TECHNICAL MANUAL

OPERATING & MAINTENANCE INSTRUCTIONS
WITH PARTS LIST

LIBRARY READER

MODEL LV
MODEL LVR
MODEL LVRM

NOTE

SECTIONS I THROUGH VI OF THIS MANUAL CONTAIN DATA APPLICABLE TO THE MODEL LVR. REFER TO SECTION VII FOR DIFFERENCE DATA APPLICABLE TO MODELS LV AND LVRM.

magnasync moviola

Manufactured by: magnasync/moviola corporation
A Subsidiary of Craig Corporation
5539 Riverton Ave., No. Hollywood, Calif. 91601

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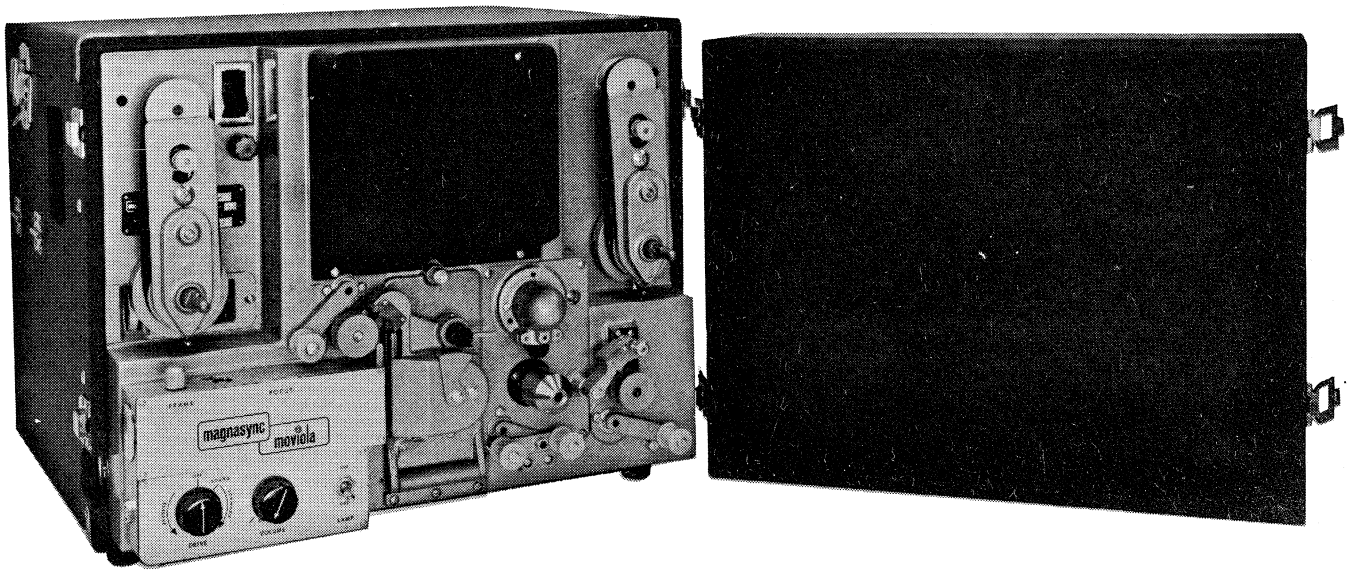


Figure 1-1. Library Reader Model LVR

SECTION I

INTRODUCTION

1-1. INTRODUCTION.

1-2. This publication contains operating and maintenance instructions with parts list for the Model LVR Library Reader manufactured by Magnasync/Moviola Corporation, North Hollywood, California.

1-3. PURPOSE OF EQUIPMENT.

1-4. The Model LVR Library Reader (figure 1-1) is a special-purpose portable projector for viewing 16mm motion picture film with an optical sound track. It may be used as a "portable screening room" to review 16mm motion picture film from a film library for the purpose of previewing, editing, or marking the film.

1-5. GENERAL DESCRIPTION.

1-6. The Model LVR Library Reader is a fully self-contained portable unit and does not require any auxiliary equipment except the film to be viewed and a suitable empty takeup reel. In use, the front portion of the carrying case is unsnapped and the reel arm assemblies are unfolded into the operating position. The film to be viewed is loaded onto the left reel arm and an empty takeup reel is loaded onto the right-hand arm. The film is then projected onto the rear of the built-in viewing screen and optically recorded sound is reproduced on the built-in loudspeaker or supplied at the headset jack. The projected image is bright enough to be viewed in normal interior room lighting. An aperture in the film gate permits selected frames to be marked for subsequent cutting and splicing. Optional counters indicate film position in feet and frames or hours, minutes, and seconds.

1-7. CHARACTERISTICS.

1-8. Characteristics concerning the performance, dimensions, weight, power and construction of the library reader are given in table 1-1.

1-9. SAFETY PRECAUTIONS.

1-10. Standard safety procedures for the use of electrical equipment are required. No special safety precautions or other equipment are necessary.

1-11. SPARES.

1-12. The library reader is shipped with a spare bulb and a spare fuse. These are packed in the storage compartment for the power cable which is on the left-hand side of the unit.

1-13. SPECIAL SUPPORT EQUIPMENT.

1-14. No special tools or test equipment are required for support of the library reader. However, common electronic test equipment such as an ohmmeter and vacuum-tube voltmeter may be required for troubleshooting and maintenance.

Table 1-1. Characteristics of Library Reader Model LVR

Dimensions of carrying case:	19-3/8 in. long by 15-3/8 in. wide by 19-3/4 in. high
Weight:	58 pounds
Electrical input power:	115-volt, 60-Hz, ac power fused for 5 amperes
Film type:	16mm motion picture film single or double perforated with or without optical sound track
Picture size:	4-1/8 inches by 5½ inches with ample illumination for viewing in a normally lighted room

Table 1-1. Characteristics of Library Reader Model LVR (Cont)

Capacity:	Determined by the size of the reel; a 15-inch-diameter reel of 16-mm motion picture film is maximum capacity. It holds 2,000 feet of film and has a running time of 55 minutes at sound speed.
Speed:	Variable from zero to six times the normal sound speed (216 feet/minute) in either the forward or reverse mode
Framing:	Controlled by a framing knob which frames the image in vertical center of screen
Rewinding:	Accomplished at high speed in either direction without switching or reversing the reels
Threading:	Accomplished by simple straight-through threading with no loops being required; the continuous-motion principle saves wear and tear on the film perforations and minimizes holddown pressure required in the film gate
Picture action:	Produced by a rotating 12-sided prism; no intermittent mechanism noise is heard due to the use of the rotating prism; all optics are precision ground
Film marking:	Film access to the projected frame is provided for marking
Center of gravity:	In center of carrying case when cover is in place
Volume:	3.4 cubic feet
Environmental requirements:	Operation: 40 to 120°F (4 to 50°C) 0- to 95-percent humidity Storage: 0 to 150°F (-18 to 65°C) 0- to 100-percent humidity

SECTION II

PREPARATION FOR USE OR RESHIPMENT

2-1. PREPARATION FOR USE.

2-2. The library reader is shipped prepared for use. No installation or servicing procedures are required. Removal of the carrying case top and connecting the external power cord are the only procedures required prior to loading the reels and threading.

2-3. PREPARATION FOR RESHIPMENT.

2-4. The unit may be shipped fully assembled. Ship the unit in its carrying case, or with other suitable protection on the outside, to prevent damage during shipment. If the unit is to be stored for a long period of time, a waterproof or overseas shipping container should be used. Avoid storage in damp areas.

SECTION III

GENERAL THEORY OF OPERATION

3-1. INTRODUCTION.

3-2. This section contains a general description of the mechanical/optical operation of the Model LVR Library Reader plus a description of the electronic circuits required for motor control and sound amplification.

3-3. MECHANICAL/OPTICAL OPERATION.

3-4. The library reader operates on the light transfer principle using two mirrors, a reflector assembly, and a rotating prism to project the frame or picture on the screen. The light from the projection lamp is projected through the frame of film in the film gate assembly to the rotating prism. As the prism rotates, it transfers the light beam and image to the lens and the first mirror. It is then reflected from the first mirror to the mirror in the rear of the light tunnel and hence to the screen.

3-5. The rotating prism is used instead of a moving shutter to eliminate the sound of the Geneva movement and the flickering of the framed light and image at the slower speeds while reviewing the film. It also permits the film to be projected at six times normal speed.

3-6. The drive controller is a two-section wafer switch (and potentiometer) that controls the direction of current flow to the motor. This control of the direction of current flow allows control of the motor direction (forward or reverse), thus allowing rewinding of the film without changing the reels or film. The controller also regulates the film speed.

3-7. POWER CONTROL CIRCUITS. (See figure 5-2.)

3-8. Input power of 115 vac, 60 Hz is applied to the unit through cable assembly W1 and power connector J101. The unit is protected by 5-ampere fuse F101 and input power is controlled by power switch-indicator S101. Power to 150-watt projection lamp DS101 is controlled by LAMP switch S102. Lamp fan B101 and fan B102, which cools power transistor Q101, operate at all times when power is applied to the unit. Power for the sound amplifier is controlled by switch S301, which is on the same shaft with the amplifier VOLUME control.

3-9. Film transport motor B103 is controlled in speed and direction by DRIVE switch S103 and associated potentiometers R103 and R104 and the motor control circuit board. Power transistor Q101, which provides the motor drive current, is mounted on a heatsink assembly and cooled by fan B102. The majority of other motor-control circuit components are mounted on a replaceable circuit board.

3-10. SOUND AMPLIFIER CIRCUIT. (See figure 5-3.)

3-11. Optically recorded sound can be reproduced by the library reader when VOLUME control R311-S301 is in the on position. Input power is stepped down by transformer T301 and rectified by CR302-CR305 to provide dc power for the amplifier circuits and the exciter lamp.

3-12. The exciter lamp, in the optical sound head assembly, projects a beam of light through the optical sound track on the film. This projected light falls on the photoelectric cell (also in the sound head), which produces an electrical signal (sound) proportional to the projected light energy. The sound signal is applied to the amplifier at input connector J301 and is amplified in three series stages by Q301, Q302, and Q303. Front panel VOLUME control R311 determines the output level.

3-13. The amplifier sound signal is then applied to coupling transformer T302 which, by means of a center-tapped secondary winding, converts the single-ended input into a double-ended output which is further amplified by push-pull amplifier Q304 and Q305. Output transformer T301 matches the impedance of the output signal to speaker SPK101 and PHONE jack J105. The speaker is disconnected when a headset is plugged into the PHONE jack.

SECTION IV

OPERATING INSTRUCTIONS

4-1. INTRODUCTION.

4-2. This section describes the function of each front panel control, indicator and switch, and provides operating instructions for the equipment.

4-3. CONTROLS AND INDICATORS.

4-4. The function of each control and indicator is described in table 4-1. Operating controls and indicators and shown in figure 4-1.

Table 4-1. Operating Controls and Indicators

Reference Designation (Fig. 4-1)	Name	Function
S101	Master power switch and indicator	Controls input power to all electrical circuits. Indicator lamp shows when switch is in on position.
F101	Power fuse	Protects electrical circuits. This is a 5-ampere slo-blo fuse. A spare fuse is packed in the power cord compartment.
COUNTER	Optional counter	Indicates location of film in either feet and frames or hours, minutes, and seconds, depending upon counter used.
FRAME	Framing control	Adjusts the center of the projected pictures on the screen in the vertical direction.
NOTE Two screws adjacent to the framing knob are for adjustments made at the factory and should not be disturbed.		
FOCUS	Focus control	To focus the picture, rotate the exposed section of the knurled ring clockwise or counterclockwise. The knurled ring is a half circle with a pin into the lens assembly moving it closer or farther away from the rotating prism.
S103/R104	DRIVE control	Controls the film transport direction and speed. The film may be moved in a FORWARD or REVERSE direction and the speed may be varied from 0 to 216 feet per second. When set on SOUND SPEED, the machine runs at approximately 36 feet per minute (24 frames per second). The OFF position of the controller stops the motor only and leaves the other electrical circuits operable.
R103	Sound speed adjustment	Screwdriver adjustment to obtain exactly 24 frames per second when DRIVE control is set to SOUND speed.

Table 4-1. Operating Controls and Indicators (Cont)

Reference Designation (Fig. 4-1)	Name	Function
S301/R311	VOLUME control	Controls volume of sound applied to loudspeaker or PHONES jack. When turned to maximum ccw position, shuts off power to sound amplifier.
S102	LAMP switch	Controls power to the projection lamp.
REEL SPINDLES	Reel spindles	Film tension is controlled automatically through clutches that react to the weight of film and reel and diameter of the roll of film on the spindle. Small round knobs at the end of the spindle arms are used to release the clutches during rapid rewinding only. When the knob is moved up, the reel will freewheel. The down position is for normal operation.
FILM GATE CONTROL	Film gate control lever	Controls position of film gate. Film gate is opened when control is turned to the right.
SOUND HEAD	Optical sound head	Converts optical sound recordings to electrical sound signals.
FILM CLAMP	Film clamp assembly	Holds film against drive sprocket.

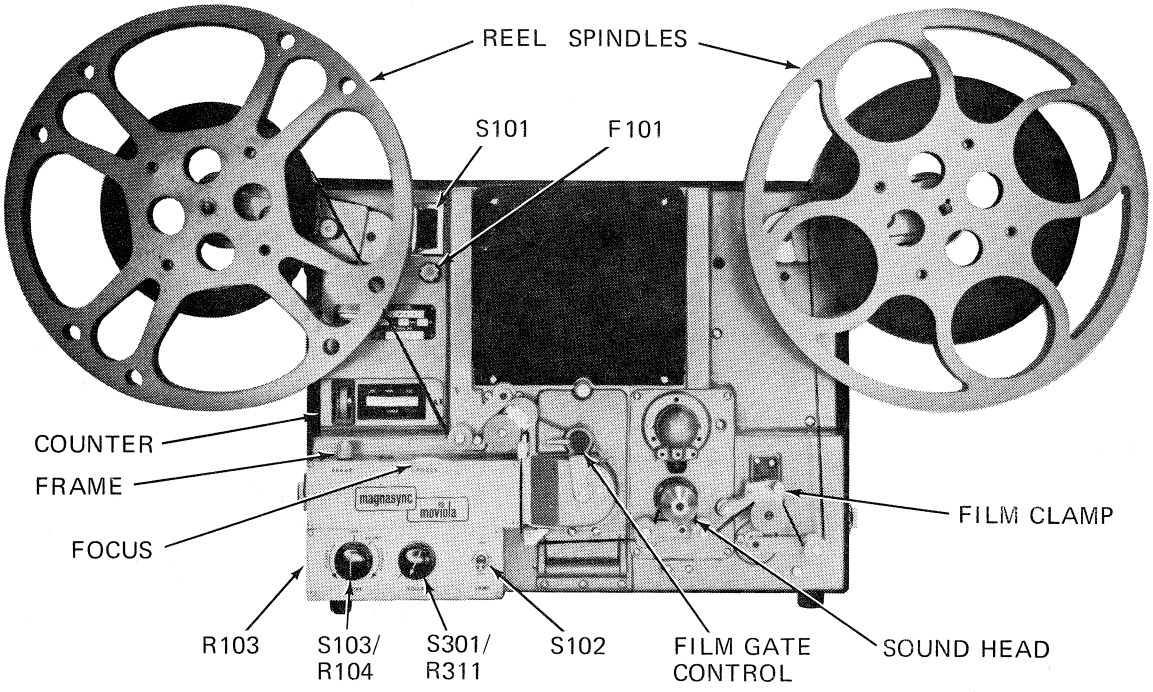


Figure 4-1. Operating Controls and Indicators

4-5. OPERATING INSTRUCTIONS.

4-6. The following paragraphs contain operating procedures for the Model LVR Library Reader (see figure 4-1).

4-7. PREPARATION FOR USE. Prepare the unit for use as follows:

a. Remove the front cover from the carrying case and set aside.

b. Take the power cord out of its compartment on the left side of the unit and connect it to input receptacle J101 and to a source of 115-vac, 60-Hz power.

c. Pull the reel arm release knobs out.

d. Swing the reel spindles up to the operating position and release reel arm release knobs. Knobs will lock in the detents for the operating position.

e. Place supply reel of film on the left spindle.

NOTE

When the supply reel is properly oriented, the "heads-out" leader extends down from the right side, with the film perforation toward the operator.

f. Place a suitable takeup reel on the right spindle.

g. Using the gate control lever, move film gate assembly away from control panel.

NOTE

No loops are required.

h. Thread film under roller on film tension regulators, over sprocket, and through film gate assembly.

i. Move film gate assembly to closed position with gate control lever.

j. Thread film under left roller on sound head assembly, over sound drum and under right-hand roller. Be sure that tensioning arm carrying right and left roller is in the center of its up and down travel. See heavy line on figure 4-1.

k. Thread film through film clamp assembly, around roller on other film tension regulator, and onto right-hand reel.

