DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DS, GS, AND DEPOT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS

PROJECTION SET, MOTION PICTURE, SOUND AS-25A (SOUND MOTION PICTURE PROJECTION SET GRAFLEX MODEL 920EX)

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENTOF THE ARMY
OCTOBER 1969

WARNING

Be careful when working on the 115-volt ac line connections. Serious injury or death may result from contact with these terminals.

WARNING

Serious burns can result from contact with projector lamp when hot. The lamp should be allowed to cool completely before handling.

TECHNICAL MANUAL
No. 11-6730-230-35

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *17 October 1969*

DS, GS, and Depot Maintenance Manual

PROJECTION SET,

MOTION PICTURE, SOUND AS-25A

(SOUND MOTION PICTURE, PROJECTION SET

GRAFLEX MODEL 920EX)

LIST OF ILLUSTRATIONS

CHAPTER 1
FUNCTIONG

Section I. GENERAL

1-1. Scope

a. This manual covers direct support, general support, and depot maintenance for Projection Set, Motion Picture, Sound AS-25A and Projector, Motion Picture, Sound AS-25AI It includes instructions appropriate to direct support, general support, and depot maintenance for troubleshooting, testing, aligning, and repairing the equipment, replacing maintenance parts, and repairing specified maintenance parts. It also lists tools, materials, and test equipment authorized for direct and general support and depot maintenance.

b. The complete technical manual for this' equipment includes TM 11-6730-230-12, c. Appendix B is current as of 1 July 1971.

NOTE

For applicable forms and records, see paragraph 1-2 of TM 11-6730-230-12.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue ol DA Pam 310-4 and DA Pam 310-7 to determine whether there are new editions, changes, or ad. ditional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 t(determine whether there are Modification Work Orders (MWO's) pertaining to the equipment.

1-3. Reporting of Equipment Manual Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the, individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-SV, Fort Monmouth, N. J. 07703.

Section II. MECHANISMS

1-4. General

The mechanisms that comprise the projector are described in paragraphs 1-5 through 1-10. These descriptions include the operation of the main drive system, film feed clutch assembly, film sprocket and feed sprocket shoe, film gate and feed mechanism, threading control arm, takeup clutch arm, and takeup sprocket, takeup , shoe, and reel tension arm.

l -5. Main Drive System (fig. 1-1)

The main drive system of the projector contains a drive unit, drive shaft, motor drive belt, and speed change pulleys. The speed change pulleys provide a constant drive shaft speed for either of two different speeds of the drive unit. Speed change is accomplished by a drive belt shift fork (fig. 1-2) which moves the drive belt from , one end of the pulleys to the other.

a. Drive Unit. The drive unit (fig. 1-1) is powered by a synchronous alternating-current (ac) drive motor, which drives the speed change pulley through a fan and hub assembly. The fan and hub assembly is mounted directly , on the end of the motor shaft and consists of a cooling fan, hub assembly, and drive spring. The drive spring provides a drive connection between the hub assembly and pulley. When the motor is reversed, the hub assembly makes 2 full revolutions before re-engaging the pulley, thus protecting the drive system against damage during motor reversal. Since the ac motor is synchronous, its operating speed is controlled by the frequency of the input power, which may be either 50 cycles per second (cps) or 60 cps. When the frequency of the 'input power is 50 cp3, the motor operates at 1, 450 revolutions per minute (rpm). When the

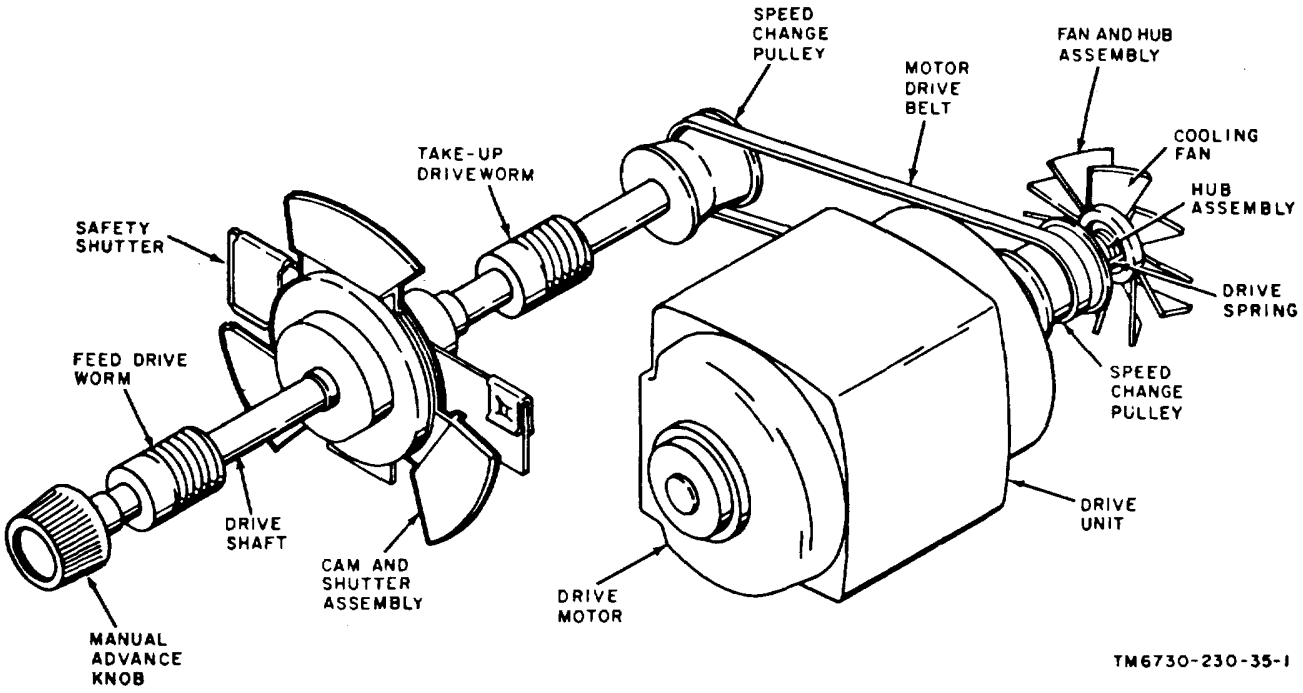


Figure 1-1. Main drive system, schematic diagram

frequency of the input power is 60 cps, the motor operates at 1, 755 rpm.

b. Drive Shaft. Mounted on the drive shaft are two worm gears for driving the film takeup and feed sprocket gears, the shutter and cam assembly, and safety shutter. A manual advance knob on the front of the drive shaft permits turning the shaft by hand. The speed change pulley at the opposite end of the shaft is rotated by the drive belt and provides the operating power for the shaft. The shaft rotates on bearings mounted in the housing assembly.

c. Drive Belt Shift Fork. The drive belt shift fork (fig. 1-2) controls the position of the drive motor belt on the speed change pulleys. The fork is moved about a pivot by a lever arm. An eccentric, operated by the power selector switch, moves the lever back and forth to move the belt shift fork. A spring attached to the bottom of the lever and to the eccentric pin pulls the eccentric into position once it has passed the midpoint of travel during power selector switch position changes. Rollers on the fork engage the motor drive belt during shifting and push the belt from one end of the pulleys to the other.

1-6. Film Feed Clutch Assembly.
(fig. 13)

The film feed clutch is a unidirectional clutch that permits free running of the supply reel for forward

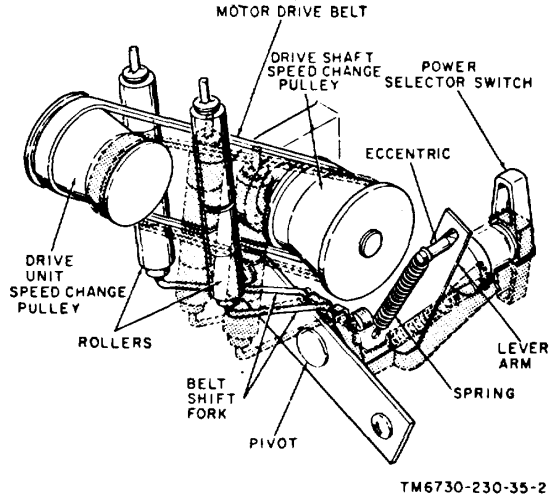


Figure 1-2. Drive belt shift fork schematic diagram.

operation. For reverse operation, the film feed clutch drives the supply reel. The clutch also serves as a direct drive unit for the supply reel during rewind. Operation of the clutch during each of these functions is described below.

a. Forward Operation. During forward operation, the clutch is automatically disengaged and

the feed clutch pulley is free-wheeling on the clutch drive shaft. A cam plate mounted in the pulley drive race contains three balls and spring combination, which interface the cam plate and pulley. During forward operation, the three balls, and springs are driven into the deep portion of tile cam plate slots by the rotation of the cam plate, removing any drive surface between cam plate and pulley drive race. The driven clutch pin engages a slot in the cam and interfaces the driven clutch and cam plate.

b. Reverse Operation . During reverse operation, the clutch is automatically engaged, providing drive to the supply reel belt. With direction of rotation reversed, the three balls and springs are pushed into the narrow portion of the cam plate. forming an interface between the cam plate and the pulley drive race. This permits direct drive between the driven clutch and the feed clutch pulley. The driving clutch plate, which is pinned to the clutch drive shaft, drives the drive clutch through the clutch facing. The amount of drive transferred by the clutch facing before slippage occurs is set by the adjusting nut and tension spring.

c. Rewind Operation. During rewind, a rewind paw-l is engaged to bypass the clutch facing and connect the driving clutch to the driven clutch. When the rewind knob is pulled out, the rewind lever is brought into alignment with the pawl forcing the pawl downward and permitting engagement with the driven clutch pawl pin. The feed clutch pulley is now driven in the same manner as reverse operation.

1-7. Shutter and Cam Assembly

(fig. 1-1)

The shutter and cam assembly consists of a cam for driving he claw arm and an automatic shutter. The shutter consists of three blades of equal size. One blade is fixed and the other two are movable and controlled by a spring-loaded actuator plate. The fixed blade cuts off light from the aperture while the film is in motion. The other two blades cut off light at regular intervals in between film motion. These two blades move into coincidence at normal projector speed to form a single blade. If the projected light is too bright, however, the two blades may be locked in position to form a fixed three-blade shutter providing *inc*rea*sed* light diffusion. The cam assembly times the operation of the claw arm to the movement of the shutter blades and is lubricated by an oiler pad.

1-8. Safety Shutter

(fig. 1-1)

The safety shutter is a spring-loaded shutter designed to diffuse light when the projector is not running. It remains in the optical path of the projection lamp when the drive shaft is not in motion. When the drive shaft is rotating to provide forward drive for the projector, the momentum of the rotating shaft acts upon a fluid clutch, raising and holding the shutter out of the optical path of -the projection lamp.

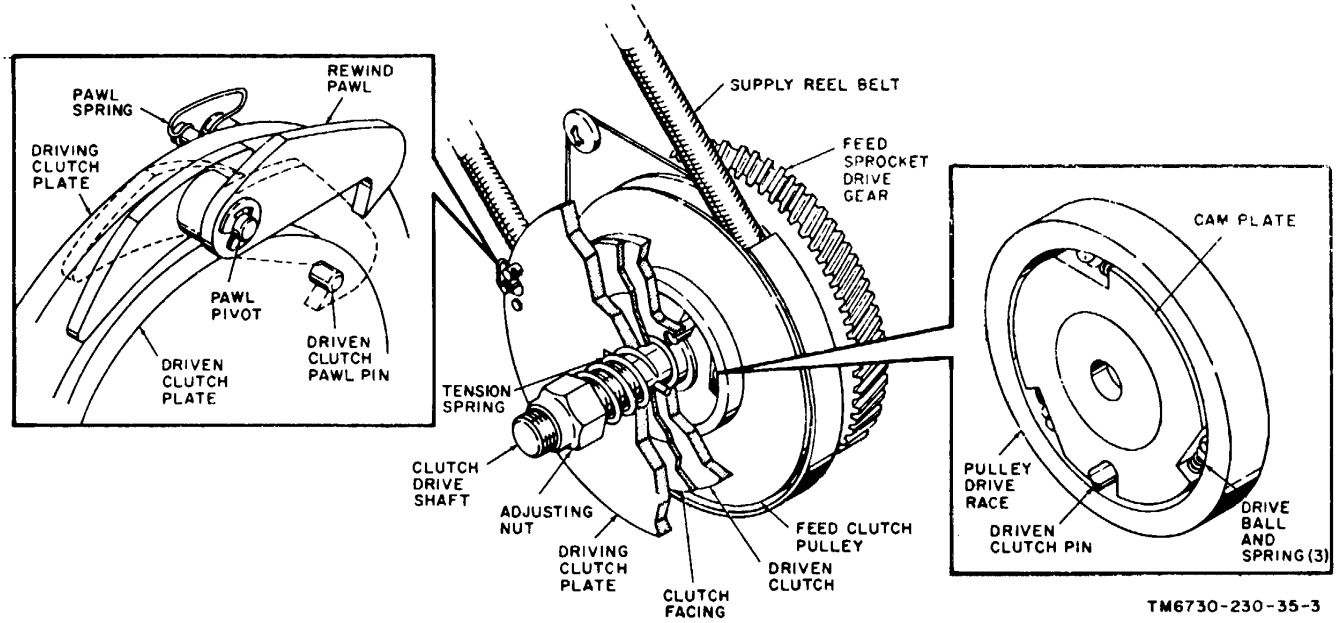


Figure 1-3. Film feed clutch schematic diagram.

Section III. OPTICAL FUNCTIONING

1-9. Sound Optical System
(fig. 1-4)

The sound optical system contains a sound exciter lamp, soundhead cartridge, and phototransistor. The sound exciter lamp provides light that is concentrated into a rectangular shaped beam by the soundhead cartridge. This beam is imposed on the film sound track as the film passes over the soundhead. The film sound track is composed of light and dark variations that pass the light beam at varying intensities. As the sound track passes beneath the light beam, variations in the light are imposed on the phototransistor. These variations are changed to corresponding voltage variations by the phototransistor and are supplied to the audio amplifier (para 1-12) for amplification.

1-10. Projection Optical System
(fig. 1-5)

The projection optical system contains a projection lamp, an aperture plate, and a projection lens assembly. The projection lamp is the light source for the projection optical system. This light is deflected forward and through the aperture plate and film to produce the image which is passed to the lens assembly when it is inverted and focused for projection.

a. Projection Lamp. The projection lamp contains a dichroic reflector that reflects light forward but permits the backward passage of the heat-producing infrared rays. The projection lamp is air-cooled.

b. Apert7ure Plate. The center of the aperture plate is cut out to the size of the image area of a single frame of 16-mm film. The film is held tightly against the aperture plate opening to minimize distortion of the image. Light rays from projection lamp are formed into the shape of the frame by the aperture opening, projecting a single frame image out of the aperture plate. When the projector is operating. the projected beam is interrupted by a shutter (para 1-7) each time a frame is moved and intermittently during the projection of the image.

c. Lens Assembly. The lens assembly inverts the image projected from the aperture and provides for focusing of the image on the screen. Two lenses. one at each end of a lens tube, comprise the optics of the lens assembly. The lens tube is threaded so that it can be conveniently screwed in or out for focusing.

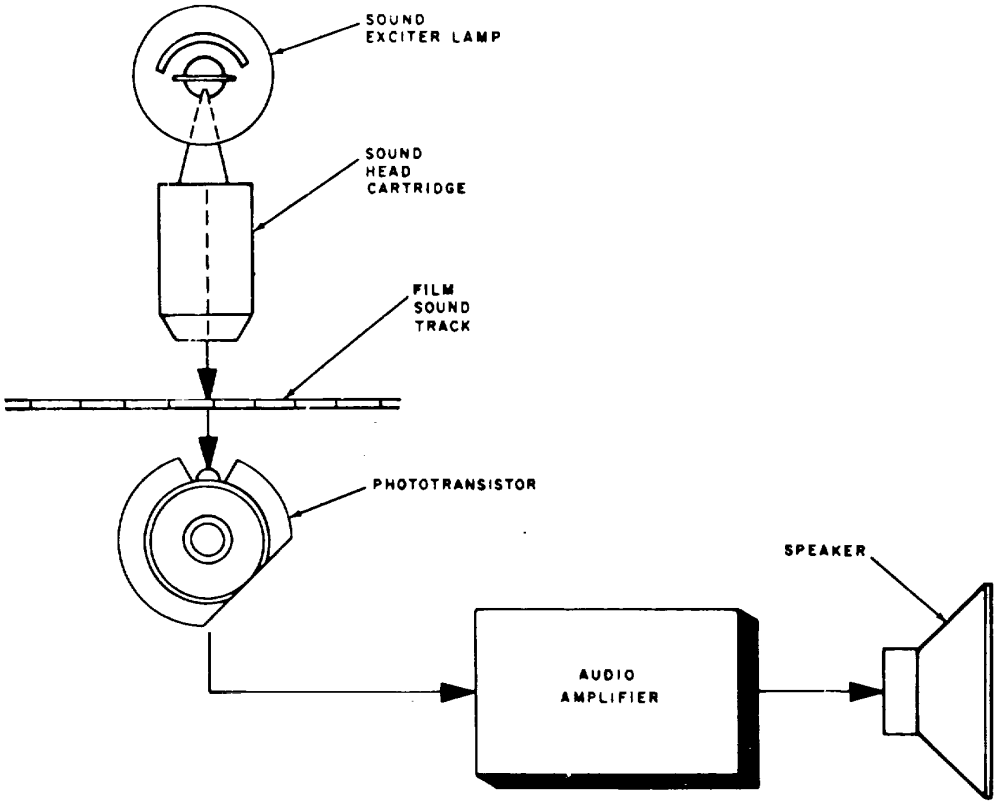


Figure 1-4.

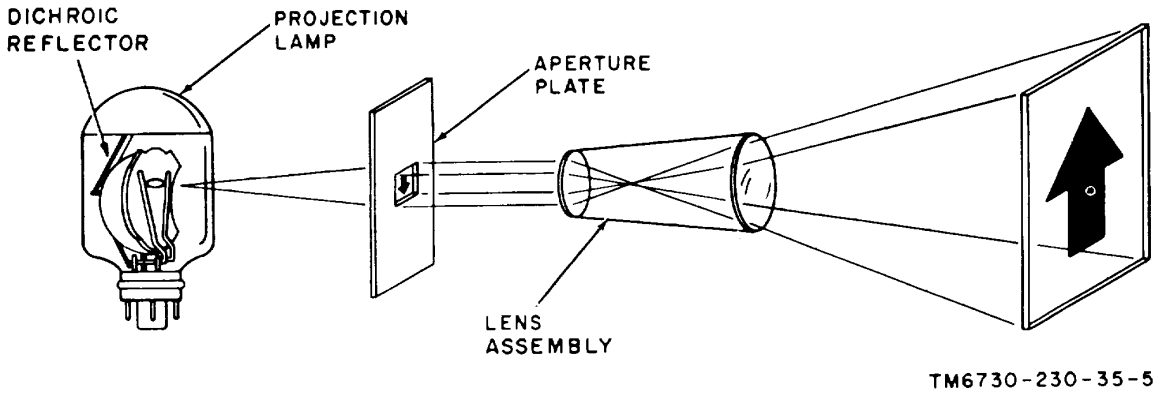


Figure 1-5. Projection optical system diagram

Section IV. CONTRL CIRCUITS AND AMPLIFIER

1-11. Control Circuit 1

(fig. 1-6 and fig. 1-6.1)

The projector control circuits are shown in the schematic diagram of fig. 1-6 for projector AQ-9A and figure 1-6 1 for projector

Except for the power interlock circuit in the AQ-9A project all circuits are the same-drive motor control circuit, main power control circuit and projection lamp control circuit.

a. Interlock Circuit Projector AQ-9A only. Interlock switch S4 disconnects power from the projector when the cover is removed. When the interlock switch is closed, 115-volt, 50or 60-cps, ac power is applied to reversing switch S3, pushbutton control S2, and threading lamp switch S1. Threading lamp DS3 lights when threading lamp switch S1 ins closed.

b. Drive Motor Control Circuit. The drive motor control contains reversing switch S3 and contacts 3 and 8 of pushbutton) control S2. Reversing switch S3 is a three-position, mechanically operated selector switch that controls motor rotation. Power is not applied to the motor when the master control lever is at THREAD. Two contacts (3 and 8) of pushbutton control S2 control the application of power to the motor.

c. Main Power Control Circuit. The main power control circuit energizes blower motor B32 and applies power to transformer T1. Whenever a pushbutton other than the OFF pushbutton is depressed, contact 4 of pushbutton panel control S2 is closed and power is applied to transformer T1 and the amplifier. Thus, one of the five pushbuttons must be depressed before the amplifier , can be turned on. When contact 4 is closed, it remains closed until the OFF pushbutton is operated.

d. Projection Lamp Control Circuit. The projection lamp control circuit contains three pushbuttons, OFF, NORM, and HT. The OFF pushbutton opens contact 6 or 7 if either one of these is closed. The NORM pushbutton closes contact 6 of pushbutton panel control S2. connecting the L0O tap in the secondary of transformer TI to projection lamp ID, 1 The HI pushbutton closes contact 7 of pushbutton panel control S2, connecting the HI tap in the secondary of transformer T1 to projection lamp D1. The LO tap of transformer T1 provides 17.5 volts ac to the projection lamp for normal lamp intensity. The HI tap of transformer T1 provides 21.75 volts ac to the projection lamp for a brighter intensity.

