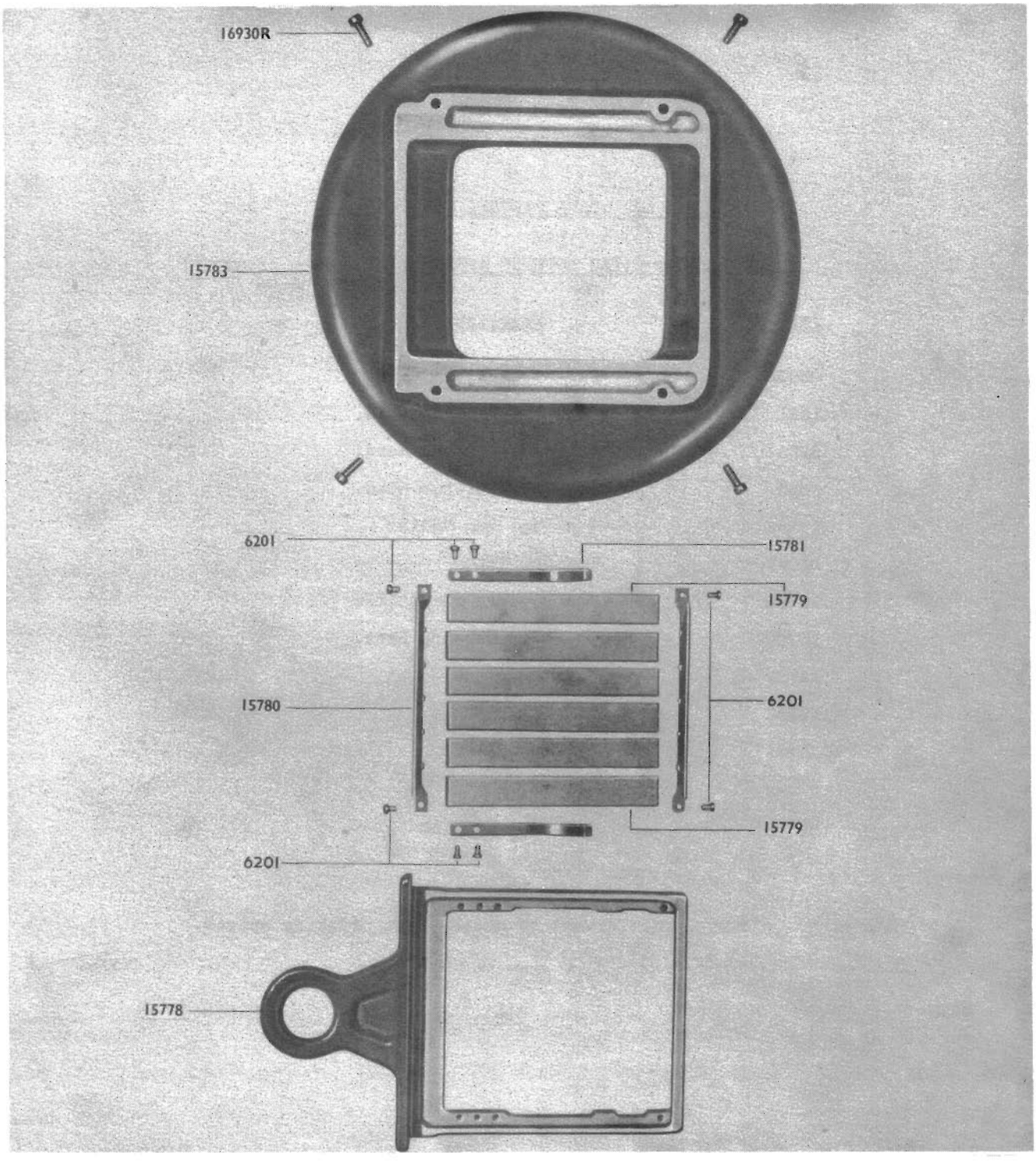


Fig. 5

MODEL 609 SPARE PARTS LIST.

FIGURE 6. (FAN HOUSING ASSEMBLY).

Part No.	Description.
05002	Fan Assembly.
1361	Screw, Fillister Head.
3225	Screw, Fillister Head.
9335	Screw, Fillister Head.
10356	Bearing, 6mm Radial.
12087	Hexagon Nut.
15703	Spacer, Fan Shaft (Long).
15708	Cone Fan Housing Heat.
15709	Housing, Fan.
15782	Housing, Filter.
15784	Baffle, Blower.
50282	Intake, Fan.
M50283	Cap, Fan Bearing.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector
Fan Housing Assembly

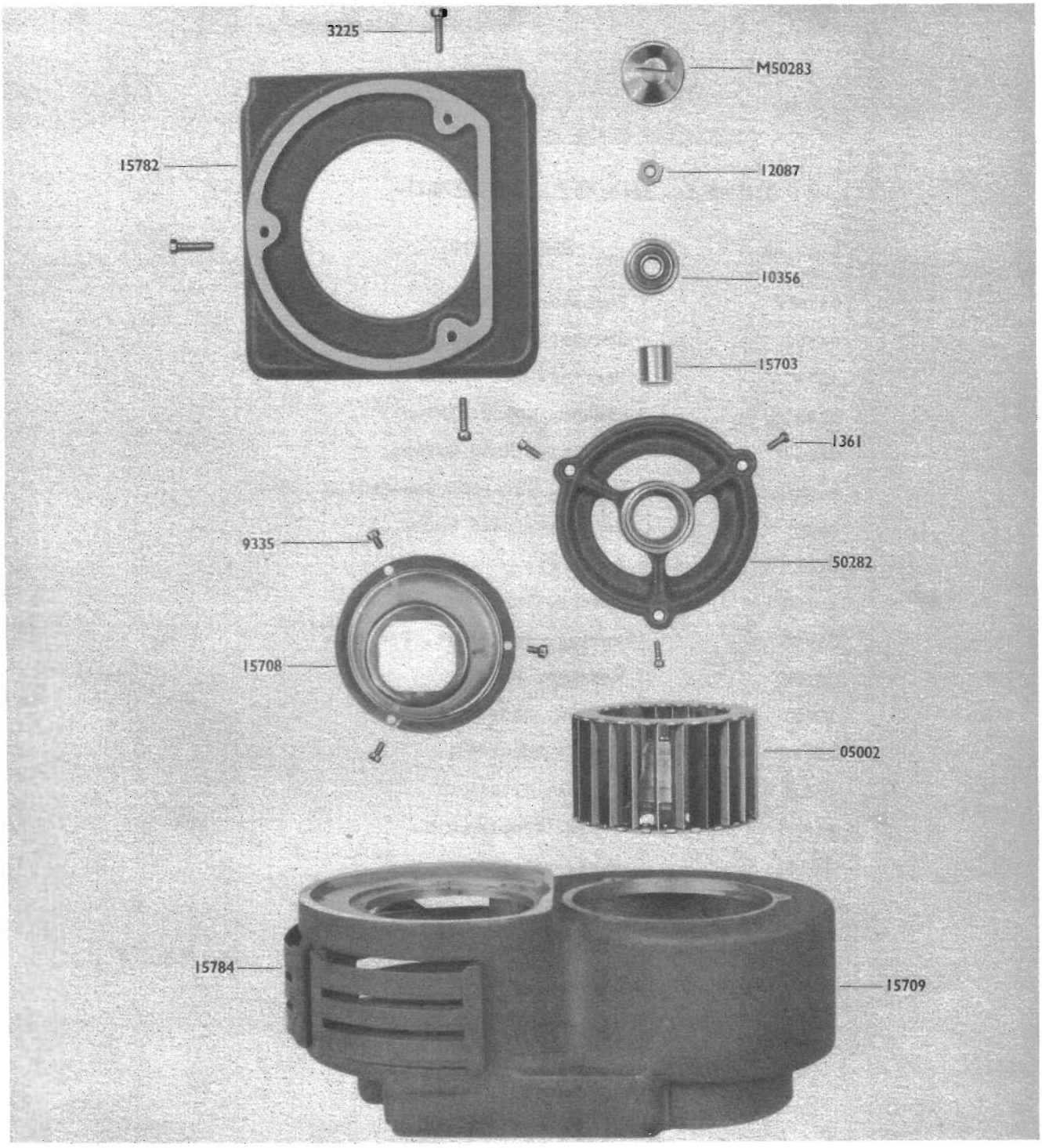


Fig. 6

MODEL 609 SPARE PARTS LIST.