CAUTION

When the machine is in operating position, the blower exhaust vent is on the bottom of the case facing the table. Make certain this vent is free from obstructions and that the air space provided by the rubber bumpers on the case is maintained.

4-8. OPERATING. Operate the library reader as follows:

a. Set DRIVE controller to OFF.

b. Turn master power switch on.

CAUTION

Make certain film is properly placed beneath tension regulator rollers, one immediately following the supply reel and one prior to the takeup reel. Failure to do so may result in damaged film.

c. Using the DRIVE controller, move film through film gate assembly until a picture appears on the screen.

d. Adjust frame with FRAME knob.

e. Focus picture with FOCUS knob.

f. Adjust sound level with VOLUME control.

g. Set DRIVE controller to desired speed for reviewing film.

h. Review and mark film as desired.

4-9. RAPID REWIND. Film may be passed directly over the screen shade from reel to reel and rewound in either direction. Move the friction release knob on the supply spindle up, position the DRIVE controller for proper direction and speed. Spinning the takeup reel by hand at the start helps accelerate the rewind action.

NOTE

Remember to move the spindle release knob down for subsequent normal operation at the conclusion of rapid rewinding.

4-10. MARKING. A tab cover located beneath the gate control lever exposes a hole into which a grease pencil may be inserted for marking the projected frame.

4-11. SHUTDOWN. The unit may be stopped at any time by setting the DRIVE control to OFF. No special shutdown procedures are required; merely reverse the steps listed in paragraph 4-7.

CAUTION

Do not stop unit with the master power switch, as the film may be damaged when the master switch is turned on again.

4-12. If unit has been stopped with master power switch or as a result of power failure, set DRIVE control to OFF before restarting unit.

SECTION V

MAINTENANCE

5-1. INTRODUCTION.

5-2. This section describes the maintenance procedures applicable to the Model LVR Library Reader. The maintenance procedures covered are: cleaning, lubrication, servicing, troubleshooting, repair, and replacement of parts.

5-3. MAINTENANCE.

5-4. SERVICING. Servicing or preventive maintenance to be performed is as follows:

a. Replacement of Projection Lamp: Refer to paragraph 5-34 for replacement procedure.

b. Replacement of Sound Head Exciter Lamp: Refer to paragraph 5-35 for replacement procedure.

c. Cleaning: Refer to paragraph 5-5 for cleaning procedures and requirements.

d. Lubrication: Refer to paragraph 5-7 for lubrication procedures and requirements.

e. Belt Tension Adjustment: Refer to paragraph 5-8 for procedures and requirements.

5-5. CLEANING. Cleaning should be done at periodic intervals and as required during servicing, repair, or use (refer to figure 5-1). Normal cleaning of the film gate slide, pressure plate, and aperture window should be done frequently to prevent the accumulation of dust, lint, and dirt. Cleaning procedures are as follows:

NOTE

The optical elements, prism, projection lens, and mirrors are contained in an almost dust-free compartment and should not require attention except during repair or replacement.

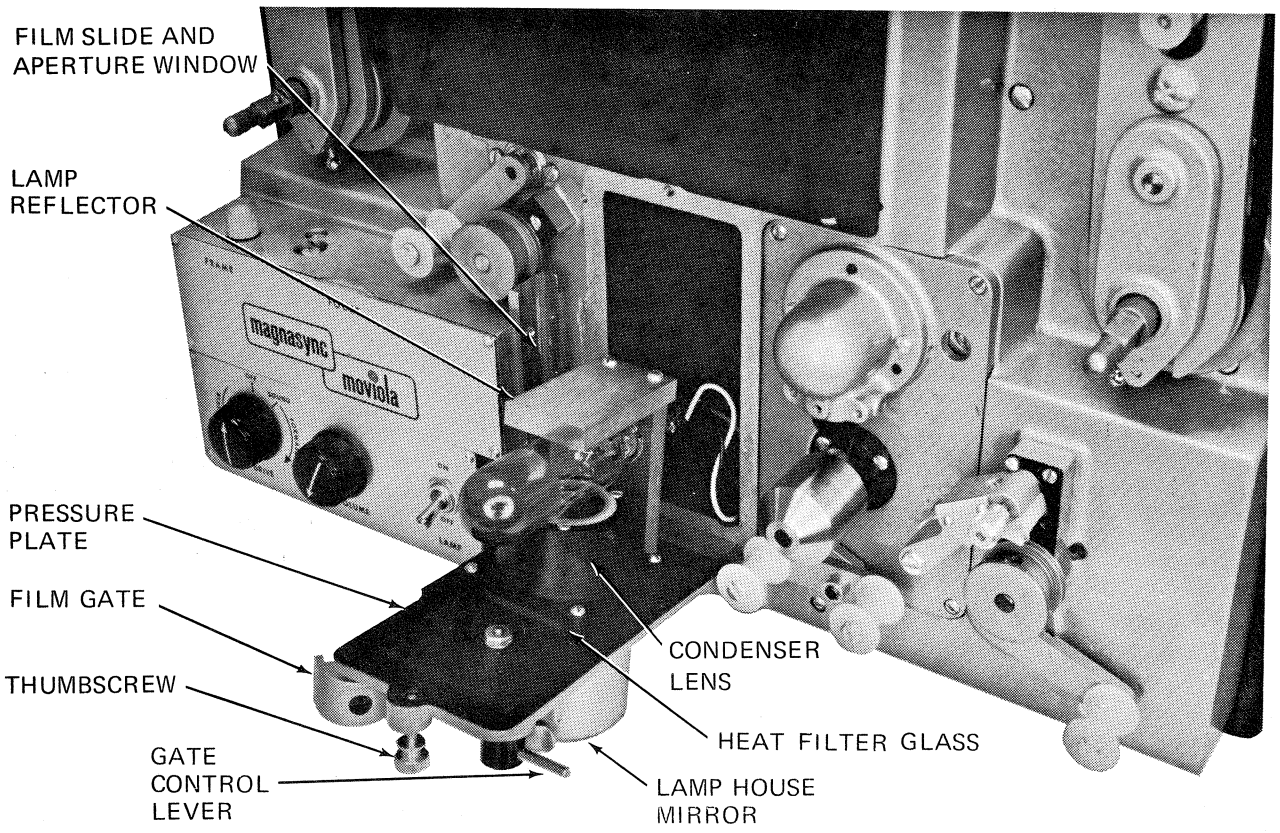


Figure 5-1. Location of Parts Requiring Periodic Cleaning

Do not touch first or second mirrors. They have very sensitive metallic surfaces and require special cleaning. See paragraph 5-6.

a. Open film gate assembly using gate control lever.

b. Loosen the thumbscrew directly beneath the screen and open projection lamp housing.

NOTE

Opening the lamp housing allows access to the film gate slide, pressure plate, and aperture window.

c. Using a lint-free cloth, clean dust, lint, and dirt from the film gate slide, pressure plate, and aperture window.

d. Remove four screws (size 4-40) from condenser assembly.

e. Using a lint-free cloth, clean dust, lint, and dirt from the lamp reflector heat filter glass, the lamp housing mirror, and the condenser lines.

f. Using a lint-free cloth and alcohol (or its equivalent), remove marking pencil residue from tab area.

NOTE

- A damp cloth should never be applied to any of the metal surfaces.
- Standard cleaning practices should be utilized when repairing or replacing all other components.

5-6. MIRROR CLEANING. Clean first and second mirrors at first sign of dirt film or dust.

CAUTION

Do not brush or rub a dusty mirror, as the surface can be easily scratched.

a. Rinse mirror under running water and blot dry with a clean cotton cloth.

b. Swab dry with Keim Mirror Cleaner, keeping surface wet.

NOTE

This cleaner is available from Keim Precision Mirrors Corporation, 124 East Angeleno Avenue, Burbank, California 91502 (no applicable federal specification).

c. Dry mirror with clean cotton cloth and polish until all streaks are removed.

5-7. LUBRICATION. Either monthly or as required, depending upon usage, use a few drops of light machine oil (Federal Specification VV-L-820, or equivalent) in the following places (areas are painted red):

a. Gate sprocket (6, figure 6-8) fill hole (beneath the jerk absorber arm).

b. Holdback sprocket (6) fill hole.

c. Both hinged reel arms (2 and 3) (when arms are up in operating position).

d. Lubrication reservoir (34, figure 6-1) which supplies oil for five bearings inside the case. Remove the button head socket screw to the left of the right-hand reel arm and squirt oil inside.

e. If any of the guide rollers are not turning freely, remove them, wipe off shafts, and lubricate.

f. Grease gear train inside case with silicon grease (Military Specification MIL-G-14931, or equivalent).

g. Coat counter assembly (6, figure 6-1) with silicon grease.

5-8. ADJUSTMENTS. Periodically check the tension on the three drive belts (1, figure 6-6; 21 and 22, figure 6-8) and on the timing belt (23, figure 6-8). All belts should be tight enough to eliminate slipping, but not so tight as to cause excessive shaft noise or bearing wear. Belts should be tightened until they deflect about ½ inch under moderate finger pressure. Adjust belt tension as follows:

a. Adjust tension on drive motor belt (1, figure 6-6) by adjusting nuts on motor cradle adjustment stud (8, figure 6-6).

b. Adjust tension on reel drive belts (21 and 22, figure 6-8) by adjusting position of idler arm assemblies (17, figure 6-8).

c. Adjust tension on timing belt (23, figure 6-8) by adjusting position of idler arm assemblies (11, figure 6-6, and 17, figure 6-8).

5-9. TROUBLESHOOTING.

5-10. Troubleshooting causes and corrections are contained in table 5-1. Specific repair and replacements procedures are contained in subparagraphs following the table.

5-11. REPAIR.

5-12. Repair is limited to replacement of damaged or malfunctioning parts.

5-13. REPLACEMENT OF MECHANICAL PARTS.

5-14. Replace damaged or malfunctioning parts of the library reader by performing the removal procedures of the following paragraphs. Disassemble the reader only to the extent necessary to effect required replacements and use care when disassembling so as not to damage other parts.

5-15. CARRYING CASE REMOVAL.

a. Place the library reader face down on a table or bench. Use suitable blocks under the unit to avoid weight bearing on the rollers or controls on the front of the unit.

b. Remove the ten screws from the side, top, and bottom of the carrying case containing the side mounting pads.

c. Carefully lift carrying case from the chassis.

5-16. CONTROL PANEL REMOVAL. To remove the control panel from the reader, proceed as follows:

a. Remove nut from switch (13, figure 6-1) and push switch through panel.

b. Loosen setscrew in DRIVE controller knob (14) and VOLUME control knob (14) and remove knobs.

c. Remove four screws (18) from control panel to complete removal of panel.

d. Refer to figure 6-3 for replaceable parts within control panel.

5-17. REEL ARM ASSEMBLIES REMOVAL. To remove the left-hand reel arm assembly (2, figure 6-8) and the right-hand reel arm assembly (1), proceed as follows:

a. Loosen phillips head screw (15, figure 6-9) and remove drive belt (3, figure 6-8).

b. Remove setscrew retaining pulley (25) on shaft (24) and remove pulley from shaft.

c. Remove retaining ring (28) from bearing (27) and slide bearing from shaft (24).

d. Remove shaft (24) from chassis.

5-18. SCREEN HOUSING ASSEMBLY REMOVAL. To remove screen housing assembly (22, figure 6-1) from chassis, remove four mounting screws (21) and lift housing assembly from the reader chassis.

5-19. LAMPS AND DOOR ASSEMBLY REMOVAL. Remove the lamp and door assembly as follows:

a. Using the gate opening lever (27, figure 6-1), rotate film gate assembly (25) away from the control panel.

b. Loosen door assembly knurled latch screw.

c. Remove three screws holding door hinge assembly.

d. Remove lamp and door assembly from chassis.

5-20. FILM CLAMP ASSEMBLY REMOVAL. Remove the film clamp assembly by removing screw and spacer (33, figure 6-1) and lift clamp (32) away from sprocket.

5-21. FILM TENSION REGULATOR REMOVAL. Remove either film tension regulator as follows:

a. Remove two retaining screws from each regulator assembly (4 or 12, figure 6-8).

b. Slide shaft and regulator assembly from chassis.

5-22. MOTOR CONTROL ASSEMBLY REMOVAL. Remove motor control assembly as follows:

a. Remove control panel assembly (paragraph 5-16).

b. Remove motor control assembly nut from motor control assembly (38, figure 6-1).

c. Unsolder leads from motor control assembly (tag leads for later reassembly).

d. Remove motor control assembly from chassis.

Table 5-1. Troubleshooting Chart

Trouble	Probable Cause	Correction
Motor completely inoperative	Open resistor R101	Replace resistor R101
	Defective motor control circuit board	Replace circuit board
	Defective power transistor Q101	Replace power transistor
	Defective control switch S103	Replace control switch
	Defective rectifier CR101-CR102	Replace rectifier
	Defective motor	Replace motor
Motor runs full speed as soon as control is turned in either direction	Defective control switch S103	Replace control switch
	Control and switch not properly coupled	Align and tighten coupling
	Power transistor Q101 shorted	Replace transistor
	Defective motor control circuit board	Replace circuit board
Motor operates properly in one direction only	Open circuit in resistance winding of control R104	Replace control
	Defective control switch S103	Replace control switch
Erratic speed control	Defective control winding R104	Replace control switch
	Defective control switch S103	Replace control switch
	Control and switch not properly coupled	Align and tighten coupling
	Defective power transistor Q101	Replace power transistor
	Loose contact of circuit board in receptacle J104	Replace or tighten contact
Slow increase of speed when control is advanced	Defective circuit board	Replace circuit board
	Defective input transistor Q201	Replace circuit board
	Mechanism binding (see figure 6-6)	Check and adjust pulley belts, etc.
No sound at loudspeaker or PHONES jack	Defective sound amplifier circuit board	Replace circuit board
	Defective VOLUME control R311/S301	Replace control
	Exciter lamp DS102 (17, figure 6-2) burned out	Check presence of light on sound head; replace if necessary
	Photoelectric cell (11, figure 6-2) defective	Replace photocell

5-23. FILM SPROCKET ASSEMBLY SHAFT REMOVAL. To remove the shaft from the film clamp assembly mount, proceed as follows:

a. Remove setscrew (7, figure 6-8) from the sprocket (6) and slide sprocket from shaft (40).

b. Remove the drive belts at the rear of the front panel from pulley (41) and clutch assembly (45). Loosen setscrews in flex coupling attached to back end of shaft (40) and setscrews (43) in pulley (41) and spacer (42).

c. Shaft (40) can be pulled out through front panel of reader. Use care not to loosen fiber washers next to sprocket.

5-24. FILM GATE ASSEMBLY AND SHAFT REMOVAL. The film gate assembly can be removed from the front panel by removing the one screw attaching the assembly to the panel. Remove the film gate assembly shaft as follows:

a. Loosen setscrew (7, figure 6-8) to remove sprocket (6) from shaft (28).

b. Remove screw (9) attaching block (8) to panel and remove block.

c. Remove the drive belts at the rear of the front panel from pulley (29) and clutch assembly (33). Loosen setscrews (31) in pulley (29) and gear (30), and pull shaft (28) from panel and other parts. Use care not to loosen fiber washers next to sprocket and gear.

5-25. PRISM AND SHAFT REMOVAL. Remove the prism and prism shaft from the reader as follows:

a. Remove the four screws attaching the reflector assembly cover (2, figure 6-3) to the reader front panel.

b. At the rear of the front panel, loosen setscrew (35, figure 6-8) to enable removal of gear (34) from prism shaft.

c. Pull prism (10) with attached shaft from front of panel. Use care not to scratch or damage prism during removal.

5-26. IDLER GEAR REMOVAL. The idler gear (37, figure 6-8) between the prism shaft gear (34) and the film gate assembly gear (30) can be removed from the rear of the panel by removing screw and washer (39). Bushing (38) can be removed from the idler gear.

5-27. IDLER ARM ASSEMBLY REMOVAL. The three idler arm assemblies (17, figure 6-8) can be removed from the rear of the library reader panel by removing the single screw (19 or 20) attaching each assembly to the panel. Bushing (18) will come off with the center idler assembly.

5-28. REPLACEMENT OF ELECTRICAL PARTS.

5-29. Refer to schematic diagrams, figures 5-2 and 5-3, for assistance in trouble analysis. The schematic diagrams are annotated with voltage levels under normal conditions. Significant variations from the indicated levels may be helpful in isolating trouble to a group of components.

5-30. Replacement procedures for most electrical or electronic parts of the library reader, as determined necessary by troubleshooting, is obvious. As for replacement of related mechanical parts, perform disassembly only to the extent required to replace damaged parts with new parts. Replace all removed parts with like parts having the same part number as the part to be replaced. Refer to section VI for a list of replaceable parts. Note the following when replacing electrical parts.

