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INSTALLATION INSTRUCTIONS and OPERATING MANUAL

Supersedes Data No. 36 issued 3/9/36
Supersedes Data No. 36-A issued 4/24/36
Supersedes Data No. 36-C issued 7/20/36

Photophone Data No. 36
MI-1040-1041 Soundhead
Second Edition
September 23, 1936

2C1-4

2C1-2.1

MI-1040 SOUNDHEAD (60 CYCLE) (SIMPLEX)

MI-1041 SOUNDHEAD (50 CYCLE) (SIMPLEX)

These soundheads are de luxe units designed for use with high fidelity Photophone Amplifiers. All of the fine features of previous models have been retained and several new features are incorporated which make this soundhead outstanding in its performance.

The rotary stabilizer and sound take-off drum are utilized for constant film speed; all rotating shafts run in ball bearings; the motor drives the soundhead through a flexible coupling; the center plate of the soundhead, to which is attached the exciter lamp, the optical unit and the photocell, is supported on the main casting by three cushions of high grade oil resisting material, thereby reducing any tendency for microphonic pickup; and the interior of the soundhead operating side is aluminum finished to permit the operator to see the mechanism and film more easily. The motor can be quickly removed from its support bracket without disturbing any of the soundhead mechanism. The oil lever in the gear compartment is kept below the center of the worm gear and other gears are lubricated with the oil carried up by the lower gear. The Stock No. 23676 oil deflector shown in Figure 8 prevents oil leakage along the drive shaft.

The following text gives the installation procedure, care and maintenance and the mechanical and electrical adjustments which may be required for this type of soundhead.

PART I - INSTALLATION (SIMPLEX PROJECTOR)

(1) DISMANTLING PROJECTOR

To dismantle the existing projector equipment, proceed as follows:

(a) Remove the top magazine and the take-up magazine from the projector.
(b) Remove the projector head from the Simplex main bearing bracket.
(c) Remove the lower door from the drive side of the projector head.
(d) Remove the projector drive motor.
(e) Remove the lamphouse from the lamphouse carriage.
(f) Remove the Simplex main bearing bracket by taking out the pivot pin which holds the bracket to the projector pedestal.

(2) ASSEMBLY OF SOUNDHEAD AND PROJECTOR

(a) Place the RCA main bearing bracket on the pedestal and secure it in place with the main bearing pivot pin.

(b) Start the two upper mounting screws in the rear of the soundhead and lift the soundhead into position so that the screws fit into the slotted holes in the main bearing bracket. Insert the two lower screws and tighten all four screws so that the soundhead is securely fastened.

(c) Remove the shipping guard from the soundhead. Clean off any excess packing grease from all parts. Remove the flexible coupling and spacing collar from the main drive shaft.

(d) Install the anchor plate for BX connectors and the photocell or exciter supply transformer. The equipment schedule will indicate which transformer is to be supplied. Figure 3 shows the photocell transformer and Figure 4 shows the exciter lamp transformer.

(e) Disconnect the ground lead from the motor. Loosen the two motor clamps and remove the motor from its cradle - see Figure 1. Mount the motor bracket loosely with the four 5/16"-18 x 3/4 bolts provided. Place the Stock No. 20421 aligning tool on the motor shaft and set the motor in its cradle. Replace and lock the two motor clamps. Shift the motor bracket to a position that will permit the aligning tool to slide on the soundhead drive shaft and tighten the motor bracket screws when the alignment is such that the aligning tool will slide freely from one shaft to the other - see Figure 2.

(f) When the alignment is correct, remove the motor and aligning tool. Place the spacing collar on the soundhead drive shaft. Place the framing wheel and flexible coupling unit on the motor shaft and replace the motor. Lock the motor clamps.

Push the flexible coupling tight against the Stock No. 20422 spacer so that the Stock No. 23676 deflector will rotate with the shaft, and lock the set screw to the flat of the soundhead drive shaft. Then lock the coupling to the flat of the motor drive shaft. Align the hole in the face of the framing wheel with the set screw in the motor end of the flexible coupling. Lock the framing wheel to the motor shaft while in this position. Connect the ground lead to the motor and fasten it beneath an end bell nut.

(g) Remove the upper oil plug from the gear box cover plate and install the oil cup.

(h) Start the 1/8" head 3/8"-16 screw in the front projector mounting hole and the 1/4" head 3/8"-16 screw in the rear mounting hole of the projector head, using the special lockwashers provided. Lift the projector into position and lower it so that the mounting screws will pass through the slotted holes in the top of the soundhead.

(i) Place the gear and pulley shown in Figure 5 on the shaft. Install the projector drive shaft and gear in the projector head and slide the projector forward so that the textolite drive gear will mesh properly with the Stock No. 26244 gear. Remove the gear and pulley and tighten the projector mounting screws. Install the gear and pulley with the lower take-up belt on the pulley, locking it in place with the "C" washer after having placed the thrust washer, the tension spring and cup washers on the shaft. The convex face of the cup washer must be adjacent to the tension spring. Install the drum shaft oil cup.

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(j) Install the lower magazine and place the take-up belt on the lower magazine pulley.

(k) Make connections to the photocell transformer as in Figure 3 or to the exciter lamp transformer as in Figure 4, and complete all electrical connections. Place the rotary stabilizer on the drum shaft and install the spring and locknut. A hole through the drum shaft is provided so that a small holding punch or pin can be used to hold the shaft while tightening the damping wheel locknut with a wrench. Install the gear cover - see Figures 5 and 6.

(l) Fill the gear box with Stock No. 25551 oil and oil all other points indicated in Figure 6.

(m) Mount the upper magazine. Replace the lamphouse on the lamphouse carriage.

(n) Install the film guide at the lower sprocket of the projector.

The drawings, Figures 8, 9, 10, 11, 12, and 13, have been included to assist in the locating of part numbers for parts used in the soundhead and to show the detail of assembly.

PART II - SERVICE DATA
SOUNDHEAD

(1) WIRING DIAGRAMS

Figure 14 shows the wiring for the MI-1040 and MI-1041 Soundheads.

Figure 15 shows the exciter lamp transformer wiring.

(2) EXCITER LAMP ADJUSTMENT

The proper vertical positioning of the exciter lamp in its socket may be made in the following manner:

(a) Insert the exciter lamp in the bayonet socket by pressing it down and giving a slight clockwise twist to lock it into position.

(b) Turn on the exciter lamp.

(c) Place a white card in the path of light between the condenser lens and lens barrel, next to the condenser lens.

(d) Adjust the vertical position of the lamp by means of the knurled ring, so that the light spot on the card is evenly illuminated.

(e) Lock the adjustment clamping screw.

(3) FOCUSING LIGHT BEAM OF SOUND OPTICAL SYSTEM

Two methods of obtaining correct focal adjustment of the optical unit are available. An output meter such as a thermogalvanometer, connected across the voice coil circuit, and a 9,000 cycle test film, Stock No.

27638, running through the projector will indicate when the correct focal adjustment is obtained. Focal adjustment which gives maximum output is sharply defined.

If an output meter is not available the optical system may be focused by a listening test. With the 9,000 cycle film running through the projector and soundhead, the optical system should be adjusted until the 9,000 cycle note is the loudest. This is the proper focal adjustment and the optical system should be clamped in this position.

