EQUIPMENT INSTRUCTION - SH-1000 SOUND MECHANISM (60 CYCLES & DC)
SH-1001 SOUND MECHANISM (50 CYCLES)

1. DESCRIPTION.

The SH-1000 (SH-1001) is a film propulsion mechanism for the reproduction of sound from 35mm sound film by the photo-electric cell method. It reproduces from single track sound film, details included herein, or from either single track or push-pull sound film when equipped with the SH-106 Push-Pull Kit. This kit is furnished separately - refer to Equipment Instruction "SH-106 Push-Pull Kit" for details. A motor assembly (SH-2053, 60 cycles; SH-2062, 50 cycles; SH-2063, DC), furnished separately, is required to drive the mechanism. The complete unit is 11-5/8" high x 27-3/8" long x 14" deep and weighs 110 lbs.

The mechanism is attached to the sound head support arm mounted on the projector pedestal. The motor assembly, including a motor and flywheel, flywheel guard and hand brake on a bracket, is attached to the front of the sound mechanism, and drives the projector mechanism and the constant speed sound and hold-back sprockets in the mechanism through a reduction gear box. The gear box may be removed as a unit. The hand brake, which engages the flywheel, is provided to stop the mechanism in case of film breakage. The take-up is driven from the mechanism. Belt drive is standard, but chain drive may be obtained.

At the rear of the mechanism is the scanning system. It is assembled on a bracket attached to the sound mechanism by a special vibrationless mounting. The well known rotary stabilizer maintains constant film speed past the scanning beam. A prefocused exciter lamp on an adjustable bracket provides an intense source of light to illuminate the .0012" slit in the optical system. Light from the optical system passes through the film sound track, and is reflected to the photo-electrical cell by an adjustable lens mirror. The vertically mounted photo-electrical cell and wirings are shielded from oil leakage and static pick-up.

Noise level - 35 db or better, flutter .15%, as measured on an ERPI Flutter Bridge, maximum weave $\pm$.001", pick-up time 2 - 3 seconds.

PEC polarizing potential and exciter lamp supply are obtained from separate sources.

2. DRIVE MOTOR.

Motors operating on power supplies of 105 - 125 volts AC., 50 or 60 cycles $\pm$ 3% or 105 - 125 volts DC are available. A 5 ampere fusetron is recommended for each motor circuit. If fusetrons are not available, a 20 ampere fuse may be used temporarily.

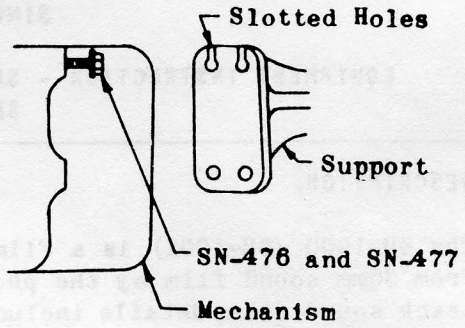
3. INSTALLATION.

Remove all existing equipment from the projector pedestals, and install the sound head supports supplied with the system (See table).

Pedestal	Sound Head Support
"L"	SN-483
"R" or "M"	SN-484
Super Simplex or SI	S-1183-L (Up to 20°) OR S-1244-L (Above 20°)

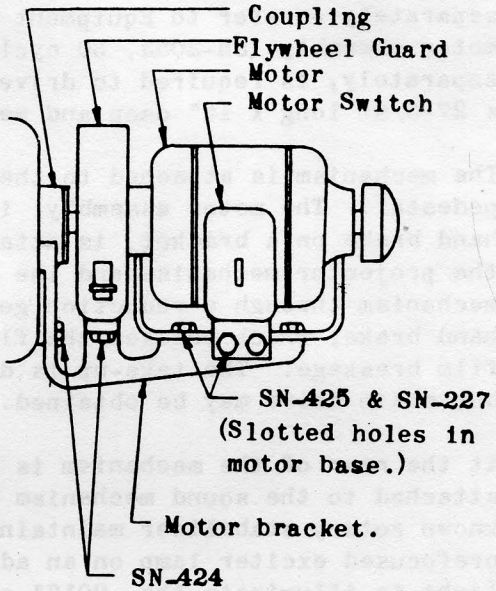
Clean all parts of the sound mechanism carefully and install as follows:-

A. Main Frame Assembly. Bolt to the sound head support with four SN-476 Screws (3/8-16 x 1-1/4") and SN-477 Washers. Insert two upper bolts, hang assembly in slotted holes in support and thread in two lower bolts.

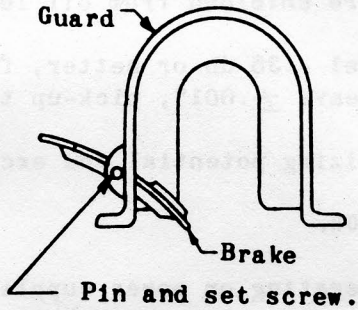


B. Motor Assembly. The motor and flywheel, motor switch box, attached to the motor by flexible conduit, and flywheel guard are shipped mounted on the motor bracket. Remove the motor, motor switch and flywheel guard (See Paragraph C below) from the bracket, and mount the bracket on the front of the sound mechanism with four SN-424 Screws (5/16-18 x 3/4"). Mount motor, motor switch and flywheel guard. In assembly the motor shaft slides into the flexible coupling on the gear box drive shaft, the motor is positioned laterally so that it lines up with the coupling, the mounting bolts tightened and the Allen set screws in the coupling tightened.