5-31. DRIVE MOTOR. Remove the library reader drive motor as follows:

a. Unplug motor connector (4, figure 6-6) from power chassis assembly, and remove belt (1) from drive motor pulley (2). Loosen pulley setscrew to remove pulley from motor shaft.

b. Remove two screws and lockwashers (6) attaching bottom of motor case to motor cradle (7) to complete removal of the drive motor.

c. Adjust drive belt tension so that belt deflects about ½ inch under firm finger pressure.

5-32. MOTOR CONTROL PRINTED CIRCUIT BOARD ASSEMBLY. If malfunction of the library reader is traced to the motor control printed circuit board, do not attempt to repair the board. The printed circuit board is a plug-in unit that should be replaced as an assembly if damaged. Replace the circuit board as follows:

a. Remove the screws attaching carrying case to chassis assembly and remove case (paragraph 5-15). The power chassis assembly is on the lower right side of the library reader.

b. The printed circuit board is fully exposed when the cover is removed. Remove the circuit board by carefully pulling toward the front of the reader to disconnect the connector end of the board.

c. When installing replacement circuit board, make certain that plug and jack connectors mate correctly and are tightened to each other for good electrical contact.

d. Other components in the power chassis assembly (figure 6-7) can be replaced by unsoldering leads to each part and replacing with new duplicate parts.

5-33. HEATSINK, TRANSISTOR, AND FAN. If damaged, the power transistor (60, figure 6-1) can be replaced as follows:

a. Remove the screws and washers attaching heatsink and transistors to spacer posts (62).

b. Remove the fan (64 and 66), if required, from in front of the heatsink by removing the two nuts and bolts attaching the fan to the panel.

c. Unsolder the leads to the transistor and remove the screws attaching transistor to heatsink (61).

5-34. PROJECTION LAMP. Replace the library reader projection lamp by turning knurled thumbscrew at top of lamp and door assembly (30, figure 6-1) to release door. Lower door on hinged bottom; projection lamp base is attached to door. Push in and rotate bayonet-type projection lamp counterclockwise about one-fourth turn to disengage from socket, and install replacement lamp (29) in similar manner, turning clockwise to seat in socket.

NOTE

Clean aperture window of reader while projection lamp is removed as described in paragraph 5-5.

5-35. SOUND HEAD EXCITER LAMP AND PHOTOCELL. Replace the sound head photocell or exciter lamp by removing four screws (28, figure 6-1) fastening the sound head (23) to the chassis and remove the sound head. Refer to figure 6-2 for location and replacement part number of exciter lamp (17, figure 6-2) and photocell (11).

5-36. SOUND AMPLIFIER CIRCUIT BOARD. Replace amplifier circuit board as follows:

a. Unplug power cord from receptacle (43, figure 6-1).

b. Unplug exciter lamp and photoelectric cell cords from phonograph-type connectors on top of circuit board.

c. Remove screws (42) fastening board (40) to spacers (41) and remove board.

d. Unsolder 3 wires from motor speed control potentiometer.

e. Refer to figure 6-5 for identification of replacement parts for circuit board.

5-37. MOTOR CONTROL ASSEMBLY. The motor control assembly or drive controller (38, figure 6-1) consists of a potentiometer coupled and wired to a 2-wafer rotary switch. The potentiometer, which is the motor speed control, can be removed separately by disconnecting electrical leads and uncoupling from the switch portion of the control assembly. Remove one setscrew from rubber coupling. When removing potentiometer, tag the disconnected leads as an aid to reassembly, and scribe the position of the shaft and switch shaft so that it can be duplicated at reassembly by installing the replacement part in the same position. The control switch can be removed for replacement as follows:

a. Loosen setscrew attaching knob (14, figure 6-1) to switch shaft and remove knob and locknut (15) from front panel.

b. Remove 4 flat head screws from bottom of housing which holds the switch bracket.

c. Refer to figure 6-4 for identification of replacement parts on control assembly.

5-38. ADJUSTMENTS AND TEST.

NOTE

If desired or required, the speed control potentiometer (figure 4-1) may be adjusted to equal the normal sound speed for reviewing.

5-39. No adjustments (other than those described in paragraphs 5-8, 5-40, and 5-41) or calibration are necessary for the library reader after replacement of parts, and test consists of an operational check only. After reassembly of the unit, perform the operation procedures of section IV. Observe and check each operational phase for satisfactory operating condition of the unit.

5-40. PRISM SPROCKET ADJUSTMENT. When prism assembly (10, figure 6-8) or related components are removed or replaced, readjustment of the framing synchronization will be required as described in the following steps.

Related components include prism gear (34), sprocket (6), and sprocket drive gear (30). Adjust framing as follows:

a. Loosen setscrews (7) on sprocket (6).

b. Thread a length of film on unit and place unit in operation with DRIVE control set to OFF.

c. Operate DRIVE control to move film slowly through unit, checking position of frame on viewing screen.

d. Adjust sprocket (6) on shaft as necessary to frame picture in center of screen.

e. Remove film and tighten setscrews (7).

5-41. MIRROR ADJUSTMENT. If image on viewing screen is distorted or fails to fill screen, adjustment of rear mirror (56, figure 6-1) may be necessary. There are two adjustment screws attached to this mirror which are accessible at back end of light tunnel (58). Adjust these screws as necessary to center picture on screen and remove any distortion.

5-42. EXCITER LAMP REPLACEMENT.

a. Remove the two 6/30 screws (1, figure 6-2) from the lamp cover assembly (9) and remove the lamp cover assembly.

b. Remove the exciter lamp by rotating it counterclockwise.

c. Place new exciter lamp in the socket (18) and rotate it clockwise.

NOTE

Use exact lamp replacement, otherwise sound may distort.

d. Place lamp cover assembly (9) to the chassis and replace 6/32 screws (1). When replacing the exciter lamp assembly, make sure that the three setscrews (2) are not adjusted. Also be sure that these setscrews (2) sit flush against the chassis after exciter lamp replacement or the optical unit (5) will be out of adjustment.

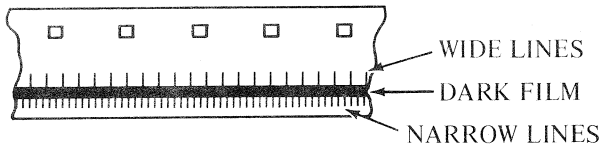
5-43. OPTICAL ALIGNMENT AND FOCUS.

a. Using SMPTE buzz film:

(1) Thread LUR using SMPTE buzz film.

(2) Run LUR at sound speed.

(3) The adjustment is made by rotating the three setscrews (2, figure 6-2) on the lamp cover (9). On the buzz film, there is a dark soundtrack with one side having wide lines and the other side narrow lines.



The wide lines is a low-frequency tone. The dark film has no sound. The narrow line is a high-frequency tone.

(4) When the adjustment is correct, the light from the optical unit (5) will be on the dark film and there will be no sound. When the adjustment is incorrect, the light from the optical unit (5) will be on or slightly on the wide or narrow lines and a high- or low-frequency tone can be heard.

b. Using SMPTE 7000-cycle focusing film:

(1) This adjustment is made after the buzz film alignment of the optical unit.

(2) Thread the LUR using SMPTE 7000-cycle focusing film.

(3) Turn on and run at sound speed.

(4) The adjusting is made by rotating the alignment plug screws (4, figure 6-2) for the loudest and clearest 7000-cycle tone level.

c. Optical alignment and focus adjustments not using SMPTE buzz or 7000-cycle focus film:

(1) Thread LUR using 16-mm film with optical sound.

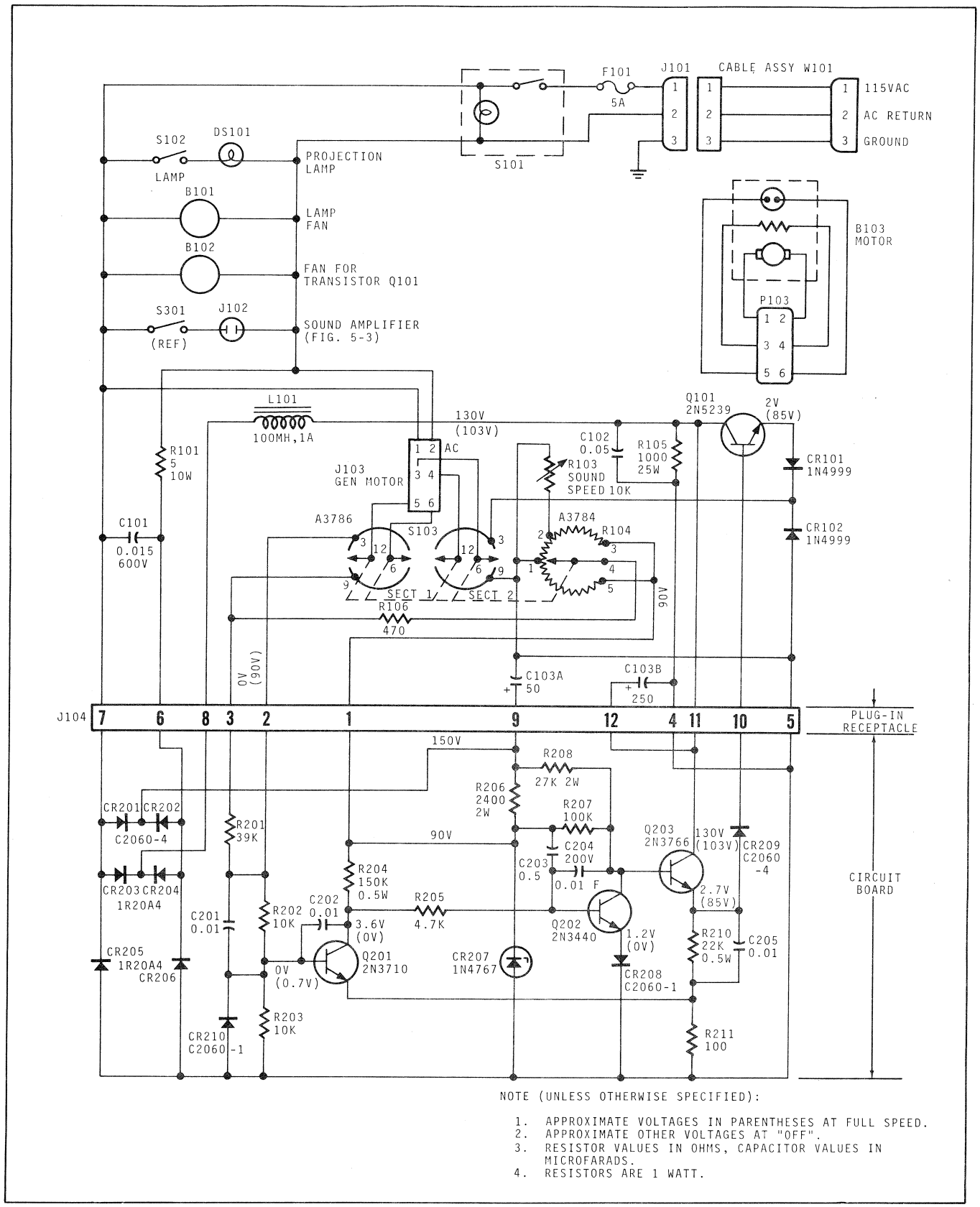
(2) Rotate the three setscrews (2, figure 6-2) so that the light coming from the optical unit(s) is centered on the optical soundtrack.

(3) Unlock the optical unit by rotating the setscrews (3) counterclockwise.

(4) Run LUR at sound speed.

(5) Rotate the alignment plug screws (4) for the clearest sound.

(6) Lock the optical unit by rotating the setscrews (3) clockwise.



NOTE (UNLESS OTHERWISE SPECIFIED):

1. APPROXIMATE VOLTAGES IN PARENTHESES AT FULL SPEED.
2. APPROXIMATE OTHER VOLTAGES AT "OFF".
3. RESISTOR VALUES IN OHMS, CAPACITOR VALUES IN MICROFARADS.
4. RESISTORS ARE 1 WATT.

Figure 5-2. Power Control, Schematic Diagram

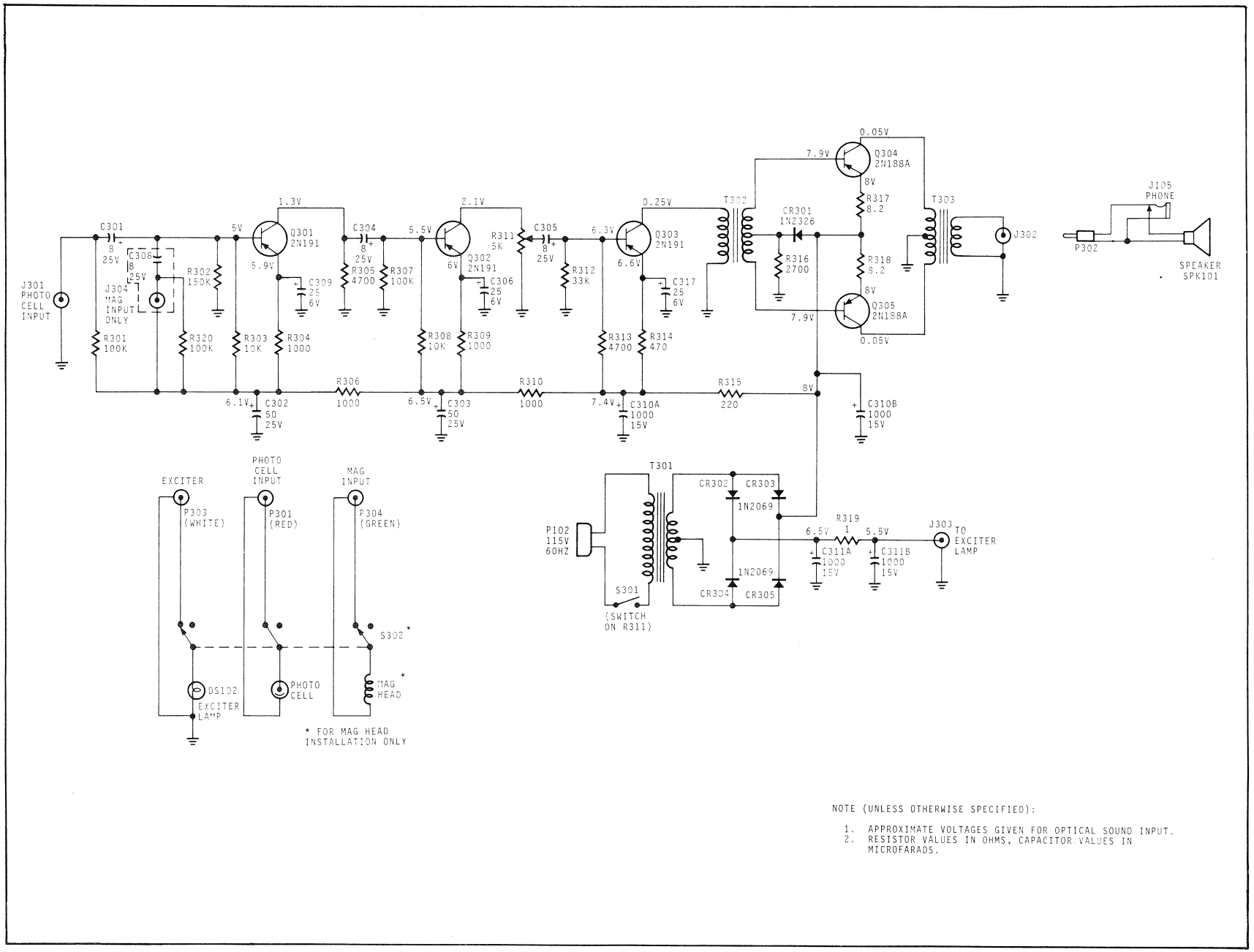


Figure 5-3. Sound Amplifier, Schematic Diagram

SECTION VI

PARTS LIST

6-1. GENERAL.

6-2. This section lists and illustrates the assemblies and replaceable detail parts of Library Reader, Model LVR.

6-3. GROUP ASSEMBLY PARTS LIST.

6-4. The group assembly parts list consists of a parts breakdown and illustrations to provide identification for all parts with maintenance significance. The group assembly parts list breaks down the equipment into its assemblies and detail parts. Each breakdown is listed in the order of disassembly of the related component or assembly, with the part names and descriptions arranged and indented in the order of their relationship to the major assemblies.

6-5. COMPONENT DESCRIPTION. The description of each part in the group assembly parts list is in accordance with the manufacturer's drawing title, plus modifiers as necessary to completely identify the part. Common hardware items, such as attaching parts that are not of special design and are obtainable from many sources, are listed as commercial parts (COML) and include sufficient description of the part to enable procurement of equivalent items. Attaching parts for a component or assembly are listed immediately following the part attached.

6-6. QUANTITIES. The quantities listed in the UNITS PER ASSY column of the group assembly parts list are the quantities for one assembly. AR in the UNITS PER ASSY column means AS REQUIRED and indicates an indefinite quantity is required.