FIGURE 7. (FAN HOUSING ASSEMBLY).

Part No.	Description.
04758R	Resistor Assembly.
04769	Shutter Assembly, Fire.
4373	Bearing, 8mm Radial.
5193	Washer, Motor Pinion.
5211	Fillister Head Screw.
6403	Spacer, Governor Connecting Link.
8988	Fillister Head Screw.
9171	Dowel Pin.
15704	Spacer, Fan Shaft (Short).
15705	Spring, Fan Shaft, Preload.
15709	Housing, Fan.
15731	Shield, Aperture Heat.
15755	Screw, Shoulder.
21328	Pinion, Motor.
21330	Screw, Compression.
21331	Ring, Retaining.
M50269	Shaft, Fan.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector
Fan Housing Assembly

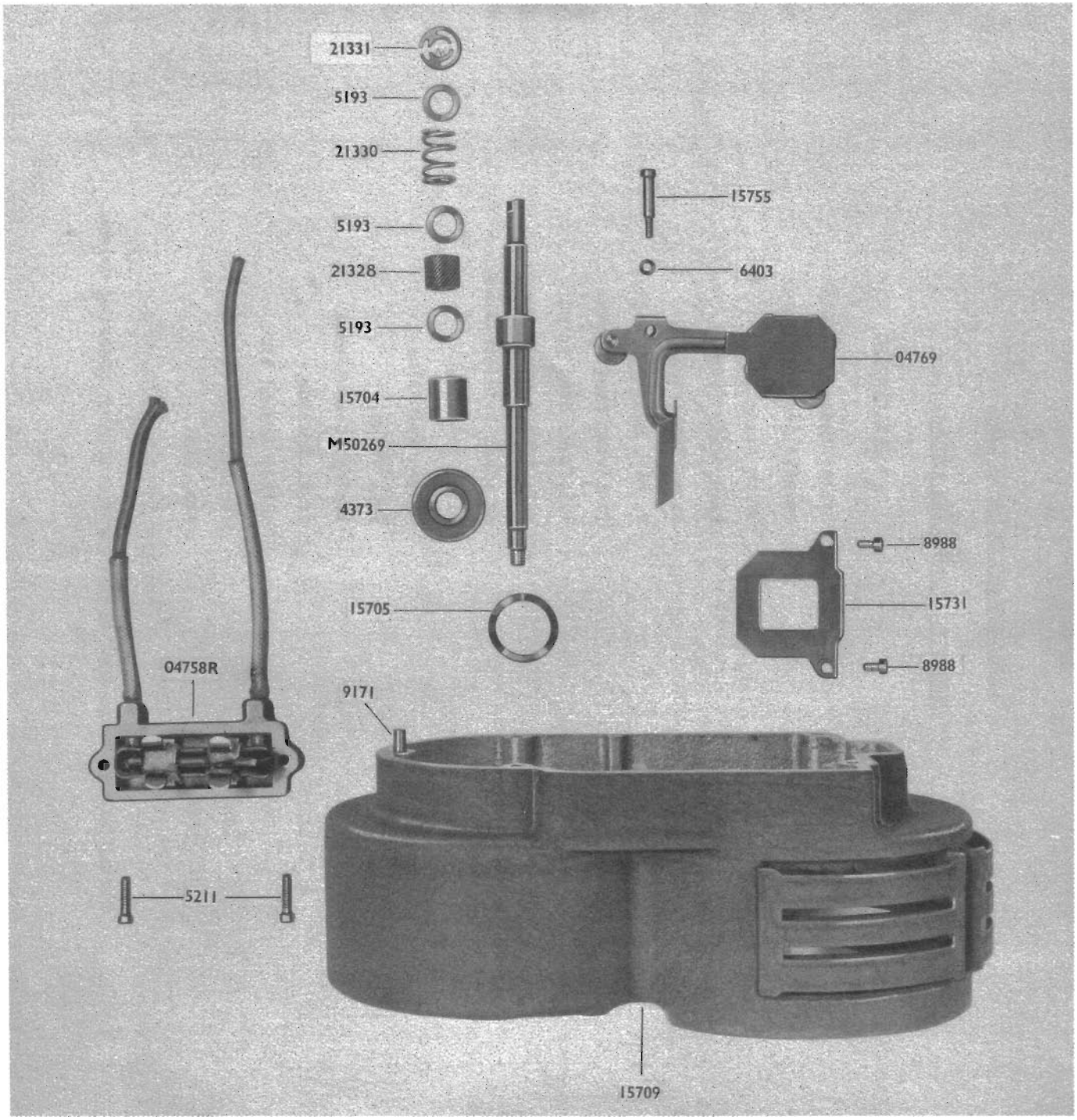


Fig. 7

MODEL 609 SPARE PARTS LIST.

FIGURE 8. (REEL ARM ASSEMBLY).

Part No.	Description.
02247	Roller Assembly, Idler.
02682	Spindle Assembly, Reel.
04765	Screw Assembly, Reel Arm.
860	Race, Ball (Outer).
861	Race, Ball (Inner).
1375	Washer, Split Retaining.
5157	Fillister Head Screw.
5843	Fillister Head Screw.
6715	Ball 1/16th Steel.
10925	Retainer Friction Block.
10926	Block Friction.
10927	Screw, Adjusting.
10928	Cap, Screw.
10929	Spring, Compression.
14849	Stud, Snubber.
15745	Guide, Rewind Film.
15747	Spring, Compression.
15772	Arm, Reel.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Reel Arm Assembly