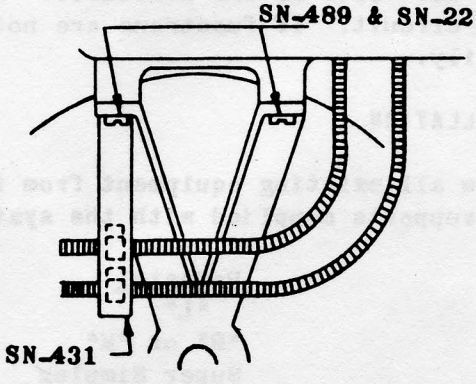
NOTE:- Slotted holes are provided in the motor base and clearance holes in the motor bracket for alignment purposes. For lateral alignment, loosen the motor mounting bolts and shift the motor horizontally. For vertical alignment, loosen the motor bracket mounting bolts and adjust the vertical position of the bracket.



C. Flywheel Guard and Brake. For installation, remove the brake from the guard by loosening the set screw and driving out the pin. To remove the guard from the motor bracket, withdraw the two SN-424 Screws (5/16-18 x 3/4") To reassemble the guard and brake, the procedure is reversed.



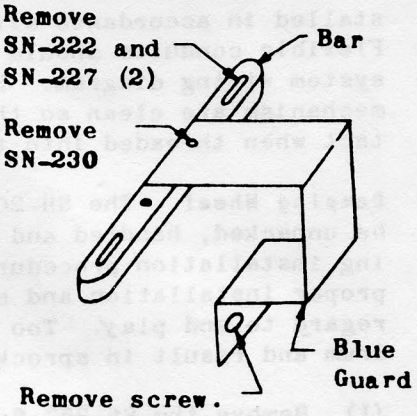
D. Lower Magazine. Bolt the lower magazine and SN-431 Cable Clamp Bracket to the bottom of the sound mechanism, using two SN-489 Screws (5/16-18 x 7/8") and SN-227 Washers. The contractor should furnish the cable clamps and should clamp the cables securely so that they do not contact the take-up drive belt.



E. Take-up Belt. Adjust length as required and assemble. The take-up is driven from the sound mechanism.

F. Projector Mechanism is installed as follows:-

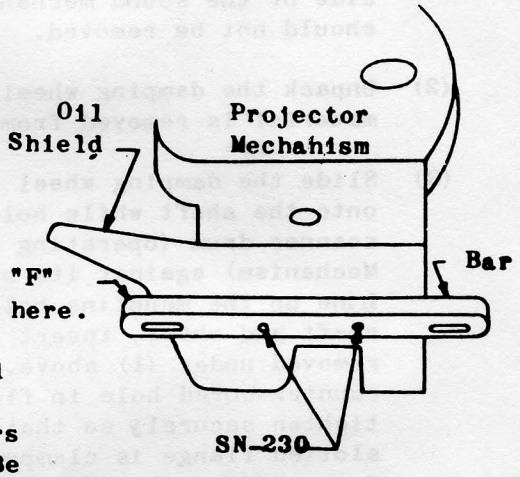
(1) Remove the blue guard on the non-operating side of the sound mechanism, and the bar on the top of the mechanism as a unit, by taking out the screw on the side of the mechanism and the two SN-222 Screws (5/16-18 x 1") and SN-227 Washers fastening the bar to the mechanism.



(2) Detach the blue guard from the bar. Save the two SN-230 Screws (3/8-16 x 5/8") as they are used to bolt the bar to the projector mechanism. The blue guard is provided only to protect the rotary stabilizer shaft from damage during shipment, and should be discarded.

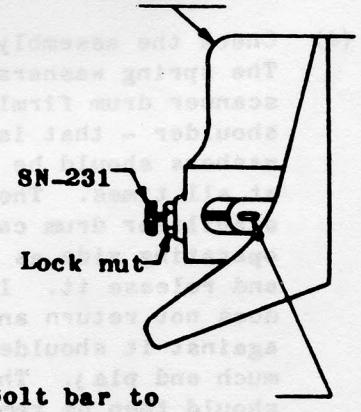
(3) Fasten the oil shield and bar to the mechanism with the two SN-230 Screws. "F" on the bar should be at the front.

NOTE:- The SN-475 Oil Shield is used with Regular Super Simplex and E-7 Projector Mechanisms. The SN-493 Oil Shield is used with Model SI Mechanism.



(4) Mount the projector mechanism oil shield and bar assembly on the sound mechanism with two SN-222 Screws and SN-227 Washers through the slotted holes in the bar. Be sure that the SN-231 Screw, on the front of the mechanism, is threaded all the way in for clearance in mounting the drive gear.

Sound Mechanism.



(5) Install the drive gear and stud supplied with the system (See table).

Mechanism	Drive Gear	Stud
Regular	SH-2005	SH-2007
Super Simplex	SH-2005	SH-2007
E-7 or SI	SH-2060	SH-2008

(6) Turn the adjusting screw on the front of the mechanism so that proper mesh is obtained between the drive and driven gears. Tighten the lock nut and mounting bolts.