6-7. The FIG. & INDEX NO. column contains the figure number of the related illustration and the index numbers assigned to the parts illustrated.

6-8. REFERENCE DESIGNATION. The reference designation of electrical and electronic parts is listed in parentheses following the description. These same designations appear on the electrical schematics (figures 5-2 and 5-3).

6-9. MANUFACTURERS' CODES. Purchased parts are listed in the parts list by the manufacturer's part number. Numerical manufacturer's coding following the description of such parts identifies the manufacturer from whom the part is purchased. The codes listed below are used in the parts list and comply with the Federal Supply Code for Manufacturers, Cataloging Handbook H4-1.

Code No.	Manufacturer's Name and Address
01295	Texas Instruments, Inc. Semiconductor Div. Dallas, Texas 75231
08806	General Electric Co. Miniature Lamp Dept. Cleveland, Ohio 44112
26528	Lamcor, Inc. Anaheim, California 92806
28954	Truflex Rubber Products Co. Los Angeles, California 90054
44655	Ohmite Mfg. Co. Skokie, Illinois 60076
75376	Kurz and Kasch, Inc. Dayton, Ohio 45401
75915	Littlefuse, Inc. Des Plaines, Illinois 60016
78368	Solar Corp. Milwaukee, Wisconsin
79136	Waldes Kohinoor, Inc. Long Island City, New York 11101
80648	The Torrington Co. South Bend, Indiana

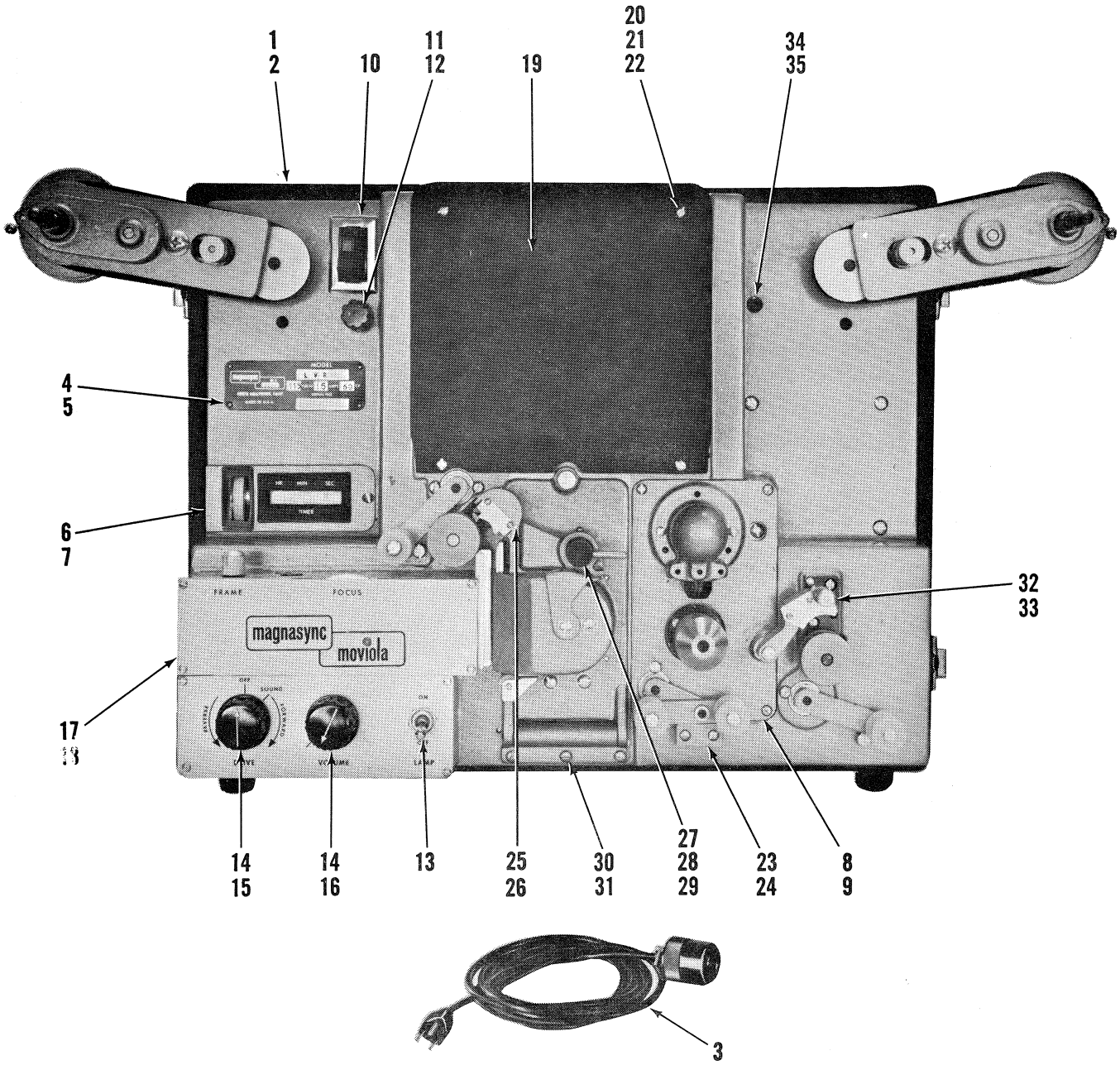


Figure 6-1. Library Reader Assembly (Sheet 1 of 3)

Group Assembly Parts List

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-1	Model LVR	READER ASSEMBLY, Library, 16mm film, optical sound	Ref
-1	76176	. CASE, Carrying	1
		(ATTACHING PARTS)	
-2	COML	. SCREW, Binding head, No. 8-32 by ¾ in. long	10
		---*---	
-3	24518	. CORD ASSEMBLY, Power (W101)	1
-4	95100	. NAMEPLATE	1
		(ATTACHING PARTS)	
-5	COML	. SCREW, Drive, No. 0 by 3/16 in. long	4
		---*---	
-6	76194	. COUNTER, Hours-minutes-seconds (optional)	AR
-6	76188	. COUNTER, Frame and footage (optional)	AR
-6	76079	. COVER, Blank (used when counter is not ordered)	AR
		(ATTACHING PARTS)	
-7	COML	. SCREW, Round head, No. 6-32 by 3/8 in. long	3
		---*---	
-8	76111	. HEAD ASSEMBLY, Optical sound (for breakdown, see figure 6-2)	1
		(ATTACHING PARTS)	
-9	COML	. SCREW, Filister head, No. 6-32 by 3/8 in. long	4
		---*---	
-10	24538	. SWITCH, Power, with light (S101)	1
-11	312005	. FUSE, Cartridge, 5-ampere type 3AG (75915) (F101	2
-12	24514	. FUSEHOLDER (XF101)	1
-13	1003	. SWITCH, Toggle SPST, lamp (S102)	1
-14	1162	. KNOB, Control (75376)	2
-15	76249	. NUT, Motor potentiometer mounting	1
-16	24520	. RESISTOR, Variable, volume control with switch (R311/S301)	1
-17	76132	. PANEL ASSEMBLY, Control (for breakdown, see figure 6-3)	1
		(ATTACHING PARTS)	
-18	COML	. SCREW, Filister head, No. 8-32 by 3/8 in. long	4
		---*---	
	76002	. HOUSING ASSEMBLY, Screen	1
-19	76053	. . SCREEN, Projection	1
		(ATTACHING PARTS)	
-20	76003	. . CLIP, Screen	2
-21	COML	. . SCREW, Round head, No. 3-48 by 3/16 in. long	4
		---*---	
-22	76002-1	. . HOUSING	1
-23	76183	. BLOCK	1
		(ATTACHING PARTS)	
-24	COML	. SCREW, Filister head, No. 6-32 by ½ in. long	2
		---*---	
-25	76037	. GATE ASSEMBLY, Film	1
		(ATTACHING PARTS)	
-26	COML	. SCREW	1
		---*---	

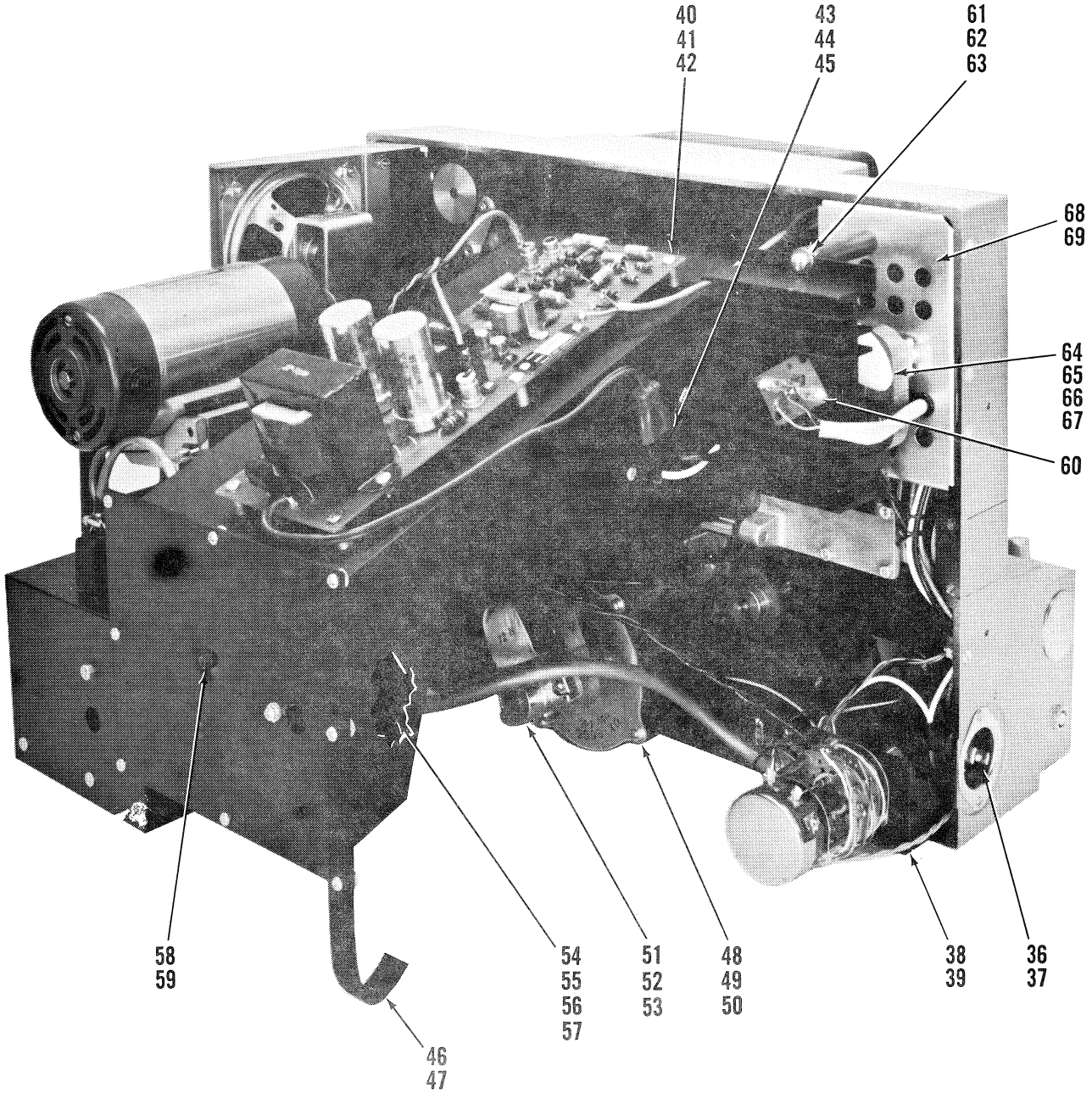


Figure 6-1. Library Reader Assembly (Sheet 2 of 3)

Group Assembly Parts List (Cont)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-1-27	76022	. ECCENTRIC ASSEMBLY	1
		(ATTACHING PARTS)	
-28	COML	. SCREW, Round head, No. 4-40 by ¼ in. long	1
		---*---	
-29	1166	. LAMP, Projection, 150-watt CEW (26528) (DS101)	1
-30	76039	. DOOR ASSEMBLY, Lamp	1
		(ATTACHING PARTS)	
-31	COML	. SCREW, Filister head, No. 6-32 by 5/16 in. long	3
		---*---	
-32	76093	. CLAMP ASSEMBLY, Film	1
		(ATTACHING PARTS)	
-33	76129	. SPACER	1
	COML	. SCREW, Pan head, No. 8-32 by ¼ in. long	1
		---*---	
-34	76219	. HEADER ASSEMBLY, Oil	1
		(ATTACHING PARTS)	
-35	COML	. SCREW, Round head, No. 10-24 by ¼ in. long	1
	COML	. NUT, Hex, No. 10-24	1
		---*---	
-36	24519	. CONNECTOR, Receptacle, power (J101)	1
		(ATTACHING PARTS)	
-37	COML	. SCREW, Filister head, No. 4-40 by ¼ in. long	2
		---*---	
-38	76243	. CONTROL ASSEMBLY, Motor (for breakdown, see figure 6-4)	1
		(ATTACHING PARTS)	
-39	COML	. SCREW, Round head, No. 8-32 by 1/8 in. long	2
		---*---	
-40	24537-1	. AMPLIFIER ASSEMBLY, Sound (for breakdown, see figure 6-5)	1
-41	76184	. SPACER	6
		(ATTACHING PARTS)	
-42	COML	. SCREW, Round head, No. 6-32 by ¼ in. long	6
	COML	. SCREW, Binding head, No. 6-32 by ¼ in. long	6
		---*---	
-43	24535	. RECEPTACLE, Amplifier power (J102)	1
-44	76185	. BRACKET, Receptacle	1
		(ATTACHING PARTS)	
-45	COML	. SCREW, Sheet metal, No. 6-32 by ¼ in. long	2
		---*---	
-46	76186	. SUPPORT	1
		(ATTACHING PARTS)	
-47	COML	. SCREW, Round head, No. 6-32 by 3/8 in. long	2
	COML	. NUT, Hex, No. 6-32	2
		---*---	
	76030	. HOUSING ASSEMBLY, Lamp	1