1-12. Audio Amplifier, Projector AQ-9A

(fig. 1-7)

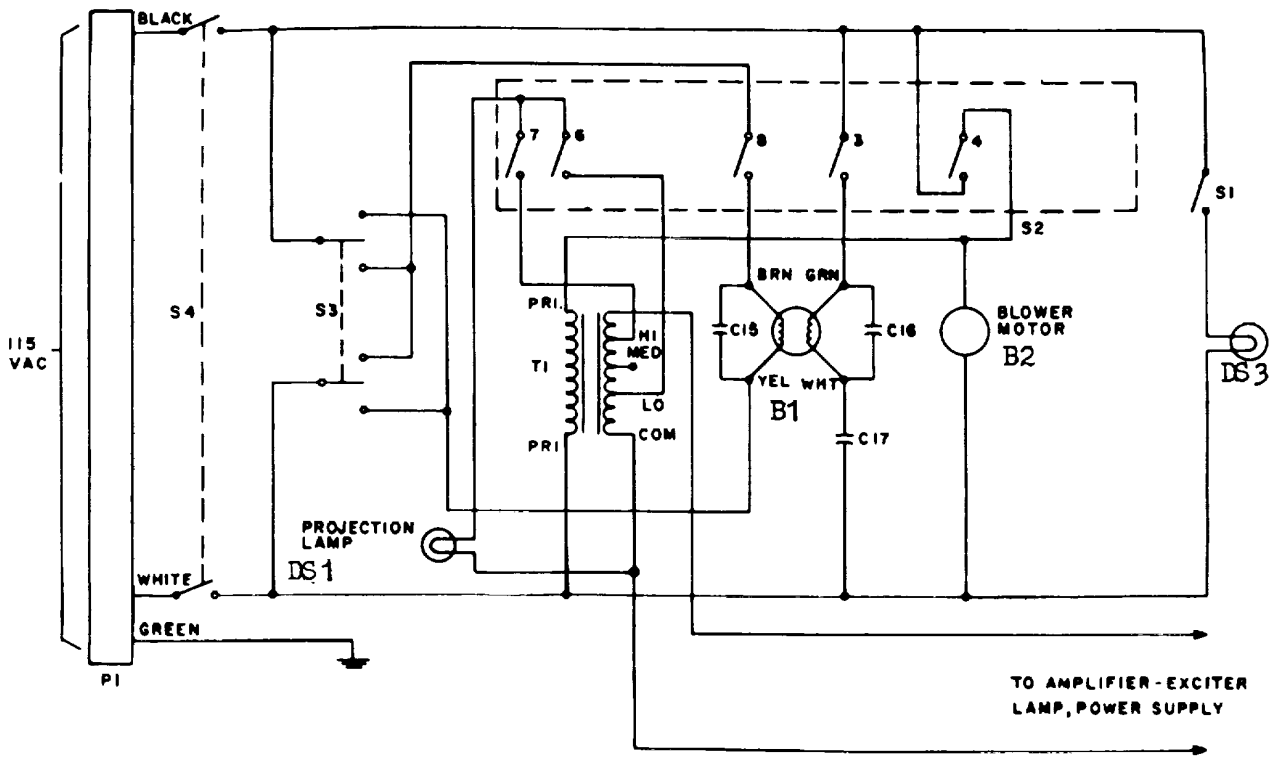
The audio amplifier converts the voltage output of the sound optics into audio power for operating the speakers. Circuits that comprise the audio amplifier include a power supply and audio amplification circuits.

a. Power Supply. The power supply contains a bridge rectifier and regulator circuits which produce output voltages of -31 volts direct current (dc) and -15.5 volts dc. The -31 volts dc operates the power output stages, of the audio amplification circuits and ON indicator lamp DS4. The -15.5 volts de operates the preamplifier stages of the audio amplification circuits.

(1) Bridge *rectifier.* Diode bridge CR1 is a bridge rectifier circuit that converts 115 volts ac to de for driving the regulator circuit. This circuit is fed by transformer T1 through power switch S.5 and circuit breaker CB1.

(*2) Regulator circuit* The regulator circuit consists of transistor Q7 and associated parts. Zener diode CR2provides a reference level for the base of transistor Q7, Variation in the bridge rectifier output produces corresponding variations in the conduction of transistor Q7. thus providing regulated voltages at the collector and emitters. Filtering of the bridge rectifier output produces corresponding variations in the conduction of transistor _Q7 Thus providing regulated voltages at the collector and emitters. Filtering of the bridge rectifier output is provided by capacitor C14. ON indicator DS4 is connected into the regulator circuit and lights when switch S5 and circuit breaker CB1 are closed.

b. Amplification Circuits . The audio amplification circuits consist of preamplifiers Q1 and Q2, driver Q3, and power amplifier Q6 through Q4 Volume control R1A sets the operating level for preamplfier Q1 , which is a common base class A audio amplifier. Tone control R1B adjusts filter network C1, C2, and C4 which selects the frequency range of the input signals. The output of preamplifier Q1 is taken from the collector circuit and drives emitter follower Q2 which provides impedance matching between preamplifier Q1and driver Q3. The output of driver Q3 drives the power amplifier which consists of two cascade amplifiers operating in a push-pull configuration. Transistors Q8 and :comprise the-other cascade amplifier.



-		3	4	6	7	8
OFF		O	O	O	O	O
STILL		O	X			O
RUN		X	X			X
LAMP	OFF		X	O	O	
	LO		X	X	O	
	HI		X	O	X	

SWITCH TABLE

DEPRESSING A BUTTON ON SWITCH S-2 WILL OPEN (O), CLOSE (X), OR LEAVE UNCHANGED (NO MARK) CONTACTS, AS INDICATED.

TM6730-230-35-6

Figure 1-6. Projector schematic diagram (1, Q-9 A).

1-13. Audio Amplifier, Projector
AS-25A1
(fig. 1-7.1)

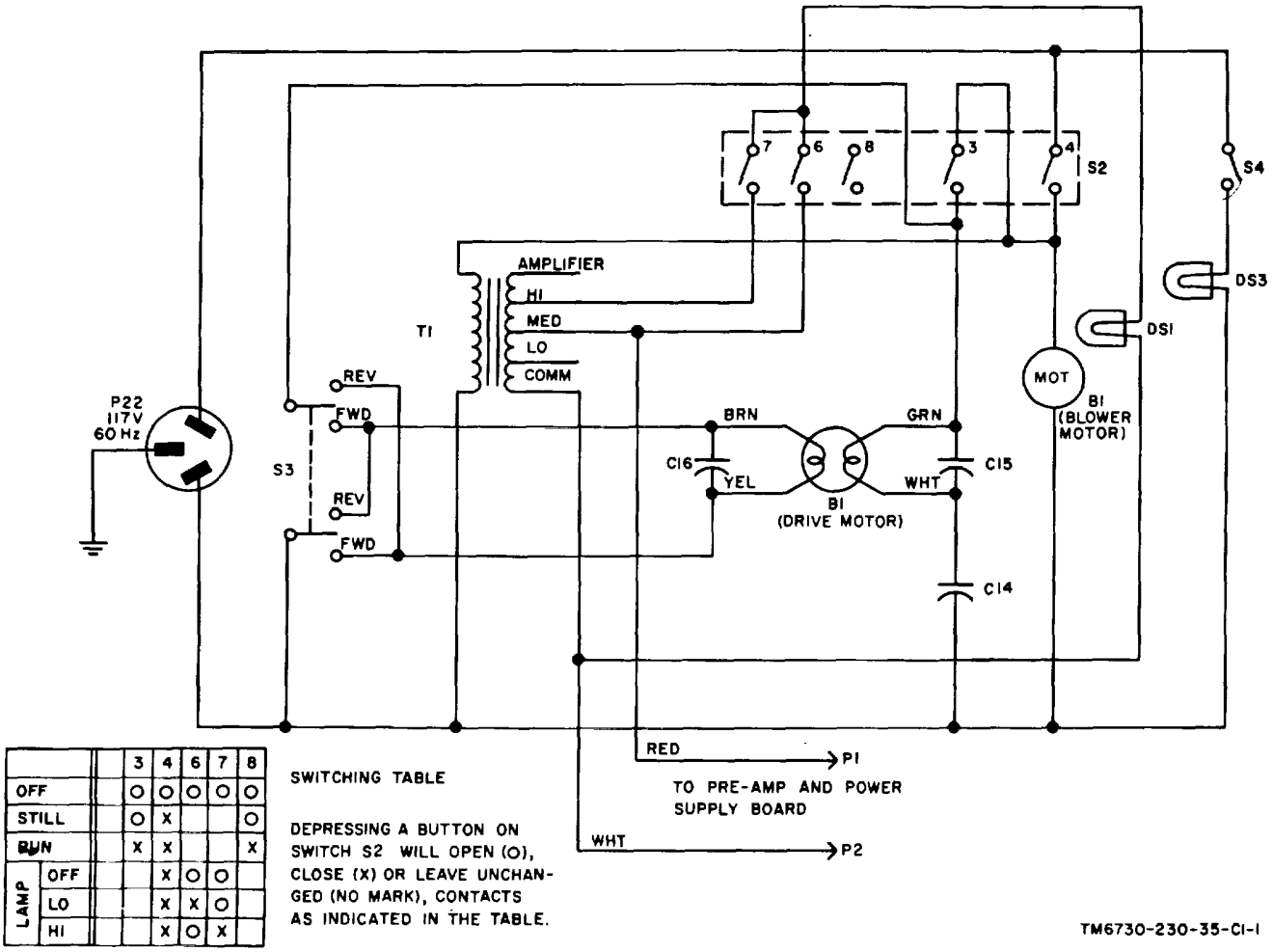
The audio amplifier converts the current output from the sound optics into audio power to drive the speakers. .Jacks J7 and .Ts are used for testing only. Circuits that comprise the audio amplifier include a power supply and audio amplification.

a. Power Supply. The power supply contains a bridge rectifier and a regulator circuit which produces output voltages of +33 volts direct current (dc) and +16.5 volts dc regulated. The +33 volts dc operates the power output stage of the audio amplification circuit. The 16.5 volts dc operates the preamplifier stage of the audio amplification circuit. The power supply is fused with T1 (1. 5 Amp Slo Blo). Output of the regulator also provides proper dc voltage for the exciter lamp through the series-dropping resistor R11.

(1) Bridge Rectifier. Diode bridge CR1 is a bridge rectifier that converts 24 volts ac to dc. Input is from the transformer rl through power switch S2.

(2) Regulator Circuit. The regulator circuit consists of transistor Q1 and associated parts. Zener diode 1 provides a reference level for the base of Q1Variation in the bridge rectifier output and 16. 5 vdc load produces corresponding variations in the conduction of transistor Q1thus providing regulated voltage at the emitter. Filtering of the bridge rectifier output is provided by capacitor C6 and C9.

b. Amplification Circuit. The audio amplification circuit consists of preamplifiers Q2, -Q3, Q4 and power amplifier AR. Volume control R1A sets the operating level for the driver transistor Q4 which is a common emitter class A audio amplifier. Tone control R13 adjusts the filter network C18 and C 19 which selects the frequency response of the input signals. The output of driver transistor Q4 is taken from the collector circuit and drives AR. The output of AR is capacitively coupled to the speaker load (8.0 ohms). R3 is a variable resistor control which is factory adjusted to insure a minimum reserve gain of 12 db.



		3	4	6	7	8
OFF		O	O	O	O	O
STILL		O	X			O
RUN		X	X			X
LAMP	OFF		X	O	O	
	LO		X	X	O	
	HI		X	O	X	

Figure 1-6.1. Projector, schematic diagram (AS-2SA1).

CHAPTER 2
TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING INFORMATION

WARNING

When troubleshooting or making repairs in the projector, be extremely careful, since 110 volts ac are present internally. Use insulated test probes when making the required voltage measurements. Always disconnect the power cord from the equipment before touching any of the internal parts.

2-1. General Instructions

a. Troubleshooting at direct suppoIrt, general support., and depot maintenance levels includes all the techniques outlined in TM 11-6730-230-12 for operator's and organizational maintenance and any special or additional techniques required to isolate a defective paint. The direct and general support and depot maintenance procedures are not complete in themselves but supplement the procedures described in organizational maintenance. The systematic troubleshooting procedure, which begins with the operational and sectionalization checks performed at organizational level must be completed by further localizing and isolating techniques. Section II of this chapter provides *unit* troubleshooting procedures which must be performed at direct and general support and depot maintenance levels.

b. Troubleshooting may be performed while the equipment is operating or, if necessary, after the equipment (or parts of it) has been removed from service. When trouble occurs, certain observations and measurements can be made that will help to determine the source of trouble. Paragraphs 2-4 and 2-5 describe the systematic procedures to be followed which will enable the maintenance personnel to isolate the cause of the trouble and correct the fault.

2-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective projector is to sectionalize the fault, which means tracing the fault to the major section. The second step is to localize the fault, which means tracing the fault to the defective section, stage, or unit. The third step, isolation, means tracing the fault to the defective part. Some faults, such as a broken claw a*im* pin, defective sprocket teeth, or binding of mechanical components, can often be isolated by sight, , touch, or hearing. The majority of faults, however, must be isolated by detailed electrical, mechanical, and optical checks.

b. Sectionalization Check. After the trouble has been sectionalized, make a general operational test (para 2-4) of the suspected section. The general operational test selves as a check of the sectionalizing test.

(1) Visual inspection. The purpose of visual inspection is to locate faults without testing or measuring circuits or components. All visual signs should be analyzed to help localize the fault to a particular subchassis, stage, or unit. Mechanical faults are most often localized through visual inspection.

(*2) Pluckout parts.* Defective lamps and other pluckout parts will be the cause of many troubles. After checking suspected lamps, remove and test all pluckout parts suspected of being faulty (TMI 11-6730-230-12). Replace each defective part with an identical part known to be good.

c. Localization. The tests listed below will aid in localizing the trouble. First, localize the trouble to a section or unit. Then isolate the trouble within that section or unit by electrical mechanical, or optical checks as required. Use the following methods of trouble localization:

(1) Troubleshooting charts. The trouble symptoms listed in this chart (para 2-5) will aid in localizing trouble to a component part.

(*2) Signal substitution.* Signal substitution procedures (para 2-6) quickly enable localiza-

tion of a trouble in the amplifier. P signal generator, an audio oscillator, and an oscillator, are units of test equipment that may be used in signal substitution procedures.

(3) Stage gain measurements. Stage gain measurements (para 2-7) help to locate hard-to find troubles in an individual stage or circuit of the amplifier.

(4) Optical tests. Optical testing procedures (para 2-8 and 2-9) will aid in localizing troubles within the optical systems.

d. Isolation.

(1) Voltage and resistance measurements. This equipment is transistorized. Observe all cautions given to prevent transistor damage. Make voltage and resistance measurements in this equipment only as specified. when measuring voltages, use tape or sleeving to insulate the entire test probe, except for the extreme tip. A momentary short circuit can ruin the transistor. *(For example,* if the bais is shorted out, excessive current between the emitter and the base would ruin the transistor.) Use resistor and capacitor color codes to find value of components. Use voltage and resistance measurements given on the schematic diagrams to find normal readings, and compare them with readings taken.

(2) Intermittent troubles. In all tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made evident by tapping or jarring the equipment. Check the wiring and connections to the units of the set.

(3) Optical troubles. Troubles in optical systems can be usually located by following step-by step testing procedure. Perform these test: (para 2-8 and 2-9) to find the normal results and compare them with the results obtained.

2-3. Tools and Test Equipment Required

a. Tools. Tool Kit, Photographic Repairman TK-77/CGF. Tool Kit, Photographic Repair TK109 'GF, and the special tools and test equipment listed in the chart below. If any of the tools listed are not on hand and the means for making it are available. refer to the figure listed in the Figure No. column for fabrication details. In addition to these special tools and test equipment, the standard tools contained in the TK-77/GF and TK-109/GF are required.

Figure No.	Tools and test equipment	Part number	Use
2-1	Roll pin extracting tool	T-38000-P	Remove warm gear roll pins during drive shaft roll pins during drive shaft removal.
2-2	Roll pin inserting tool	T-38000-N	Install worm gear roll pins during drive shaft installation
2-.3	Feeler gage	T-38000-Y	Set end play of feed and takeup sprocket during projector assembly
2-4	Shuttle cam adjusting tool	ST-5884	Adjust claw arm side clearance and pull down stroke
2-5	Claw arm protrusion gage	G14-38000	Set claw arm pin protrusion
2-6	Sound drum locating plug	T-38001-G	Locate the lateral and rotational positions of the sound drum during assembly
2-7	Spring-loading tool	T-38001-M	Preload the reel tension arm and the take-up sprocket shoe arm springs.
2-8	Film pressure adjusting gage	G8-38000	Check displacement of film pressure shoe springs.
2-9	Stroke setting gage	ST-5880	Adjust the stroke of the projector
2-10	Film tension gage	T-38000-S	Measure forward takeup tension
2-11	Lamp and optical path alignment	G3-38000	Position lamp socket and aperture plate in correct alignment with respect to the lens axis.
2-12	Supply reel spindle torque gage	G17-3800	Measure supply reel spindle reverse drive torque.

b. Test Equipment.

(1) Multimeter TS-352B/U.

(2) Generator, Signal AN/URM-127.

(3) Voltmeter. Electronic ME-30E/U.