Bolt bar to Mechanism with SN-222 & SN-227

G. **Upper Magazine.** Bolt to the top of the projector mechanism.

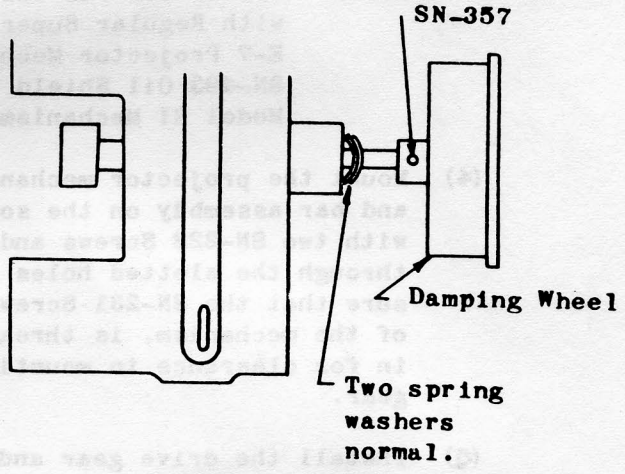
H. **Conduit Connections to Sound Mechanism.** The coaxial cable should be installed in accordance with the equipment instruction packed with the cable. Flexible conduits should be installed and connected in accordance with the system wiring diagram. Be sure that the threads in the holes in the sound mechanism are clean so that the flexible conduit connectors make good contact when threaded into the holes.

I. **Damping Wheel.** The SH-2026 Damping Wheel is shipped separately, and should be unpacked, handled and installed carefully to prevent damage. The following installation procedure should be followed carefully in order to insure proper installation and operation of the damping wheel, especially with regard to end play. Too much end play will cause weaving of the scanner drum and result in sprocket hole and frame line noise.

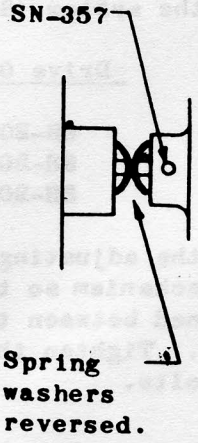
(1) Remove the SN-357 Screw and nut from the drum shaft on the non-operating side of the sound mechanism. The two loose spring washers on the shaft should not be removed.

(2) Unpack the damping wheel carefully, and make sure that all foriegn material is removed from the mounting hole.

(3) Slide the damping wheel carefully onto the shaft while holding the scanner drum (operating side of Mechanism) against its shoulder. Line up the mounting holes in the shaft and wheel, insert the screw, removed under (1) above, in the counter-bored hole in flange and tighten securely so that the slotted flange is clamped to the drum shaft. The nut removed under (1) above is not used.



(4) Check the assembly for end play. The spring washers should hold the scanner drum firmly against its shoulder - that is, the spring washers should be under compression at all times. Therefore, push the stabilizer drum carefully toward the operating side as far as it will go and release it. If the scanner drum does not return and seat firmly against it shoulder, there is too much end play. The damping wheel should then be removed, and one of the spring washers reversed. This will increase the effectiveness of the washers and should give the proper amount of end play.



J. **Rear Guard.** Attach to the non-operating side of the main frame assembly tightening the thumb screws securely.

K. Install the exciter lamp and photo-electric cell supplied with the system.

SN-297 Exciter Lamp (4 amps, 9 volts) - Systems having PU-1000 Power Unit.
SN-299 Exciter Lamp (7½ amps, 10 volts) - Systems having PU-1005 Power Unit.

L. Fill the gear box on the non-operating side slowly with SAE #40 Oil (1-1/2 ounces required) to the red line of the sight glass while the mechanism is idle.

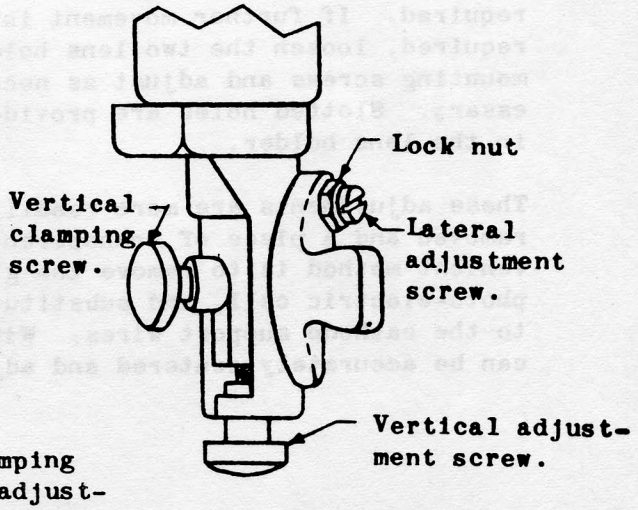
CAUTION:- Do not add oil while the mechanism is running. Oil taken up by the running gears will drain into the bottom of the gear box when the mechanism is idle. The oil level will then be too high and leakage may occur around the bearings, especially with large projection angles.

Oil leakage around the bearings may be due to clogged oil return holes in the gear box casting, preventing oil thrown on the bearings from returning to the gear box. If such a condition is encountered (with correct oil level in the gear box) the gear box should be taken out of the sound mechanism, the retainer ring removed from each bearing and the oil return hole carefully cleaned with a toothpick or similar device by pushing the grease deposit down into the gear box.