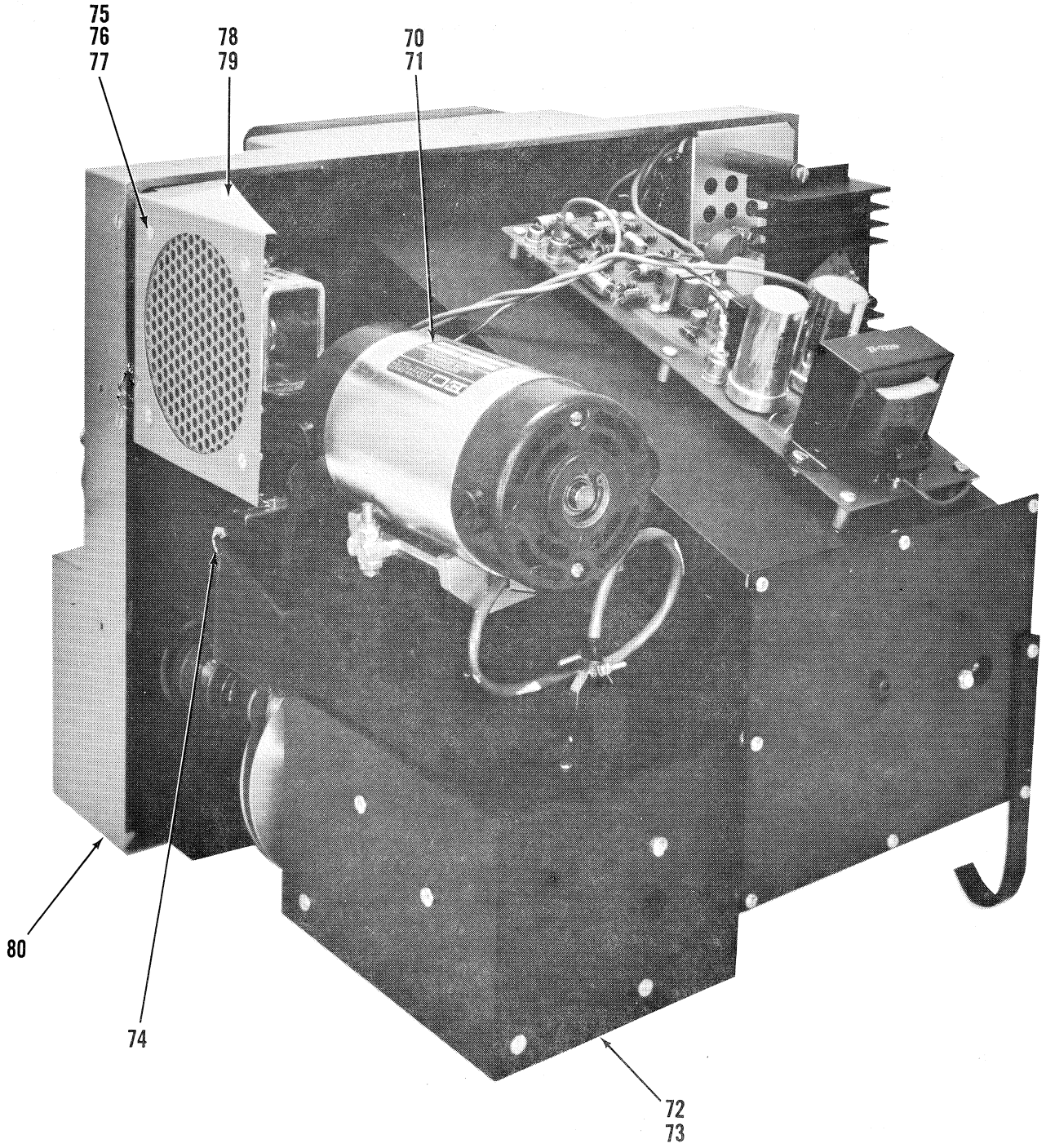


Figure 6-1. Library Reader Assembly (Sheet 3 of 3)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-1		(ATTACHING PARTS)	
-48	COML	. SCREW, Round head, No. 6-32 by ¼ in. long	4
		---*---	
-49	76178	. . DUCT, Air	1
		(ATTACHING PARTS)	
-50	COML	. . SCREW, Round head, No. 6-32 by ¼ in. long	2
		---*---	
-51	76232	. . BLOWER AND MOTOR ASSEMBLY (B101)	1
-52	76179	. . BUSHING, Spacer	3
-53	76024	. . HOUSING, Lamp	1
-54	76077	. MOUNTING ASSEMBLY, Mirror	1
		(ATTACHING PARTS)	
-55	COML	. SCREW, Round head, No. 6-32 by 3/8 in. long	3
	COML	. NUT, Hex, No. 6-32	3
		---*---	
-56	76075	. MIRROR, Rear	1
		(ATTACHING PARTS)	
-57	COML	. SCREW, Round head, No. 3-48 by 1/8 in. long	4
		---*---	
-58	76260	. TUNNEL, Light	1
		(ATTACHING PARTS)	
-59	COML	. SCREW, Round head, No. 6-32 by ¼ in. long	10
		---*---	
-60	2N5239	. TRANSISTOR (01295) (Q101)	1
-61	24562	. HEATSINK	1
-62	76285	. POST, Standoff	2
		(ATTACHING PARTS)	
-63	COML	. SCREW, Round head, No. 8-32 by ¼ in. long	4
	COML	. WASHER, Lock, No. 8	4
		---*---	
-64	34317	. FAN	1
		(ATTACHING PARTS)	
-65	COML	. SCREW, Round head, No. 6-32 by 1 in. long	1
	COML	. NUT, Hex, No. 6-32	1
		---*---	
-66	76282	. MOTOR, Fan	1
		(ATTACHING PARTS)	
-67	COML	. SCREW, Round head, No. 8-32 by ¼ in. long	2
	COML	. WASHER, Flat, No. 8	2
		---*---	
-68	76281	. PLATE, Mounting	1
		(ATTACHING PARTS)	
-69	COML	. SCREW, Flat head, No. 6-32 by ¼ in. long	5
		---*---	
-70	76253	. DRIVE ASSEMBLY, Motor (for breakdown, see figure 6-6)	1

Group Assembly Parts List (Cont)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-1		(ATTACHING PARTS)	
-71	COML	. SCREW, Filister head, No. 10-32 by ¾ in. long	3
	COML	. SCREW, Filister head, No. 10-32 by 2 in. long	1
		---*---	
-72	76180	. CHASSIS ASSEMBLY, Power (for breakdown, see figure 6-7)	1
		(ATTACHING PARTS)	
-73	COML	. SCREW, Round head, No. 6-32 by 3/8 in. long	2
		---*---	
-74	2451-1	. JACK, Headset (PHONES J105)	1
-75	24155	. SPEAKER, 4-in. diameter (SPK101)	1
-76	25408	. SCREEN, Speaker	1
		(ATTACHING PARTS)	
-77	COML	. SCREW, Filister head No. 6-32 by 3/8 in. long	4
	COML	. NUT, No. 6-32 hex	4
		---*---	
-78	76209	. BRACKET, Speaker	1
		(ATTACHING PARTS)	
-79	COML	. SCREW, Filister head, No. 6-32 by 3/8 in. long	3
		---*---	
-80	76133	. DRIVE ASSEMBLY (for breakdown, see figure 6-8)	1

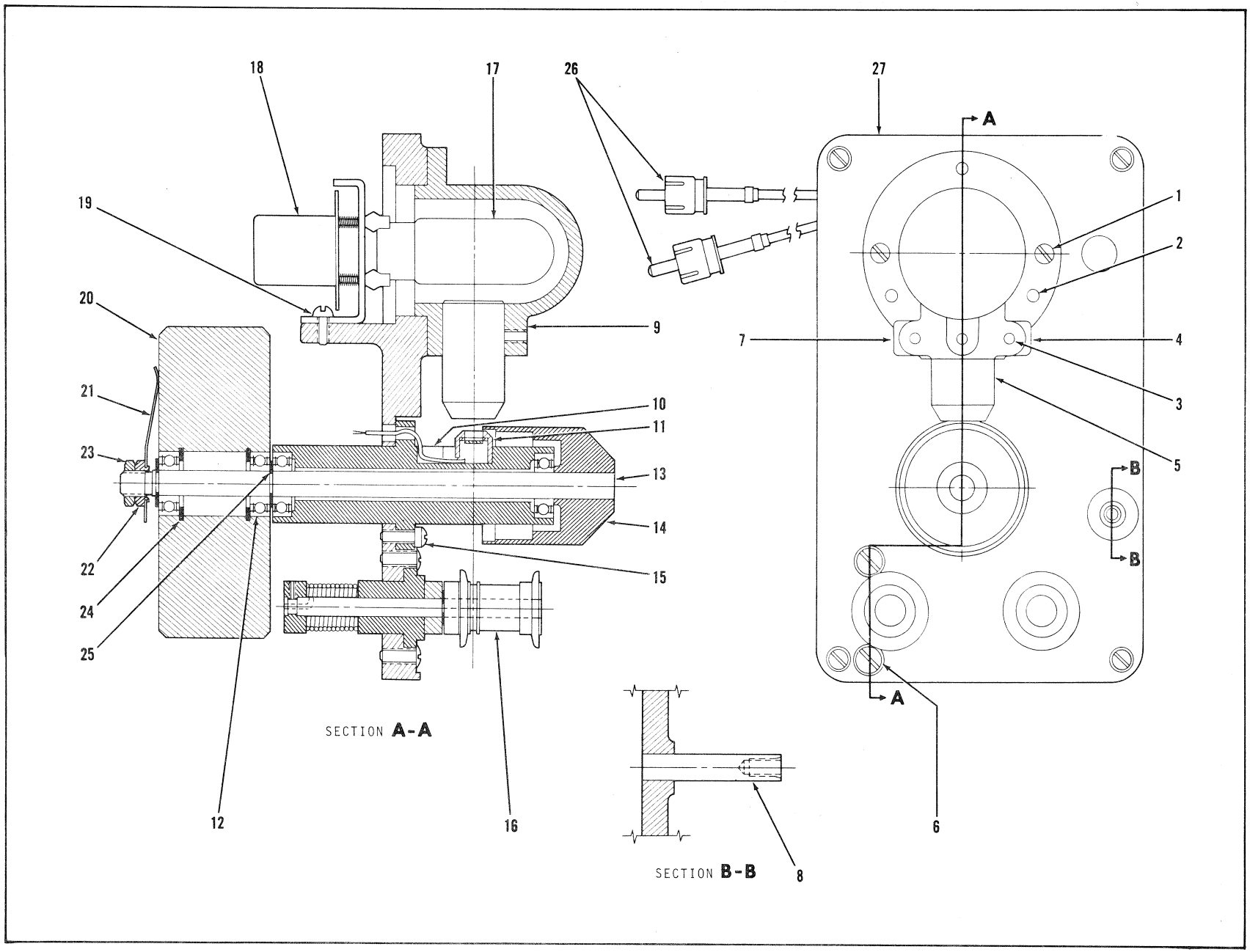


Figure 6-2. Optical Sound Head Assembly

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-2	76111	HEAD ASSEMBLY, Optical sound (for NHA, see figure 6-1)	Ref
-1	COML	. SCREW, Filister head, No. 6-32 by 3/8 in. long	2
-2	COML	. SETSCREW, No. 6-32 by ¼ in. long	3
-3	COML	. SETSCREW, No. 6-32 by 1/8 in. long	3
-4	21124-1	. PLUG, Alignment	1
-5	21137	. UNIT, Optical	1
-6	COML	. SCREW, Pan head, No. 6-32 by ¼ in. long	2
-7	21124-2	. PLUG, Alignment	1
-8	71404	. SHAFT	1
-9	76113	. COVER, Lamp	1
-10	76130	. SLEEVE	1
-11	21171	. CELL ASSEMBLY (78368)	1
-12	70178	. BEARING	4
-13	76123	. SHAFT	1
-14	76120	. DRUM	1
-15	COML	. SCREW, Filister head, No. 6-32 by 3/8 in. long	3
-16	76071	. IDLER ASSEMBLY, Tension	1
-17	1156	. LAMP, Exciter (08806) (DS102)	2
-18	21147	. SOCKET ASSEMBLY, Lamp (XDS102)	1
-19	COML	. SCREW, Round head, No. 6-32 by ¼ in. long	2
-20	76122	. FLYWHEEL	1
-21	76116	. SPRING	1
-22	76267	. NUT, Flywheel lock	1
-23	36116	. NUT, Hex, jam ¼-28	1
-24	5000-62	. RING, Retaining	2
-25	5100-25	. RING, Retaining	2
-26	24530	. CONNECTOR, Plug (P301, P303)	2
-27	76112	. PLATE, Sound head	1

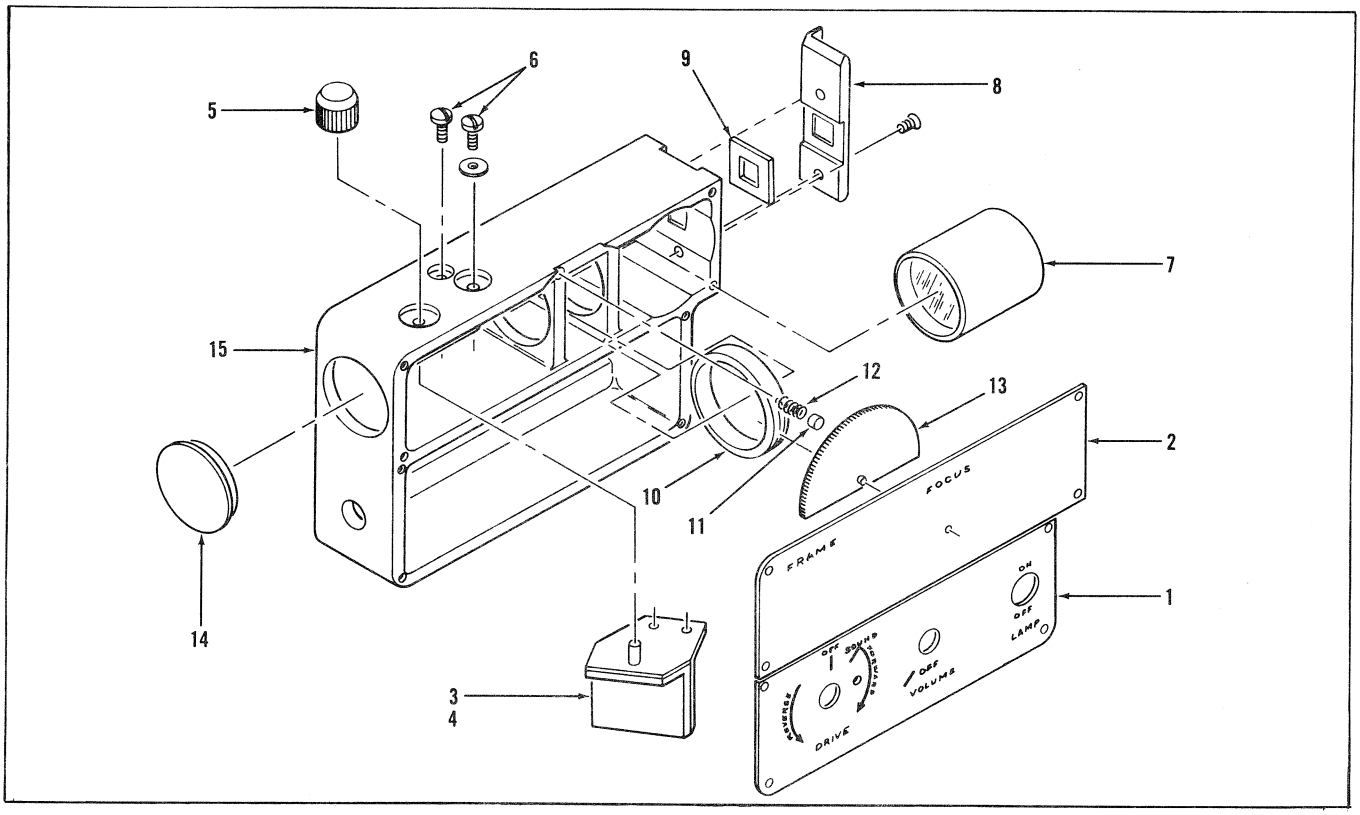


Figure 6-3. Control Panel Assembly

Group Assembly Parts List (Cont)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-3	76132	PANEL ASSEMBLY, Control (for NHA, see figure 6-1)	Ref
-1	76248	. PLATE, Control	1
-2	76005	. PLATE, Cover	1
-3	76074	. MIRROR, Front	1
-4	76007	. MOUNTING ASSEMBLY, Mirror	1
-5	76006	. KNOB ASSEMBLY, Framing	1
		(ATTACHING PARTS)	
-6	COML	. SCREW, Binding head, No. 8-32 by 3/8 in. long	2
	COML	. WASHER, Flat, brass, No. 8	2
		---*---	
-7	76131	. LENS ASSEMBLY, Projection	1
-8	76031	. PLATE, Aperture	1
-9	76182	. COVER	1
-10	76153	. COLLAR	1
-11	76138	. PLUG	1
-12	50132	. SPRING	1
-13	76073	. CONTROL, Focus	1
-14	76154	. PLUG, Button	1
-15	76008	. HOUSING, Front	1

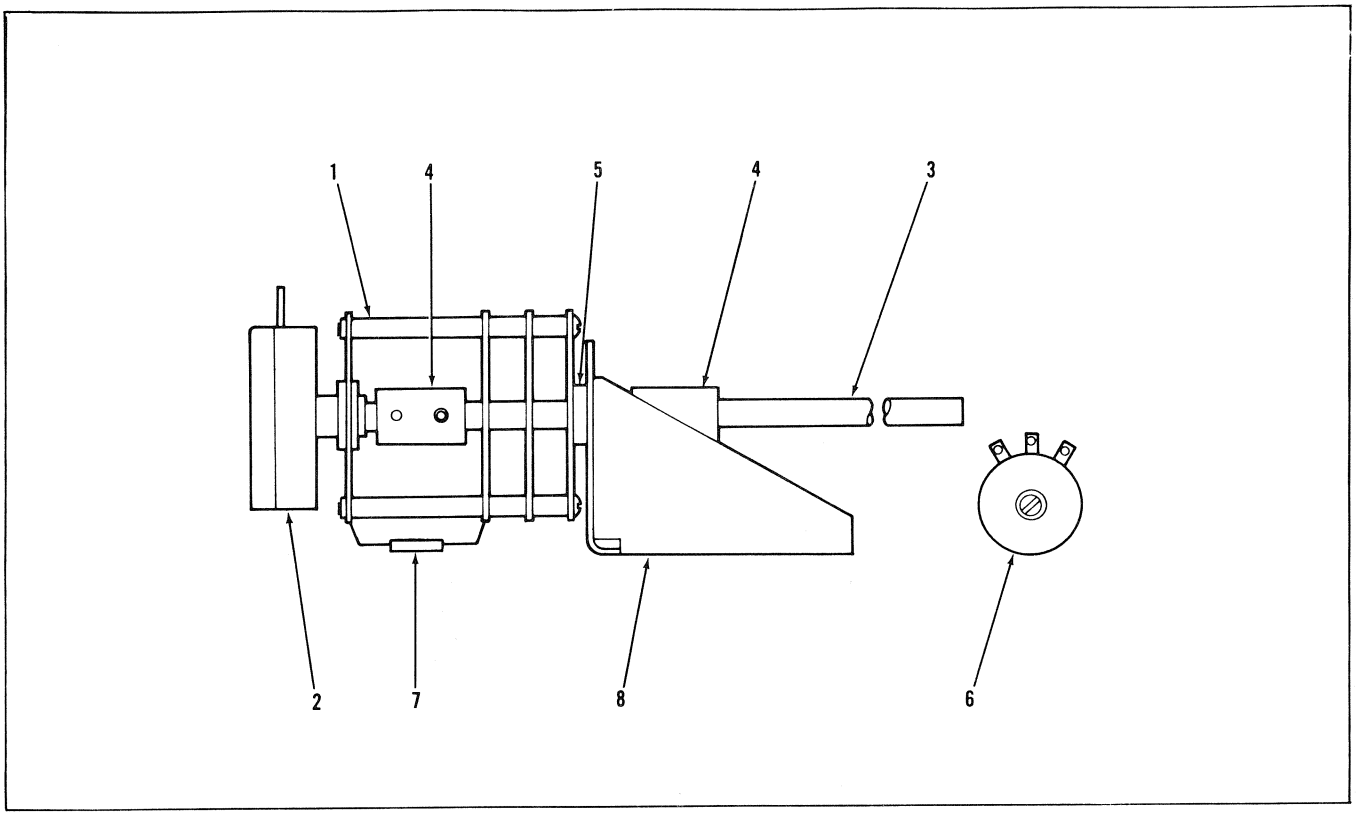


Figure 6-4. Motor Control Assembly

Group Assembly Parts List (Cont)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-4	76243	CONTROL ASSEMBLY, Motor (for NHA, see figure 6-1)	Ref
-1	76246-1	. SWITCH	1
-2	76244	. POTENTIOMETER (R104)	1
-3	76262	. SHAFT, Flexible	1
-4	76263	. CONNECTOR	2
-5	76243-1	. COUPLER	1
-6	24125-1	. POTENTIOMETER, Speed adjust (44655) (R103)	1
-7	COML	. RESISTOR, 470-ohm, ±10%, 1-watt (R102)	1
-8	76245	. BRACKET, Control mounting	1