For the flicker method of focusing the light beam proceed as follows:

> Place a white card between the photocell lens and the photocell. Thread in a 9,000 cycle test film. Pull the film very slowly down through the soundhead by turning the framing wheel by hand. Note the direction of travel of the 9,000 cycle parallel line shadows across the light circle on the card. If the shadows move downward, move the optical unit closer to the film. If the shadows move upward, move the optical unit away from the film.

The proper focal adjustment is obtained when one parallel line on the film completely covers the light beam. This condition is indicated on the card when the light circle is alternately completely shadowed and lighted as the film is moved slowly downward. Also at this point there should be no apparent upward or downward motion of the shadow on the light circle.

(4) PAD ROLL ADJUSTMENT

To obtain the proper clearance between the pad roll and its corresponding sprocket, proceed as follows:

(a) Thread the soundhead with two thicknesses of film and adjust each pad roll, by means of the locking screws in the pad roll plate, so that it is in contact with the film.

(b) Tighten the locking screws and remove the film.

(5) ADJUSTMENT OF FILM STRIPPERS

Each film stripper should be adjusted so that the lip of the stripper is below the film guide surface of its corresponding sprocket but not sufficiently close to be in danger of touching it. The lip of the stripper should be approximately 1/32 inch from the film guide surface of the sprocket. This adjustment is made by loosening the two mounting screws which hold the stripper to the center plate of the soundhead. Turning the stripper to the desired position and tightening the screws completes the adjustment.

(6) ADJUSTMENT OF LATERAL GUIDE AND PRESSURE ROLLER

The lateral guide roller should be adjusted so that it will keep the sound track in correct alignment with the light beam.

If the test film, Stock No. 27638 is used, it may be threaded into the machine in the usual manner, with the buzz track interrupting the light beam.

(a) With the exciter lamp lighted and the amplifier in operation, start the projector and listen for a 300 cycle or 1,100 cycle note from the loudspeaker. If neither note is heard the guide roller is in proper adjustment.

(b) If either note is heard, loosen the lock screw in the knurled nut on the lateral guide roller bracket. Make the lateral adjustment while the film is in motion by turning the knurled nut until no signal is heard. When the proper position of the guide roller is obtained, lock the knurled nut in position by means of the lock screw.

(7) REPLACEMENT OF PHOTO-CELL CONDENSER LENS

There should be no necessity for making any adjustments on the condenser lens. However, should the lens be removed from lens holder, it should be replaced so that the notch in the lens lines up with the notch in the holder. Be sure the flat surface of the lens is toward the Photo-cell cover.

(8) ADJUSTMENT OF THE FEED MAGAZINE SPINDLE

The nut at the rear end of the feed magazine spindle should be adjusted so that the tension in the film is just sufficient to prevent the reel from unreeling film faster than it is taken up by the upper feed sprocket.

To check the adjustment, thread and start the projector using a full reel of film in the upper magazine. When the machine has come up to speed, turn the motor switch off and watch the action of the film as it unreels. The tension should be just sufficient to prevent an excessive accumulation of film between the reel and the upper feed sprocket.

If an adjustment is necessary, loosen the set screw in the adjustment nut and turn the nut against the spring to increase the tension. Backing it off will decrease the tension.

When the proper film tension is obtained, tighten the set screw in the adjusting nut.

(9) ADJUSTMENT OF THE TAKE-UP MECHANISM

The adjustment of the take-up mechanism consists of an adjustment of the spring on the rear end of the take-up reel spindle so that there is just sufficient tension to prevent a loose loop of film from forming in the lower magazine. Excessive tension will cause undue wear on the film sprocket holes and on the projector mechanism and may cause the film to break.

To make the adjustment, thread the projector with a 2,000 foot reel of film. Start the projector and watch the action of the film as it is

wound on the take-up reel. If a loose loop forms stop the projector, loosen the set screw in the knurled nut at the end of the take-up spindle, and increase the tension by screwing the adjustment nut against the spring. If the take-up reel pulls the film taut, the tension of the spring should be decreased by backing off on the adjustment nut.

(10) A. C. PROJECTOR DRIVE MOTOR

The A. C. Motor is of the split phase starting, induction type and runs at a constant speed of 1,765 R.P.M. It is rated at 1/4 h.p. The motor incorporates an automatic starting switch which opens to remove the starting winding from the motor circuit when normal running speed has been reached. Figure 16 shows a schematic of the motor circuit and Figure 17 shows the wiring of the motor switch box. The starting resistor should be adjusted so that normal running speed will be reached two seconds after starting the motor.

REPLACEMENT PARTS

OPTICAL SYSTEM AND EXCITER LAMP ASSEMBLIES

Stock No.	Description	
23660	BASE - Exciter lamp socket base	$ .52
23663	BOARD - Mounting board for exciter lamp assembly	1.40
23664	BRACKET - Photocell bracket complete with three mounting screws and three washers	1.42
23661	HANDLE - Molded handle for exciter lamp socket assembly	.68
25539	HOLDER - Photocell lens holder	1.30
25538	LENS - Photocell lens	4.55
20314	NUT - Knurled adjusting nut for exciter lamp socket	.20
20316	NUT - Knurled nut for locking optical unit	.20
26237	OPTICAL UNIT - Optical unit complete with all lenses	18.00
20317	PIN - Locking pin for optical unit	.26
20315	SCREW - Set of two 6-32 fillister head screws and two flat washers for securing knurled adjusting nut	.15
23662	SHIELD - Exciter lamp shield complete with two mounting screws and two washers	.45
23659	SOCKET - Exciter lamp socket comprising socket and outer threaded shell assembled - complete with flexible lead and terminal	1.95
26238	SOCKET - Exciter lamp socket assembly complete	4.35
23665	SOCKET - Photocell socket complete with two leads	.34
23080	SPRING - Exciter lamp socket clamping spring complete with reenforcing blade, two mounting screws, nuts and lockwashers	.50

ROTARY STABILIZER ASSEMBLY

25509	OIL - 1/2 pint of special oil for damping wheel assembly	1.10
27727	STABILIZER - Rotary stabilizer	18.70

The prices quoted above are subject to change without notice.

DRUM SHAFT ASSEMBLY

Stock No.	Description	
25514	BEARING - Ball bearing for drum shaft	$1.70
25518	GASKET - Vellumoid gasket (OD) for ball bearing	.25
23666	RETAINER - Ball bearing retainer	.42
27728	SHAFT - Drum shaft complete with nut and washer	14.40
20319	SPACER - Steel spacing sleeve for drum shaft	.69
20318	SPACER - Steel spacer between drum shaft ball bearing retainer and damping wheel	.20