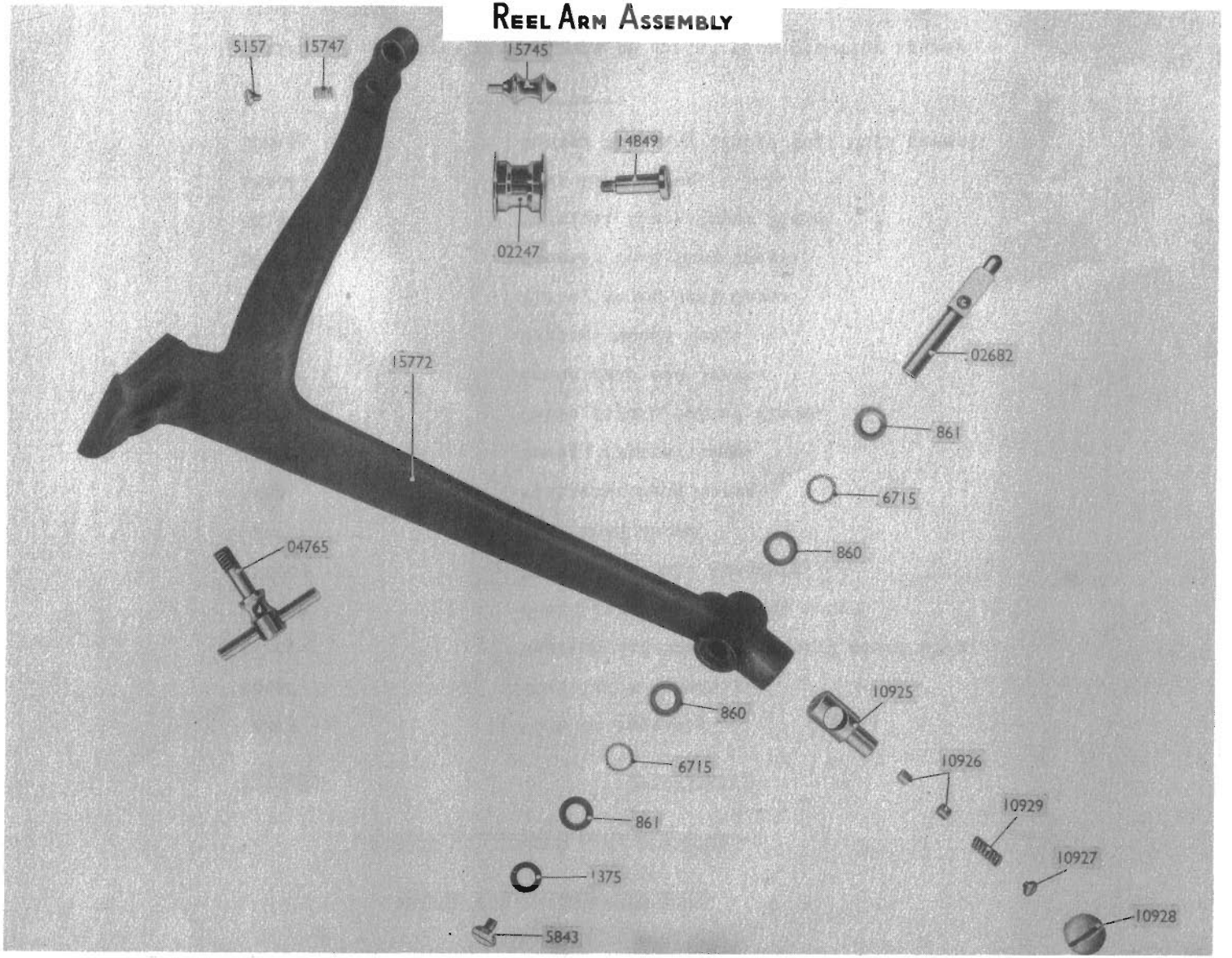


Fig. 8

MODEL 609 SPARE PARTS LIST.

FIGURE 9. (SOUND HEAD ASSEMBLY).

Part No.	Description.
02674	Snubber Assembly.
03690	Stabilizer Assembly.
04169	Bearing and Shaft Assembly, Sound Drum.
025073	Cable Assembly, Take up Motor.
025067	Photo Cell Unit Assembly.
1587	Oval Head Screw.
5266	Fillister Head Screw.
13720R	Cover, Exciter Lamp.
15742	Cable Strain Relief Plate.
50120	Sound Head end Cover.
50127	Casing, Sound Head.
50136	Plate, Sound Head Cover.
50138	Counter Sunk Head Screw.
50149	Terminal Block Cover Plate.
50244	Oval Head Screw.
50316	Rubber Surround (Photo Cell Unit Cover).

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector
Sound Head Assembly

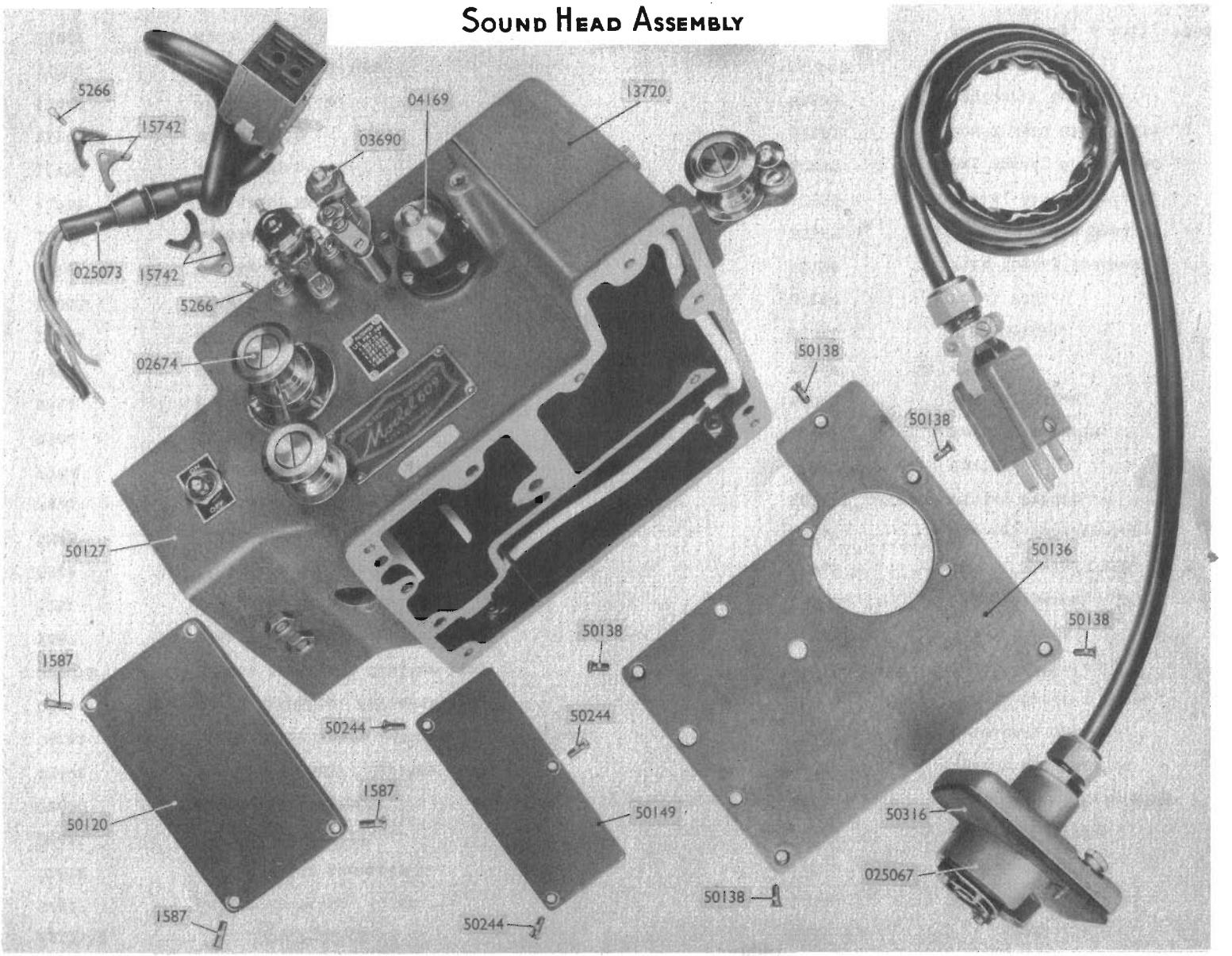


Fig. 9

MODEL 609 SPARE PARTS LIST.

FIGURE 10. (SOUND HEAD ASSEMBLY).

Part No.	Description.
02247	Roller Assembly, Idler.
02678	Optical Slit Assembly.
03461	Sprocket Assembly.
03690	Stabilizer Assembly.
03692	Damper Assembly, Exciter Lamp.
04169	Bearing and Shaft Assembly, Sound Drum.
04946	Guard Assembly, Sprocket.
025078	Socket Assembly, Exciter Lamp.
1587	Oval Head Screw.
5157	Fillister Head Screw.
5266	Fillister Head Screw.
5893	Set Screw.
7493	Fillister Head Screw.
7764	Screw 6/32 x 3/8 Fillister Head.
9305	Fillister Head Screw.
9414	Plate, Snubber Bearing.
9415	Snubber Bearing.
10291	Knurled Head Screw.
10343	Plug.
11147	Washer.
11268	Headless Set Screw.
11757	Fillister Head Screw.
11758	Shaft, Sprocket.
11761	Guide, Film.
11762	Stripper, Film.
11859	Headless Set Screw.
11867	Gear.
12145	Shield, Light Control.
12246	Bearing, 6mm Radial
12511	Stud, Mounting.
13499	Washer, Spacer.
13656	Cap, Bearing Retaining.
13659	Spring Compression.
13661	Retainer, Spring.
13720R	Cover, Exciter Lamp.
14848	Retainer Spring.
14849	Snubber Stud.
14852	Snubber Lever.
15745	Guide, Rewind Film.
15747	Spring, Compression.
15753R	Plate, Patent.
16243	Spring.
16244	Washer, Tension.
50025	Special Screw.
50027	Plug.
50090	Plug Holder.
50110	Dowel Pin.
50126	Film Rewind Bracket.
50127	Casing, Sound Head.
50155	Plate, Switch on/off.
50245	Tag Board, Sound Head.
50265	Sound Head Name Plate.
50323	Supressor Condenser.
50246	Switch D.P.D.T.
202254	Exciter Lamp, 4 volt .75 amp.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector
Sound Head Assembly