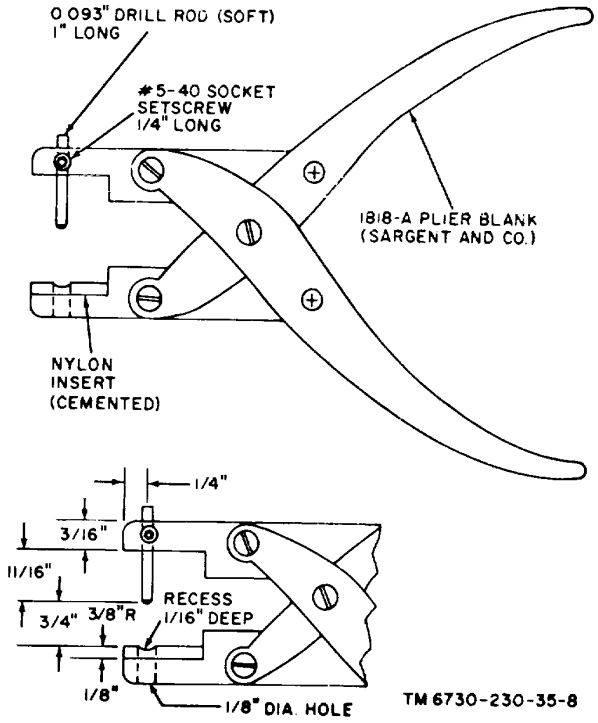


Figure 2-1. Roll pin extracting tool T-38000-P

TM 11-6730-230-35

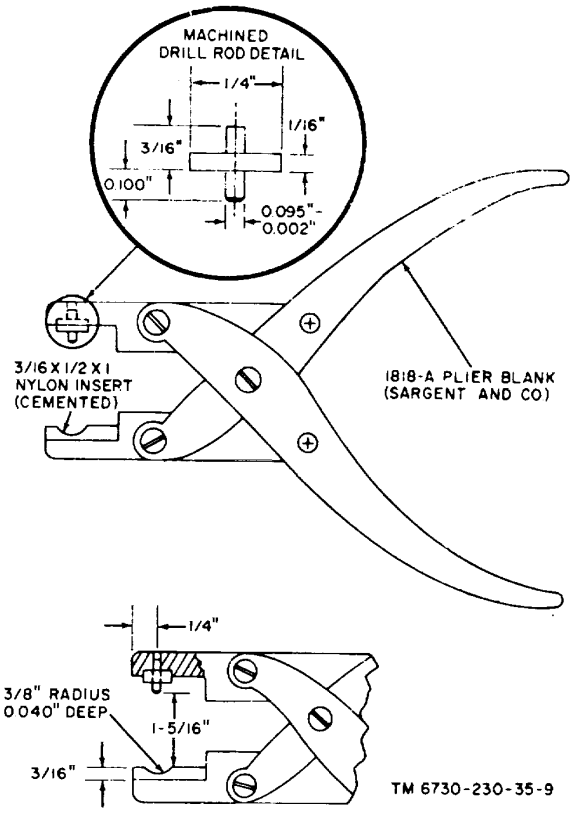


Figure 2-2. Roll pin inserting tool T-38000-N.

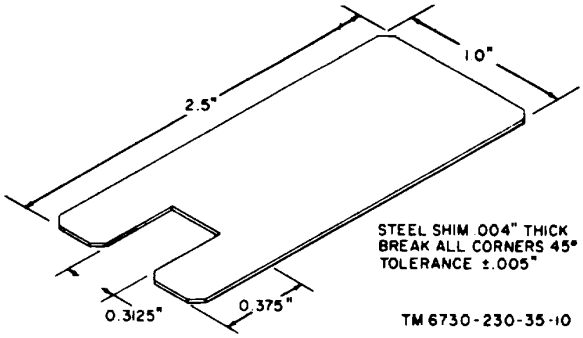


Figure 2-3. Feeler gage T-38000-Y

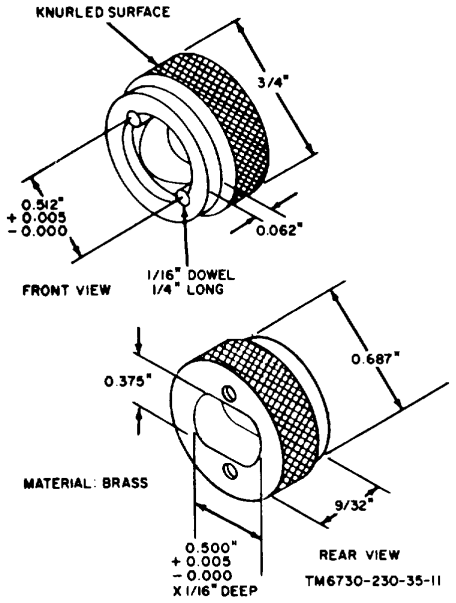


Figure 2-4. Shuttle cam adjusting tool ST-5884

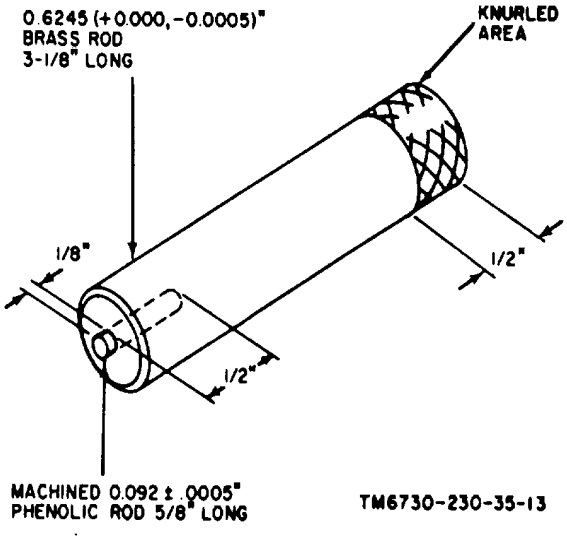


Figure 2-6. Sound drum locating plug T-38001-G

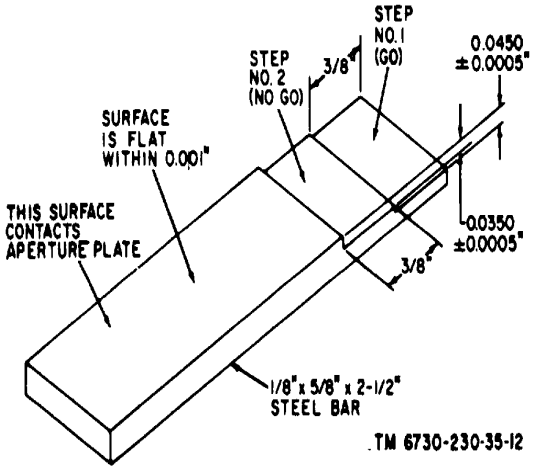


Figure 2-5. Claw arm protrusion gage G14-38000

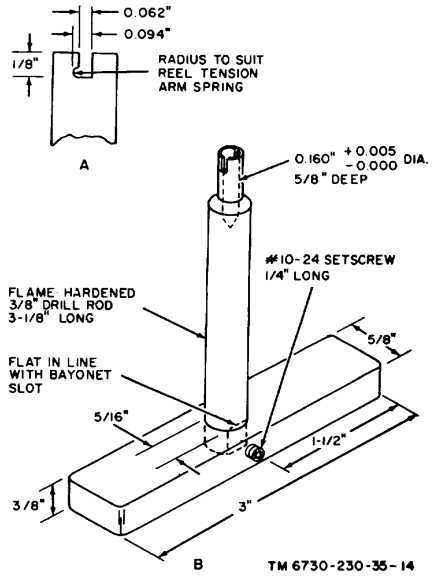


Figure 2-7. Spring loading tool T-38001-M

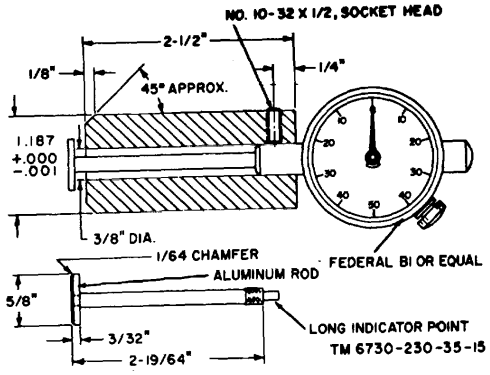


Figure 2-8. Film pressure adjustment gage G8-38000.

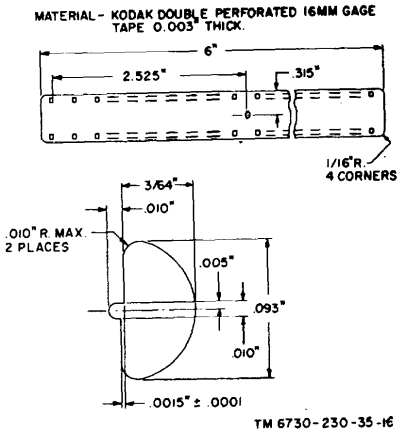


Figure 2-9. Stroke setting ST-5880.

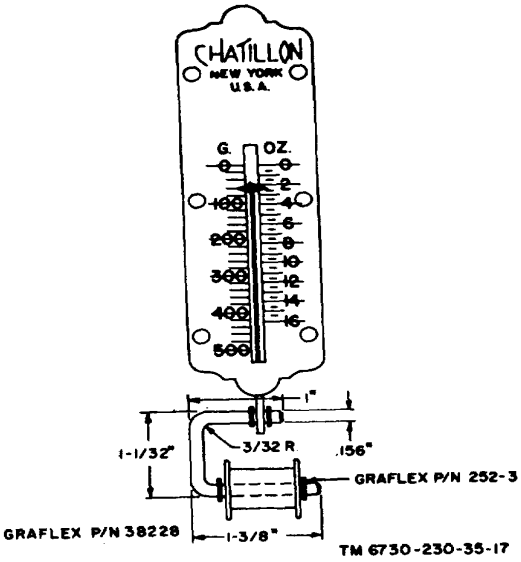


Figure 2-10. Film tension gage T-38000 S.

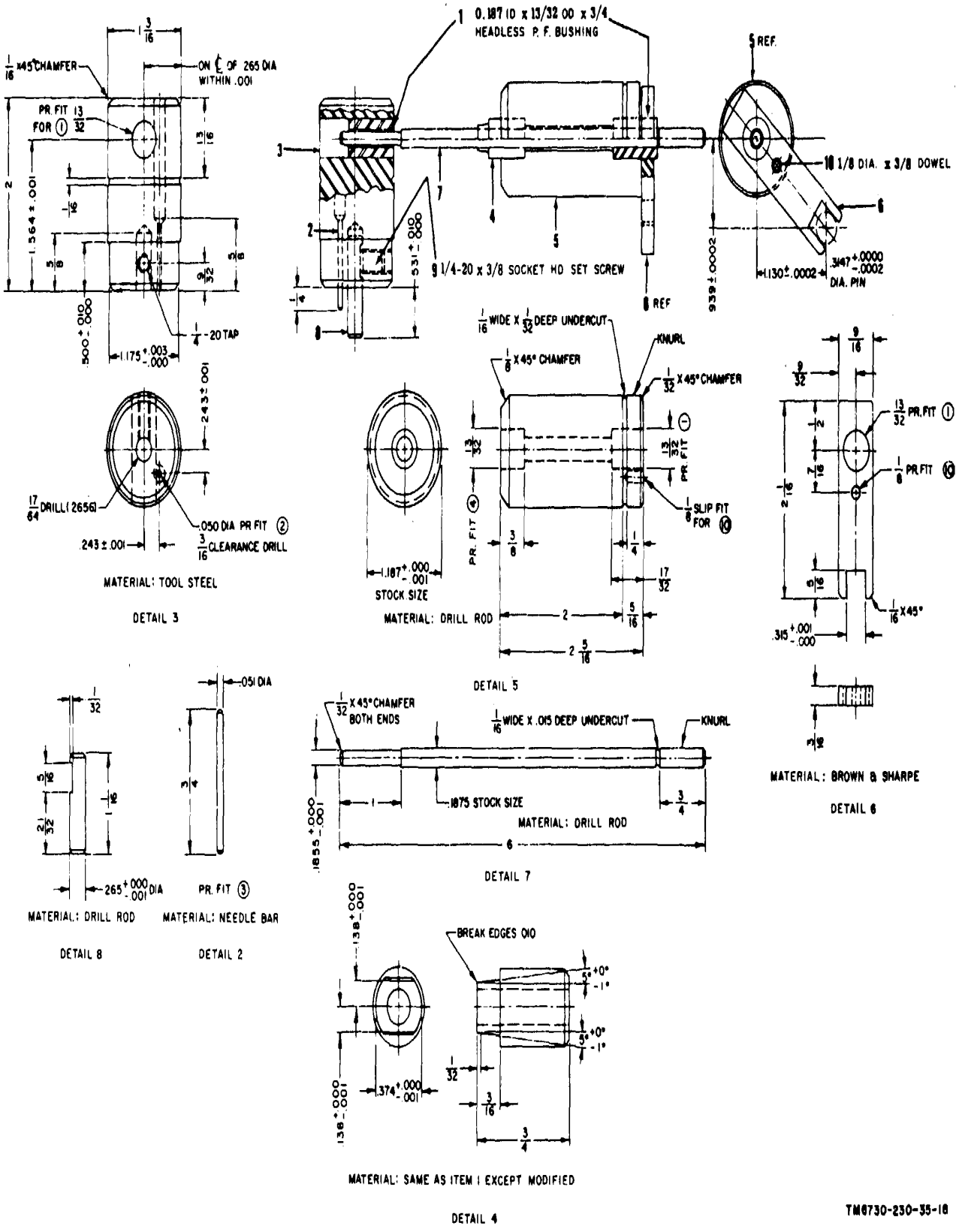


Figure 2-11. Lamp and optical path alignment tool G3-38000.

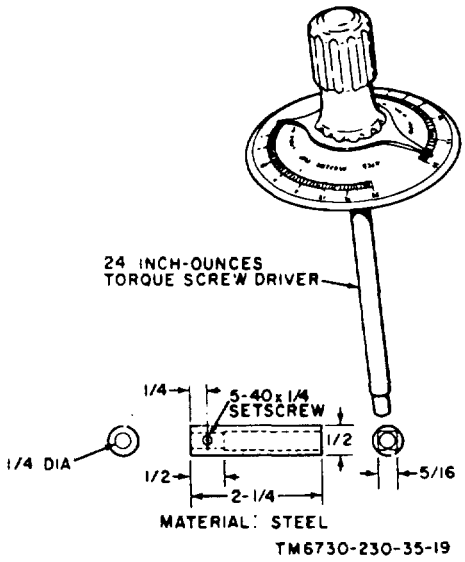


Figure 2-12. Supply reel spindle torque gage G17-38000.

Section II. TROUBLESHOOTING

2-4. General Operational Check for Projector

The operational checks that follow are divided into sections so that the various functional groups of the projector may be checked individually. For a complete operational check of the projector, all procedures should be performed as specified.

a. Projector Control System.

(1) Depress each pushbutton on the pushbutton panel and check for positive switch action. A pushbutton that is loose or does not have positive action may be making bad contact.

(2) Operate the master control lever to each of its three positions and check for positive action.

(3) Inspect the wiring harness for broken, burned, or damaged wires and insulation.

(4) Apply power and check each of the pushbutton functions.

(5) Set the THREADING LAMP switch to ON and be sure the threading lamp lights.

b. Main Drive System.

(1) See that the drive belt is tight and in position on the speed change pulleys.

(2) See that the fan and hub assembly is securely mounted to the motor drive shaft.

(3) See that the shutter and cam assembly and safety shutter are tightly mounted on the drive shaft.

(4) Operate the projector and listen for motor noise or vibration.

(5) Observe the way the wolm gears engage the takeup and feed sprocket drive gears.

(6) Listen for noise in the drive shaft bearings.

(7) See that the shutter and cam assembly properly engages the claw arm assembly to provide a smooth drive action.

(8) Reverse the motor direction and be sure the drive shaft comes to a complete stop before its direction is reversed.

c. Film Handling Mechanism.

(1) Thread a film into the projector and check the operation of the film handling mechanism in forward operation.

(2). See that the film is not torn at the film feed sprocket, takeup sprocket, and claw arm, and that there is no film slap at the supply reel or takeup reel.

(3) Reverse the projector and again check for film slap and tearing as specified in (2) above.

(4) Lead a reel of film on the takoup arm and set the projector for rewinding. See that film is wound smoothly onto the supply reel.

d. Projector Optical System.

(1) Thread a film into the projector and set the projection lamp to low intensity.

(2) Set the projector for still and see that the safety shutter has dropped into position.

(3) Check for synchronization between sound and picture. Restore the loop with the sound loop synchronizer, if necessary.

2-5. Localizing Troubles

a. General. If the proper results are not obtained during the operational tests (para 2-4), the trouble should be localized to the individual section or major component. Depending upon the nature o, f the operational symptom, one or more of the localizing procedures will be necessary. When following the procedures results in localization of trouble to a particular section, refer to the appropriate troubleshooting chart for assistance in isolation.

b. Use of Charts. The troubleshooting charts are designed to supplement the troubleshooting chart of TM 11-6730--230-12 and are based on the operational checks of paragraph 24.

(1) Projector.

Item	Symptom	Probable trouble	Correction
1	All projector functions inoperative.	*a.* Broken power cord.	*a.* Replace power cord assembly (5, fig. 3-8) fig *:(*-8).
		b. Defective interlock switch Projector AQ-9A only	*b.* Replace interlock switch (6, fig. 3-9)
		c. Broken wire between interlock switch and control switch Projector AQ-9A only	*c.* Check wiring and repair as needed.
2	Blower does not operate when pushbutton is de-pressed	*a.* Defective control switch	*a.* Replace control switch (16, fig. 3-26)
		b Defective blower motor.	*b.* Replace motor and mounting plate assembly (8, fig. 3-4).
		c. Defective motor wiring.	*c.* Check motor wiring and repair as needed.
3	Projector does not operate when pushbutton is de-pressed.	*a.* Defective control switch.	*a.* Replace control switch (16, fig. 3-26)
		b. Defective motor capacitor	*b.* Replace motor capacitor (1, fig. :3-1).
		c. Defective drive unit.	*c.* Refer to main drive system trouble-shooting procedure (2) below
		d. Defective wiring.	d. Check wiring and repair as needed.
4	Projection lamp does not light when LO or HI pushbutton is de-pressed.	*a.* Defective projection lamp.	*a.* Replace projection lamp (3, fig. 3-3)
		b. Defective control switch.	*b.* Replace control switch (16, fig. 3-26).
		c. Defective transformer T1.	*c.* Check transformer assembly (7, fig. 3-27) if defective.
		d. Defective projection lamp socket.	*d.* Replace lamp socket (I, fig. 3-3).
		e. Broken or disconnected wire to projector lamp	*e.* Check wiring and repair as needed.
5	Threading lamp does not light when switch is operated	*a.* Defective threading lamp	a. Replace threading lamp (14, fig. 3-8).
		b. Defective threading lamp switch.	*b.* Replace threading lamp switch (9, fig 3-26).
		c. Defective threading lamp socket.	*c.* Replace threading lamp socket assembly (17, fig. 3-8).
		d. Broken wire to threading lamp socket.	*d.* Check wiring and repair as needed.

(2) Main drive system.

Item	Symptom	Probable trouble	Correction
1	Motor runs but drive shaft does not rotate.	*a.* Worn or damaged drive motor belt.	*a.* Replace drive motor belt (9, fig. 3-4).
		b. Speed change pulleys dirty.	*b.* Clean speed change pulleys.
		c. Speed change pulleys out of alignment.	*c.* Align speed change pulleys (TM 11-6730-2.30-12).
		d. Broken drive spring.	*d.* Replace drive spring (2f, fig. 3-18
		e. Broken drive pin on hub assembly.	e. Replace hub assembly (2f, fig. 3-18).

(2) Main drive system (cont).