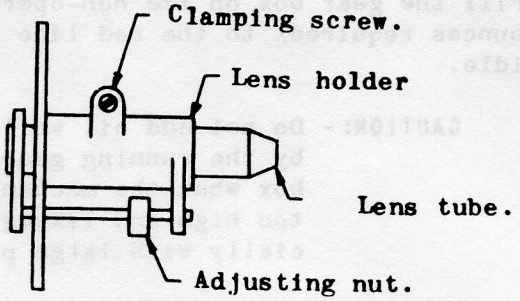
M. Adjustment of Scanning System. The main frame assembly is shipped with the exciter lamp bracket, lens tube, lateral guide roller and reflector lens mounted and adjusted ready for use. It is recommended, however, that the adjustments be checked. Use the Academy Buzz Track Film to check the adjustment of the lateral guide roller. Use the Academy Standard Scanning Illumination Test Track to check the exciter lamp adjustment and for final precise adjustments of the lateral guide roller. See attached Supplement "Standard Scanning Illumination Test Track" for application in Simplex Sound Systems. The lens tube adjustment should be checked, using the Academy 7,000 Cycle or 9,000 Cycle Film or ED-20 Test Film.

Refer to the Tuning-Up Instruction (included in the Instruction Book shipped with the system) for temporary changes in the warping circuit to increase high frequency response. The adjustment procedure for each of the above units is given below. Before proceeding, however, it is extremely important that the exciter lamp, photo-electric cell and lenses be thoroughly cleaned with lens tissue, and all parts of the sound mechanism cleaned with a soft cloth. Refer to Equipment Instruction "SH-106 Push-Pull Kit" for adjustments of push-pull scanner system.

(1) Exciter Lamp Bracket. Vertical and lateral adjustment are provided for the prefocused base exciter lamp. For vertical adjustment, loosen the clamping screw on the left of the bracket, and adjust the vertical knurled screw at the bottom as required. For lateral adjustment a screw and lock nut are provided on the front of the bracket. To move the bracket inward, loosen the screw and slide the bracket in. To move the bracket outward, tighten the screw. After the adjustments have been completed, be sure that the clamping screw and nut are tight. Check the adjustment with the Academy Standard Scanning Illumination Test Track (See Supplement).



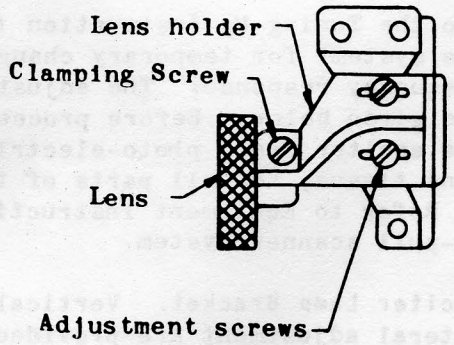
(2) **Lens Tube.** The lens tube is accurately adjusted for azimuth and properly focused before shipment. The azimuth adjustment should not be disturbed. To focus the lens tube, loosen the clamping screw above the lens holder and turn the knurled adjusting nut below as required. Be sure the clamping screw is tightened after the adjustment has been completed. Two methods of adjustment, using the Academy 7,000 Cycle or 9,000 Cycle Test Film or ED-20 Test Film, may be used - the response test or flicker test.



(a) **Response Test.** Thread the machine with the test film, run the machine and adjust the lens tube for focus until maximum response is obtained on a volume indicator or aurally.

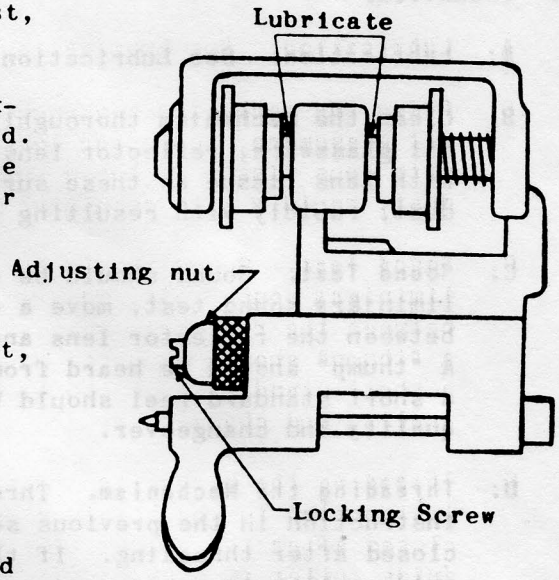
(b) **Flicker Test.** Thread the machine with test film, place a white card between the film and reflector lens and turn the motor hand wheel slowly. The film frequency lines make a definite flicker of light on the card. The tube is focused when the lines are stationary. If they move downward on the card, the lens tube should be closer to the film - while if they move upward, the tube should be farther from the film.

(3) **Reflector Lens** (Single track film only) If properly adjusted the spot on the photo-electric cell should be about 7/16" in diameter and centered on the anode of the cell. To position the spot of light, loosen the clamping screw at the top of the lens holder and carefully rotate the lens until the spot is centered on the anode. To change the size of the spot, move the lens in or out of the bracket as required. If further movement is required, loosen the two lens holder mounting screws and adjust as necessary. Slotted holes are provided in the lens holder.