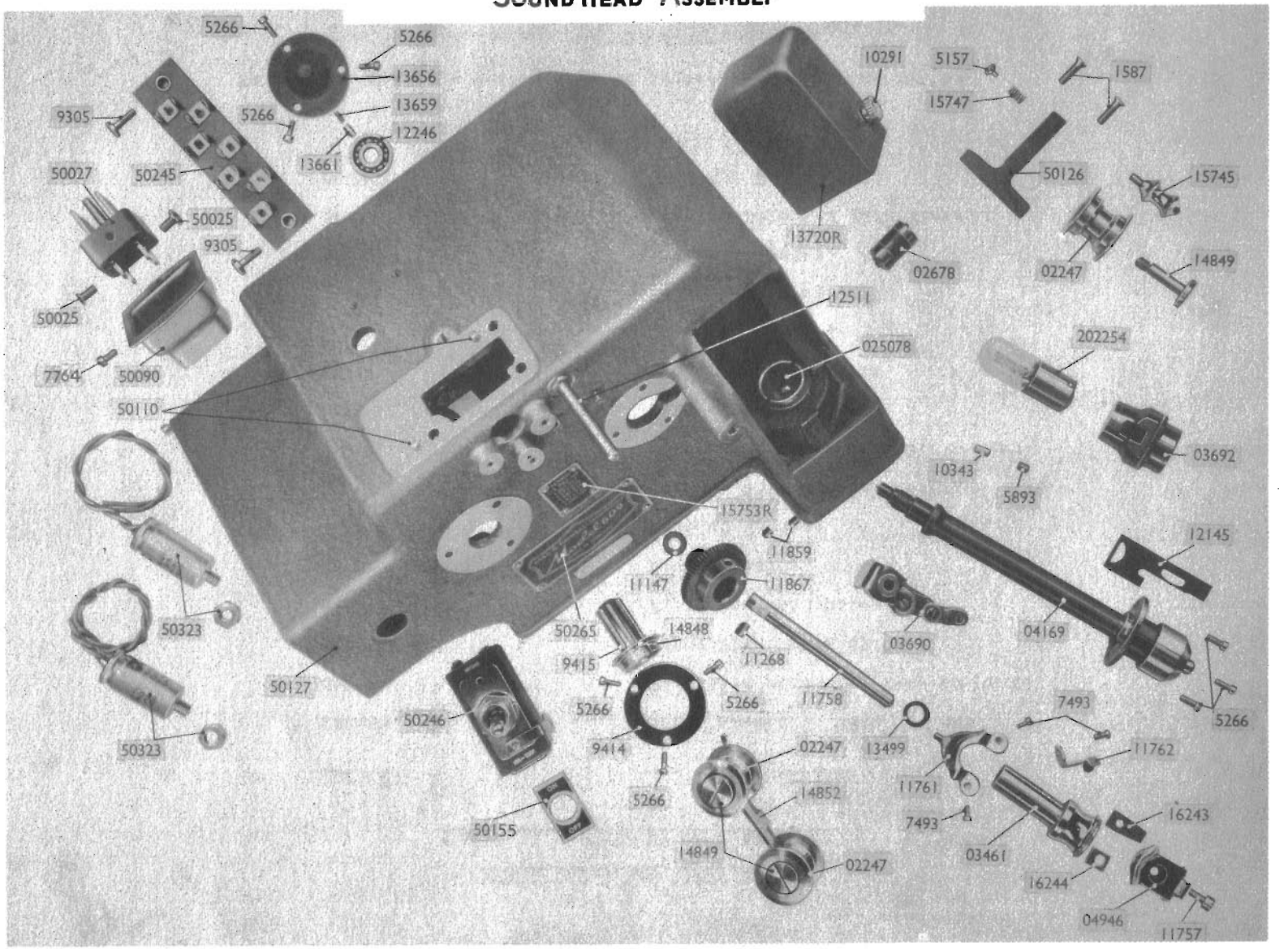


Fig. 10

MODEL 609 SPARE PARTS LIST.

FIGURE 11. (TAKE UP UNIT ASSEMBLY).

Part No.	Description.
025085	Screw Assembly, Take up Unit.
025091	Tag Board Assembly, Take up Unit.
025092	Input Plug, Take up Unit.
9305	Fillister Head Screw.
50025	Special Screw.
50249	Take up Housing.
50250	Take up Unit Housing Cover.
50253	Take up Unit Terminal Strip Post.
50254	Take up Switch Knob.
50255	Fillister Head Screw.
50256	Rheostat.
50257	Switch, Take up Unit.
50259	Standard Washer.
50267	Take up Selector Main Plate.
50383	Rheostat Knob.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Take up Unit Assembly

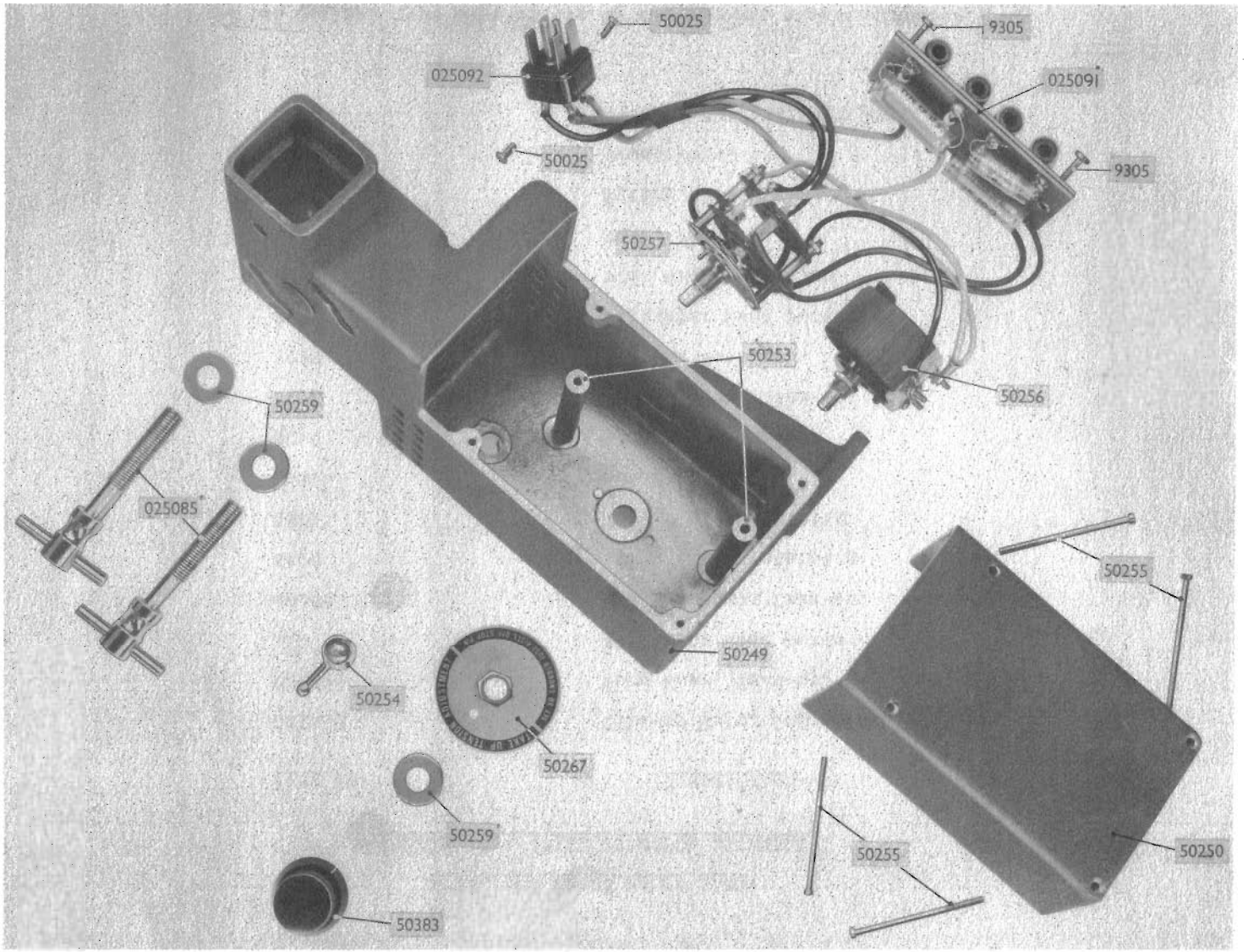


Fig. 11

MODEL 609 SPARE PARTS LIST.