Item	Symptom	Probable trouble	Correction
		f. Broken drive pin on motor speed change pulley.	*f.* Replace pulley assembly (4, fig. 3-18).
		g. Drive shaft hearings seized org. gear binding.	*g.*. Check the drive shaft (para 2-10).
2	Excessive vibration	*a.* Drive unit adjusting screw out of adjustment.	*a.* Adjust drive unit adjusting screw (TM 11-6730-230-12).
		b. Drive motor bearing defective.	*b.* Check bearings and replace drive motor assembly (14, fig. 3-18), if defective.
		c. Motor mounting plate loose.	*c.* Tighten mounting screws (21, fig. 3-4).
3	Loss of power and/ora. speed.	Cam lubrication pad dry.	*a.* Lubricate cam lubrication pad (pa ra 3-41).
		b. Drive unit adjusting screw out of adjustment	*b.* Adjust drive unit adjustment .screw (TM 11-6730-230-12).
		c. Dirty worm takeup or feed sprocket bearing.	*c.* Check bearings and clean or re-place if necessary (para 3-40).
		d. Drive shaft bearing defective or gears binding.	*d.* Check drive shaft (para 2-10).
4	Projector drive shaft does not change speed when setting of power. Selector switch is changed.	*a.* Worn or damaged drive motor belt	a. Replace drive motor belt (9, fig. 3-4).
		b. Belt shift fork assembly out of adjustment.(TM 11-6730-230-12).	*b.* Adjust belt shift fork assembly

(3) Film handling troubles.

Item	Symptom	Probable trouble	Correction
1	Upper loop at film gate lost.	Feed sprocket loose on shaft.	Tighten setscrew (6, fig. 3-2).
2	Film slaps as it is fed through film gate.	*a.* Claw protrusion or stroke out of adjustment.(para 4-6).	*a.* Adjust claw protrusion and stroke
		b. Film pressure shoe out of adjust-ment or defective.	*b.* Adjust or repair film pressure shoe (TM 11-6730-230-12).
		c. Film gate not closing properly.	*c.* Disassemble and inspect the film gate components. Repair or re place as required.
3	Film is scratched as it is fed through pressure shoe.	*a* Film pressure shoe dirty or dam-aged.	*a.* Clean and inspect film pressure shoe. Replace if damaged.
		b. Aperture plate dirty or damaged.	*b.* Clean and inspect aperture plate assembly. Repair or replace if damaged.
4	Lower loop from film gate lost.	*a.* Claw protrusion or stroke out of adjustment.	*a.* Adjust claw protrusion and stroke (para 4-6)
		b. Film pressure shoe out of adjust-ment or defective.	*b.* Adjust or repair film pressure shoe (TM 11-6730-230-12).
5	Clicking noise (film picking).	Damaged tooth on takeup or feed sprocket.	Replace defective sprocket.
6	Little or no takeup	*a.* Takeup belt defective.	*a.* Replace takeup reel belt (1, fig. 3-5).
		b. Clutch bias incorrectly set.	*b.* Adjust clutch bias (TM 11-6730-230-12).
		c. Takeup clutch linkage too short.	*c.* Adjust takeup clutch linkage (TM 11-6730-230-12).
		d. Takeup clutch inoperative.	*d.* Repair takeup clutch.
7	Takeup belt squeals	Takeup film tension too high.	Adjust takeup film tension (para 4-3).
8	Film damaged at takeup sprocket.	*a.* Takeup film **tension to** high.	*a.* Adjust takeup film tension (par 43).

(3) Film handling troubles (cont)

Item	Symptom	Probable trouble	Correction
		b. Defective film tension arm.	*b.* Repair film tension arm.
		c. Defective takeup sprocket.	c. Replace takeup sprocket assembly (15, fig. 3-5).
9	Film takeup erratic	*a.* Dirty brake surface on takeup reel pulley.	*a.* Clean takeup pulley brake surface (para 3-32).
		b. Worn clutch liner.	*b.* Replace clutch liner (20, fig. 3-5).
10	Film spills at takeup reel when changing from forward to reverse operation.	Takeup clutch linkage too long.	Adjust takeup clutch linkage (TM 11-6730-230-12).
11	Film damaged at feed sprocket during reverse operation.	Film feed clutch torque too high.	Adjust reverse drive film tension (para 4-2).
12	Film split from reel during reverse operation.	Film feed clutch torque too low.	Adjust reverse drive film tension (para 4-2).
13	Rewind stalls part way through reel.	*a.* tamp on rewind lever stop assembly does not throw pawl assembly properly.	*a.* Check for worn or defective part and replace as needed.
		b Supply reel belt stretched.	b. Replace supply reel belt (25, fig. 3-2).
14	Film rewinds loosely	Bent supply or takeup reel.	Replace bent reel.
15	No rewind	Film feed clutch defective.	Repair film feed clutch.

(4) Optical and illumination troubles.

Item	Symptom	Probable trouble	Correction
1	Intensity of light on screen same for still or running operation.	Safety shutter not functioning.	Replace safety shutter. (para 3-1'8).
2	Light output lower than normal.	*a.* Cam and shutter assembly in operative.	*a.* Repair cam and shutter assembly (para 3-18).
		b. Low lamp filament voltage.	*b.* Check transformer and replace if defective.
3	Picture jumps (possible loss of loop).	Claw arm protrusion out of adjustment.	Adjust claw arm protrusion (para 4-6).
4	Picture will not focus.	Defective projection lens.	Replace projection lens (2, fig. 3-2).

(5) Sound troubles.

Item	Symptom	Probable trouble	Correction
1	No sound (amplifier pilot lamp does not light).	*a.* Circuit breaker open or defective (AQ-9A). Blown fuse (AS-25A1).	*a.* Reset circuit breaker or replace fuse Check for short circuit if it continues to open. Replace circuit breaker if ti will not reset.
		b. Defective OFF switch.	*b.* Replace OFF switch.
		c. Defective amplifier component.	*c.* Troubleshoot amplifier and replace defective component.
2	No sound (amplifier pilot lamp lights; sound exciter lamp does not light; hiss from speaker).	*a.* Defective sound exciter lamp.	*a.* Replace sound exciter lamp (4, fig. 3-3).
		b. Defective sound exciter lamp socket.	*b.* Replace sound exciter lamp socket (12, fig. 3-9).
3	No sound (no hiss from speaker-exciter, and pilot lamps both light).	*a.* Faulty speaker connection.	*a.* Repair speaker connection.
		b. Defective speaker.	*b.* Replace speaker.
		c. Defective phototransistor in sound drum.	*c.* Replace sound drum (36, fig. 3-4).
		d. Defective amplifier component.	*d.* Troubleshoot amplifier and replace defective component.
4	Low volume	*a.* Defective VOLUME control.	*a.* Replace VOLUME control.
		b. Defective amplifier component.	*b.* Troubleshoot amplifier and replace defective component

(5) Sound troubles (oont).

Item	Symptom	Probable trouble	Correction
5	Low volume and/or excessive hum.	Defective amplifier component.	Troubleshoot amplifier and replace defective component.
6	Microphonic noises	Defective sound exciter lamp.	Replace exciter lamp (4, fig. 3-3).
7	Pitch of sound incorrect, no highs, insufficient volume.	*a.* Sound optical system dirty or out of adjustment.	*a.* Clean and align sound optical system (para 4-8).
		b. Sound drum support misaligned.	*b.* Align sound drum support (para 4-9).
		c. Drive motor belt slipping.	*c.* Replace drive motor belt (9, fig. 3-4).
8	Sound distorted	Defective amplifier component.	Troubleshoot amplifier and replace defective component.
9	Pitch of sound	*a.* Sound drum support bearing dirty or worn.	*a.* Clean and wipe sound drum sup port bearing. Replace if worn.
		b. Film tension arm assembly inoperative.	*b.* Repair film tension arm assembly.

2-6. Signal Substitution Procedure, Audio Amplifier

The following procedure outlines the method for substituting a signal into the audio amplifier for testing purposes, and is accomplished with the amplifier removed from the projector and placed on a test bench.

a. Connect the audio amplifier and test equipment into te test setup as shown in figure 2-13.

b. Apply power to the test equipmnent and allow it to warm up and stabilize.

c. Apply 115 volts ac to the amplifier.

CAUTION

Do not apply power to the amplifier unless a circuit breaker is used because serious damage can result to the equipment.

d. Set the audio signal generator for 1, 000 cps at 1 microvolt.

2-7. Stage-Gain Measurements

a. Set up the amplifier and apply a signal to the input as specified in paragraph 2-6.

b. Measure inputs and outputs at each stage (figure 1-7 and chart 2-7c below for Projector AQ-9A, and figure 1-7.1 and chart 2-7d below for Projector AS-25A1). If an incorrect reading is obtained at any given stage, check for a faulty component at that stage.

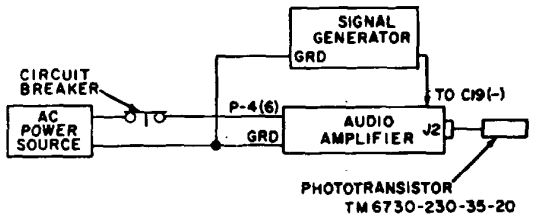


Figure 2-13. Signal Substitution procedure test setup.

c. AQ- 9A Projector

Stage under test	Input: Point of measurement	Input: Reading (volts)	Output: Point of measurement	Output: Reading (volts)
Preamplifier	Junction of R6 and R7	-1.9	Junction of collector Q1 and R8.	-7.3
Emitter follower	Junction of 42 base and R5.	-7.3	Junction of 2 emitter and R11.	-7.2
Driver	Junction of3 base and R21.	-1.0	Junction of Q3 .collector and CR3 anode	-15.3
Power amplifier	Base of Q5	-15.8	Emitter of Q6	-15.6
	Base of Q4	-15.3	Emitter of Q8	-15.6
Output	Positive side of C8	15.8		

d. AS-25A1 Projector.

Test Stage	Point of Measurement	Reading
Preamplifier	Base of Q2	2.10MV
	Collector of Q2	73.40MV
	Collector of Q3	183.00MV
	Base of Q4	77.20MV
	Collector of Q4	1.84V
Power Amplifier	J21	1.77MV
	J16	8.84MV

Note: If readings in sequence given exceed 10% of the value shown, check for faulty

2-8. Testing Sound Optical System

The procedure that follows outlines a method for testing the sound optical system. Follow the procedure in the order of steps presenbed, noting each indication. If a faulty indication is observed, stop the procedure and isolate the cause of trouble.

a. Connect an ac voltmeter across the speaker terminls.

b. Thread a 7, 000-cycle test filn (PH22.42) into the projector and set the TONE control for maximum treble output.

c. Operate the projector. A deflection should be observed on the voltmeter.

d. Vary the volume control and note that the voltmeter indication changes accordingly.

2-9. Testing Projection Optical System

Thread a film into the projector and observe the projected image, which should be centered and properly framed with no blur. Change light intensity and observe picture clarity.

2-10. Drive Shaft Troubles

If the drive shaft does not turn or shows a loss of power when the drive unit is operating, the trouble may be the result. of a defective drive shaft bearing or a binding gear. Check this condition first by attempting to rotate the drive shaft by hand. If -the shaft will not turn or turns hard, visually inspect the gears for binding. If the cause of trouble is not apparent after inspection, remove the two clutch assemblies and attempt to rotate the shaft by hand. If the trouble is still present, remove the drive shaft and replace the bearings. If the drive shaft operates smoothly at this point, carefully clean and inspect the drive gear on each clutch assembly, the takeup and feed sprocket bearings, and the two shaft worms.

CHAPTER 3
REPAIRS

Section I. Disassembly

3-1. General Parts Replacement Techniques

Most of the parts in the projector can be reached easily and replaced without special procedures.
The following precautions and notes apply:

a. The amplifier in the projector is transistorized. Use a pencil-type soldering iron with a 2-watt maximum capacity for all soldering operations. If the iron must be used with ac, use an isolating transformer between the iron and the ac line. Do not use a soldering gun; damaging voltages may be induced in circuit components.

b. When soldering transistor leads, solder quickly; wherever wiring permits, use a heat sink (such as long-nose pliers) between the soldered joint and the transistor. Use approximately the same length and dress of transistor leads as used originally.

3-2. Considerations Before Disassembly

Sectionalizing trouble in the projector (para 22) can simplify repairs by limiting the work to the defective area. After disassembling the basic projector (para 3-3), refer only to the paragraphs that contain instructions concerning the defective area. Repair or replace the defective part or parts, and then assemble the projector (para 8-0).

3-3. Basic Projector Disassembly

a. Disassembly of Projector (fig. 3-1).

(1) Remove the front cover assembly (1) by releasing the four latch assemblies.
(2) Drill out the rivet (2) and remove the cover latch (8) and the latch spacer (4) if removal of a latch assembly is rpguired. (8)

(3) Remove the film redl , (5) and the power cord adapter (6) from the storage compartment, Projector AQ-9A only.

(4) See that the shipping screw assembly (7) has been removed. If not, remove and discard it.

(5) Remove the four screws (8) and remove the identification plate (9) and the dampener (10) if identification plate is damaged or not
readable.
(6) Inspect the threading diagram plate (11) and remove it if damaged or not readable.
(7) Remove the interlock switch screw (12), Projector AQ-9A only, and the machine screws (13) and remove the rear cover (14).
(8) Remove the two machine screws (15) and lift off the handle housing (16), the carrying handle (17), and the handle retainer (18).
(9) Remove the four machine screws (19) and remove the frame assembly (20).
(10) Remove the tension from the elevating spring (21) by fully elevating the projector.
(11) Remove the thread cutting screw (22) and take off the foot assembly (23).

b. Removal of Lens Holder Assembly (fig. 3-2).

(1) Remove the film pressure shoe (1) and disassemble, as described in paragraph 3-4, Projector AQ-9A only.

(2) Loosen the thumbscrew on the lens holder assembly (19) (Projector AQ-9A only) and remove the projection lens (2).

(3) Remove the thread forming screw (3) and remove the film stripper (4).

(4) Remove the setscrew (6) and remove the film sprocket assembly (7) and flat washers ((8) and (9)) from the shaft of the film feed clutch assembly (28). Remove the sprocket button (5), (Projector AQ-9A only), from the film sprocket assembly (7).

(5) Remove the three screws (10) and remove the feed sprocket shoe (11).

(6) Disassemble the feed sprocket shoe as described in paragraph 3-6.

(7) Remove the setscrew (12) lens holder eccentric spring (13), flat washer (14), and ball (15) from the lens holder assembly (19).

(8) Remove the machine screw (16) and the control lever (17).

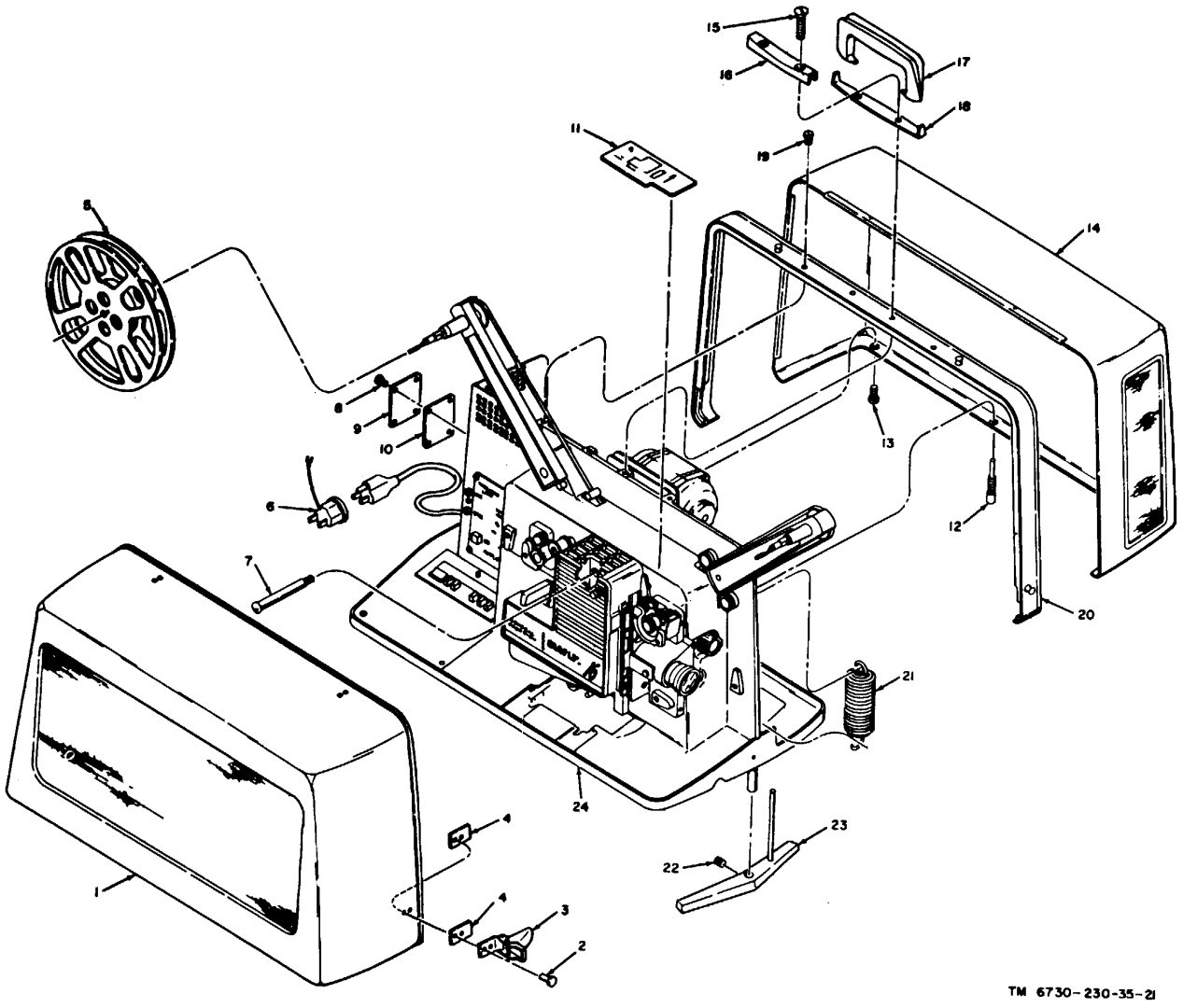


Figure 3-1. Projector, exploded view.

Projector AQ-9A.

1 Front cover assembly (1A1)
2 Rivet (1A11H2) P/O item 1
3.Cover Latch (1A1MP2) P/O item 1
4 Latch spacer (A1MP3) PO item
5 Film reel (400 foot) (iMte)I
6 Power cord adapter (1CP1)
7 Shipping screw assembly (1A2)
8 Screw (1H1)
9 Identification plate (1MP2)
10 Dampener (IMP3)
11 Threading diagram plate (1MP4)
12 Interlock switch screw (1H2)
13 Machine screw (1H3)
14 Rear cover (1A3)
15 Machine screw (1H4)
16 Handle housing (1MP5)
17 Carrying handle (1MP6)
18 Handle retainer (1MP7)
19 Machine screw (1H5)
20 Frame assembly (1H4)
21 Elevating spring (1MP8)
22 Thread cutting screw (1H6)
23 Foot assembly (1A5)
24 Projector Assembly

Projector AS-25A1

1 Front Cover Assembly (1A1)
2 Rivet (1A1H2)
3 Catch, Clamping (1A1MP2)
4 Latch Spacer (1AlMP3)
5 Film Reel (1600 feet) (IMPL)
6 N/A
7 Screw, Special (1A2)
8 Screw (1H1)
9 Identification Plate (1MP2)
10 Dampener (1MP3)
11 Plate Diagram (1MP4)
12 N/A
13 Machine Screw (1AlH4)
14 Rear Cover (1A3)
15 Machine Screw (1A3H3)
16 Cap (1A4MP2)
17 Carrying Handle (1A4MP3)
18 Bracket (1A4MP1)
19 Machine Screw (1AlH4)
20 Frame Assembly (1A5)
21 Spring Helical (1MP7)
22 Screw, Thread Cutting (1H3)
23 Foot Assembly (1A6)
24 Projector Assembly (1A7)

Figure 3-1-Continued.