LATERAL GUIDE AND PRESSURE ROLLER ASSEMBLY

25492	ARM - Lower arm for lateral guide and pressure roller assembly	1.40
23667	ARM - Upper arm for lateral guide and pressure roller assembly	1.42
10194	BALL - Steel ball for pressure roller arm locking mechanism	.15
23673	BEARING - Ball bearing for lateral guide roller .. (pkg. of 20)	1.55
23669	COVER - Inner cover for lateral guide roller ball bearings	.20
23668	COVER - Outer cover for lateral guide roller ball bearings	.22
23670	FLANGE - Lateral guide roller guiding flange	1.50
25491	KNOB - Knurled knob complete with taper pin for latch	.95
25493	LATCH - Lateral guide and pressure roller latch complete with taper pin	1.45
20135	NUT - Knurled adjusting nut complete with locking screw	.70
20137	PIN - Pivot pin for upper arm, complete with taper pin	.50
23672	ROLLER - Pressure roller assembly	1.18
23671	SHAFT - Lateral guide roller shaft complete with two "C" washers	.22
23087	SPRING - Coil tension spring for pressure roller latch	.30
23088	SPRING - Coil tension spring for lower arm pivot	.45
23091	SPRING - Coil tension spring for lateral guide roller	.25
23089	SPRING - Tension spring for pressure roller locking mechanism	.25
25504	STUD - Lateral guide and pressure roller assembly mounting stud	1.65
20165	WASHER - "C" washer for lateral guide and pressure roller shaft	.15
20136	WASHER - Pivot tension spring retaining washer	.15

PAD ROLL ASSEMBLY

23685	ARM - Pad roll arm complete with ball, spring, stop pin and set screw	1.65
23085	PLATE - Pad roll arm locking plate	1.25
23686	ROLL - Steel pad roll	.80
23086	SCREW - Bearing screw for pad roll arm	.50
20326	SCREW - Square head set screw for pad roll	.10

GEAR BOX ASSEMBLY

25514	BEARING - Ball bearing for constant speed and hold back sprocket shafts, also main drive shaft	1.70
23677	COUPLING - Flexible coupling - main drive shaft to motor - complete with set screws	1.20
23683	COVER - Cover plate for main drive shaft inner bearing	.20

The prices quoted above are subject to change without notice.

GEAR BOX ASSEMBLY (CONT'D)

Stock No.	Description	
23676	DEFLECTOR - Oil deflector for main drive shaft outer bearing and constant speed and hold back sprocket shaft inner bearings	.26
23682	DEFLECTOR - Oil deflector for constant speed and hold back sprocket shaft outer bearings	.26
23679	GASKET - Vellumoid gasket (O.D. 1 7/8) for ball bearing retainers and cover	.12
26240	GASKET - Vellumoid gasket for gear box	.22
26241	GEAR - 49 tooth bronze spiral gear for constant speed and hold back sprocket shafts, complete with Woodruff key (60 cycle)	3.45
26246	GEAR - 37 tooth bronze spiral gear for constant speed and hold back sprocket shafts, complete with Woodruff key (50 cycle)	8.85
23678	RETAINER - Ball bearing retainer for constant speed and hold back sprocket shafts, also coupling end of main drive shaft	.26
26242	SHAFT - Constant speed sprocket shaft	3.90
26239	SHAFT - Hold back sprocket shaft	3.30
26243	SHAFT AND PINION - Main drive shaft with 10 tooth spiral pinion gear (60 cycle)	4.95
26245	SHAFT AND PINION - Main drive shaft with 9 tooth spiral pinion gear (50 cycle)	18.20
20422	SPACER - Spacer between flexible coupling and oil deflector	.22
20321	SPRING - Coil tension spring at ends of constant speed and hold back sprocket shafts	.10
23681	SPROCKET - Constant speed sprocket complete with set screw	3.95
21432	SPROCKET - Hold back sprocket complete with set screw	3.00
20322	WASHER - "C" washer for ends of constant speed and hold back sprocket shafts	.12
20323	WASHER - Cup washer used between "C" washer and tension spring at ends of constant speed and hold back sprocket shafts	.12
20325	WASHER - Spring washer used between ball bearings and retainers on outer bearings for constant speed and hold back sprocket shafts and inner bearing for main drive shaft	.12
20324	WASHER - Thrust washer for tension spring at ends of constant speed and hold back sprocket shafts	.10

MAIN CASE ASSEMBLIES

23675	BOARD - Terminal board for exciter lamp leads	1.00
20320	CUP - Oil cup for drum shaft	.50
23674	CUSHION - Set of 2 rubber cushions	.30
23106	GASKET - Triangular Vellumoid gasket for photocell socket	.30
23688	KNOB - Operating or exciter lamp compartment door knob complete with nut and washer	.45
23684	LATCH - Door latch - female portion complete with mounting screws, nuts and lockwashers	.20

The prices quoted above are subject to change without notice.

MAIN CASE ASSEMBLES (CONT'D)

Stock No.	Description	
23689	LATCH - Operating or exciter compartment door latch male section complete with mounting screws, nuts and washers	.22
20419	SCREW - Special screw for Stock No. 23674 cushion - complete with nut and washer	.20
23690	STOP - Door stop assembly complete with bushing, stud and nut	.56
23691	STRIPPER - Film stripper complete with mounting screws and washers	.42
23692	WHEEL - Framing hand wheel	.54
25560	WINDOW - Glass window for operating compartment door	.85

A. C. DRIVE MOTOR ASSEMBLIES

29215	MOTOR - 110 volt, 60 cycle single phase projector drive motor complete with switch box, switch and resistor	30.00
29216	MOTOR - 110 volt, 50 cycle single phase drive motor complete with switch box, switch, and resistor	31.30
25140	RESISTOR - 40 ohm variable porcelain starting resistor for Cat. No. 29215 and 29216 motors	3.40
25765	SWITCH - Double pole single throw tumbler switch - motor starting switch	2.40
26259	SWITCH - Rotating section of centrifugal starting switch for Cat. No. 29215 and 29216 motors	1.20
26260	SWITCH - Stationary section of centrifugal starting switch for Cat. No. 29215 and 29216 motors	.80

ACCESSORIES (SIMPLEX)

26197	BELT - Round leather take-up belt	1.00
22490	CUP - Projector drive shaft oil cup	.25
23680	CUP - Oil cup for filling oil well, complete with extension	.72
26279	GEAR - Projector drive gear assembly comprising 51 tooth textolite gear, 17 tooth spiral pinion and bronze bushing, fitted and assembled	11.75
26244	GEAR - 66 tooth spiral gear and pulley - projector driving gear and take-up pulley	3.65
21457	GUIDE - Film guide	.70
20012	NUT - Rectangular nut for projector drive shaft	.75
25001	SHAFT - Projector drive shaft	6.15
22235	WASHER - Hardened steel thrust washer for projector drive shaft	.25
22112	WRENCH - 1/4" Allen set screw wrench	.15

MISCELLANEOUS

22776	FILM - 12 ft. length of 9,000 cycle and buzz track test film	2.00
27638	FILM - 75 ft. length of 9,000 cycle and buzz track test film	15.00
27637	FILM - 500 ft. length of special test film - frequencies to 10,000 cycles, music and speech	85.00
20421	TOOL - Motor shaft alignment tool	.80
23833	TRANSFORMER - Photocell Transformer - RT-387	15.00
23834	TRANSFORMER - Exciter Lamp Transformer - RT-388	6.25

The prices quoted above are subject to change without notice.