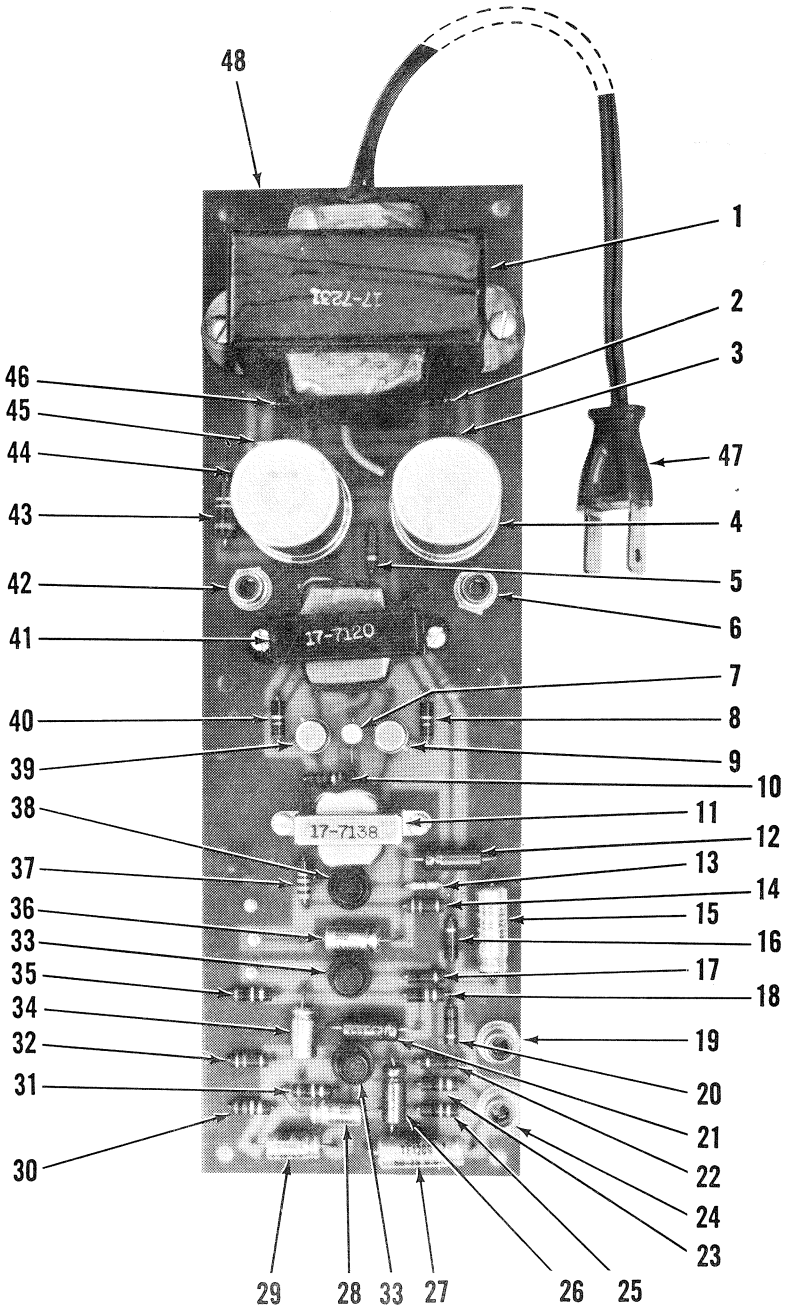


Figure 6-5. Sound Amplifier Assembly

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-5	24537	AMPLIFIER ASSEMBLY, Sound (for NHA, see figure 6-1)	Ref
-1	24521	. TRANSFORMER (T301)	1
-2	1N2069	. DIODE (01295) (CR302)	1
-3	1N2069	. DIODE (01295) (CR303)	1
-4	24524	. CAPACITOR, 1000-1000 mf, ±10%, 15 vdc (C310A, C310B)	1
-5	2425-6	. RESISTOR, 220 ohm, ±10%, ½ watt (R315)	1
-6	24529	. CONNECTOR, Receptacle (J302)	1
-7	1N2326	. DIODE (01295) (CR301)	1
-8	2425-3	. RESISTOR, 8.2 ohm ±10%, ½ watt (R318)	1
-9	2N188A	. TRANSISTOR (01295) (Q305)	1
-10	2406	. RESISTOR, 2700 ohm ±10%, ½ watt (R316)	1
-11	24523	. TRANSFORMER (T302)	1
-12	24527	. CAPACITOR, 25 mf ±10%, 6 vdc (C307)	1
-13	2425-8	. RESISTOR, 470 ohm ±10%, ½ watt (R314)	1
-14	2425-4	. RESISTOR, 4.7K ±10%, ½ watt (R313)	1
-15	24526	. CAPACITOR, 50 mf ±10%, 25 vdc (C303)	1
-16	2417	. RESISTOR, 1000 ohm ±10%, ½ watt (R313)	1
-17	2417	. RESISTOR, 1000 ohm ±10%, ½ watt (R309)	1
-18	2425-7	. RESISTOR, 10K ±10%, ½ watt (R308)	1
-19	24529	. CONNECTOR, Receptacle (J304)	1
-20	2417	. RESISTOR, 1000 ohm ±10%, ½ watt (R306)	1
-21	24527	. CAPACITOR, 25 mf ±10%, 6 vdc (C306)	1
-22	2417	. RESISTOR, 1000 ohm ±10%, ½ watt (R304)	1
-23	2421	. RESISTOR, 100K ±10%, ½ watt (R320)	1
-24	24529	. CONNECTOR, Receptacle (J301)	1
-25	2425-7	. RESISTOR, 10K ±10%, ½ watt (R303)	1
-26	24527	. CAPACITOR, 25 mf ±10%, 6 vdc (C309)	1
-27	24526	. CAPACITOR, 50 mf ±10%, 25 vdc (C302)	1
-28	24528	. CAPACITOR, 8 mf ±10%, 25 vdc (C301)	1
-29	24528	. CAPACITOR, 8 mf ±10%, 25 vdc (C308)	1
-30	24104	. RESISTOR, 150K ±10%, ½ watt (R302)	1
-31	2421	. RESISTOR, 100K ±10%, ½ watt (R301)	1
-32	2425-4	. RESISTOR, 4.7K ±10%, ½ watt (R305)	1
-33	2N191	. TRANSISTOR (01295) (Q301) (Q302)	2
-34	24528	. CAPACITOR, 8 mf ±10%, 25 vdc (C304)	1
-35	2421	. RESISTOR, 100K ±10%, ½ watt (R307)	1
-36	24528	. CAPACITOR, 8 mf ±10%, 25 vdc (C305)	1
-37	2425-5	. RESISTOR, 33K ±10%, ½ watt (R312)	1
-38	2N191	. TRANSISTOR (01295) (Q303)	1
-39	2N188A	. TRANSISTOR (01295) (Q304)	1
-40	2425-3	. RESISTOR, 8.2 ohm ±10%, ½ watt (R317)	1
-41	24522	. TRANSFORMER (T303)	1
-42	24529	. CONNECTOR, Receptacle (J303)	1
-43	2425-2	. RESISTOR, 1.0 ohm ±10%, 1 watt (R319)	1
-44	24524	. CAPACITOR, 1000-1000 mf ±10%, 15 vdc (C311A, C311B)	1
-45	1N2069	. DIODE (CR305)	1
-46	1N2069	. DIODE (CR304)	1
-47	24509	. CORD ASSEMBLY (P102)	1
-48	24534	. BOARD, Circuit	1

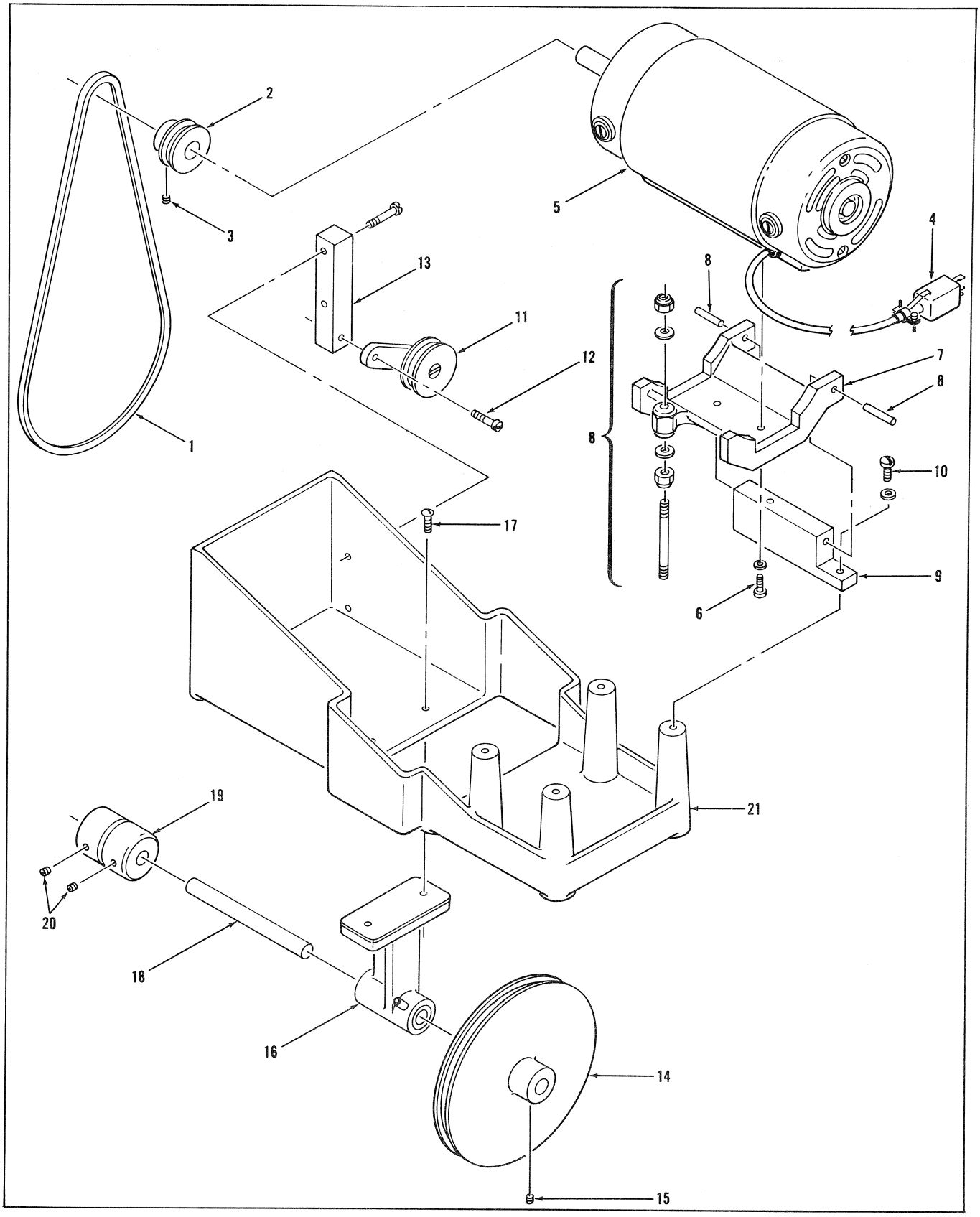


Figure 6-6. Motor Drive Assembly

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-6	76253	DRIVE ASSEMBLY, Motor (for NHA, see figure 6-1)	Ref
-1	0220	. BELT, V (28954)	1
-2	417C	. PULLEY, Motor	1
		(ATTACHING PARTS)	
-3	COML	. SETSCREW, Socket head, No. 8-32 by ¼ in. long	1
		---*---	
-4	24511	. CONNECTOR, Plug (P103)	1
-5	76255	. MOTOR ASSEMBLY (B103)	1
		(ATTACHING PARTS)	
-6	COML	. SCREW, Filister head, No. 10-32 by 5/8 in. long	2
	COML	. WASHER, Lock, No. 10	2
		---*---	
-7	76256	. CRADLE, Motor	1
		(ATTACHING PARTS)	
-8	COML	. PIN, Roll, 3/16 in. by 0.75 in. long	1
	COML	. NUT, Hex, No. 10-32	2
	COML	. WASHER, Flat, No. 10	2
	COML	. STUD, No. 10-32 by 1.75 in. long	1
		---*---	
-9	76258	. BRACKET, Cradle	1
		(ATTACHING PARTS)	
-10	COML	. SCREW, Filister head, No. 8-32 by 3/8 in. long	2
	COML	. WASHER, Lock, No. 8	2
		---*---	
-11	76028	. ARM ASSEMBLY, Idler	1
		(ATTACHING PARTS)	
-12	COML	. SCREW, Filister head, No. 8-32 by ¼ in. long	1
	COML	. NUT, Hex, No. 8-32	1
		---*---	
-13	76261	. BRACKET, Idler	1
-14	76259	. PULLEY	1
		(ATTACHING PARTS)	
-15	COML	. SETSCREW, Socket head, No. 8-32 by ¼ in. long	1
		---*---	
-16	76257	. BRACKET, Pulley	1
		(ATTACHING PARTS)	
-17	COML	. SCREW, Round head, No. 8-32 by ½ in. long	2
		---*---	
-18	76171	. SHAFT	1
-19	76172	. COUPLING, Flexible	1
		(ATTACHING PARTS)	
-20	COML	. SETSCREW, Socket head, No. 10-32 by 3/8 in. long	2
		---*---	
-21	76161	. BASE, Motor	1