FIGURE 12. (TAKE UP MOTOR ASSEMBLY).

Part No.	Description.
02158R	Take-up Motor Cap Assembly.
02159R	Worm Assy, Take-up.
112	Fillister Head Screw.
4966R	Housing Motor Take-up.
5200	Stud, Field Retaining.
5201	Nut, Field Retaining.
9089	Spacer.
9090	Armature, Take-up.
9092	Field, Motor Take-up.
9093	Bearing Retainer.
9098	Fillister Head Screw.
10356	6mm. Radial Bearing.
11888	Motor Brush Cap.
12909	Spring, Brush.
12918	Brush Motor.
50156	Screw 6-32 Fillister Head.

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Take up Motor Assembly

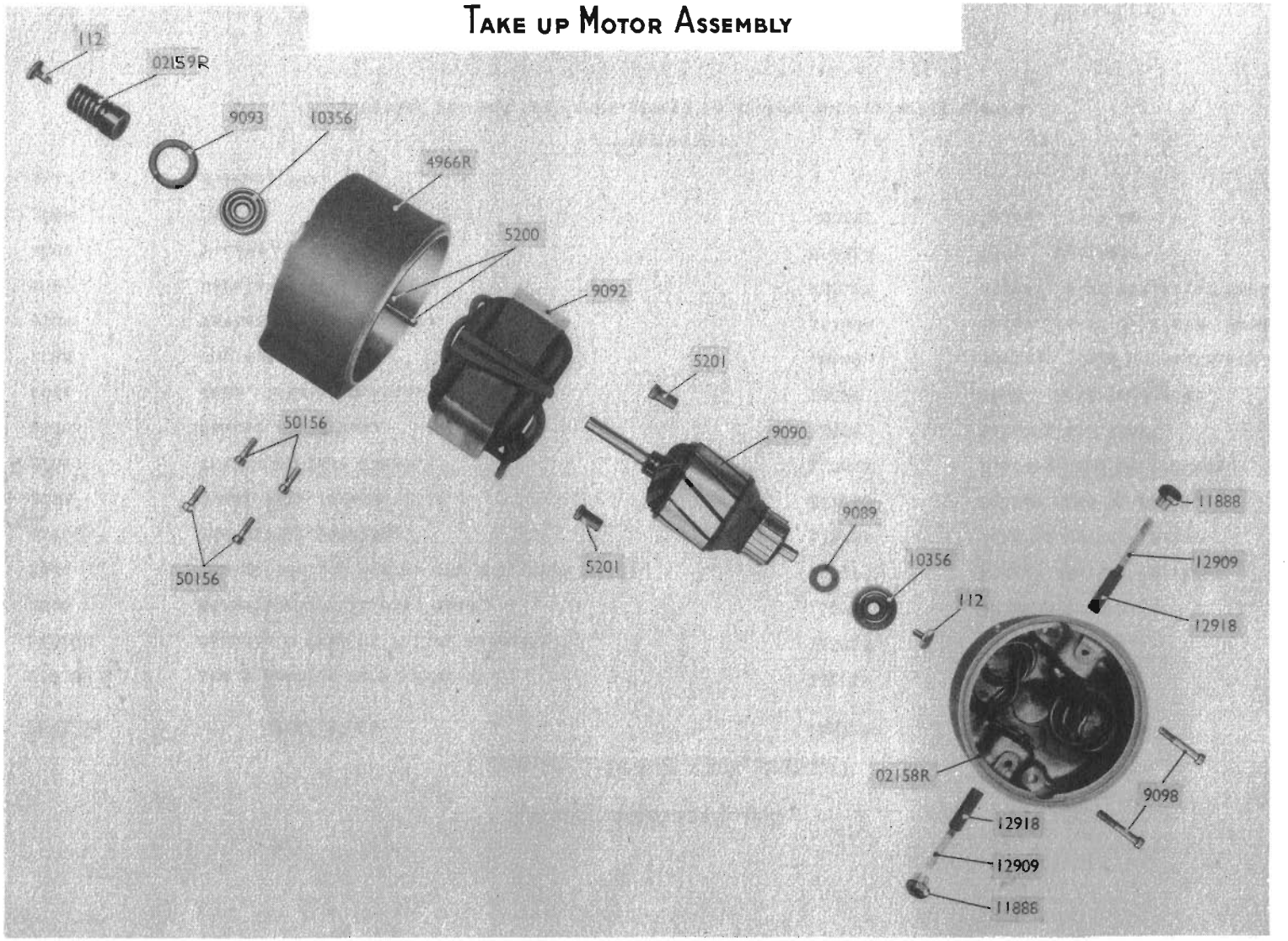


Fig. 12

MODEL 609 SPARE PARTS LIST.

FIGURE 13. (TAKE UP DRIVE ASSEMBLY).

Part No.	Description.	Part No.	Description.
03318R	Arm & Bearing Assy. Take-up.	11371R	Pin.
03320R	Spindle & Take up Pulley Assembly.	11372R	Plunger Spring.
2365	Screw 10/32 Fillister Head.	11375	Housing Worm Gear.
2464	Radial Bearing 6 m/m. (R. & M. Type 2LJ6).	11377	Ring. Bearing Retainer.
4373	8mm Radial Bearing.	11378R	Take up Spindle Drive.
5238	Steel Ball (Grade 'A').	11380R	Pulley Take up Drive.
5266	Fillister Head Screw.	11381R	Bracket Take up Tension.
9083	Washer, Friction.	11468	Take Up Arm Shaft.
9084	Gear, Take-up Spiral.	12526	Stud. Bell Tensioner.
9085	Cap end.	15822	Spring. Take up Auxiliary.
9086	Washer, Friction Drive.	16246R	Screw. 1/4-20 Fillister Head.
9087	Retainer, Bearing.	M50137	Screw. 8-32 Fillister Head.
9088	Washer, Star Friction.	M50154	Clip. Spring.
9089	Spacer.	M50260	Belts. Take up.
9117	Hexagon Nut.		

Serial No. and type must always be quoted when ordering spares.