RCA 1040

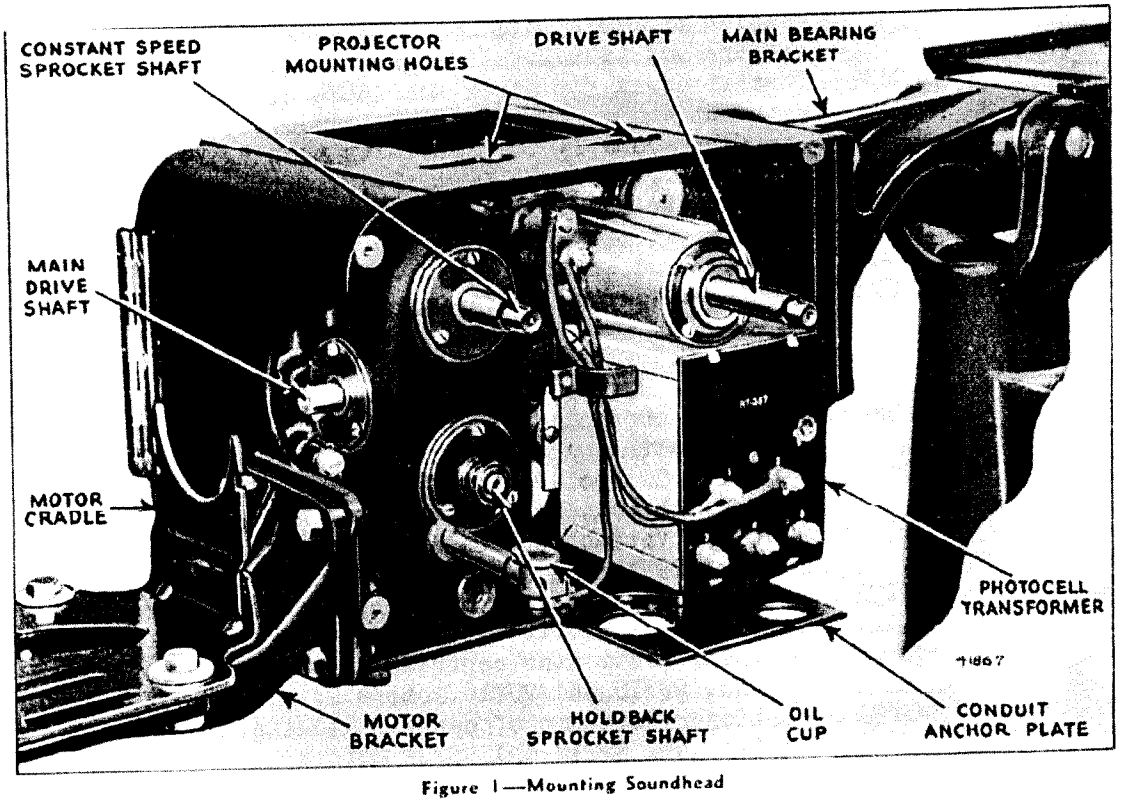

Figure 1—Mounting Soundhead

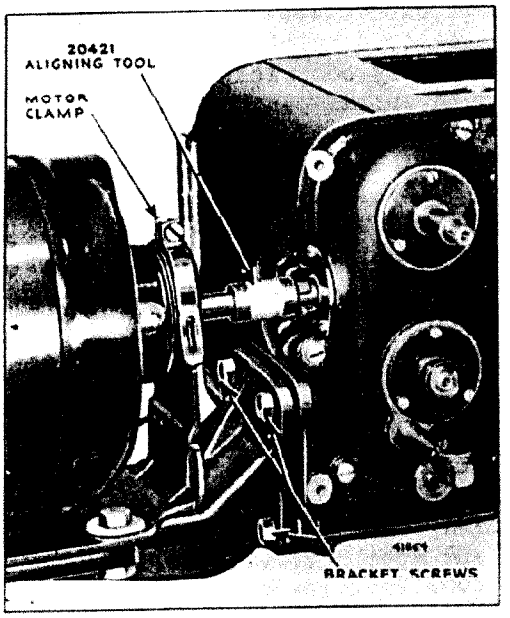

Figure 2—Aligning Motor

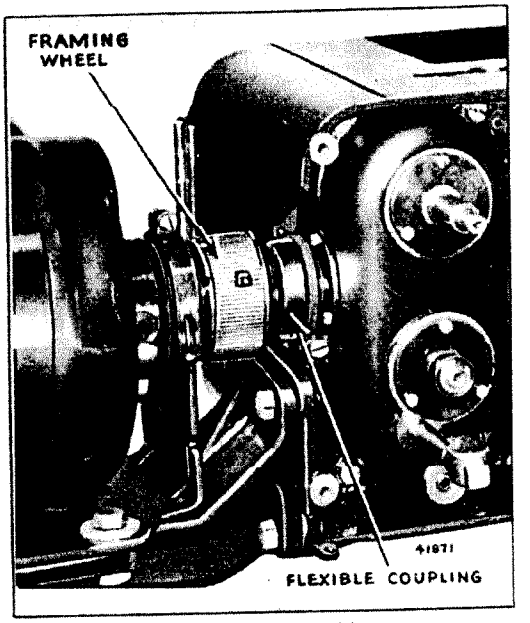

Figure 3—Mounting Motor

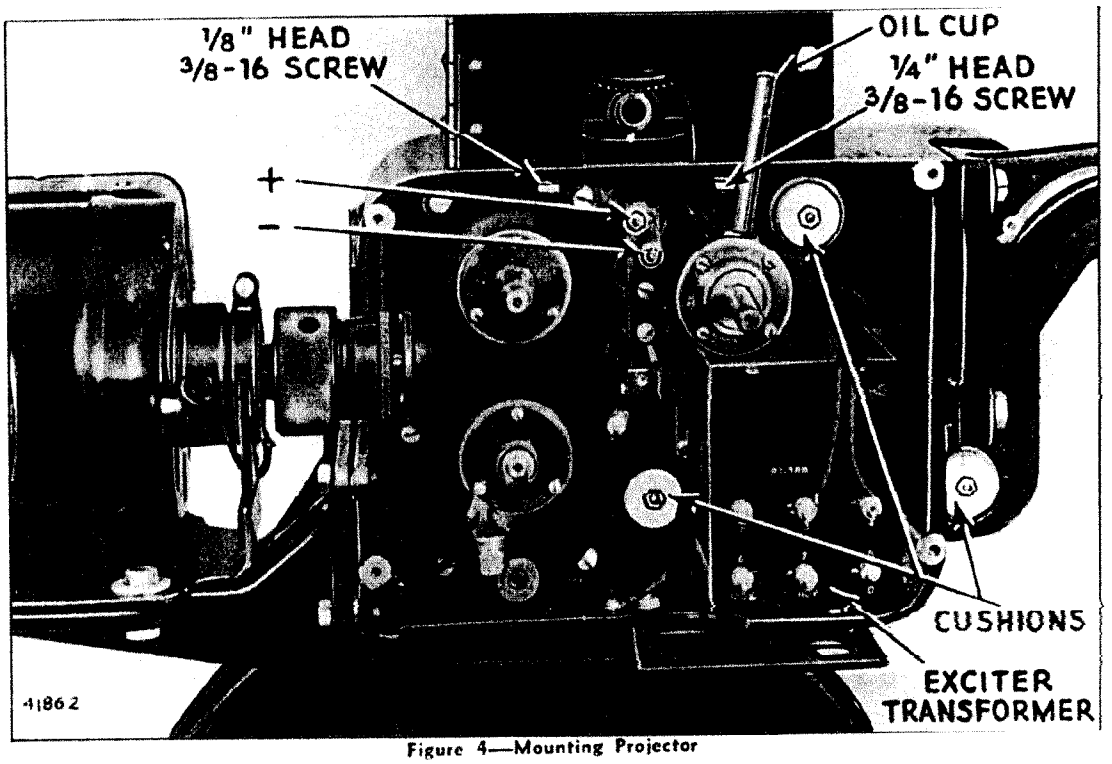

Figure 4—Mounting Projector

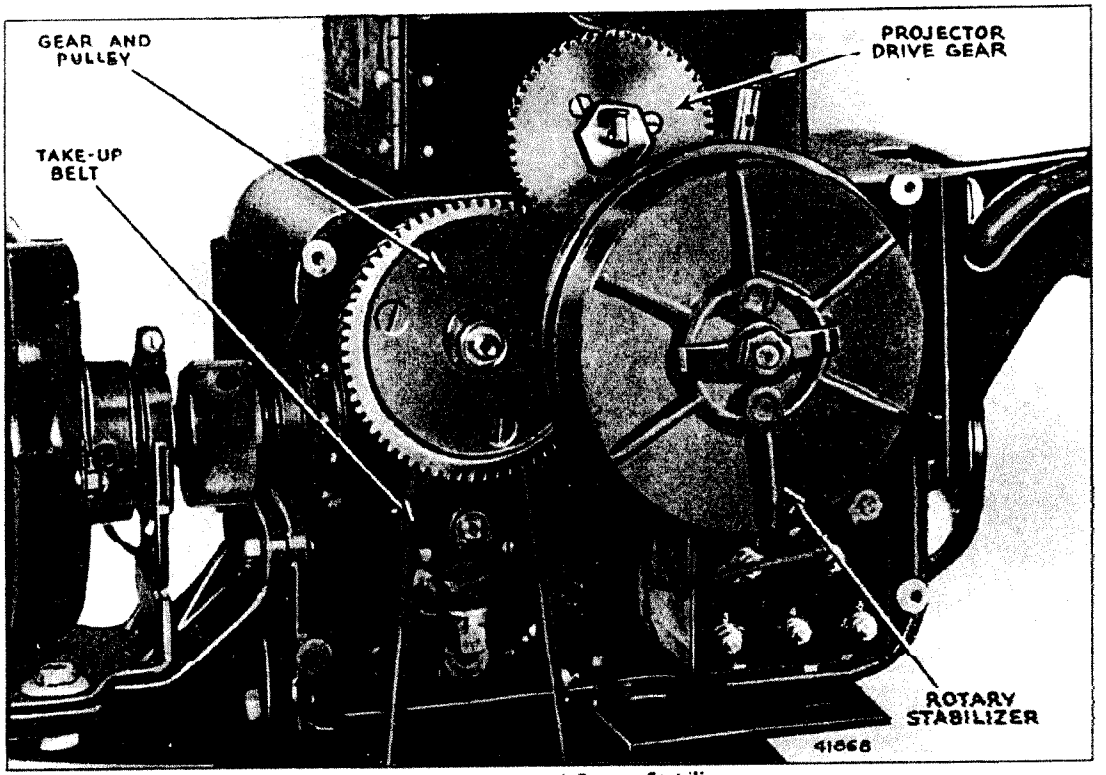

Figure 5—Gears and Rotary Stabilizer

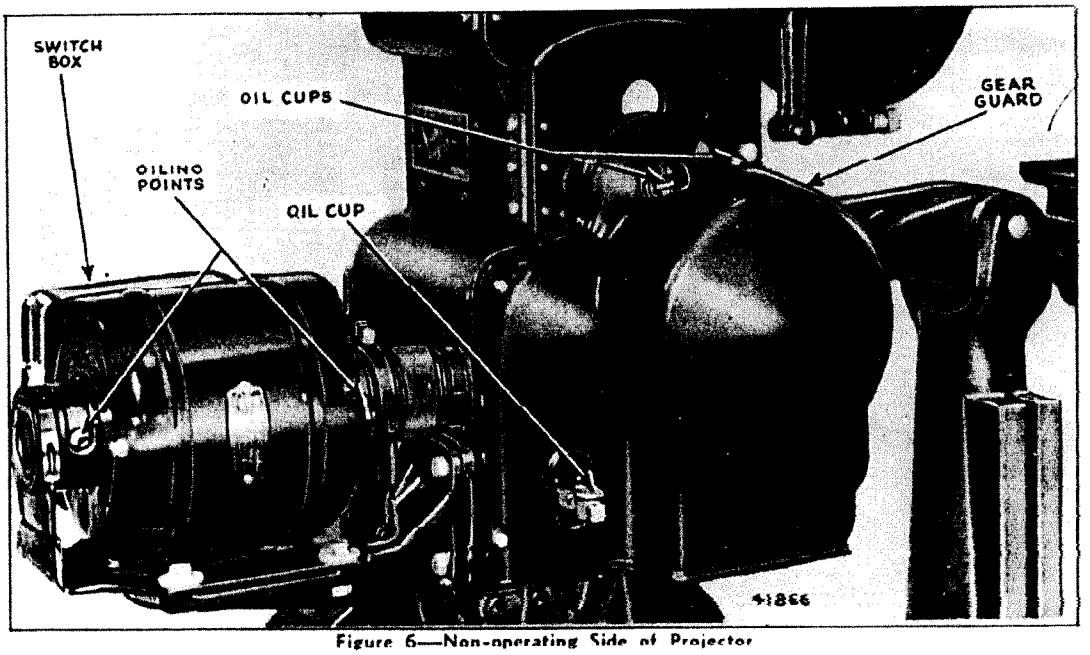

Figure 6—Non-operating Side of Projector

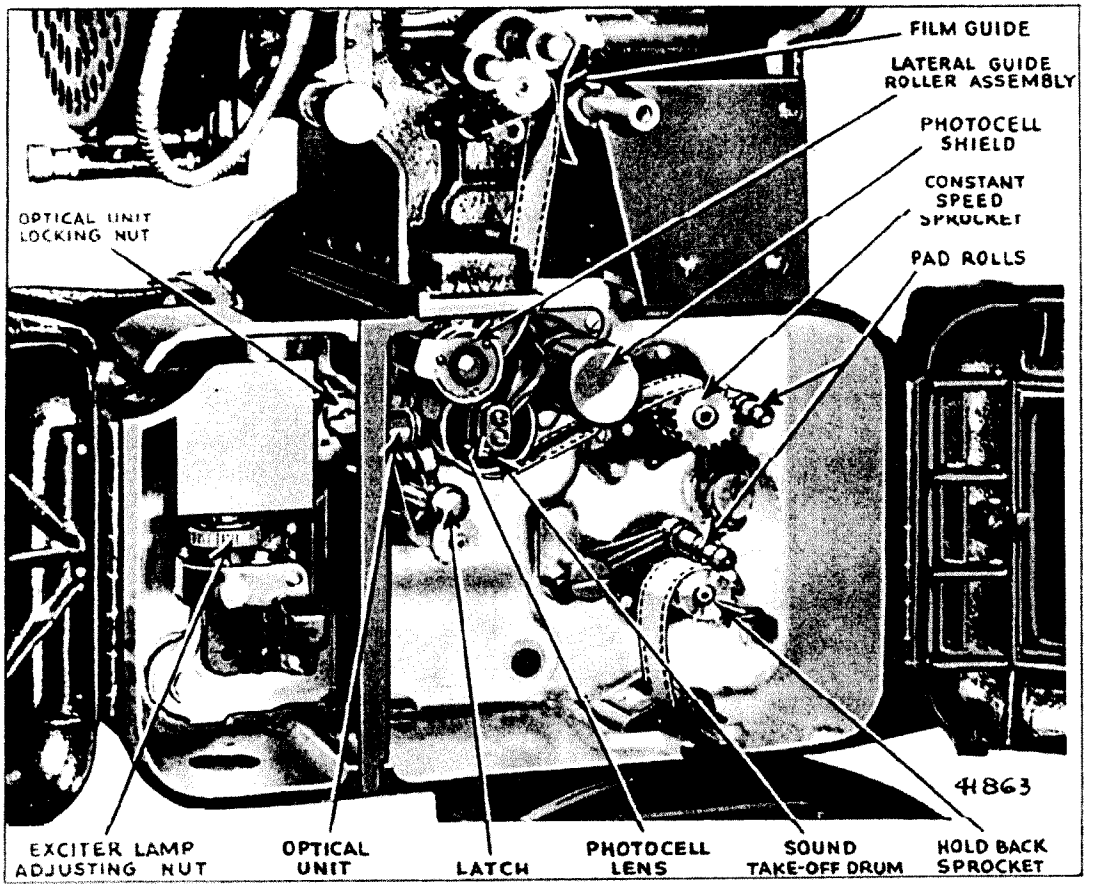

Figure 7—Operating Side of Projector

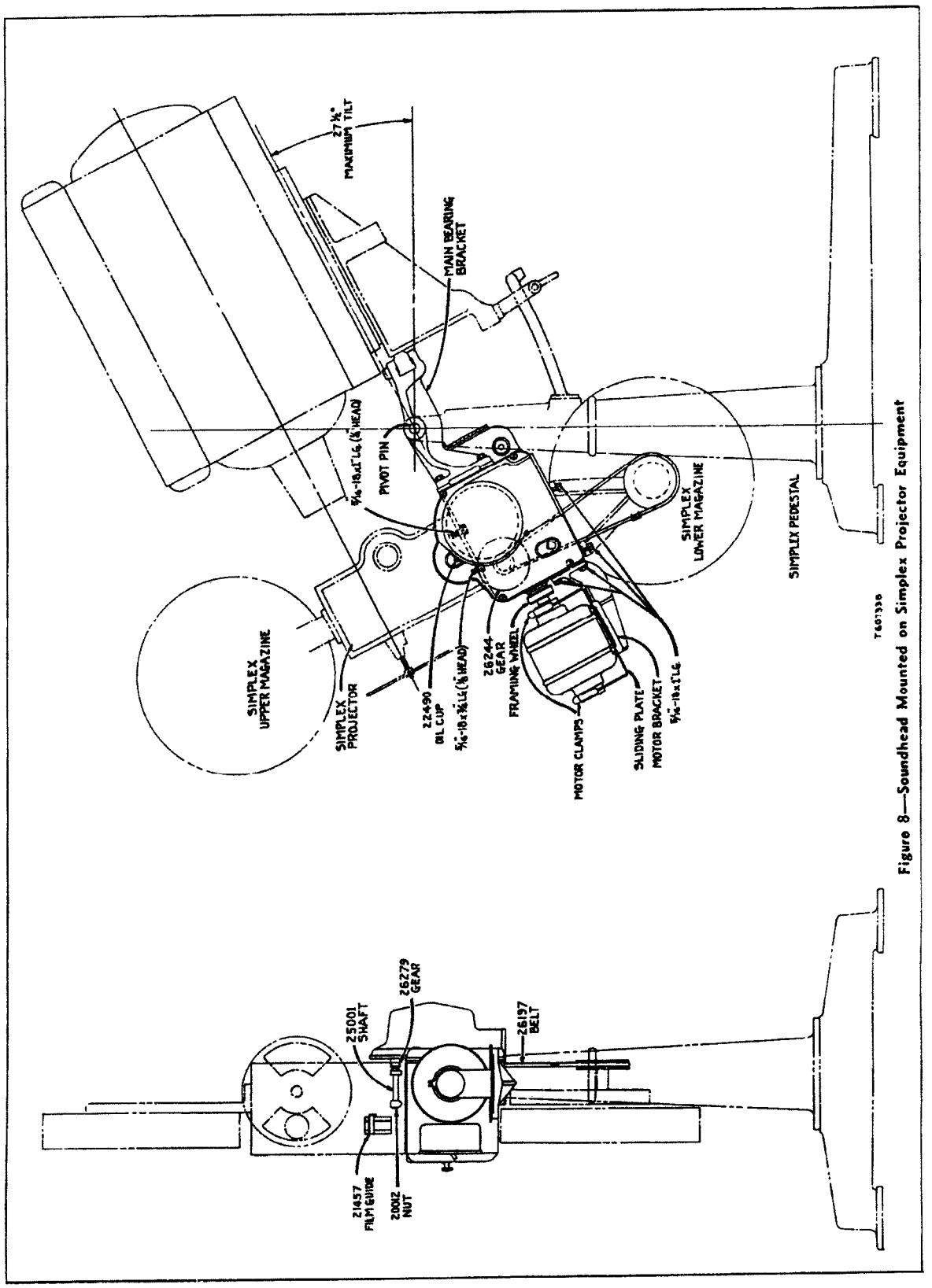

Figure 8—Soundhead Mounted on Simplex Projector Equipment

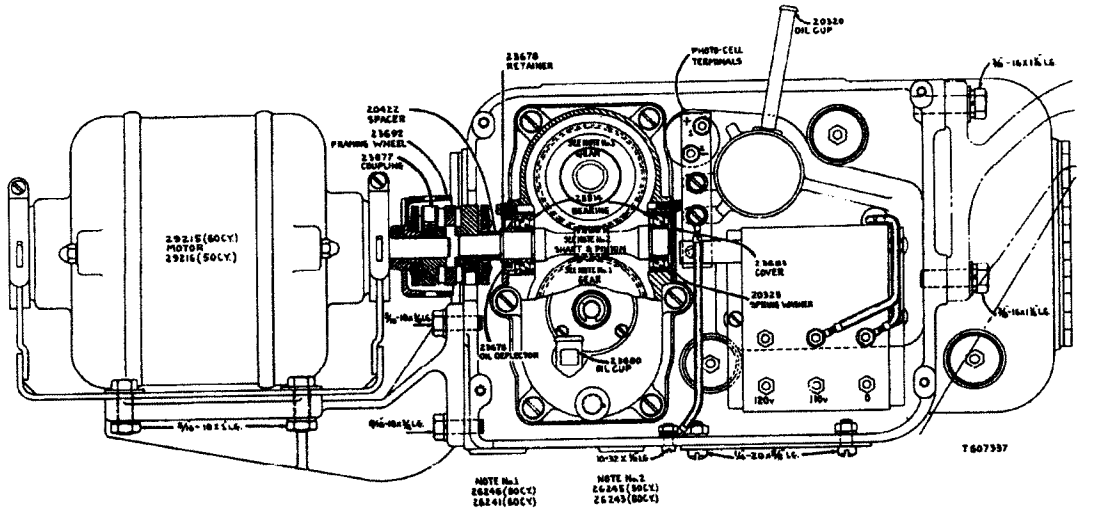