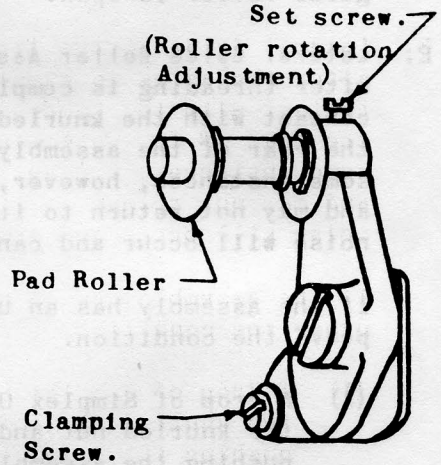
These adjustments are more readily made if the photo-electric cell is removed and a piece of transparent paper substituted. A still more convenient method is to remove the glass envelope and cathode from an old photo-electric cell, and substitute a transparent paper cathode attached to the cathode support wires. With either of these methods the spot can be accurately centered and adjusted for size.

(4) **Pressure and Guide Roller.** To adjust, loosen the locking screw in the center of the knurled adjusting nut and turn the nut as required. Clockwise rotation moves the roller inward. Be sure that the spiral spring at the rear of the pressure and guide roller holds it firmly against the knurled adjusting nut at all times. When properly adjusted the scanning beam does not strike the frame lines or sprocket holes. Check the adjustment, using Academy Buzz Track Film, and make final precise adjustments with Academy Standard Illumination Test Track (See Supplement).



(5) **Pad Rollers.** The clearance between the sound and hold-back sprockets and their pad rollers should be equal to two thicknesses of film. To adjust, loosen the fillister head clamping screw, insert two thicknesses of film between the roller(s) and sprocket, press the roller(s) firmly against the film and tighten the screw.

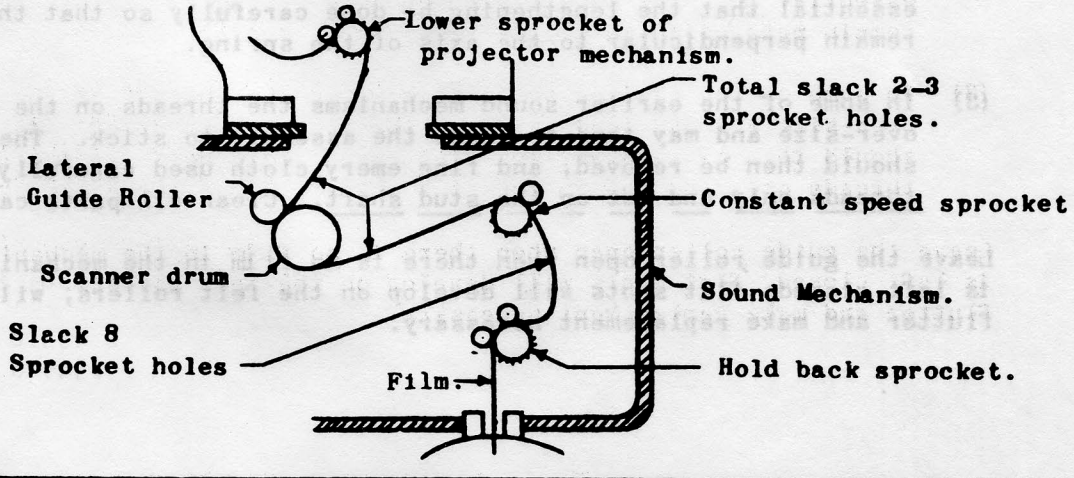
The roller(s) should rotate freely. To adjust, loosen the set screw at the top of the bracket, grasp the knurled roller stud, pull carefully until the roller rotates freely and tighten the clamping screw. Do not allow more clearance than is necessary for free rotation.



(Sprocket and roller clearance adjustment)

(6) **Lubrication.** See Lubrication Chart.

(7) **Threading Film in the Sound Mechanism.** Film should be threaded in the projector mechanism in accordance with the instructions furnished there with, and in the sound mechanism in accordance with the following sketch:-



4. OPERATION.

A. Lubrication. See Lubrication Chart.

B. Clean the mechanism thoroughly each day. It is extremely important that all glassware, reflector lens and lens tube lenses be thoroughly cleaned with lens tissue as these surfaces accumulate particles, such as carbon dust, rapidly with resulting loss in gain.

C. Sound Test. Sound should be checked daily before operating. As a preliminiary sound test, move a card rapidly in and out of the light beam between the reflector lens and the photo-electric cell on each machine. A "thump" should be heard from the stage and monitor speakers. If possible a short standard reel should be run in each machine to test for sound quality and changeover.

D. Threading the Mechanism. Thread the mechanism in accordance with the instruction in the previous section. The lateral guide roller must be closed after threading. If the sound mechanism door does not close, the guide roller is open.

E. Lateral Guide Roller Assembly. Pull the guide roller assembly outward, after threading is completed and the roller is closed, until it is in firm contact with the knurled adjusting nut. There is a spring on the stud at the rear of the assembly to hold it firmly against the adjusting nut. In some instances, however, the assembly may be pushed inward as it is closed and may not return to its proper position due to friction. Sprocket hole noise will occur and cannot be remedied by adjustment.

If the assembly has an unusual tendency to stick, the following should improve the condition.

(1) A drop of Simplex Oil should be applied on the supporting stud between the knurled nut and the assembly. Distribute the oil along the stud by pushing the assembly back and forth and opening and closing it several times. Wipe off all excess oil.