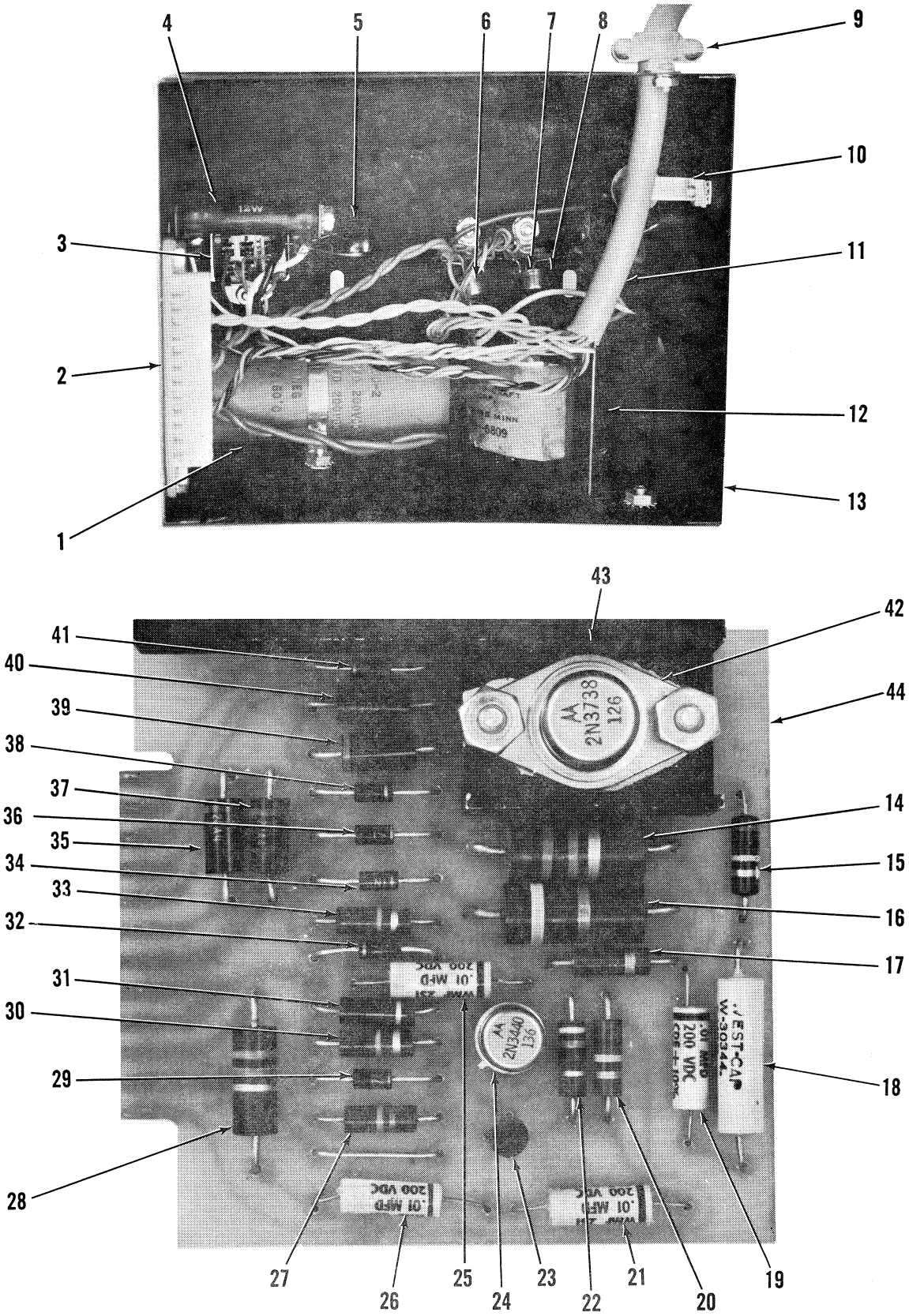


Figure 6-7. Power Chassis Assembly

Group Assembly Parts List (Cont)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-7	76180	CHASSIS ASSEMBLY, Power (for NHA, see figure 6-1)	Ref
-1	24556	. CAPACITOR, 50-250 mf ±10%, 250 vdc (C103A, C103B)	1
-2	24557	. CONNECTOR, Receptacle, 12 contact (J104)	1
-3	24512	. CONNECTOR, Receptacle, 6 contact (J103)	1
-4	24559	. RESISTOR, Wirewound, 5 ohm ±10%, 10 watt (R101)	1
-5	2432B	. CAPACITOR, 0.02 mf, 600 vdc (C101)	1
-6	1N4999	. DIODE (01295) (CR101)	1
-7	1N4999	. DIODE (01295) (CR102)	1
-8	10073	. STRIP, Terminal, 2 contact	1
-9	COML	. CLAMP, Cable	1
-10	24560	. RESISTOR, 1000 ohm ±10%, 25 watt (R105)	1
-11	2440	. CAPACITOR, 0.05 mf ±10%, 400 vdc (C102)	1
-12	24561	. CHOKE, 100 mh, 1 ampere (L101)	1
-13	76252	. CHASSIS, Power	1
	24553	. CIRCUIT ASSEMBLY, Power control	1
-14	COML	. . RESISTOR, 27K ±10%, 2 watt (R208)	1
-15	COML	. . RESISTOR, 100K ±10%, 1 watt (R207)	1
-16	COML	. . RESISTOR, 2.4K ±10%, 1 watt (R206)	1
-17	COML	. . RESISTOR, 220 ohm ±10%, 1 watt (R209)	1
-18	COML	. . CAPACITOR, 0.5 mf ±10%, 200 vdc (C203)	1
-19	COML	. . CAPACITOR, 0.01 mf ±10%, 200 vdc (C204)	1
-20	COML	. . RESISTOR, 150K ±10%, ½ watt (R204)	1
-21	COML	. . CAPACITOR, 0.01 mf ±10%, 200 vdc (C202)	1
-22	COML	. . RESISTOR, 4.7K ±10%, 1 watt (R205)	1
-23	2N3710	. . TRANSISTOR (01295) (Q201)	1
-24	2N3440	. . TRANSISTOR (01295) (Q202	1
-25	COML	. . CAPACITOR, 0.01 mf ±10%, 200 vdc (C205)	1
-26	COML	. . CAPACITOR, 0.01 mf ±10%, 200 vdc (C201)	1
-27	COML	. . RESISTOR, 10K ±10%, 1 watt (R202)	1
-28	COML	. . RESISTOR, 18K ±10%, 1 watt (R201)	1
-29	1N4767	. . DIODE, Zener (01295) (CR207	1
-30	COML	. . RESISTOR, 10K ±10%, 1 watt (R203)	1
-31	COML	. . RESISTOR, 100 ohm ±10%, 1 watt (R211)	1
-32	C2060-1	. . DIODE (CR208)	1
-33	COML	. . RESISTOR, 22K ±20%, 1 watt (R210)	1
-34	C2060-1	. . DIODE (CR210)	1
-35	C2060-4	. . DIODE (CR201)	1
-36	1R20A4	. . DIODE (CR204)	1
-37	C2060-r	. . DIODE (CR202)	1
-38	1R20A4	. . DIODE (CR203)	1
-39	1R20A4	. . DIODE (CR206)	1
-40	1R20A4	. . DIODE (CR205)	1
-41	C2060-4	. . DIODE (CR209)	1
-42	2N3766	. . TRANSISTOR (01295) (Q203)	1
-43	24553-1	. . HEATSINK	1
-44	24553-2	. . BOARD, Circuit	1

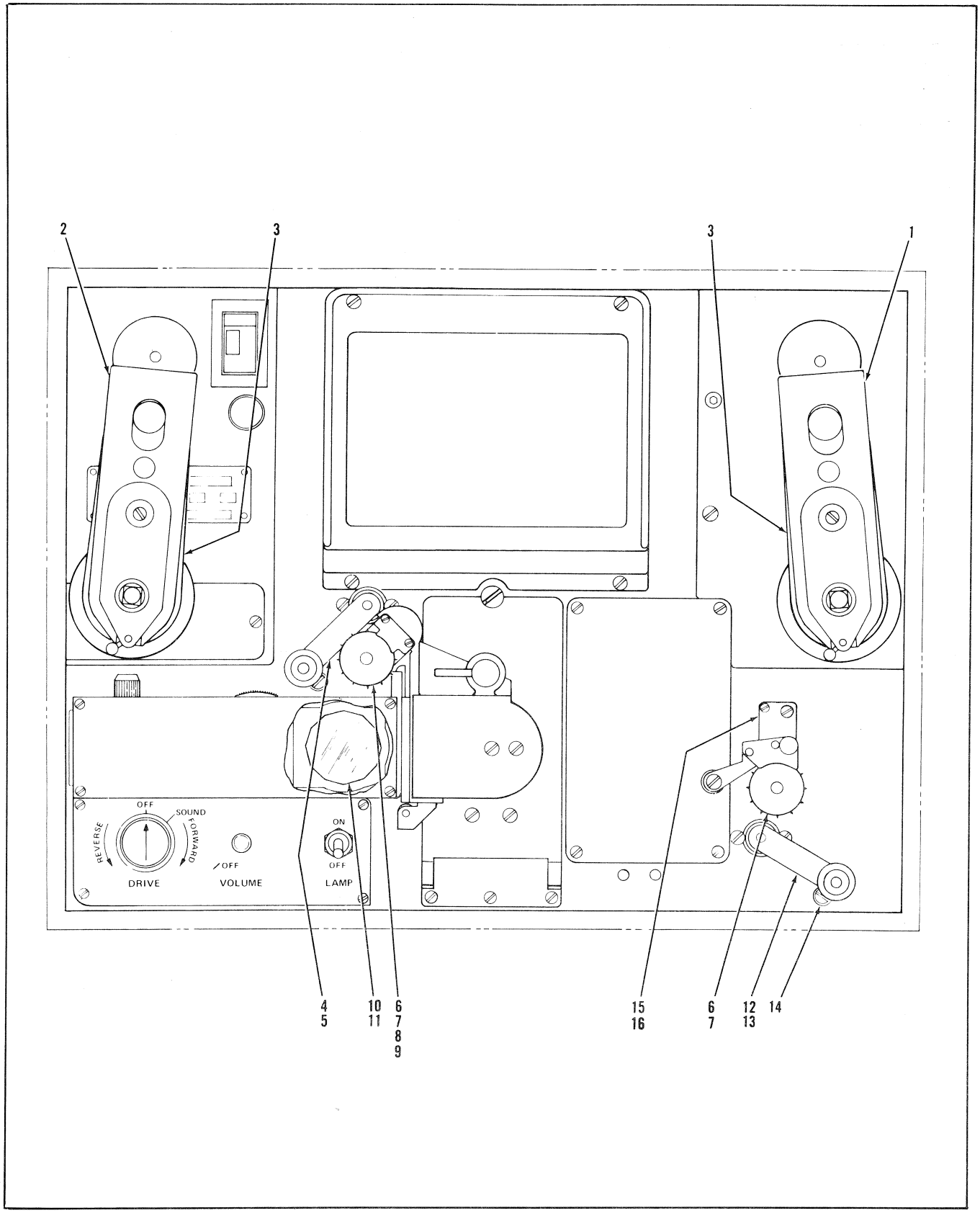


Figure 6-8. Drive Assembly (Sheet 1 of 2)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-8	76133	DRIVE ASSEMBLY (for NHA, see figure 6-1)	Ref
-1	76052R	. ARM ASSEMBLY, Reel, right (for breakdown, see figure 6-9)	1
-2	76052L	. ARM ASSEMBLY, Reel, left (for breakdown, see figure 6-9)	1
-3	0150	. BELT, V (28954)	2
-4	76069-1	. REGULATOR ASSEMBLY, Film tension (jerk absorber)	1
		(ATTACHING PARTS)	
-5	COML	. SCREW, Binding head, No. 6-32 by 3/16 in. long	2
		---*---	
-6	76084	. SPROCKET	2
		(ATTACHING PARTS)	
-7	COML	. SETSCREW, Socket head, No. 8-32 by ¼ in. long	2
	COML	. WASHER, Fiber, ¼ in. ID by ½ in. OD by 0.015 in. thick	2
		---*---	
-8	76010	. BLOCK	1
		(ATTACHING PARTS)	
-9	COML	. SCREW, Filister head, No. 6-32 by ½ in. long	1
		---*---	
-10	42042	. PRISM ASSEMBLY	1
		(ATTACHING PARTS)	
-11	COML	. PIN, Taper (not field replaceable)	1
	COML	. WASHER, Fiber, ¼ in. ID by ½ in. OD by 0.015 in. thick	1
-12	76069	. REGULATOR ASSEMBLY, Film tension (jerk absorber)	1
		(ATTACHING PARTS)	
-13	COML	. SCREW, Binding head, No. 6-32 by 3/16 in. long	2
		---*---	
-14	76226	. SCREW, Stop	2
-15	76011	. BLOCK	1
		(ATTACHING PARTS)	
-16	COML	. SCREW, Filister head, No. 6-32 by ½ in. long	2
		---*---	
-17	76028	. ARM ASSEMBLY, Idler	3
-18	76029	. BUSHING, Spacer	1
		(ATTACHING PARTS)	
-19	COML	. SCREW, Cap socket head, No. 10-32 by ½ in. long	2
-20	COML	. SCREW, Cap socket head, No. 10-32 by 7/8 in. long	1
		---*---	
-21	0220	. BELT, V (28954)	1
-22	0200	. BELT, V (28954)	1
-23	76141	. BELT, Timing	1
-24	76081	. SHAFT	2
-25	76083-1	. PULLEY	3
-26	76083	. PULLEY	1
-27	76082	. SUPPORT, Reel arm	2

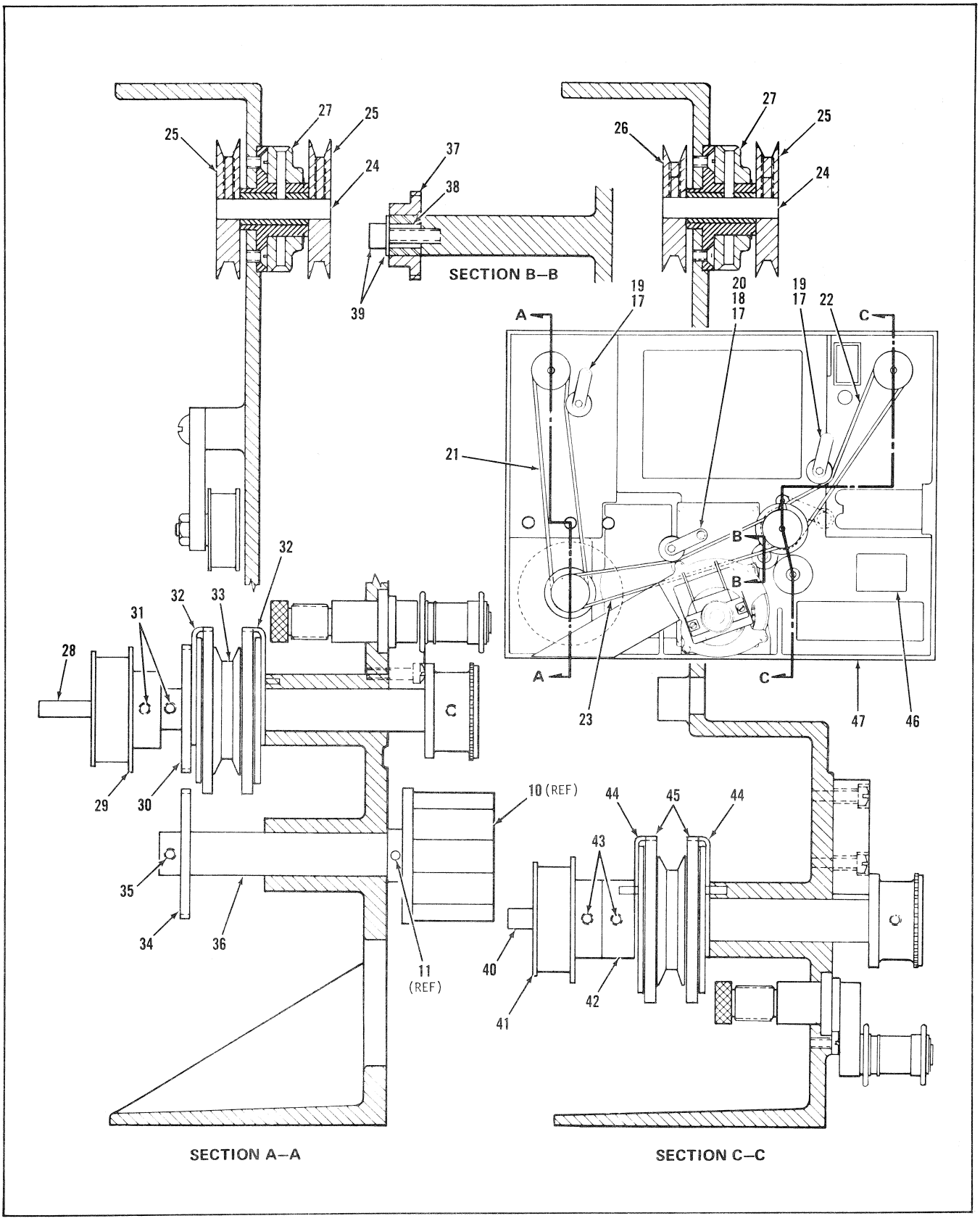


Figure 6-8. Drive Assembly (Sheet 2 of 2)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-8		(ATTACHING PARTS)	
-28	9100-62	. RING, Retaining	2
	COML	. SETSCREW, Socket head, No. 8-32 by ¼ in. long	4
	COML	. SCREW, Flat head, No. 6-32 by ¼ in. long	8
		---*---	
-28	76090	. SHAFT	1
-29	76085	. PULLEY	1
-30	76088-1	. GEAR	1
		(ATTACHING PARTS)	
-31	COML	. SETSCREW, Socket head, No. 8-32 by ¼ in. long	1
	COML	. SETSCREW, Socket head, No. 8-32 by 1/8 in. long	1
		---*---	
-32	76101	. DRIVER, Clutch	2
-33	76097	. CLUTCH ASSEMBLY	1
-34	76088	. GEAR	1
		(ATTACHING PARTS)	
-35	COML	. SETSCREW, Socket head, No. 8-32 by 1/8 in. long	1
		---*---	
-36	76280-1	. SHAFT ASSEMBLY (Not field replaceable; order prism assembly, item 10)	1
-37	76089	. GEAR	1
-38	76087	. BUSHING	1
		(ATTACHING PARTS)	
-39	COML	. SCREW, Socket head, No. 10-32 by 5/8 in. long	1
	COML	. WASHER, Flat, No. 10	1
		---*---	
-40	76086	. SHAFT	1
-41	76085	. PULLEY	1
-42	76159	. SPACER	1
		(ATTACHING PARTS)	
-43	COML	. SETSCREW, Socket head, No. 8-32 by ¼ in. long	2
		---*---	
-44	76101	. DRIVER, Clutch	2
-45	76097	. CLUTCH ASSEMBLY	1
-46	76018A	. REFLECTOR ASSEMBLY	1
-47	76001	. CHASSIS, Main	1