(9) Remove the lens holder assembly (19) by 'sliding it off the mounting rods (DC44). Remove the gate lever eccentric (18) from the lens holder assembly (19).

(10) Remove the upper and lower lens holder springs ((20 and (21)).

(11) Remove the film gate lever assembly (22) from the slot in the projector housing.

(12) Disassemble the lens holder assembly as described in paragraph 3-6.

c. Removal of Aperture Plate Assembly (fig.

(1) Remove the four machine screws (28) and remove the aperture plate assembly (24).

(2) Disassemble the aperture plate assembly as described in paragraph 3-7.

d. Removal of Film Feed Clutch Assembly (fig. S-2).

(1) Remove the supply reel belt (25) by disconnecting two links and pulling the belt from the guide.

(2) Remove the thread forming screw (26) and the flat washer (27); remove the film feed clutch assembly (28) and flat washer (29).

(3) Disassemble the film feed clutch assembly as described in paragraph 3-8.

e. Removal of Lamp House Cover Assembly and Disassembly of Lamp House Components (fig. *3*-3).

(1) Depress the , release button and remove the lamp house cover assembly (1); disassemble the lamphouse cover assembly as described in paragraph 3-9.

(2) Lift the lamp chimney (2) from the lamp socket (8), tipping it outward to clear the guide as it is raised.

(3) Remove the projection lamp (3) from the lamp socket (8).

(4) Remove the exciter lamp (4). (Refer to TM 11-6730-230-12.)

(5) Remove the pad assembly retainer (5) and remove the lubricator pad assembly (6).

(6) Remove the capscrew (7) and tip the lamp socket (8) to expose the wiring.

(7). Pull off the two wires and remove the lamp socket (8).

(8) Remove the setscrew (9) and plug (10) and lift out the sound optics cartridge (11).

*f. Removal of Supply Arm Assembly and Belt Gut (f*ig. 3-3*).*

(1) Remove the machine screw (12) and the spring washer (13); remove the belt guide post (14), supply reel belt guide (15), and flat washer (16).

(2) Extract the roll pin (17) and remove the flat washer (18) and spring washer (19). Remove the supply reel arm (20), arm locking plunger (21), and reel arm lock spring (22).

NOTE

The arm locking plunger (21) is spring-loaded and should be held in position as the supply arm is removed, and then carefully removed to prevent the loss of the reel arm lock spring (22).

(3) Remove the reel arm guard (23) from the supply reel arm (20).

(4) Disassemble the supply reel arm assembly as described in paragraph 3-10.

g. Removal of Motor and Mounting Plate Assembly (fig. 3-4 and ;-4. 1),

(1) Projector AQ-9A (fig. 3-4), disconnect four leads from motor capacitor (1). Projector AS-25A1 (fig. 3-4.1) disconnect three leads from motor capacitor (1) and five leads from the circuit board (40). Remove two screws (41) and the circuit board. (40).

(2) Remove the motor capacitor (1) by pushing it toward the housing to clear the lip of the venturi plate (6) and lifting upward. Remove the capacitor retaining spring (2).

(3) Remove the cable strap (3) from the venturi plate (6). (fig, 3-4).

(4) Projector AQ-9A(fig. 3-4), remove four screws (4) and lock washers (5) from the venturi plate (6) and remove the plate. Projector AS-25A (fig. 3-41.), remove four screws (4) and lock washers (5). Remove support (3) and venturi plate (6).

(5) Remove the three screws (7) and remove the motor mounting plate assembly (8).

(6) Disassemble motor and mounting plate assembly as described in paragraph 3-11.

h. Removal of Drive Unit Assembly and Drive Motor Mounting Plate Assembly (fig. 3-4, and 34. 1)

(1) Remove the drive motor belt (9). (Refer to TM-11-6730-230-12.)

(2) Unwrap the cable ties retaining the motor leads in the wiring harness and lift the leads from the harness.

(3) Remove the two nuts (10), flat washers (11), spacers (12), and flat washers (13) securing the drive unit assembly (14). Remove the drive unit assembly (14), motor spring (15), and eyelet (16).

(4) Projector AQ-9A (fig. 3-4), remove spacer (17), flat washer (18), spacer (19), and two flat washers (20) from)m each of two motor mounting studs on the drive motor mounting plate assembly (23). On projector AS-25A1 (fig. 3-4, 1) remove from the left motor mounting stud on the drive motor mounting plate assembly (23), one spacer (17), one flat washer (18), one spacer (19), one flat washer (20) and flat washer (42). From the right stud remove one spacer (17), one flat washer (18), one spacer (19) and two flat washers (20).

(5) Remove the three' machine screws (21) and lockwashers (22) and remove the drive motor mounting plate assembly (23).

(6) Disassemble drive unit assembly as described in paragraph 3-12.

i. Removal of Drive Belt Shift Fork Assembly and Belt Shift Eccentric (fig. 3-4).

(1) Remove the belt shift fork spring (24).

(2) Remove the thread forming screw (25) securing belt shift fork assembly (28) and remove the thread forming screw (26) securing cable clamp (27). Remove the cable clamp (27) and drive belt shift fork assembly (28).

(3) Remove the machine screw (29) and remove the control lever (30).

(4) Lift out the belt shift eccentric (31).

(5) Disassemble the drive belt shift fork assembly as described in paragraph 3-13.

j. Removal of Support and Sound Drum and Flywheel (fig. 3--4 and p-4. 1).

(1) Remove the machine screw (32) with lockwasher and remove the flywheel (33) and the lockwasher (34).

(2) Projector AQ-9A (figure 3-4), disconnect plug P1 (on the sound head cable) from the amplifier printed circuit board (40); detach cable from the wire harness by opening up all retaining straps and ties. Projector AS- 25A1(fig. 3-i1) disconnect J-5 black wire and its shield wire J-6 from the amplifier printed circuit board (21, figs. 3:.1) and detach sound head cable from wire harness by opening up all retaining straps and ties.

(3) Remove the machine screw (35) and withdraw the support and sound drum (36) from the housing assembly.

k. Removal of Reversing Switch Assembly (fig. 4).

(1) Disconnect the eight leads from the reversing switch assembly (38).

(2) Remove the two thread forming screws (37) and remove the reversing switch assembly (38).

(3) Remove the two adapters (39) from the reversing switch assembly (38).

I. Removal of Takeup Reel Arm (fig. 3-5).

(1) Disconnect the links and remove the takeup reel belt

(2) Extract the roll pin (2) and remove the takeup reel arm, flat washer (4), reel arm guard (5), arm locking plunger (6), and arm locking spring (7).

NOTE

Be careful when removing the arm locking plunger (6) to prevent the loss of the arm locking spring (7).

(3) Disassemble the takeup reel arm as described in paragraph 3-14.

m. Removal of Takeup Clutch Arm (fig. 3-5).

(1) Remove retaining ring (8) with retaining ring pliers and remove the takeup clutch arm (9).

(2) Disassemble the takeup clutch arm as described in paragraph 3-15.

n. Removal of Reversing Switch Cam.

(1) Remove the two retaining rings (10) with retaining ring pliers.

(2) Remove the reversing switch cam (11) and spacer (12).

o. Removal of Takeup Sprocket Assembly and Gear Assembly (fig. 35). (AQ-9A Projector only)

(1) Remove the setscrew (14) and pull the takeup sprocket assembly (15) and flat washers (16 and 17) from the gear assembly shaft.

(2) Push out the sprocket button(13) from the takeup sprocket assembly (15).

(3) Pull the gear assembly (18) from the housing. Remove the flat washer (19) and clutch liner (20) from the gear assembly (18).

(4) Remove the thread forming screw (21) and the belt slack post (22).

p. Removal of Takeup Shoe (fig. 3-6).

(1) Remove the top retaining ring (3) with retaining ring pliers. Release the tension from the reel tension arm spring (2) by removing the spring tab from the tension arm pivot slot. Remove the machine screw (1) and remove the reel tension arm spring (2).

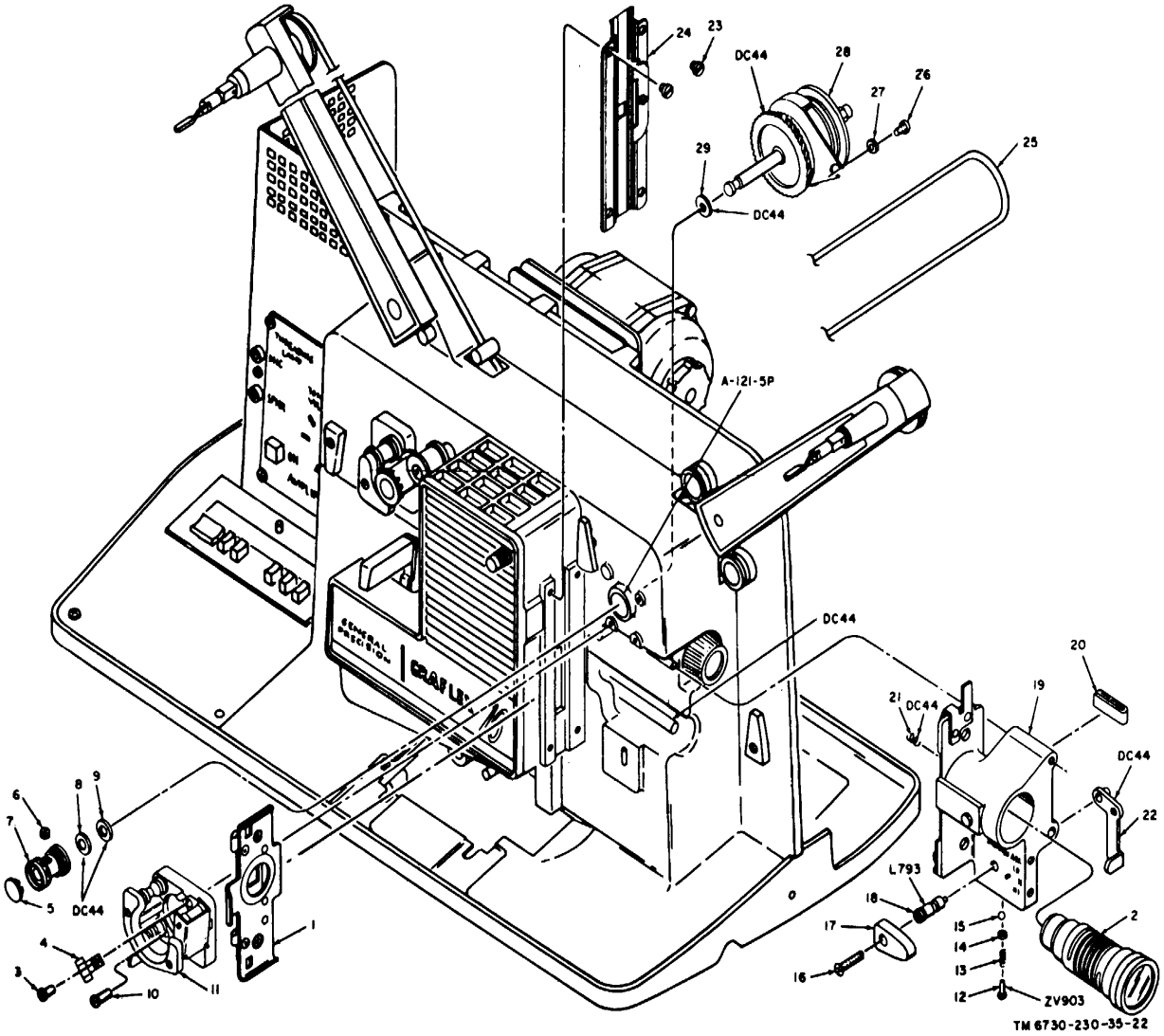


Figure 3-2. Film feed and film gate mechanism, exploded view.

Projector AQ-9A

1 Film pressure shoe (1A6AI)
2 Projection lens (1A6MPI)
3 Thread forming screw (IA6H1)
4 Film stripper (IA6MP2)
5 Sprocket button (1A6MP3)
6 Setscrew (1A6H2)
7 Film sprocket assembly (1A6A3)
8 Flat washer (1A6H3)
9 Flat washer (1A6H4)
10 Machine screw (1A6H5)
11 Feed sprocket shoe (complete) (1A6A4)
12 Setscrew (1A6H9)
13 Iens holder eccentric spring (1A6MP4)
14 Flat washer (1A6H10)
15 Ball (1A6MP5)
16 Machine screw (1A6H11)
17 Control lever (film press adjust) (IA6MP6)
18 Gate lever eccentric (1A6MP7)
19 Lens holder assembly (1A6A6)
20 Lens holder spring (upper) (1A6MPh)
21 Lens holder spring (lower) (1A6MP9)
22 Film gate lever assembly (1A6A7)
23 Machine screw (1A6H12)
24 Aperture plate assembly (1A6A8)
25 Supply reel belt (1A6MPc 2)
26 Thread forming screw (1A6H6)
27 Flat washer (1A6H7)
28 Film feed clutch assembly (1A6A5)
29 Flat washer (1A6H8)

Projector AS-25A1

I N/A
2 Projection Lens (1A7MP1)
3 Screw, Self Tapping (1A7H1)
4 Film Stripper (1A7MP2)
5 N/A
6 Set Screw (1A7H2
7 Film Sprocket Assembly (1A7A2)
8 Flat Washer (1A7H3)
9 Flat Washer (1A7H4)
10. Machine Screw (1A7H5)
11 Feed Shoe Assembly (1A7A3)
12 Set Screw (1A7H9)
13 Lens Holder Eccentric Spring (1A7MP3)
14 Flat Washer (1A7H10)
15 Ball (1A7MP4)
16 Machine Screw (1A7Hll)
17 Control Lever (1A7MP5)
18 Gate Eccentric (1A7MP6)
19 Lens Holder Assembly (1A7A5)
20 Lens Holder Spring (Upper) (1A7MP7)
21 Lens Holder Spring (lA7MP8)
22 Film Gate Lever Assembly (1A7A6)
23 Machine Screw (A7H12)
24 Aperture Plate Assembly (1A7A7)
25 Belt, Supply Reel (1A7MP10)
26 Screw, Self Tapping (1A7H6)
27 Flat Washer (1A7H7)
28 Feed Clutch Assembly (1A7A4)
29 Flat Washer (1A7H8)

Figure 3-2-Continued.

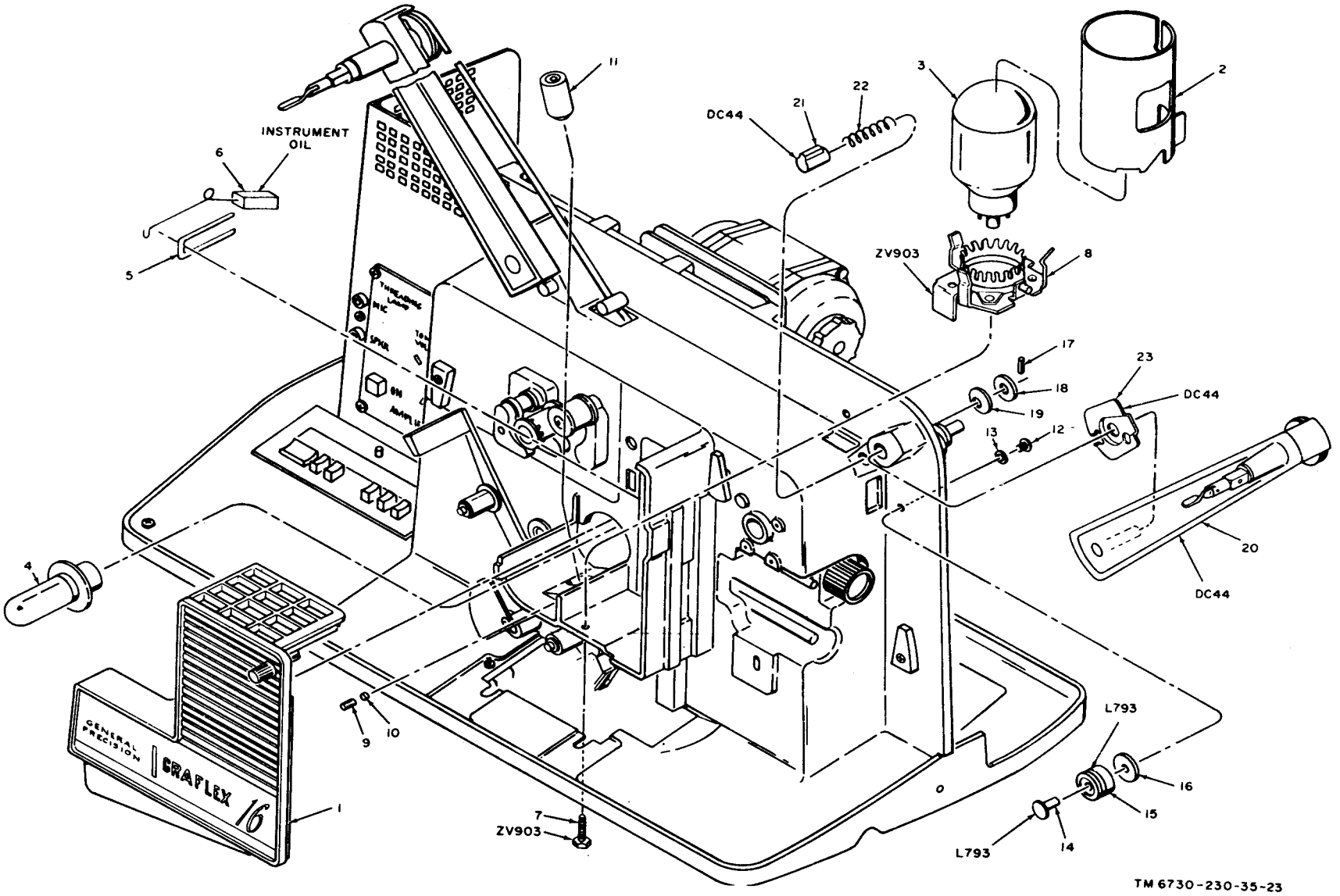


Figure 3-3. Lamp house components and supply reel arm exploded view.