(2) Increase the length of the spring at the rear of the assembly from 13/16" to 1-1/8". The effectiveness of the spring will increase and will aid in returning the assembly to its proper position. To increase the length of the spring, remove the assembly and spring and stretch each spring coil carefully until the length is 1-1/8". It is essential that the lengthening be done carefully so that the ends remain perpendicular to the axis of the spring.

(3) In some of the earlier sound mechanisms the threads on the stud were over-size and may tend to cause the assembly to stick. The assembly should then be removed, and fine emery cloth used carefully on the threads only and not on the stud shaft. Clean all parts carefully.

Leave the guide roller open when there is no film in the mechanism. If it is left closed, flat spots will develop on the felt rollers, will cause flutter and make replacement necessary.

5. MAINTENANCE.

A. Cleanliness cannot be emphasized too strongly. Oil, dirt and other foreign material in the mechanism will impair the quality of reproduction, increase wear and eventually cause interruptions in the show and increase in replacements. Careful cleaning and daily inspection, on the other hand, will insure continued uninterrupted high quality sound.

B. The Exciter Lamp glass envelope blackens with age and the filament tends to sag. Both impair the quality and reduce the volume level. Lamps should, therefore, be inspected frequently and replaced before the condition becomes serious.

C. Photo-electric Cell. The efficiency of the cell decreases with age resulting in a gradual decrease in output volume and frequency response. Cells should be replaced before quality is impaired.

D. Lateral Guide Roller Assembly. Be sure that the guide roller is left open when there is no film in the mechanism. If left closed, flat spots will develop on the felt rollers, will cause flutter and make replacement necessary. The guide roller assembly must be removed to replace a felt roller.

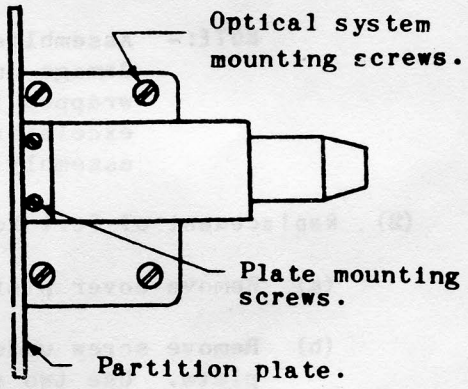
(1) Removal and Reinstallation of Guide Roller Assembly.

(a) Remove the exciter lamp bracket.

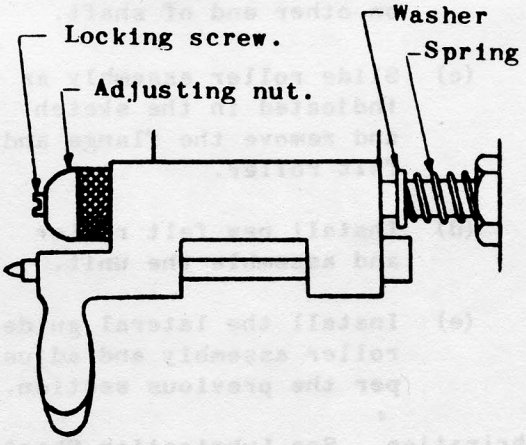
(b) Remove the photo-electric cell. and rear photo-electric cell shield.

(c) Remove the two screws holding the partition plate in place and slide out the partition plate.

(d) Remove the four screws mounting the entire optical system and lift out the optical system carefully.



(e) Remove the lateral guide roller assembly by first loosening the locking screw in the center of the chromium plated adjusting nut, remove the adjusting nut and slide the entire assembly from the mounting stud. Be sure that the spring and steel washer back of the lateral guide roller assembly remain on the mounting stud.



(f) Reinstall the guide roller assembly and adjusting nut. Do not tighten the locking screw.

(g) Reinstall the optical system, partition plate and exciter lamp bracket.

(h) By means of the adjusting nut locate the guide roller assembly laterally so that the scanning beam is properly positioned on the sound track, using buzz track and 17-position track film. If such film is not available, the adjustment may be made as follows:-

(1) Thread regular release film in projector and sound mechanisms in the usual manner and start the machine.

(2) Observe the position of the scanning beam with relation to the sound track. As an aid in observing the edges of the sound track, a flash light may be directed on the concave side of the film (that side in contact with the rotary stabilizer drum) and the image viewed from the same side of the film.

In making the above adjustments, be sure that the guide roller assembly is under tension - that is, that the spring on the mounting stud behind the guide roller assembly is functioning so that the guide roller assembly is in contact with the adjusting nut at all times.

While the removal and reinstallation of the optical system may not seriously affect the focus thereof, the focus should be checked with frequency film at the first opportunity.

NOTE:- Assemblies returned should be packed carefully to prevent damage during shipment. Each assembly should be carefully wrapped in clean paper so that packing material, such as excelsior or other foreign matter, does not reach the assembly or damage the felt roller.

(2) Replacement of Felt Roller.