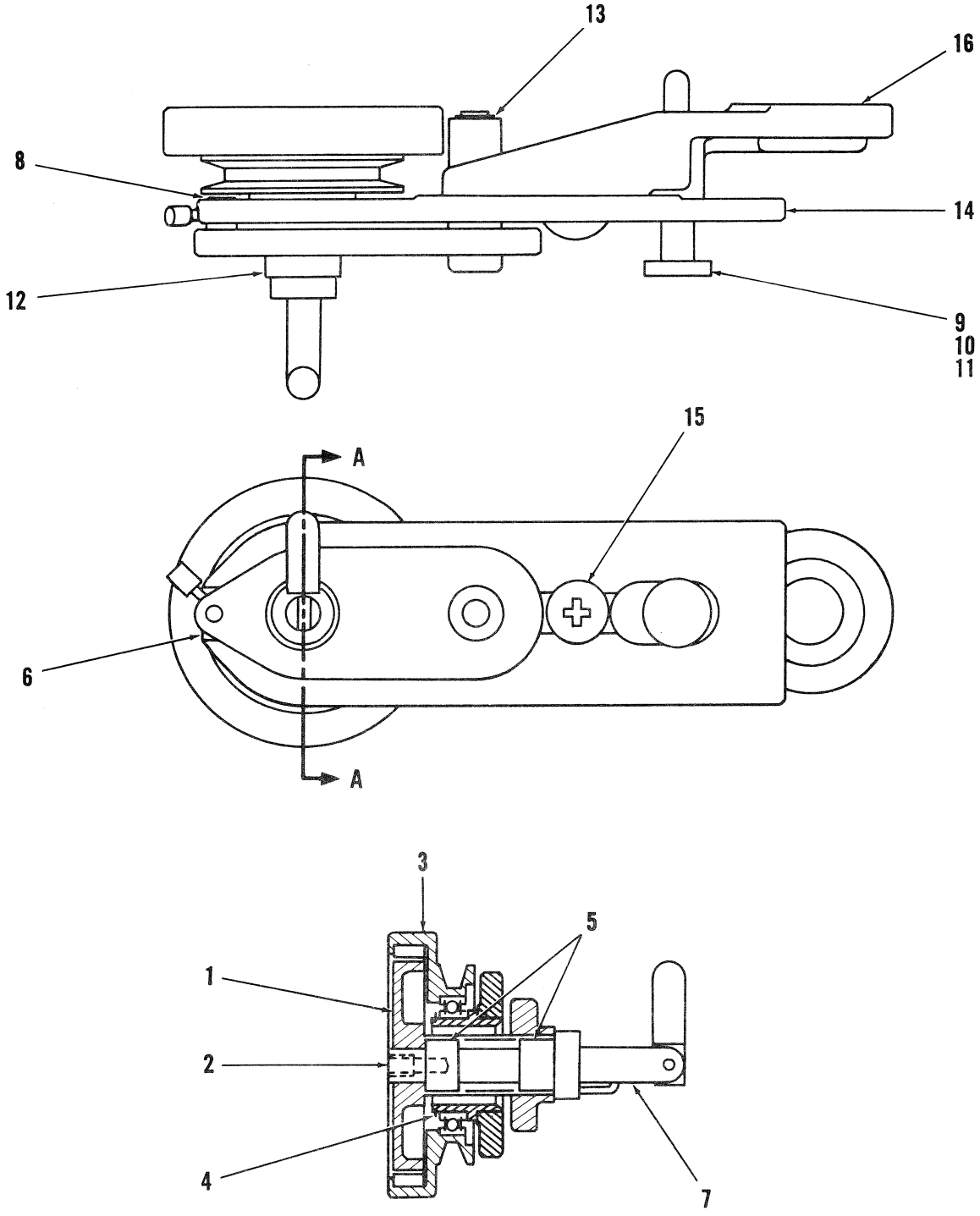


Figure 6-9. Reel Arm Assembly

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-9	76052R	ARM ASSEMBLY, Reel, right (for NHA, see figure 6-8)	Ref
	76052L	ARM ASSEMBLY, Reel, left (for NHA, see figure 6-8)	Ref
-1	50256	. DRUM	1
		(ATTACHING PARTS)	
-2	COML	. SCREW, Socket head, 10-32 by 3/16 in. long	1
	COML	. WASHER, Fiber, 15/16 in. OD by ½ in. ID by 1/32 in. thick	1
		---*---	
-3	76040	. PULLEY ASSEMBLY, Reel	1
-4	5100-87	. RING, Retaining (79136)	1
-5	3672	. BEARING, Needle (80648)	2
-6	76136	. CAM ASSEMBLY	1
-7	76045	. SPINDLE ASSEMBLY, Reel	1
		(ATTACHING PARTS)	
-8	5133-12	. RING, Retaining (79136)	1
		---*---	
-9	76049	. KNOB	1
-10	76050	. PIN	1
-11	76044	. SPRING	1
-12	76051	. BRACKET ASSEMBLY, Reel	1
		(ATTACHING PARTS)	
-13	5133-25	. RING, Retaining (79136)	1
	COML	. WASHER, Flat, ¼ in.	1
		---*---	
-14	76047	. SUPPORT ASSEMBLY, Reel	1
		(ATTACHING PARTS)	
-15	COML	. SCREW, Phillips truss head, ¼-20 by ¾ in. long	1
	COML	. NUT, Hex, ¼-20	1
		---*---	
-16	76048	. ARM, Reel	1

SECTION VII

DIFFERENCE DATA SHEETS
MODELS LV AND LVRM

7-1. GENERAL.

7-2. Sections I through VI of this manual contain data applicable to the Library Reader, Model LVR (with optically recorded sound-reproducing capability). This section describes differences applicable to Model LV (no sound reproduction) and Model LVRM (capable of reproducing either optically or magnetically recorded sound).

7-3. LIBRARY READER, MODEL LV.

7-4. The library reader, Model LV, is identical to the Model LVR except that it does not contain the optical sound head assembly, the sound amplifier assembly, or any related components. The Movel LV can be equipped with the optional footage and frame counter or the hours, minutes and seconds counter. Specific differences with the Model LVR are as follows:

a. Paragraph 3-10: Delete all description of sound amplifier circuit.

b. Table 4-1: Delete entry for S301/R311 and sound head.

c. Paragraph 4-7: Delete step j.

d. Paragraph 4-8: Delete step f.

e. Table 5-1: Delete entry, "No sound at loudspeaker or PHONES jack."

f. Paragraphs 5-35 and 5-36: Delete entire paragraphs.

g. Figure 5-3: Delete entire schematic plus S301 and J102 on figure 5-2.

h. Figure 6-1-8: Replace with sound head plate 76214.

i. Figure 6-1-16: Delete volume control and one knob (6-1-14).

j. Figure 6-1-40: Delete amplifier, attaching parts (6-1-41 and 6-1-42), and receptacle J102 (6-1-43, 6-1-44, and 6-1-45).

k. Figure 6-1-74: Delete headset jack J105.

l. Figure 6-1-75: Delete speaker and related parts (6-1-76, 6-1-77, 6-1-78, and 6-1-79).

m. Figures 6-2 and 6-5: Delete entirely.

7-5. LIBRARY READER, MODEL LVRM.

7-6. The library reader, Model LVRM (figure 7-1), is identical to the Model LVR except that it is equipped with a sound head which will reproduce sound from film recorded with either conventional optical sound or a magnetic sound stripe. Most operating and all maintenance procedures are identical for the LVR and LVRM; there is no difference in the method of threading film on the LVRM sound head. Specific differences with the Model LVR are as follows:

a. Paragraph 4-7: Add step k as follows:

k. When viewing film with magnetic sound, turn knob on eccentric (6-2-12) fully counterclockwise to M position. When viewing film with optical sound, turn this knob fully clockwise to O position.

b. Figure 6-1-8: Revise to read 76111-1, HEAD ASSEMBLY, Optical and magnetic sound.

c. Figure 6-2-26: Add connector P304 and increase units per assembly to 3.

d. Figure 6-2-27: Delete sound head plate, part No. 76112.

e. Figure 6-2: Add sheet 2 and magnetic components as follows:

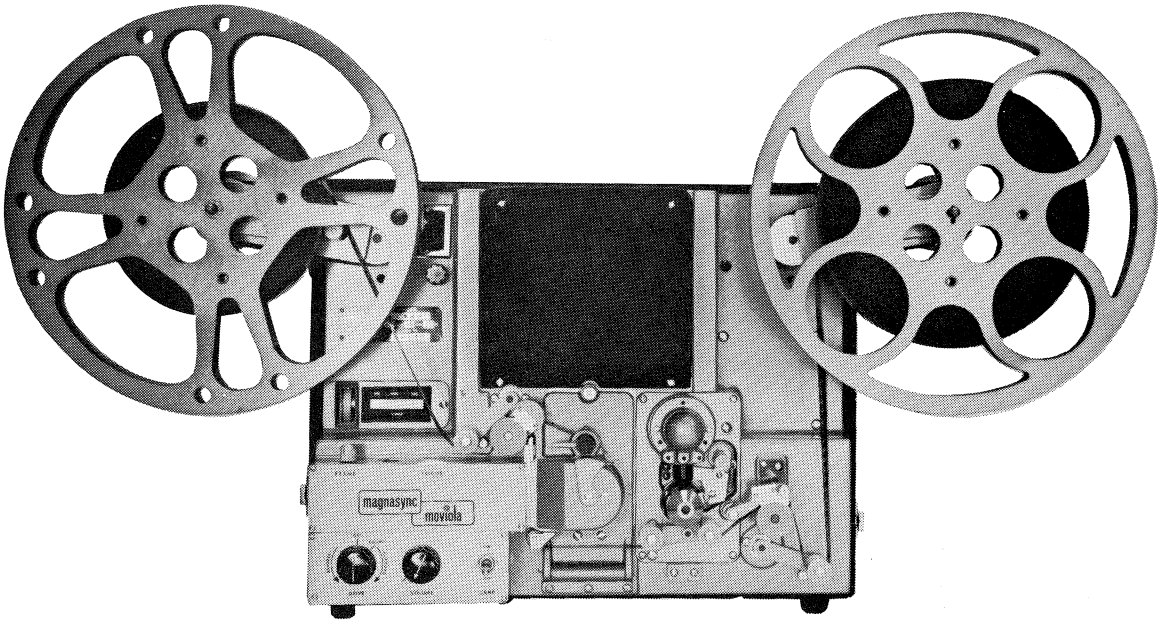


Figure 7-1. Library Reader, Model LVRM

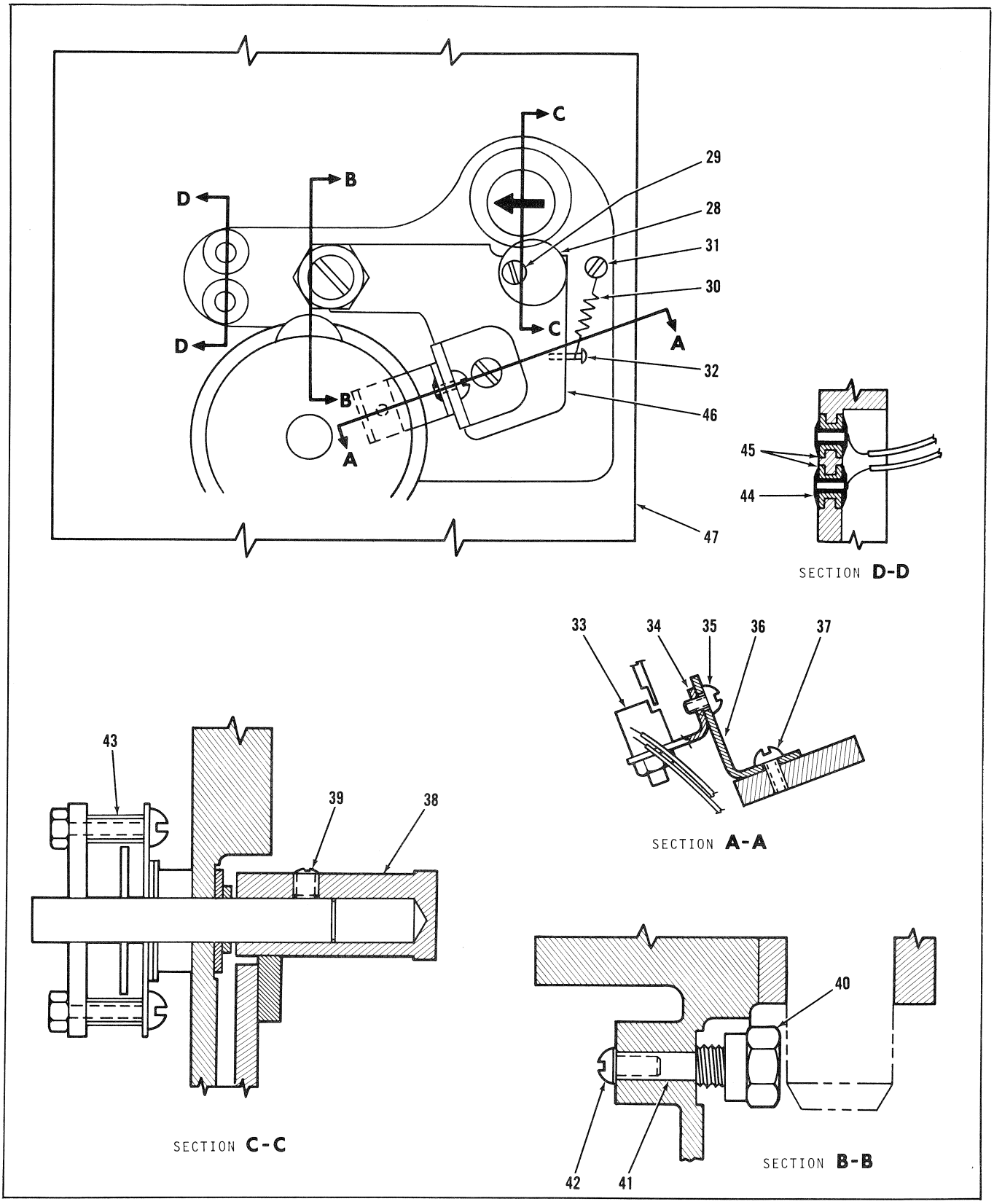


Figure 6-2. Optical and Magnetic Sound Head Assembly (Sheet 2 of 2 showing components applicable to Model LVRM)

Fig. & Index No.	Part No.	Description 1 2 3 4 5 6 7	Units Per Assy
6-2-28	76236	. CAM	1
		(ATTACHING PARTS)	
-29	COML	. SCREW, Round head, No. 4-40 by ¼ in. long	1
		---*---	
-30	76237	. SPRING, Extension	1
-31	COML	. SCREW, Round head, No. 2-56 by ¼ in. long	1
-32	COML	. SCREW, Drive, No. 0 by 3/16 in. long	1
-33	76241	. HEAD, Magnetic	1
-34	76240	. BRACKET	1
		(ATTACHING PARTS)	
-35	COML	. SCREW, Round head, No. 4-40 by 1/8 in. long	1
		---*---	
-36	76239	. BRACKET	1
		(ATTACHING PARTS)	
-37	COML	. SCREW, Round head, No. 6-32 by ¼ in. long	1
		---*---	
-38	76210	. ECCENTRIC	1
		(ATTACHING PARTS)	
-39	COML	. SETSCREW, Socket head, No. 6-32 by 1/8 in. long	1
		---*---	
-40	COML	. NUT, Hex, jam No. ¼-28	1
-41	76222	. SHAFT	1
-42	COML	. SCREW, Round head, No. 6-32 by ¼ in. long	1
-43	76211	. SWITCH (S302)	1
-44	COML	. WASHER, Fiber, 0.25 in. OD by 0.09 in. ID by 0.03 in. thick	4
-45	SE35	. EYELET (Premmco, Los Angeles, Calif.)	2
-46	76238	. ARM, Pivot	1
-47	76221	. PLATE, Magnetic and optical sound head	1