Figure 9—Gear Box and Drive Assembly

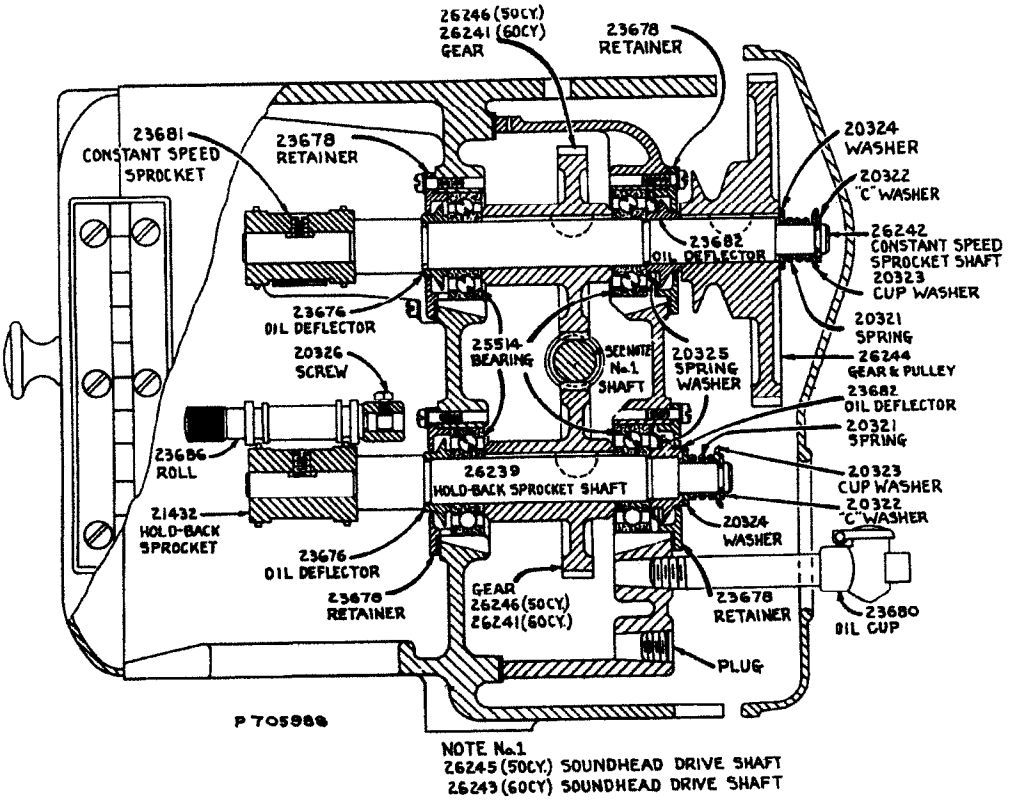

Figure 10—Cross-section of Soundhead

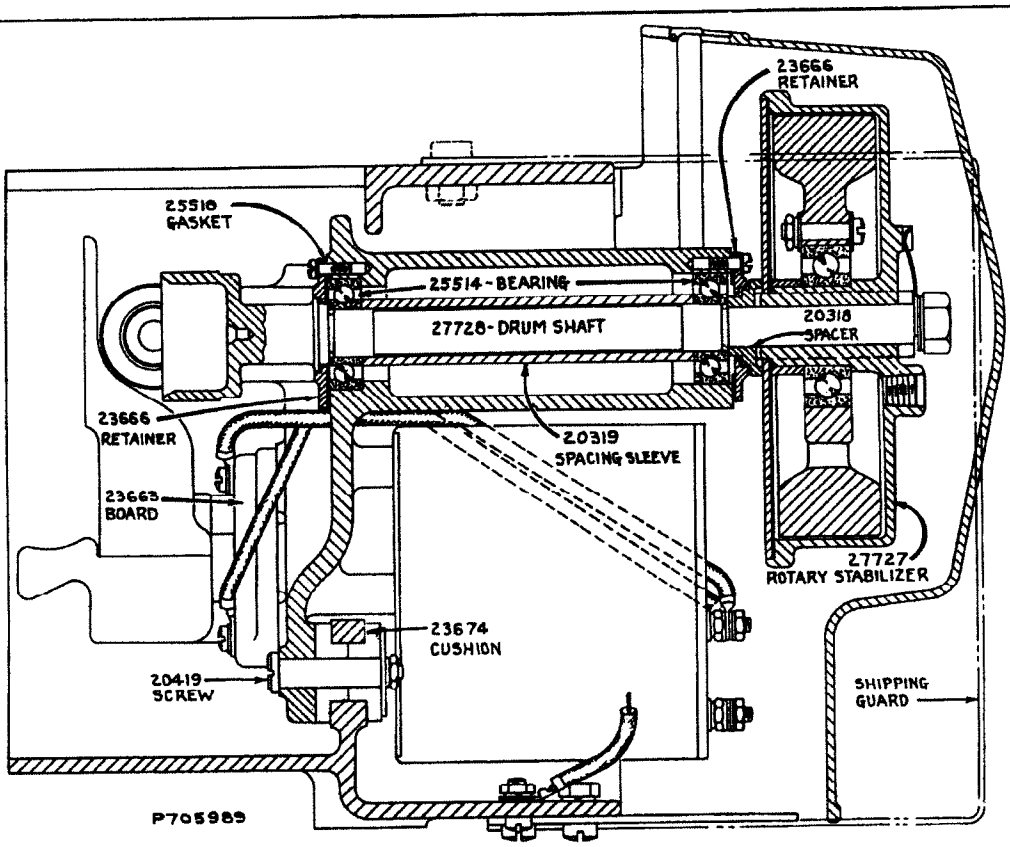

Figure 11—Cross-section of Soundhead

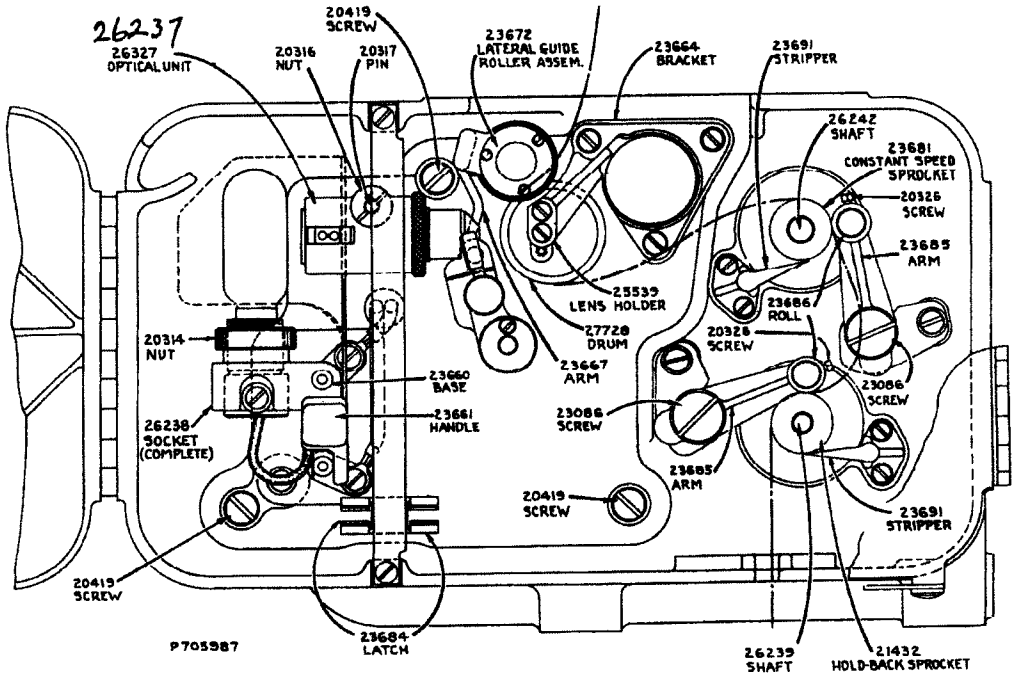

Figure 12—Operating Side of Soundhead

1	Figure 14 corrected

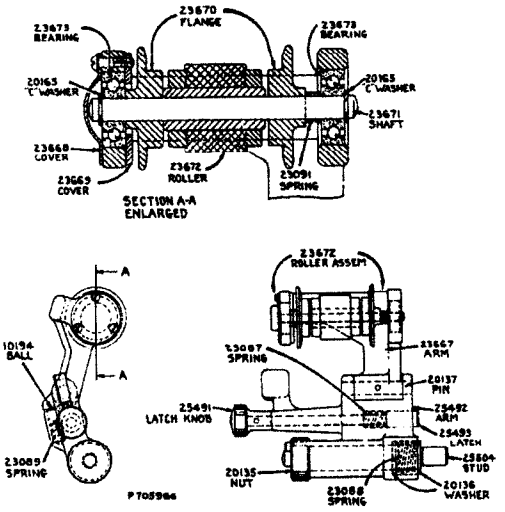

Figure 13—Lateral Guide Roller Assembly

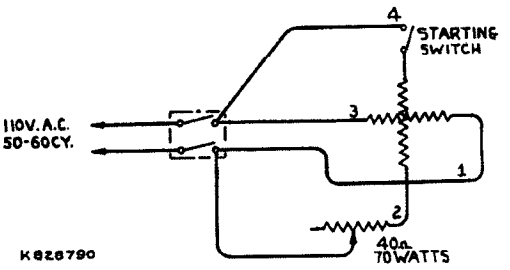

Figure 16—A. C. Motor Wiring

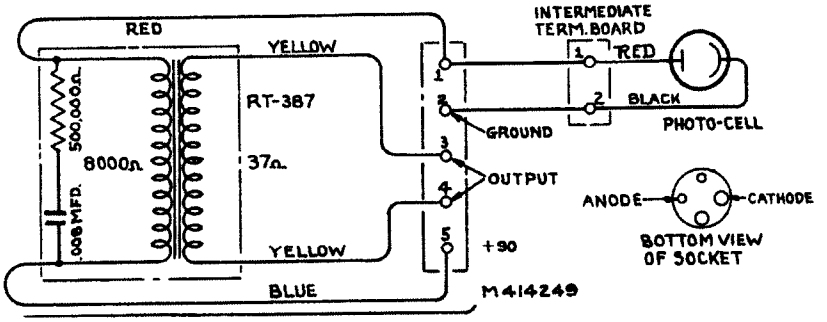

Figure 14—Schematic of Soundhead

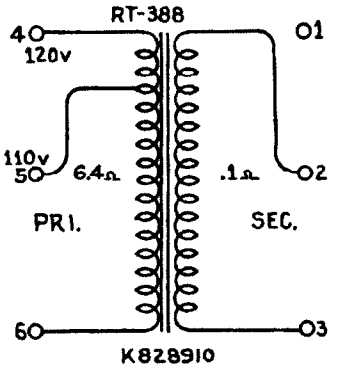

Figure 15—Exciter Lamp Transformer

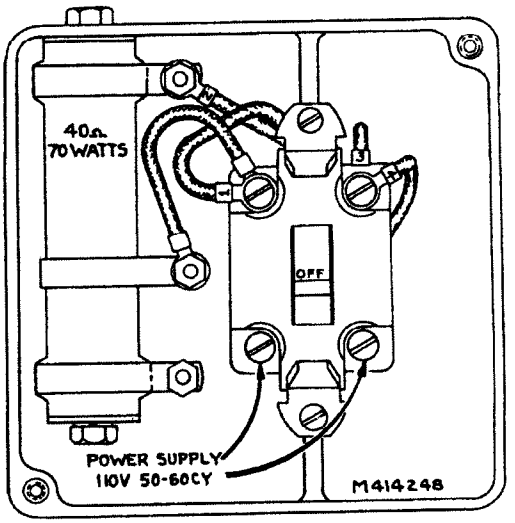

Figure 17—Motor Switch Wiring

FORM 12625