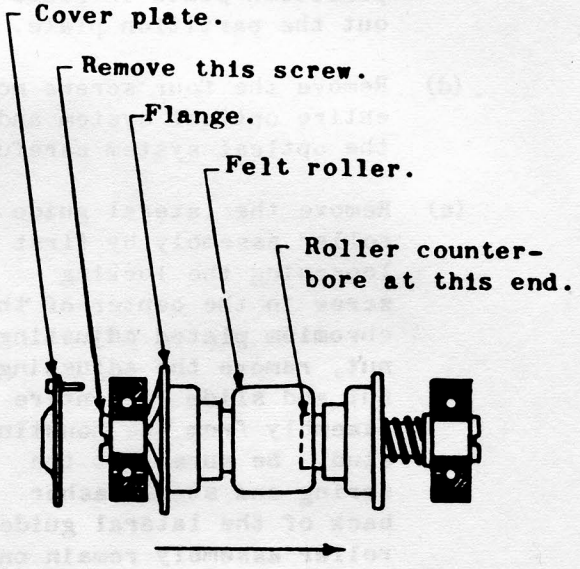
(a) Remove cover plate.

(b) Remove screw under cover plate. Use two screw drivers, one to hold screw on other end of shaft.

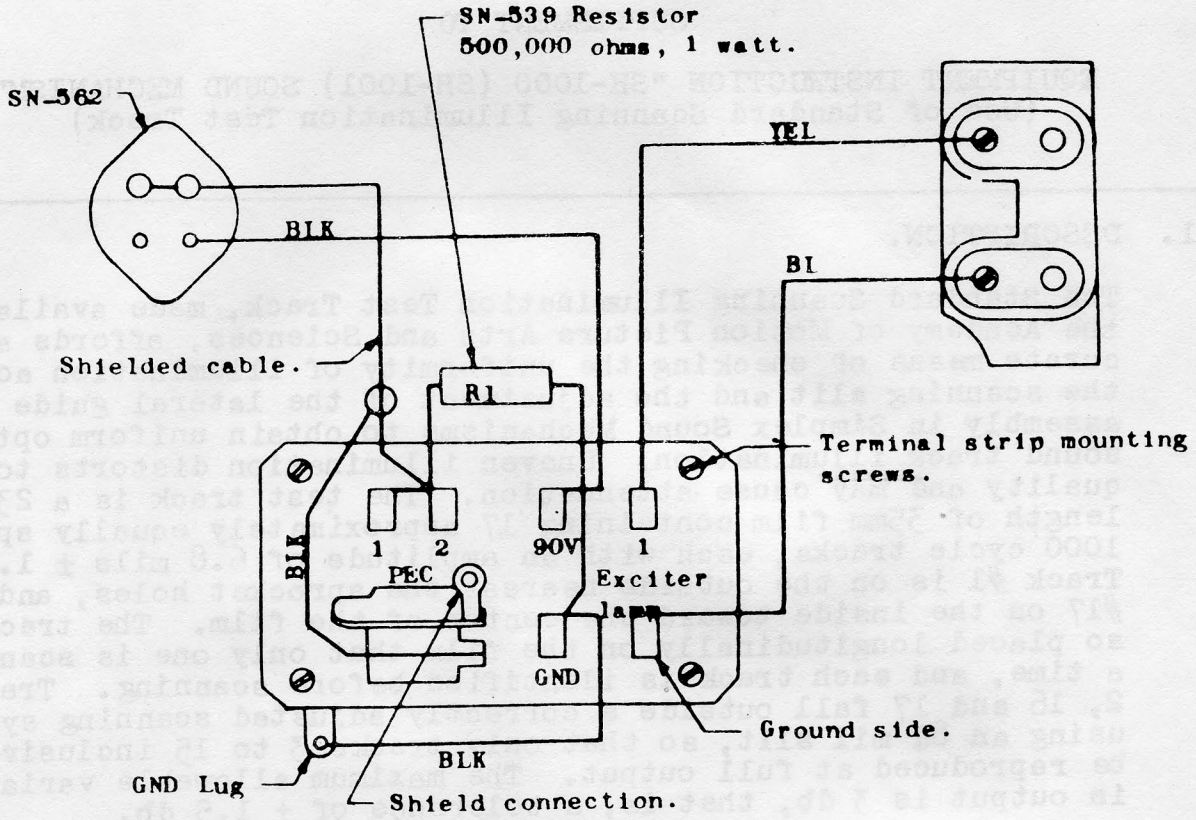
(c) Slide roller assembly as indicated in the sketch and remove the flange and felt roller.

(d) Install new felt roller and assemble the unit.

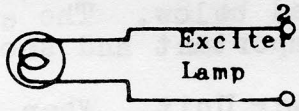
(e) Install the lateral guide roller assembly and adjust per the previous section.



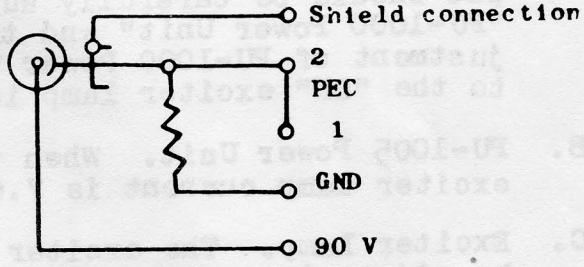
E. Lubrication. See Lubrication Chart.



SN-297 Exciter Lamp (4 amp., 9 volts)
or
SN-299 Exciter Lamp (7.5 amp., 10 volts)



SN-724 Photo-electric Cell (Single track)



SH-1000, SH-1001 SOUND MECHANISM

WIRING DIAGRAM AND SCHEMATIC.