G.B. Bell & Howell Model 609 Projector

Take up Drive Assembly

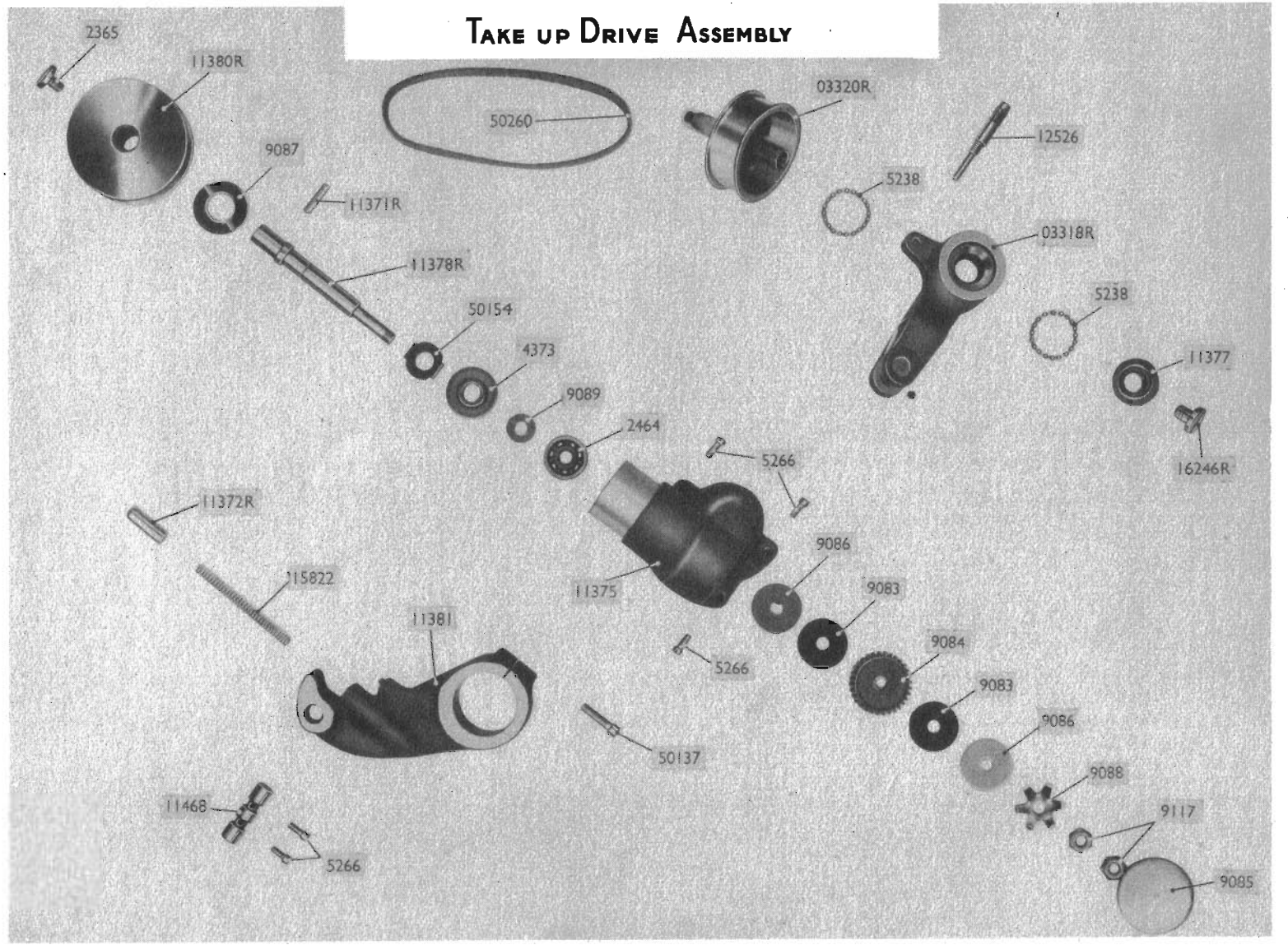
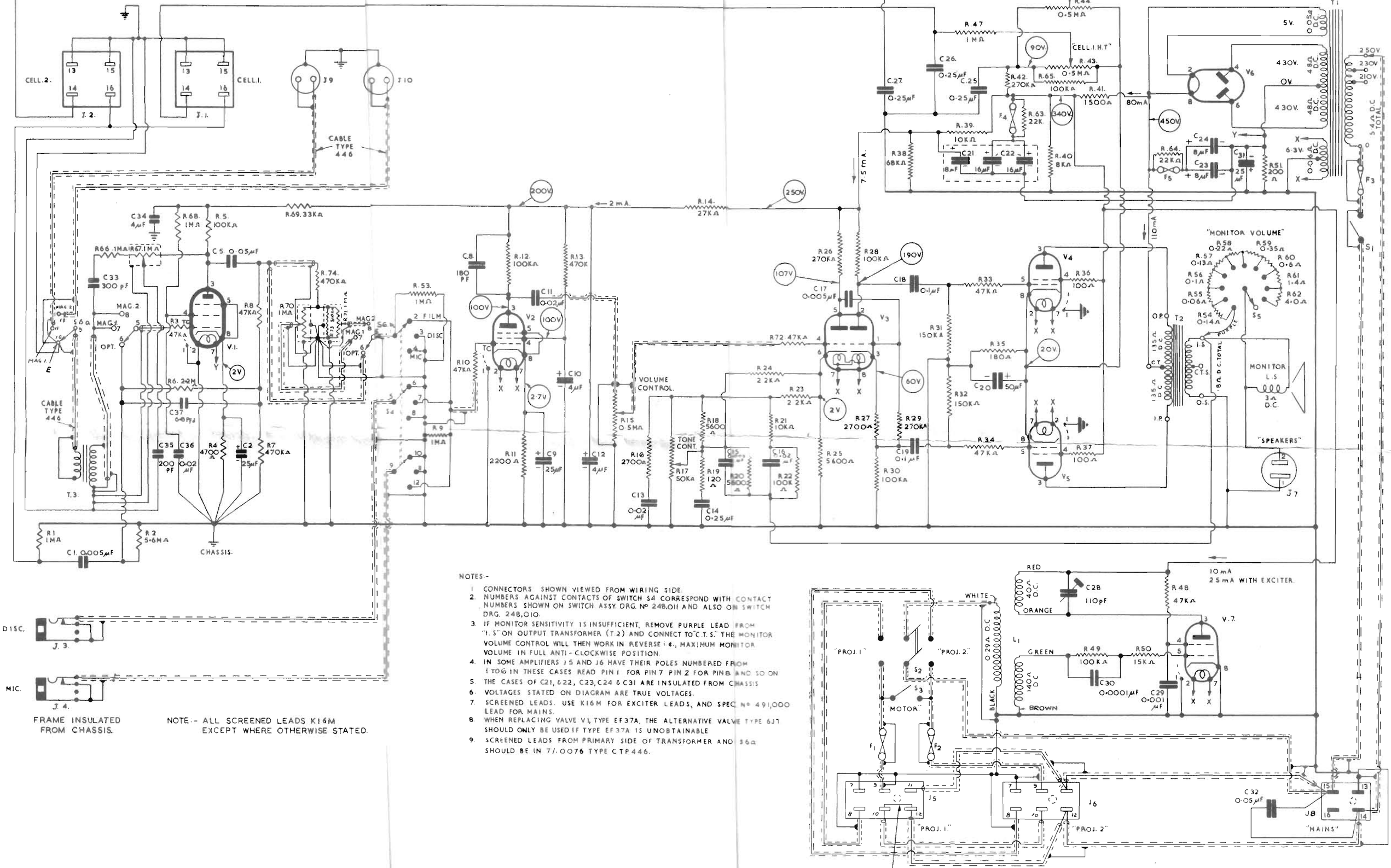