INSTALLATION AND SERVICE DIVISION

RCA MANUFACTURING CO., INC.
CAMDEN, N. J.

CLASSIFICATION: Technical Photophone
Standard Soundheads

DATE 1-27-37

SUBJECT: MI-1040D Soundheads

NUMBER 2C1-2.2

TO: "B" Mailing

A new production of soundheads for 60 cycle operation, designated as MI-1040 D are now being shipped to the field. There are certain modifications in this soundhead which we wish to point out so that you may be familiar with these changes.

The major design change is the use of dirt proof, self lubricating ball bearings in which the rotary stabilizer drive shaft runs. By the use of this type bearing, no oiling is necessary and accordingly the oil pipe has been omitted from the drum shaft housing.

Single pad rollers are employed with both the constant speed sprocket and take-up sprocket in place of the fixed pad rolls formerly used. The film strippers have been increased in length to afford better protection against film wrappage in the event of a film break at some point in the soundhead.

The above mentioned modifications will be incorporated in soundheads beginning with Serial No. B-1000.

Adolph Goodman
Service Division

INSTALLATION AND SERVICE DIVISION

RCA MANUFACTURING CO., INC.

CAMDEN, N. J.

CLASSIFICATION Technical - Photophone - Soundheads DATE Feb. 2, 1938

SUBJECT: Replacement Soundhead Bearings NUMBER SL-2C1-6.10

TO: A-5, B-1, B-2, B-4, C-7, D-7, E-7, F-7, G-1, G-2, G-3, G-4, H-7

The stock #23948 shielded bearing which is now used on the sound take-off drum shaft of the MI-1040 series soundheads is physically interchangeable with the Stock #25514 bearings which are used on the constant speed sprocket shaft, the hold back sprocket shaft and the pinion shaft. The two bearings are identical except for the shields.

Because the shielded type is much less likely to get dirt in the ball race at the time of installation, it has been agreed to stock this bearing as a replacement for the Stock #22514.

Data Sheets SL2C1-2.3; SL2C1-2.5; SL2C1-3.1; and SL2C1-3.4 should be revised to call for #23948 in every location which now uses #25514.