Projector AQ- 9A

1 Lamp house cover assembly (1A6A2)
2 Lamp chimney (1A6MP10)
3 Projection lamp (1A6D51)
4 Exciter lamp (1A6D52)
5 Pad assembly retainer (1A613)
6 Lubricator pad (1A6A9)
7 Capscrew (1A6-14)
8 Lamp socket (1A6A10)
9 Setscrew (1A6H15)
10 Plug (2A6MP11)
11 Sound optics cartridge (1A6All)
12 Machine screw (1A6H16)
13 Spring washer (1A6H17)
14 Belt guide post (1A6MP13)
15 Supply reel belt guide (1A6MP14)
16 Flat washer (1A6H18)
17 Roll pin (1A6H19)
18 Flat washer (1A6H20)
19 Spring washer (1A6H21)
20 Supply reel arm (1A6A12)
21 Arm locking plunger (1A6MP16)
22 Reel arm lock spring (1A6MP17)
23 Reel arm guard (1A6MP15)

Projector AS-25A1

1 Lamphouse Cover Assembly (1A7A1)
2 Chimney, Lamp (1A7MP9)
3 Projection Lamp (1A7DS1)
4 Exciter Lamp (1A7DS2)
5 Retainer, Pad (1A7H13)
6 Pad, Lubricator (1A7A8)
7 Cap Screw (1A7H14)
8 Lamp Socket (1A7A9)
9 Set Screw (1A7H15)
10 Plug (1A7MP10)
11 Sound Optics Cartridge (1A7A10)
12 Machine Screw (1A7H16)
13 Washer, Spring (lA7AllAH2)
14 Post, Belt Guide (1A7MP11)
15 Guide, Supply Reel Belt (1A7MP12)
16 Flat Washer (1A7H17)
17 Roll Pin (1A7H18)
18 Flat Washer (1A7H19)
19 Spring Washer (lA7H20)
20 Supply Reel Arm (1A7All)
21 Arm Locking Plunger (1A7MP14)
22 Reel Arm Lock Spring (1A7MP15)
23 Reel Arm Guard (1A7MP13)

Figure 3-3---Continued

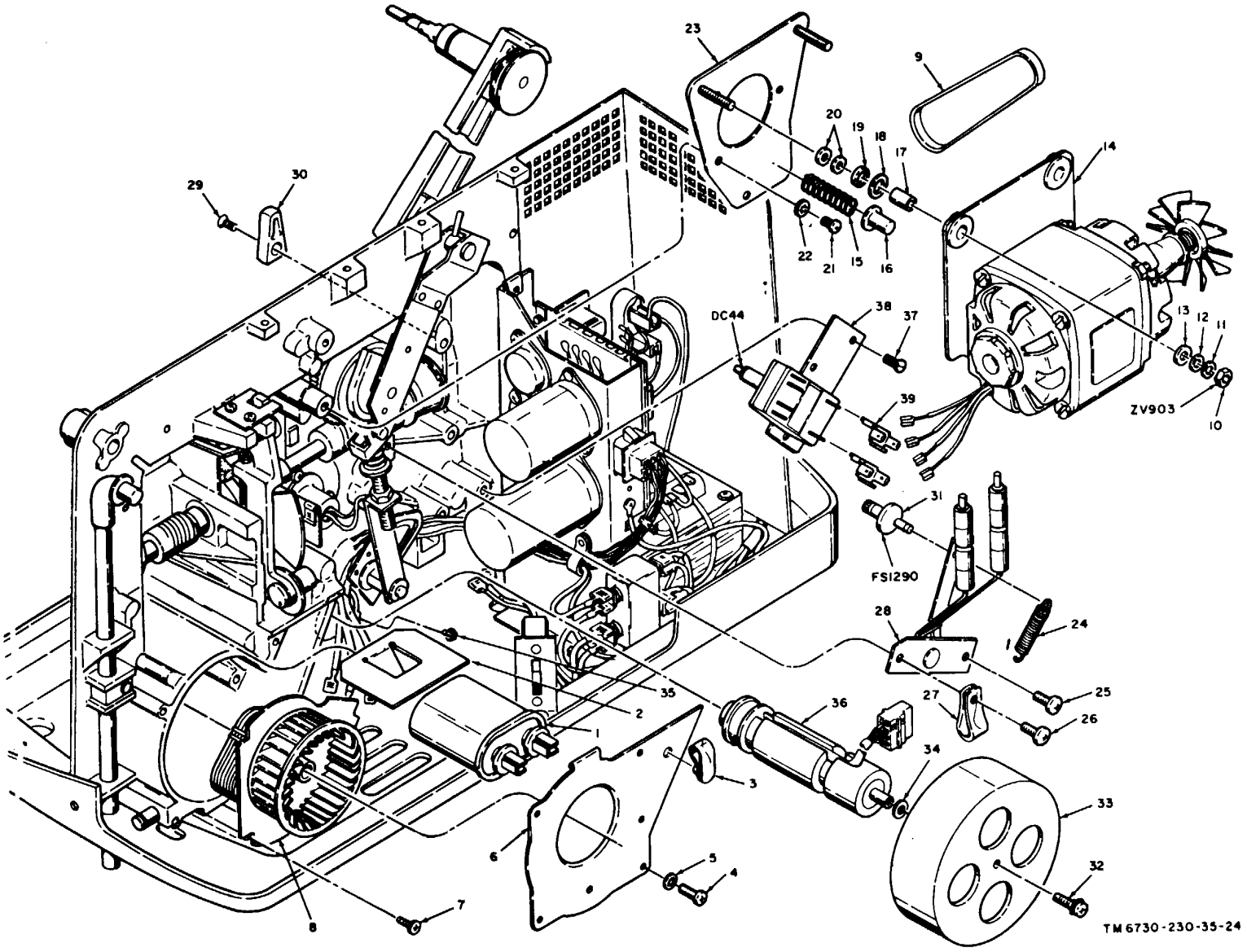
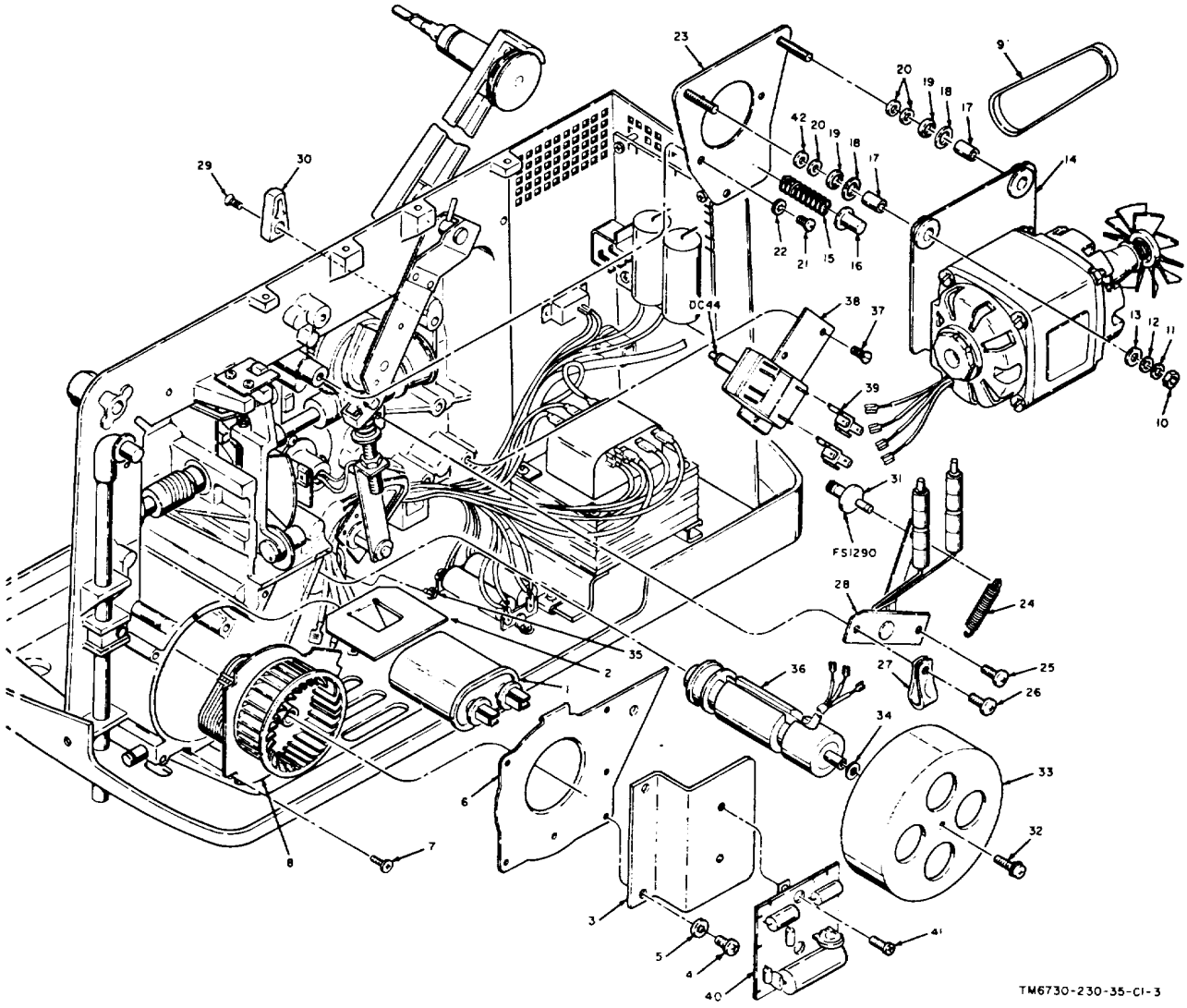


Figure 3-4. Main drive system, sound drum, and cooling system components exploded view (AQ-9A).

Projector AQ- 9A

I Motor capacitor (1A6C1)
2 Capacitor retaining spring (1A6MP18)
3 Cable strap (1A6H22)
4 Thread forming screw (1A6H23)
5 Lockwasher (1A6H24)
6 Venturi plate (1A6MP19)
7 Thread forming screw (1A6H25)
8 Motor mounting plate assembly (1A6A13)
9 Drive motor belt (1A6MP24)
10 Nut (IA6H29)
11 Flat washer (1A6H30)
12 Spacer (IA6MP25)
13 Flat washer (1A6H31)
14 Drive unit assembly (1A6A15)
15 Motor spring (1A6MP28)
16 Eyelet (IA6H34)
17 Spacer (1A6MP26)
18 Flat washer (1A6lt32)
19 Spacer (IA6MP27)
20 Flat washer (1A6H333)
21 Machine screw (1A6fiH.5)
22 Lockwasher (1A6H36)
23 Drive motor mounting plate assembly (1A6A16)
24 Belt shift fork spring (1A6MP20)
25 Thread forming screw (1A6H26)
26 Thread forming screw (1A6H27)
27 Cable clamp (1A6MP21)
28 Drive belt shift fork assembly (IA6A14)
29 Machine screw (1lA6H28)
30 Control lever (IA6MP22)
31 Belt shift eccentric (IA6MP2:3)
32 Machine screw (includes lockwasher) (1A6H39)
33 Flywheel (IA6MP30)
34 lockwasher (1A6H4())
35 Machine screw (1A6H41)
36 Support and sound drum (A6A44)
37 Thread forming screw (IA6H42)
38 Reversing switch assembly (lA6AI7)
39 Adapter (CPI)
40 Amplifier

Figure 3-4-Continued.



Projector AS-25A1

1 Capacitor (1A7C1)
2 Spring, capacitor retainer (1A7MP16)
3 Support (1A7MP17A)
4 Screw (1A7H21)
5 Washer (1A7H22)
6 Venturi plate (1A7MP17)
7 Screw (1A7H23)
8 Motor mounting plate (1A7A11A)
9 Drive belt, motor (1A7MP22)
10 Nut (1A7H27)
11 Flat washer (1A7H28)
12 Spacer (1A7MP23)
13 Flat washer (1A7H29)
14 Drive unit assembly (1A7A13)
15 Helical spring (1A7MP20)
16 Evelet (1A7H, 2)
17 Spacer (1A7MP24)
18 Flat washer (IA7H30)
19 Spacer (1A7MP2.)
20 Flat washer (1A71.qHl)
21 Screw (1A7H33)
22 Lockwasher (1A7H24)
23 motor mounting plate assembly (IA7A14)
24 Spring, belt shifting fork (1A7MP18)
25 Screw, self tapping (IA7H24)
26 Screw, self tapping (1A7H25)
27 Cable clamp (1A7NMPI)
28 Fork shift assembly (1A7A12)
29 .Machine screw (IA7H2C,)
30 Control lever (1A7MP20)
31 Bolt shift eccentric (1A7MP21)-
32 Screw assembly (1A7H37)
33 Flywheel (1A7MP28)
34 lockwasher (1A7H3, 8)
35 Machine screw (1A7H39)
36 Support and sound drum (1A7MP28A)
37 Screw, self tapping (1A7H40)
38 Reversing switch assembly (1A7A15)
39 Adapter (1A7CP1)
40 Circuit Board (power supply) (1A-A
41 Screw (1A7H104)
42 Flat washer (1A7A31A)

Figure 3-4.1. Main Drive System, sound drum and cooling system components, exploded view (AS-25A1).

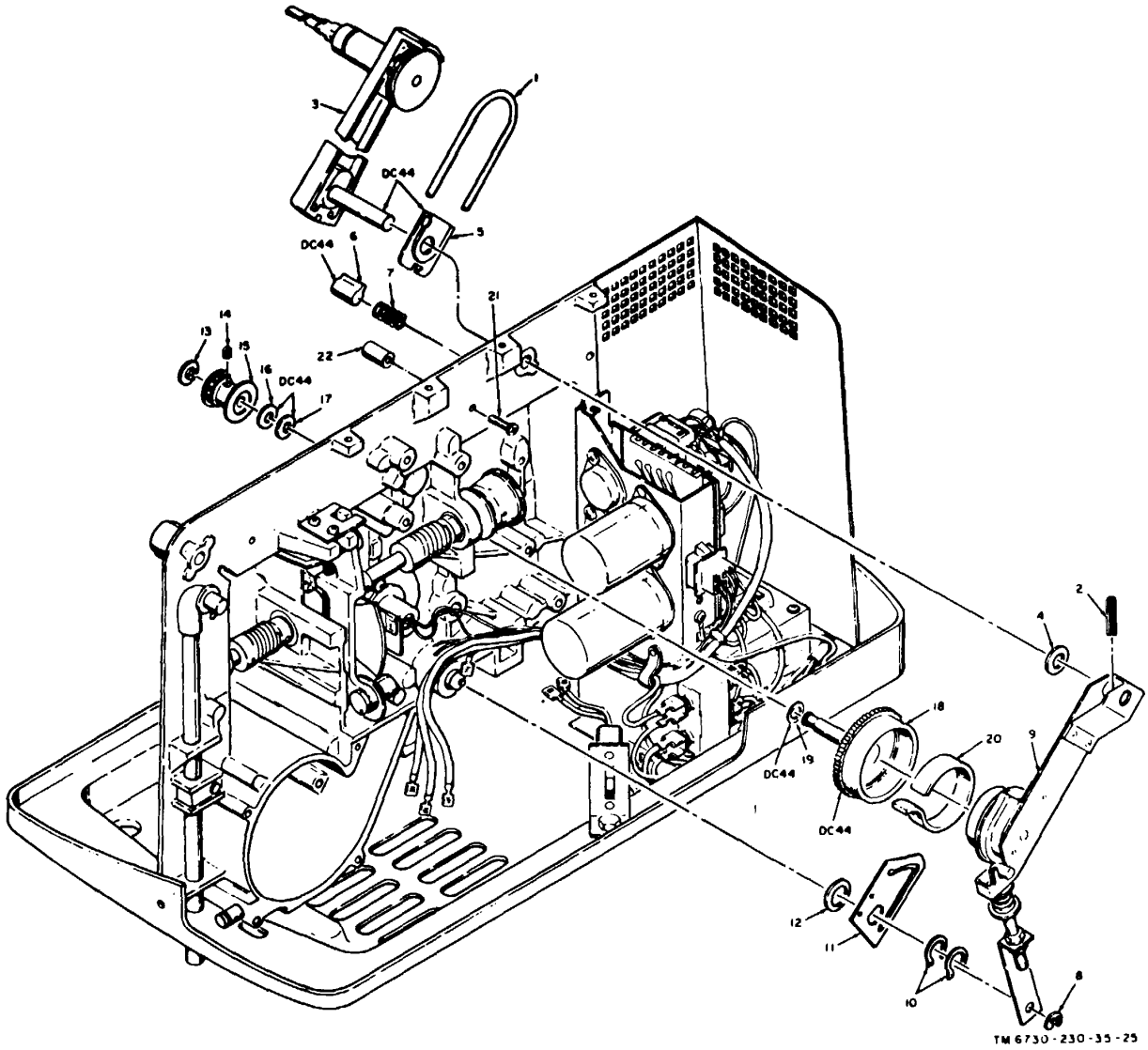


Figure 3-5. Takeup mechanism and reel arm, exploded view.

Projector AQ- 9A

1 Takeup reel belt (1A6MP31)
2 Roll pin (1A6H43)
3 Takeup reel arm (1A6A18)
4 Flat washer (1A6H111)
5 Reel arm guard (1A6MP32)
6 Arm locking plunger (1A6MP33)
7 Arm locking spring (1A6MP34)
8 Retaining ring (1A6H44)
9 Takeup clutch arm (1A6A19)
10 Retaining ring (1A6H60)
11 Reversing switch cam (1A6MP42)
12 Spacer (1A6MP43)
13 Sprocket button (1A6MP37)
14 Setscrew (1A6H46)
15 Takeup sprocket assembly (1A6A20)
16 flat washer (1A6H47)
17 Flat washer (1A6H48)
18 Gear assembly (1A6A21)
19 Flat washer (1A6H49)
20 Clutch liner (1A6MP36)
21 Thread forming screw (1A6H45)
22 Belt slack post (1A6MP35)

Projector AS-25A1

1 Take Up Reel Belt (1A7MP29)
2 Spirol Pin (1A7H41)
3 Take Up Reel Arm (1A7A16)
4 Flat Washer (1A7H41A)
5 Reel Arm Guard (1A7MP30)
6 Arm Locking Plunger (1A7MP31)
7 Arm Locking Spring (1A7MP32)
8 Retaining Ring (1A7H42)
9 Take Up Clutch Arm (1A7A17)
10 Retaining Ring (1A7H56)
11 Reversing Switch Cam (1A7MP39)
12 Spacer (1A7MP40)
13 N/A
14 Set Screw (1A7H2)
15 Take Up Sprocket Assembly (1A7A18)
16 Flat Washer (1A7H43)
17 Flat Washer (1A7H44)
18 Gear Assembly (1A7A19)
19 Flat Washer (1A7H45)
20 Clutch Liner (1A7MP34)
21 Screw, Self Tapping (1A7H42)
22 Belt Slack Post (1A7MP33)

Figure 3-5 Continued.

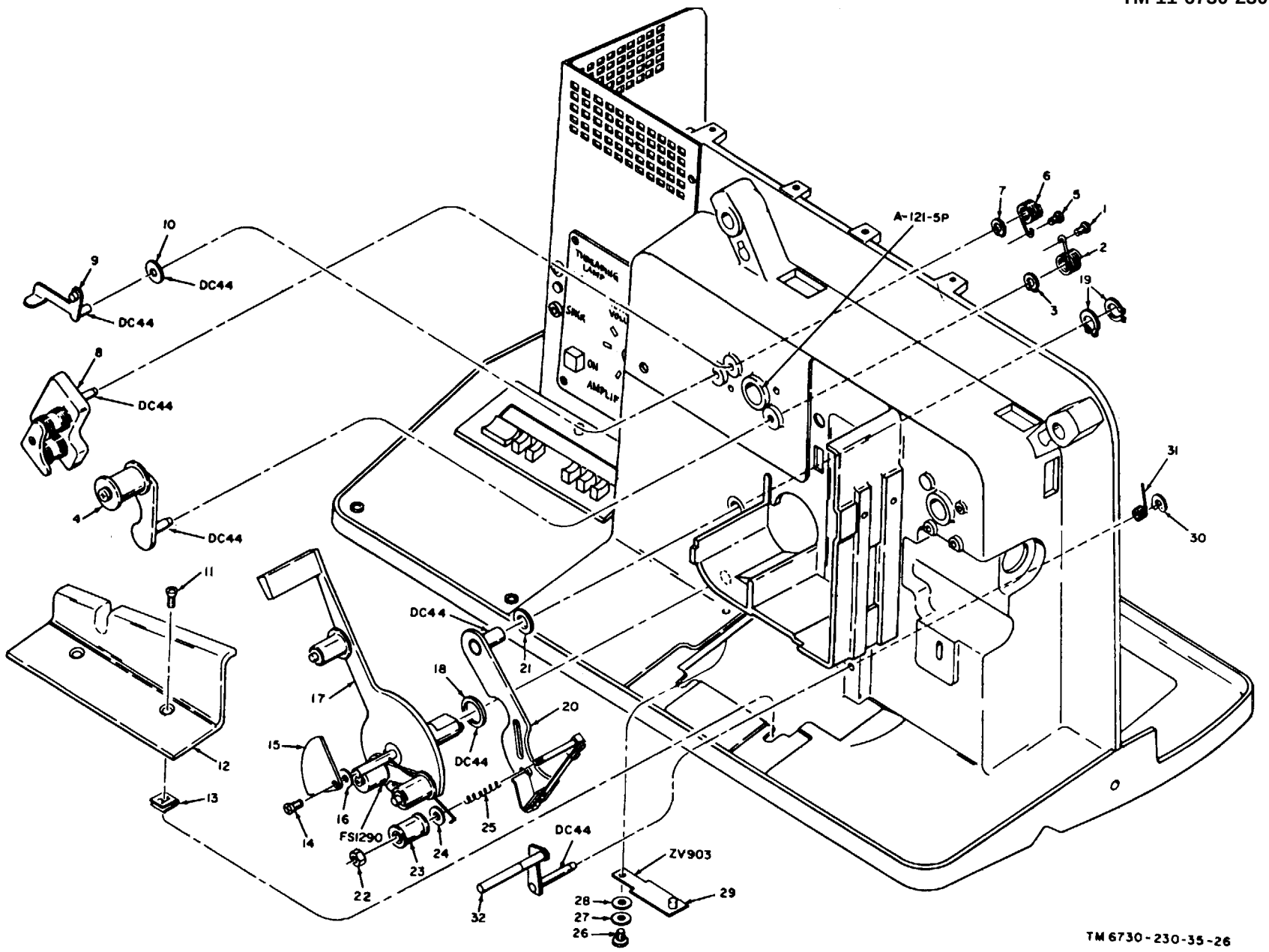


Figure 3-6. Threading control arm, pressure roller arm, and takeup shoe, exploded view.