Fig. 13

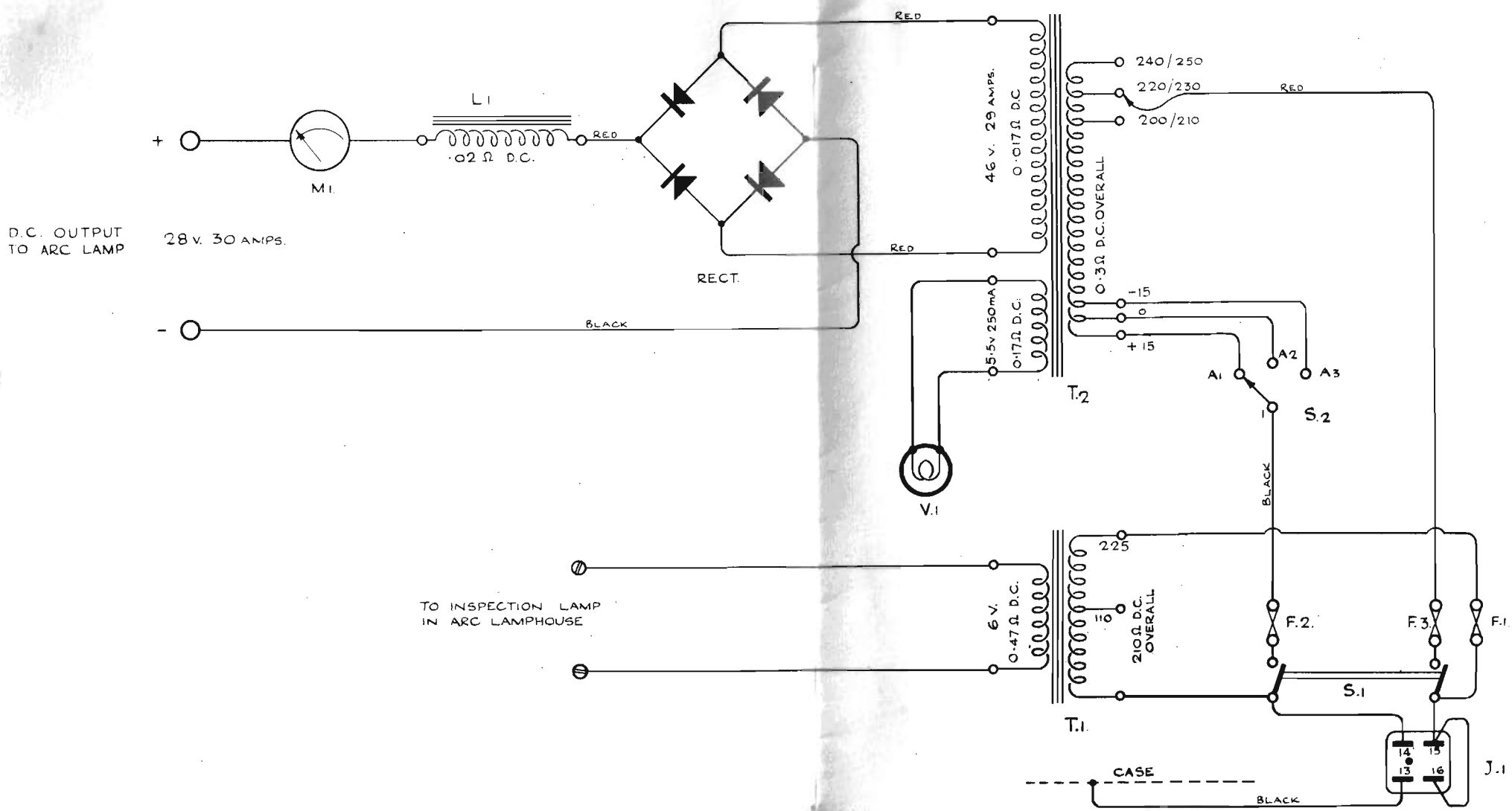
MODEL PROJECTOR
TYPE 1178 A LIFIER PARTS LIST

Circuit Ref.	Description		Part No.
C 1	Capacitor	0.005 mfd	CX0703
C 2	"	25 mfd	CSS2484
C 5	"	0.05 mfd	CS3082
C 8	"	180 pf	CY4052
C 9	"	25 mfd	CSS2484
C10	"	4 mfd	CS1479
C11	"	0.02 mfd	CS2855
C14	"	0.25 mfd	CS3204
C15	"	0.005 mfd	CX0703
C18	"	0.1 mfd	CX1822
C19	"	0.1 mfd	CX1822
C20	"	50 mfd	CS2485
C21	"	8 mfd	202073
C22	"	32 mfd	202073
C23	"	8 mfd	CS0822
C24	"	8 mfd	CS0822
C25	"	0.25 mfd	CS3204
C26	"	0.25 mfd	CS3204
C27	"	0.25 mfd	CS3204
C28	"	110 pf	CSTB2
C29	"	0.001 mfd	CS2206
C30	"	0.0001 mfd	CS2201
C31	"	25 mfd	CSS2488
C32	"	0.05 mfd	CS3082
C33	"	300 pf	CZ2203
C34	"	4 mfd	CS1479
C35	"	200 pf	CZ1487
C36	"	0.02 mfd	CS3400
C37	"	6.8 pf	CY6507
R 1	Resistor	1 meg ohm ± 10%	REX8105
R 2	"	5.6 meg ohm " 10%	REX8565
R 3	"	47000 ohm " 20%	REW9473
R 4	"	4700 ohm " 10%	REX16472
R 5	"	100,000 ohm " 10%	REX100104
R 6	"	2.2 meg ohm " 10%	REX8225
R 7	"	470,000 ohm " 10%	REX8474
R 8	"	47,000 ohm " 20%	REW8473
R 9	"	1 meg ohm " 20%	REW16105
R10	"	47,000 ohm " 20%	REW9473
R11	"	2,200 ohm " 10%	REX8222
R12	"	100,000 ohm " 10%	REX8104
R13	"	470,000 ohm " 20%	REW16474
R14	"	27000 ohm " 10%	REX8273
R15	Potentiometer	0.5 meg ohm	POC3504
R16	Resistor	27000 ohm " 10%	REX16272
R17	Potentiomer	50.000 ohm	202077
R18	Resistor	5600 ohm " 10%	REX16562
R19	"	120 ohm " 10%	REX16121
R20	Resistor	5600 ohm " 10%	REX16562
R21	"	10,000 ohm " 10%	REX16103
R22	"	100,000 ohm " 5%	REY16104
R23	"	22000 ohm " 10%	REX16223
R24	"	22000 ohm " 10%	REX16223
R25	"	5600 ohm " 10%	REX16562
R26	"	270,000 ohm " 10%	REX16274
R27	"	2,700 ohm " 10%	REX16272
R28	"	100,000 ohm " 5%	REY16104
R29	"	270,000 ohm " 10%	REX16272
R30	"	100,000 ohm " 5%	REY16104
R31	"	150,000 ohm " 10%	REX8154
R32	"	150,000 ohm " 10%	REX8154
R33	"	47,000 ohm " 20%	REW8473
R34	"	47,000 ohm " 20%	REW8473
R35	"	180 ohm ± 5%	REB3181
R36	"	100 ohm " 10%	REX8101
R37	"	100 ohm " 10%	REX8101
R38	"	68,000 ohm " 5%	REY1683
R39	"	10,000 ohm " 5%	REY2103
R40	"	8000 ohm " 5%	REG3802
R41	"	1500 ohm " 5%	RED3152
R42	"	270,000 ohm " 5%	REY8275
R43	Potentiometer	0.5 meg ohm	POC3504
R44	"	0.5 meg ohm	POC3504
R46	Resistor	1 meg ohm " 20%	REW16105
R47	"	1 meg ohm " 20%	REW16105
R48	"	47,000 ohm " 5%	REY8473
R49	"	100,000 ohm " 5%	REY16104
R50	"	15,000 ohm " 20%	REW16153
R51	"	200 ohm " 5%	RED3201
R53	"	1 meg ohm " 10%	REX8105
R54 - R62	Reference only (Part of S5)		
R63	Resistor	22000 ohm 20%	REW2223
R64	"	22000 ohm " 20%	REW2223
R65	"	100,000 ohm " 5%	REY8104
R66	"	1 meg ohm " 20%	REW9105
R67	Potentiometer	1 meg ohm	POD3105
R68	Resistor	1 meg ohm " 20%	REW9105
R69	"	33,000 ohm " 20%	REW1633
R70	Potentiometer	1 meg ohm	POT7003
R71	"	1 meg ohm	POT7003
R72	Resistor	47,000 ohm " 20%	REW9473
R73	"	510,000 ohm " 10%	REX8514
R74	"	470,000 ohm " 10%	REX8474
J 1	Socket		CJS-4-AB
J 2	"		CJS-4-AB
J 3	" Jack		732281
J 4	Socket		732281
J 5	"		CJS-6-AB
J 6	"		CJS-6-AB
J 7	"		500462
J 8	Plug		222034
J 9	Socket		SOL625/S
J10	"		SOL625/S
F 1	Fuse 2 amp		FCA0200
F 2	"		FCA0200
F 3	"		FCA0200
F 4	Fuse 500 ma		FCA0050
F 5	"		FCA0050
S 1	Switch		SW8280/K15
S 2	"		SW8373/K8
S 3	"		SW8280/K15
S 4	Switch		248011
S 5	"		222006
S 6	"		1,135,024
L 1	Coil, Oscillator		202029
L 2	Speaker		92027
T 1	Transformer, Mains		574000
T 2	Transformer, Output		498000
T 3	Transformer, Input		1135019
V 1	Valve, EF37A		VEF37A
V 2	" EF37A		VEF37A
V 3	" ECC35		VECC35
V 4	" KT66		VKT66
V 5	" KT66		VKT66
V 6	" U52		VU52
V 7	" 6V6		V6V6