Simplex ★★★★ SOUND System

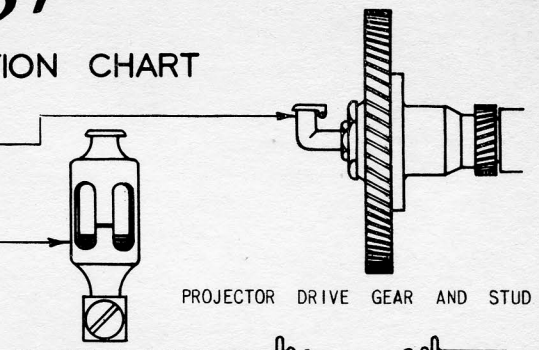
SOUND MECHANISM LUBRICATION CHART

DAILY

FILL OIL CUP CAREFULLY WITH SIMPLEX OIL.

DAILY

ADD SAE #40 OIL AS REQUIRED TO MAINTAIN OIL LEVEL SHOWN WHEN MECHANISM IS AT REST.
(ADD OIL ONLY AFTER MECHANISM HAS BEEN IDLE OVERNIGHT. DO NOT FILL TO RED LINE AFTER INITIAL FILLING WHEN INSTALLED.)

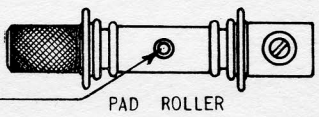


PROJECTOR DRIVE GEAR AND STUD

OIL SIGHT GAUGE

MONTHLY

APPLY 1 DROP OF SIMPLEX OIL TO THE OIL HOLE IN EACH PAD ROLLER. (ROTATE PAD ROLLER TO DISTRIBUTE OIL.) *



PAD ROLLER

MONTHLY

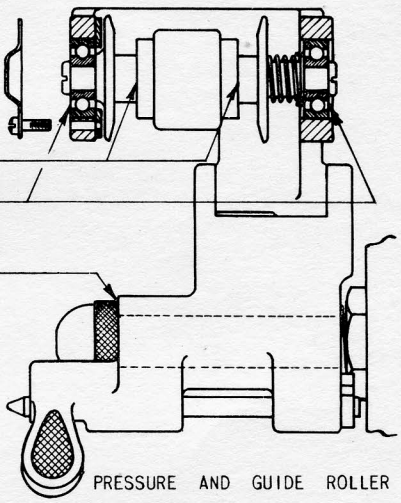
APPLY 1 DROP OF SIMPLEX OIL TO THE SHAFT AT EACH END OF THE ROLLER. (ROTATE FLANGES TO DISTRIBUTE OIL.) *

SEMI-ANNUALLY

APPLY 1 DROP OF SIMPLEX OIL TO EACH BALL BEARING.
(ROTATE BEARINGS TO DISTRIBUTE OIL.) *

MONTHLY

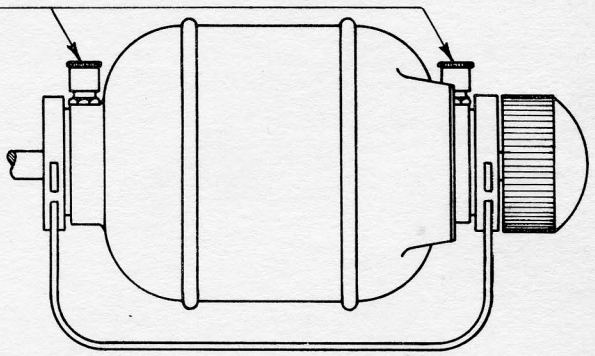
APPLY 1 DROP OF SIMPLEX OIL TO THE SHAFT. (SLIDE ASSEMBLY IN TO APPLY OIL. OPERATE TO DISTRIBUTE OIL.) *



PRESSURE AND GUIDE ROLLER

MONTHLY

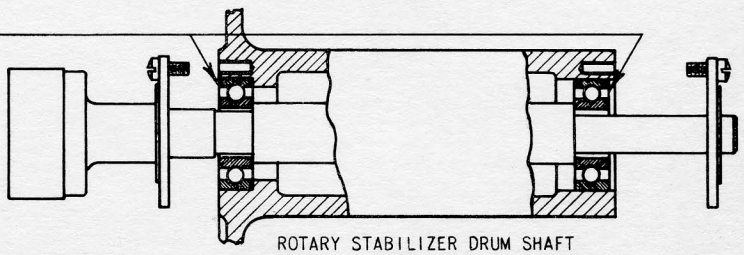
GIVE EACH GREASE CUP ABOUT 1/2 TURN. DO NOT FORCE TOO MUCH GREASE INTO THE BEARINGS. REFILL WITH SIMPLEX REAR SHUTTER GREASE AS REQUIRED. MARFAK #2 (TEXACO) MAY BE USED AS A SUBSTITUTE.



PROJECTOR DRIVE MOTOR

SEMI-ANNUALLY

APPLY 1 DROP OF SIMPLEX OIL TO EACH BALL BEARING.
(REMOVE DAMPING WHEEL AND TWO RETAINER RINGS.
ROTATE BEARINGS TO DISTRIBUTE OIL.) *



ROTARY STABILIZER DRUM SHAFT

* APPLY SIMPLEX OIL WITH A TOOTHPICK OR PIPE CLEANER. DO NOT OVER-LUBRICATE.

EXCESS OIL SHOULD BE CAREFULLY WIPED OFF WITH CHAMOIS OR LINTLESS CLOTH.

ISSUED BY
SOUND ENGINEERING DIVISION
INTERNATIONAL PROJECTOR CORPORATION
NEW YORK