Projector AQ- 9A

I Machine screw (1A6H50)
2 Reel tension arm spring (1A6MP38)
3 Retaining ring (1A6H51)
4 Reel tension arm (IA6A22)
5 Machine screw (1A6H52)
6 Takeup shoe spring (1A6MP39)
7 Retaining ring (1A6H53)
8 Takeup shoe (1A6A23)
9 Shoe lever assembly (1A6A24)
10 Flat washer lA6H., 4)
11 Thread forming screw (1A6H37)
12 Soundhead cover (1A6MP29)
13 Speed nut (IA6H38)
14 Machine screw (1A6H57)
15 Guard (1A6MP41)
16 lockwasher (IA6H58)
17 Threading control arm (1A6A26)
18 Spacer (1A6MP44)
19 Retaining ring (1A6H61)
20 Pressure roller arm assembly (1A6A27)
21 Spring washer (1A6H62)
22 Nut (A6H55)
23 Pressure roller (1A6A25)
24 Flat washer, 0.312 x 0.128 x 0.015 (1A6H56)
25 Pressure roller spring (1A6MP40)
26 Machine screw (1A6H108)
27 lockwasher (1A6H109)
28 Flat washer, (1A6H110)
29 Threading control arm spring (1A6MP79)
30 Retaining ring (1A6H76)
31 Loop set lever spring (1A6MP60)
32 Loop set lever (1A6A3:3)

Projector AS-25A1

1 Machine Screw (1A7H46)
2 Spring, Reel Arm Tension (1A7MP35)
3 Retaining Ring (1A7H47)
4 Reel Tension Arm (1A7A20)
5 Machine Screw (1A7H48)
6 Take Up Shoe Spring (1A7MP36)
7 Retaining Ring (1A7H49)
’8 Take Up Shoe (1A7A21)
9 Lever Assembly, Shoe (1A7A22)
10 Flat Washer (1A7H50)
11 Screw, Self Tapping (1A7H35)
12 Sound Head Cover (1A7MP27)
13 Speed Nut (1A7H36)
14 Machine Screw (1A7H53)
15 Guard (lA7MP38)
16 Lock Washer (1A7H54)
17 Threading Control Arm (1A7A24)
18 Spacer (1A7MP41)
19 Retaining Ring (1A7H57)
20 Pressure Roller Arm Assembly (1A7A25)
21 Spring Washer (1A7H58)
22 Nut (1A7H51)
23 Pressure Roller (1A7A23)
24 Flat Washer (1A7H52)
25 Pressure Roller Spring (1A7MP32)
26 Machine Screw (1A7H98)
27 Lock Washer (1A7H99)
28 Flat Washer (1A7H100)
29 Threading Control Arm Spring (1A7MP70)
30 Retaining Ring (1A7H72)
31 Loop Set Lever Spring (1A7MP57)
32 Loop Set Lever (1A7A30)

Figure 3-6 Continued

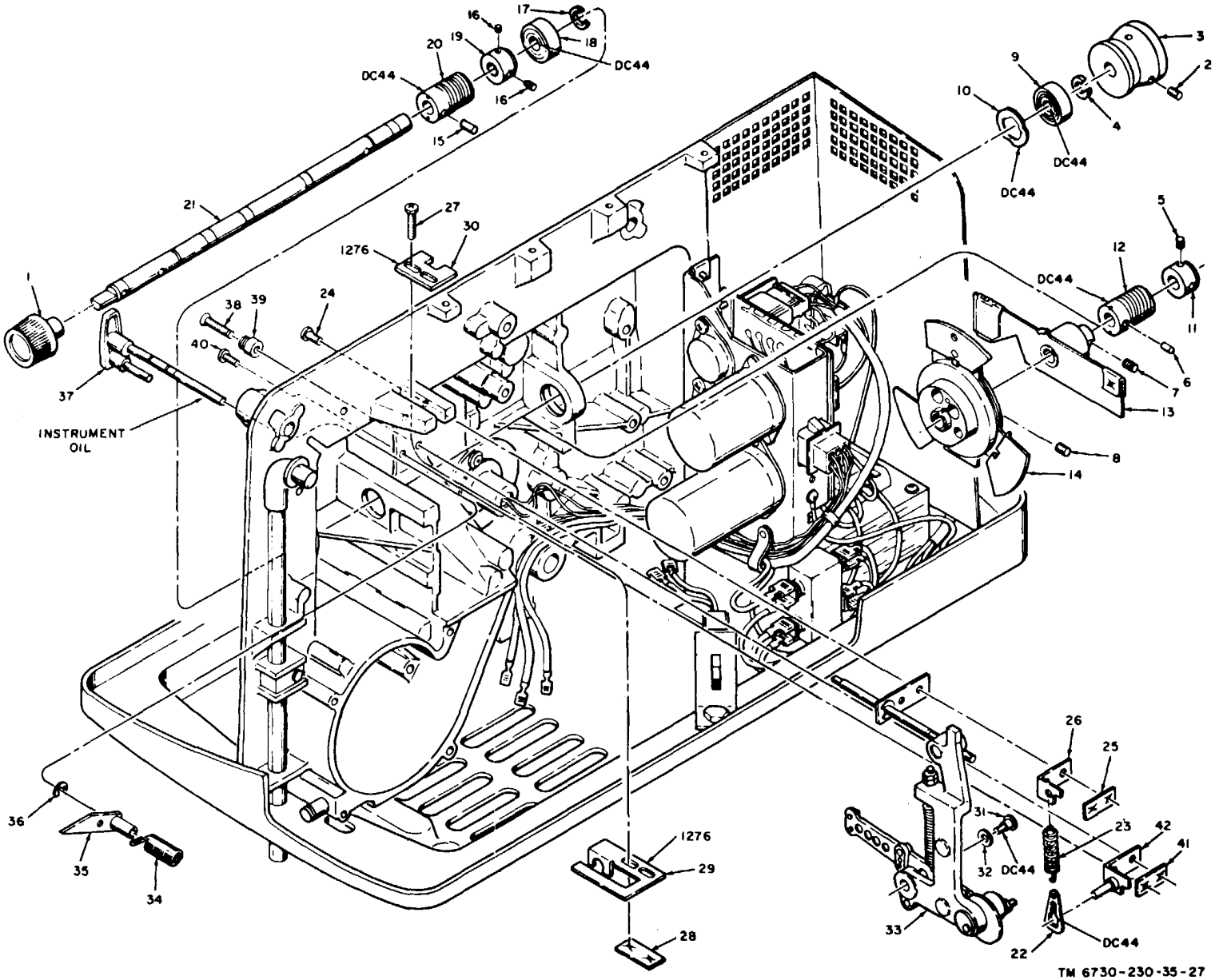


Figure 3-7. Drive shaft components and claw arm, exploded view.

Projector AQ- 9A

1 Manual advance knob (inching knob) preface 1A6(1A6MP45)
2 Setscrew (1A6H63)
3 Drive shaft pulley (1A6MP46)
4 Retaining ring (1A6H64)
5 Setscrew (1A6H65)
6 Spiral pin (1A6H66)
7 Setscrew (1A6H67)
8 Setscrew (1ASH68)
9 Bearing (1A6MP47)
10 Spring washer (1A6H72)
11 Collar (1A6MP48)
12 Drive gear (1A6MP49)
13 Safety shutter (IA6A28)
14 Shutter and cam assembly (1A6A29)
15 Spiral pin (1A6H71)
16 Setscrew (1A6H70)
17 Retaining ring (1A6H69)
18 Bearing (1A6MP52)
19 Collar (1A6MP53)
20 Feed drive gear (1A6MP54
21 Drive shaft (1A6MP55)
22 Safety shutter link (1A6MP51)
23 Safety shutter spring (1A6MP50)
24 Thread forming screw (1A6H71)
25 Speed nut (1A6H74)
26 Shutter spring bracket
27 Thread forming screw (1A6H73)
28 Speed nut (1A6H74)
29 Rewind lever stop (1A6MP57)
30 limit plate (1A6MP56)
31 Framing arm pivot (1A6MP59)
32 Spring washer (1A6H112)
33 Claw arm (1A6A32)
34 Rewind lever spring (1A6, MP58)
35 Rewind lever assembly (1A6A30)
36 Retaining ring (1A6H75)
37 Rewind knob assembly (1A6A31)
38 Machine screw (1A6H0)
39 Stabilizer (1A6MP62)
40 Thread forming screw (1A6H79)
41 Speed nut (1A6H81)
42 Shutter stop bracket assembly (1A6A34)

Projector AS-25A1

1 Manual Advance Knob (1A7MP42)
2 Set Screw (1A7H59)
3 Drive Shaft Pulley (1A7MP43)
4 Retaining Ring (1A7H60)
5 Set Screw (1A7H61)
6 Spiral Pin (1A7H62)
7 Set Screw (1A7H63)
8 Set Screw (1A7H64)
9 Bearing (1A7MP44)
10 Spring Washer (1A7H68)
11 Collar (1A7MP45)
12 Drive Gear (1A7MP46)
13 Safety Shutter (1A7A26)
14 Shutter and Cam Assembly (1A7A27)
15 Spiral Pin (1A7H67)
16 Set Screw (1A7H66)
17 Retaining Ring (1A7H65)
18 Bearing (lA7MP49)
19 Collar (1A7MP50)
20 Feed Drive Gear (1A7MP51)
21 Drive Shaft (1A7MP52)
22 Safety Shutter Link (1A7MP48)
23 Safety Shutter Spring (1A7MP47)
24 Screw, Self Tapping (1A7H73)
25 Speed Nut (1A7H74)
26 Shutter Spring Bracket (1A7MP58)
27 Screw, Self Tapping (1A7H69)
28 Speed Nut (lA7H70)
29 Rewind Lever Stop (1A7MP54)
29 Rewind Lever Stop (1A7MP54)
30 Limit Plate (1A7MP53)
31 Framing Arm Pivot (1A7MP56)
32 Spring Washer (1A7H71A)
33 Claw Arm (1A7A29)
34 Rewind Lever Spring (1A7MP55)
35 Rewind Lever Assembly (lAYA28)
36 Retaining Ring (1A7H71)
37 Rewind Knob Assembly (1A7A29)
38 Machine Screw (1A7H76)
39 Stabilizer (1A7MP59)
40 Screw, Self Tapping (1A7H75)
41 Nut, Stamped (1A7H7742 Shutter Stop Bracket Assembly (1A7A31)

Figure 3-7 Continued.

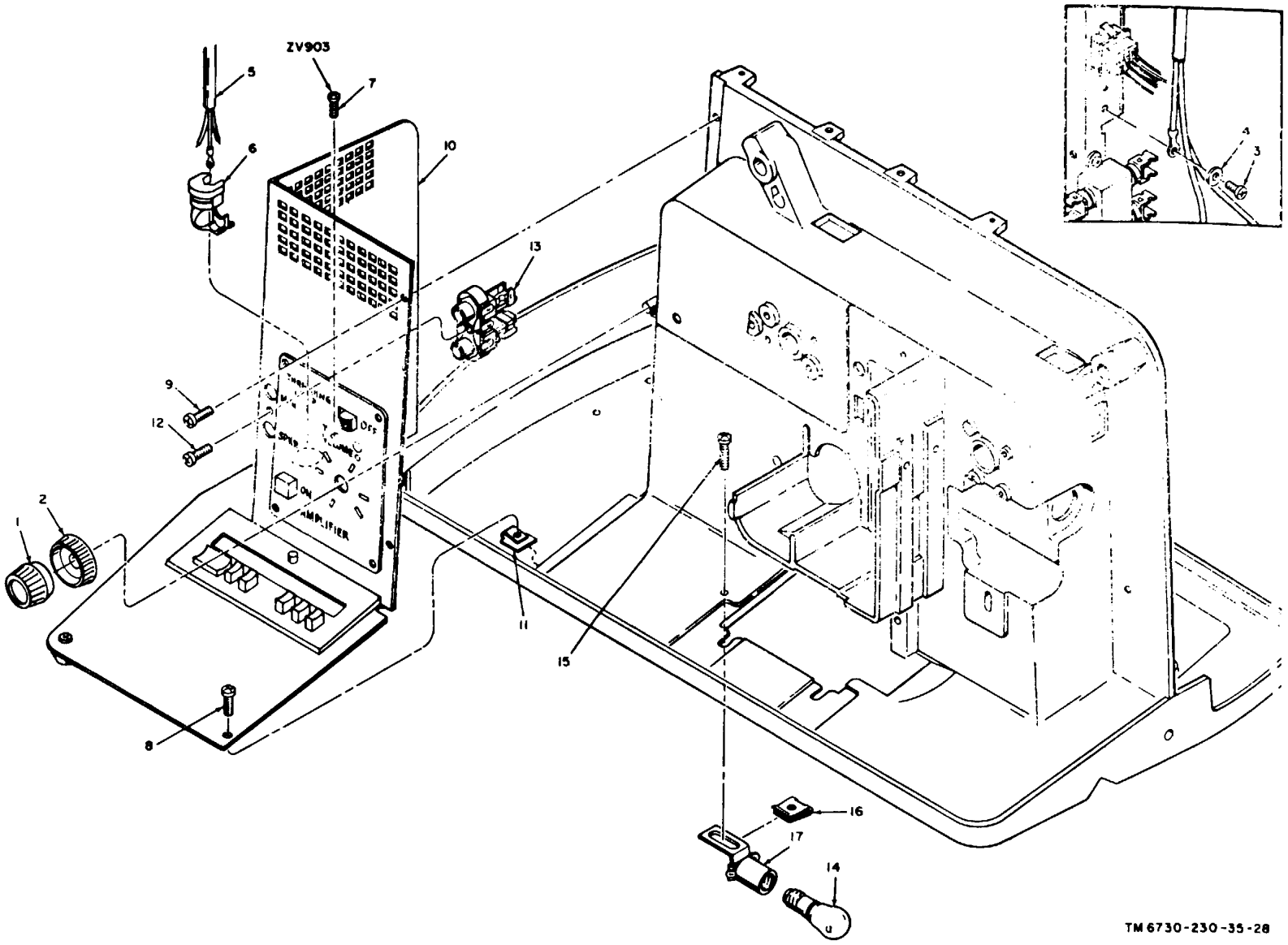


Figure 3-8. Amplifier cover assembly and threading lamp components exploded view (AQ-9A)

Projector AQ-9A

I Volume control knob (1A6MP69)
2 Tone control knob (IA6MP70)
3 Machine screw (IA6iH9O)
4 Lockwasher (1A6H91)
5 Power cord assembly (1A6A:36
6 Strain relief hushing (IAfiH92)
7 Machine screw (1A6H89)
8 Thread forming screw (1A6H89)
9 Thread forming screw (1A6H87)
10 Amplifier cover assembly (1A6A38)
11 Speed nut (1A6H93)
12 Machine screw (1A6H86)
13 Jack (1A6MP68)
14 Threading Lamp (1A6DS3)
15 Threading forming screw (1A6H102)
16 Speed nut (1A6H103)
17 threading Lamp socket assembly (1A6XDS3)

Figure 3-8 Continued

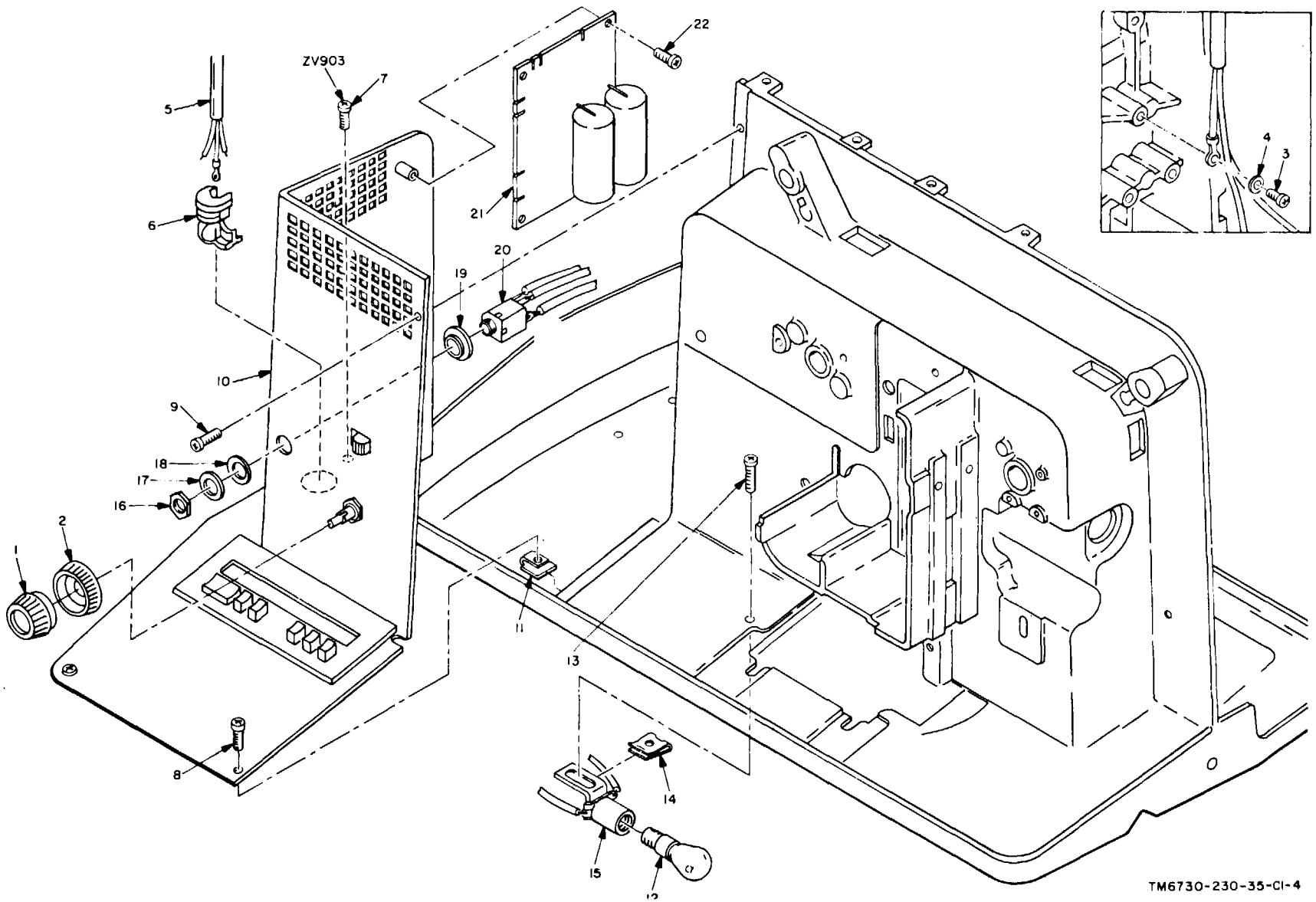


Figure 3-8.1. Amplifier cover assembly and threading lamp components, exploded view (AS-25A1).