NOTES:-

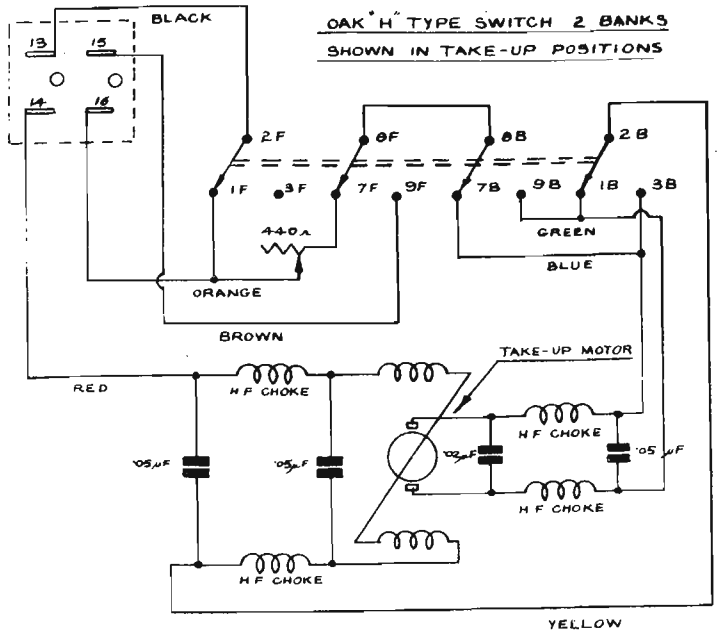
1. CONNECTORS SHOWN VIEWED FROM WIRING SIDE.
2. NUMBERS AGAINST CONTACTS OF SWITCH S4 CORRESPOND WITH CONTACT NUMBERS SHOWN ON SWITCH ASSY. DRG. Nº 248,011 AND ALSO ON SWITCH DRG. 248,010.
3. IF MONITOR SENSITIVITY IS INSUFFICIENT, REMOVE PURPLE LEAD FROM "1. S" ON OUTPUT TRANSFORMER (T.2) AND CONNECT TO "C.T.S." THE MONITOR VOLUME CONTROL WILL THEN WORK IN REVERSE i.e., MAXIMUM MONITOR VOLUME IN FULL ANTI-CLOCKWISE POSITION.
4. IN SOME AMPLIFIERS J5 AND J6 HAVE THEIR POLES NUMBERED FROM 1 TO 6 IN THESE CASES READ PIN 1 FOR PIN 7 PIN 2 FOR PIN 8 AND SO ON
5. THE CASES OF C21, 22, C23, C24 & C31 ARE INSULATED FROM CHASSIS
6. VOLTAGES STATED ON DIAGRAM ARE TRUE VOLTAGES.
7. SCREENED LEADS. USE K16M FOR EXCITER LEADS, AND SPEC Nº 491,000 LEAD FOR MAINS.
8. WHEN REPLACING VALVE V1, TYPE EF37A, THE ALTERNATIVE VALVE TYPE 6J7 SHOULD ONLY BE USED IF TYPE EF37A IS UNOBTAINABLE
9. SCREENED LEADS FROM PRIMARY SIDE OF TRANSFORMER AND S6a SHOULD BE IN 7/.0076 TYPE C.T.P.446.



J.1	TRANS. 50 c/s 200/7 KILOVOLT	TRK 6/50	250020
T.2	TRANS.		
	RECTIFIER ASSY		250009
M.1	0-30 AMPS D.C. F.S.D.		250021
L.1	CHOKE 2 mH		280000
V.1	LAMP 8 V. 3 W. M.E.S.	LMES 8	
F.1	FUSE 2 AMP	FCA0200	
F.2	" 25 SWG	WT2125	
F.3	" 28 SWG	WT2125	
S.1	SWITCH, PANTON D.P. ON-OFF	M50108	
S.2	SWITCH, ROTARY S.P. 3 WAY		250038
J.1	INPUT PLUG	IP4CCT	

BRITISH ACOUSTIC FILM

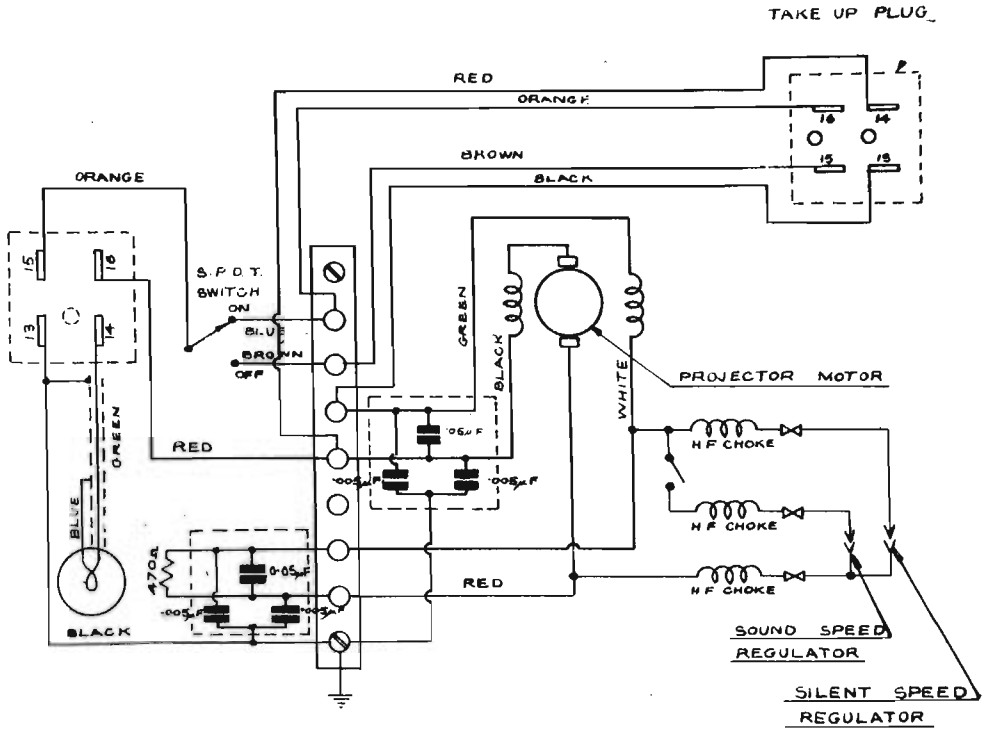
SPECIFICATION No.		THEORETIC ARC RE
USED ON	DATE	
DRWN BY [illegible]	23 XI 49	
TRCD BY		ISSUE No. 1
CHKD BY [illegible]		C- 25
APPD BY [illegible]		



WIRING DIAGRAM

230v. MODEL 609 TAKE UP MOTOR CIRCUIT.

M 025076 SHEET 2



230v. MODEL 609 EXCITER LAMP AND PROJECTOR MOTOR CIRCUIT.

M 025062 SHEET

MODIFICATIONS

SCALE FULL SIZE	USED ON ASSY. No.	TOLERANCES, UNLESS STATED, ON DECIMAL DIMS. ± ON OTHER DIMS. ±	BRITISH ACOUS
▽ NORMAL MACHINED FINISH		DRN. BY P.A. DATE 7-11-52.	WIRING DI
▽▽ GROUND OR FINE MACHINED FINISH		CKD. BY APPD. BY	MODEL 609 TA
▽▽▽ FINE GROUND FINISH WITHOUT WHEELMARKS		MATERIAL	MODEL 609 E & PROJECTOR
		FINISH	PART NUMBER M 025