Projector AS-25A1

1 Volume control knob (1A7MP66)
2 Tone control knob (lA7MP6
3 Machine screw (1A7H85)
4 Lockwasher (1A7H86)
5 Power cord assembly (1A7A32)
6 Strain relief bushing (1A7H87)
7 Machine screw (1A7H84)
8 Screw, self-tapping (1A7H83)
9 Screw, self-tapping (1A7H82)
10 Amplifier cover assembly (1A7A34)
11 Nut, stamped (1A7MP28)
12 Threading lamp (1A7DS3)
13 Screw, self-tapping (1A7H93)
14 Nut, stamped (1A7H94)
15 ''Threading lamp socket assembly (1A7A37A2)
16 Nut (1A7H81
17 Washer (IA7H101)
18 Insulator (IA7H102)
19 Bushing (1A7MP65)
20 Jack (1A7A37J1) (part of harness 1A7A37)
21 Board assembly (1A7A36)
22 Screw (1A7H105)

Figure 3-8.1-Continued.

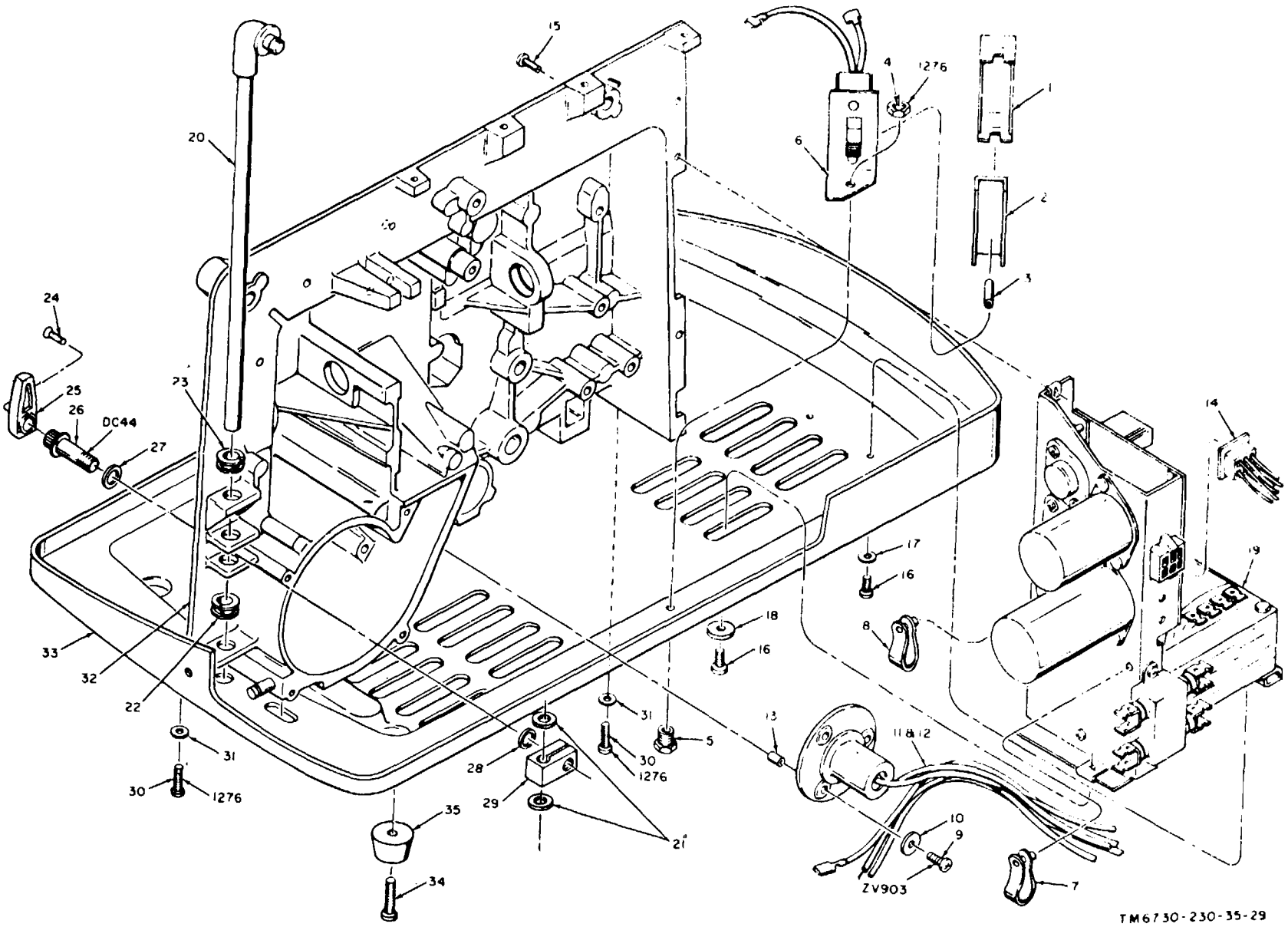
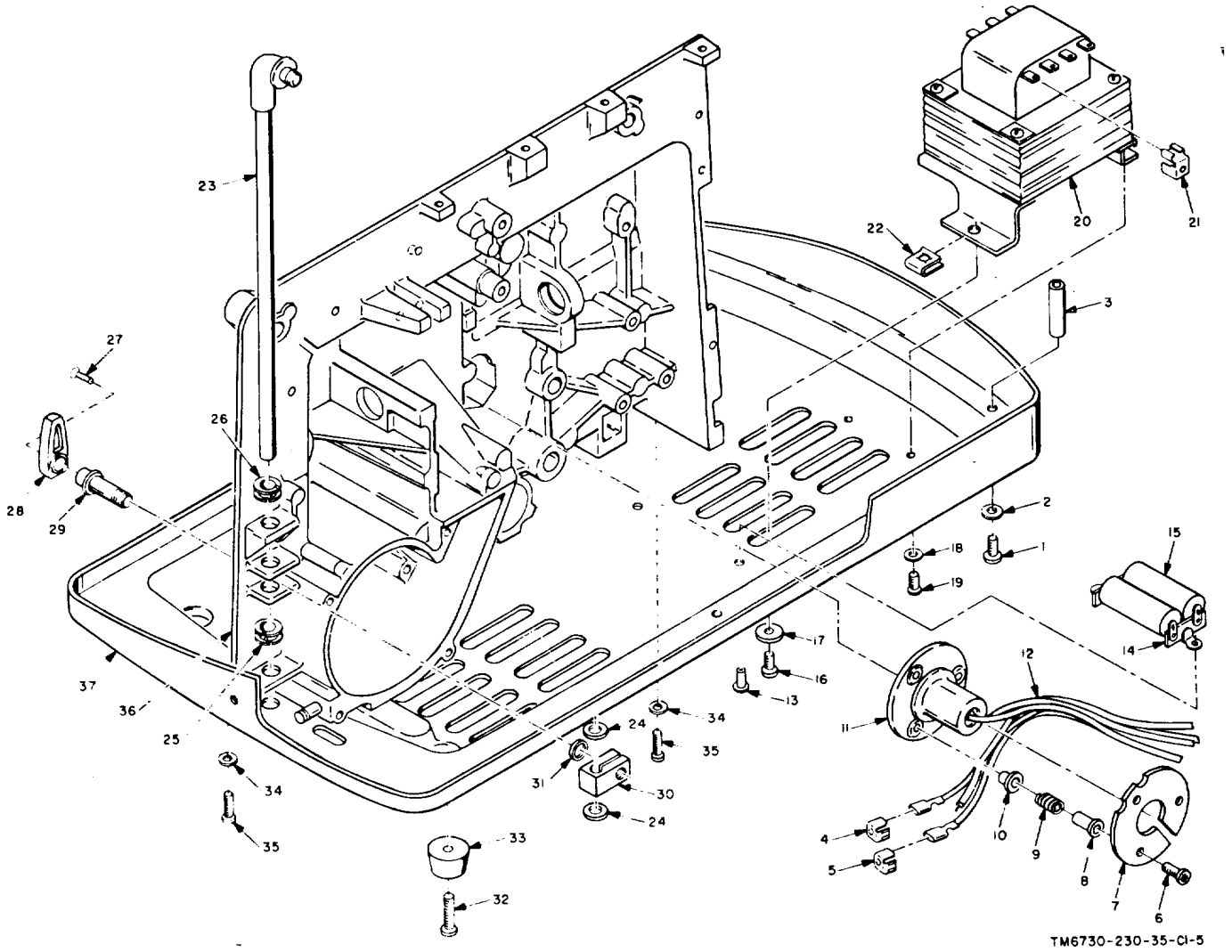


Figure 3-9 Interlock switch, amplifier, exciter lamp socket, and base details, exploded view (AQ-9A)

Projector AQ-9A

1 Interlock switch shield (1A6MP75)
2 Interlock switch liner (1A6MP76)
3 Tubing (1A6MP77)
4 Nut (1A6H104)
5 Interlock screw guide
6 Interlock switch (1A6A41)
7 Cable clamp (1A6H94)
8 Cable clamp (1A6H95)
9 Thread forming screw (1A6H100)
10 Flat washer (1A6H101)
11 Harness assembly (1A6A40)
12 Exciter lamp socket (1A6A10A1) (part of item 1)
13 Spacer (1A6MP72)
14 Terminal cap (1A6J1)
15 Thread forming screw (1A6H96)
16 Thread forming screw (1A6H97)
17 Flat washer (1A6H98)
18 Flat washer (1A6H99)
19 Amplifier (1A6A39)
20 Elevation rod assembly (1A6A35)
21 Flat washer (1A6H85)
22 Bearing (lower) (1A6MP66)
23 Bearing (upper) (1A6MP67)
24 Machine screw (1A6H82)
25 Elevation lock control lever(1A6MP63)
26 Elevation clamp stud (1A6MP63)
27 Flat washer, 0.375x0.251x0.0050 (1A6H83)
28 Flat washer, 0.437x0.252x0.048 (1A6H84)
29 Elevation clamp (1A6MP65)
30 Machine screw (1A6H106)
31 Washer (1A6H107)
32 Housing assembly (1A6A43)
33 Base assembly (1A6A42)
34 Machine area (1A6H105)
35 Foot (1A6MP78)

Figure 3-9 Continued.



Projector AS-25A1

1 Screw (1A7A38H1)
2 Washer (1A7A38H2)
3 Standoff (1A7A38MP1)
4 Adapter (1A7A37CP1)
5 Adapter (1A7A37CP2
6 Screw (1A7H106)
7 Plate (1A7MP67A)
8 Spacer (1A7H107)
9 Spring (1A7H108)
10 Spacer (1A7H109)
11 Socket, exciter lamp (1A7A37A1) (part 0f item 12)23 Elevation rod (1A7A31)
12 Harness (1A7A37)
13 Rivet (1A1H3)
14 Terminal strip (1A7A37C1)
15 Capacitor (1A7A37C1)
16 Screw (1A7H90)
17 Washer (1A7H92)
18 Washer (1A7H91)
19 Screw (1A7H89)
20 Transformer (1A7T1)
21 Adapter (1A7A37H4)
22 Nut, stamped (1A7H103)
24 Washer (1A7H80)
25 Bearing, lower (1A7MP63)
26 Bearing, upper (1A7MP64)
27 Screw (1A7H78)
28 Lever, elevation lock (1A7MP60)
29 Stud, elevation clamp (1A7MP61)
30 Clamp elevation, clamp ((1A7MP62)
31 Washer (1A7H79)
32 Screw (1A7H96)
33 Foot (1A7MP69)
34 Washer (1A7H98)
35 Screw (1A7H97)
36 Housing assembly (1A7A39)
37 Base (1A7A38)

Figure 3-9.1. Exciter lamp socket, transformer and base details, exploded view (AS-25A1)

(2) Remove the bottom retaining ring (3) with retaining ring pliers and remove the reel tension arm (4).

(3) Remove the top retaining ring (7) with retaining pliers. Release the tension from the takeup shoe spring (6) by removing the tab from the takeup shoe pivot slot. Remove the machine screw (5) and remove the takeup shoe spring(6).

(4) Remove the bottom retaining ring (7) with retaining pliers and remove the takeup shoe (8).

(5) Remove the shoe lever assembly (9) and flat washer (10) from the projector housing.

(6) Disassemble the takeup shoe as described in paragraph 3-16.

q. Removal of Threading Control Arm and Pressure Roller Arm Assembly (Figure 3-6).

(1) Remove the two thread forming screws (11) and remove the soundhead cover (12). Remove the speed nut (13).

(2) Remove the machine screw (14) and remove the guard (15) and lockwasher (16) from the threading control arm (17).

(3) Withdraw the threading control arm (17) and remove the spacer (18).

(4) Disassemble threading control arm as described in paragraph 3-17.

(5) Remove the two retaining rings (19) pressure roller arm assembly (20), and spring washer (21).

(6) Unthread the nut (22) and remove the pressure roller (23), flat washer (24), and pressure roller spring (25) from the pressure roller arm assembly (20).

(7) Remove the machine screw (26), lockwasher (27), and flat washer (28), and remove the threading control arm spring (29).

r. Removal of Loop Set Lever (figure 3-6)

(1) Remove the retaining ring (30) with retaining ring pliers, and lift off the loop set lever spring (31).

(2) Remove the loop set lever (32) from the housing.

s. Removal of Drive Shaft Components (fig. 3-7)

(1) Pull the manual advance knob (1) from the drive shaft (21).

(2) Remove the two setscrews (2) and slide the drive shaft pulley (3) off the end of the drive shaft (21).

(4) Remove the setscrews (5, 7, and 8) and remove the spiral pin (6); use roll pin extracting too; T-38000-P (fig. 2-1). Disconnect the safety shutter link (22, fig. 3-7) from the safety shutter (13).

(5) Carefully pull the drive shaft (21) out through the front of the projector removing the bearing (9), spring washer (10), collar (11), drive gear (12), safety shutter (13), and the shutter and cam assembly (14) from the end of the shaft as it is removed.

(6) Disassemble the shutter and cam assembly as described in paragraph 3-18.

(7) Remove the spiral pin (15) and the retaining feed drive gear (20) with the roll pin extracting tool.

(8) Remove the two setscrews (16) and the retaining ring (17). (Use retaining ring pliers.)Slide the bearing (18), collar (19), and the feed drive gear (20) off the drive shaft (21).

t. Removal of Claw Arm, Rewind Lever, and Safety Shutter Stop (fig. 3-7)

(1) Disconnect and remove safety shutter link (22) and safety shutter spring (23) from the shutter spring bracket (26).

(2) Remove the two thread forming screws (24) and speed nut (25) and remove the shutter spring bracket (26).

(3) Remove the two thread forming screws (27) and speed nut (28) and remove the rewind lever stop (29) and limit plate (30).

(4) Remove the framing arm pivot (31) and spring washer (32) and remove the claw arm (33).

(5) Remove the rewind lever spring (34) and rewind lever assembly (35) from the shaft of the rewind knob assembly (37).

(6) Remove the retaining ring (36) and remove the rewind knob assembly (37).

(7) Remove the machine screws(38)and 40), stabilizer (39), and speed nut (41) and remove the shutter stop bracket (42)

u. Removal of Amplifier Cover assembly (fig. 3-8 and 3-8.1)

(1) Remove the volume control knob (1)and the tone control knob (2) by pulling them from the amplifier control shaft.

(2) Pull off the leads from the pilot lamp,

threading lamp switch, and the jack at the back of the amplifier cover assembly panel (AQ-9A).

(3) Remove the machine screw (3) and lockwasher (4) that secures the power cord ground lead to the amplifier chassis.

(4) On projector AQ-9A, slide the cover and liner from the interlock switch (6, fig 3-9) and unsolder two leads on the power cord assembly (5, figure 3-8). On projector AS-25A1,

uncouple the two power cord leads, black from main switch and white from reversing switch.

(5) Remove the power cord assembly (5) and the strain relief bushing (6) from the base plate of the amplifier cover assembly (10). On the AS-25A1 projector, continue disassembly. Remove the four screws (22 fig. 3-8.1) and the board assembly (21) from the amplifier cover (10).

(6) Remove the screws (7, 8. and 9) securing the amplifier cover assembly (10), and remove the amplifier cover assembly to the extent permitted by the wiring harness. Disconnect the leads from the switch and remove the amplifier cover assembly.

(7) Remove the speed nut (11) from the projector chassis.

(8) On projector AQ-9A (figure 3-8), remove the machine screw (12) and the jack (13). On Projector AS-25A1 (fig. 3-8.1) remove the nut (16), washer (17), insulator (18) and bushing (19). (This loosens Jack J20,part of harness (12), fig. 3-9.1.)

(9) Disassemble the amplifier cover assembly as described in paragraph 3-20.

v. Removal of' Threading Lamp Components,

(1) Remove the threading lamp (14, **f**ig. 3-8 or 12, fig. 3-8.1**)**from the threading lamp socket (17, fig. 3-8 or 15, fig. 3-.8.1)

(2) Disconnect the wire terminals of the threading lamp socket assembly (17, fig. 3-8 or 15, fig. 3-8.1)

(3) Remove the screw (15, fig. 3-8 or 13, fig. 3-.1). Remove the threading lamp socket (17, fig. 3-8 or 15, fig. 3-8.1) and remove the speed nut [16, fig. 3-8 , or 14, fig. 3-8.1).from the socket.

w. Removal of Interlock Switch (fig. 3-9). Unsolder the wire leads from the interlock switch (6) and remove the interlock switch shield (1), interlock switch liner (2), and tubing (3). Remove the nut (4) and the interlock switch guide (5) to remove the interlock switch (6).

x. Removal of Amplifier, Exciter, Lamp Socket, and Wiring Harness AQ-9A Projector (fig. 3-9).

(1) Remove the table clamps (7 and 8) and disconnect all the leads from the amplifier (19).

(2) Remove the three thread forming screws (9) and flat washers (10) and remove the harness assembly (11), with the exciter lamp socket (12) attached, from the chassis.

(3) Push out the three spacers (12). Use the exciter lamp socket (12) and remove the terminal cap (14) from the amplifier(19).

(4) Remove the thread forming screws 915 and 16) and flat washers (17 and 18) and fully lift out the amplifier (19).

(5) Lift out the wiring harness.

(6) Disassemble the amplifier as described in paragraph 3-21.

y. Removal of Transformer Exciter Lamp Socket and Wire Harness, AS-25A1 Projector (fig. 3-9.1).

(l) Disconnect all leads to transformer (20).

(2) Remove screw (16), washer (17) two screws (19), two washers (18), and lift out transformer (20).

(3) Remove three nuts (22) and adapter (21) from the transformer (all pick off parts).

(4) Break out two rivets (13) and free the capacitors (15) keeping terminal strips (14) attached.

(5) Slip adapters (4and 5) off terminals in the wire harness (12). Note connections to the adapter.

(6) Remove three screws (6), plate (7), three spacers (8), three springs (9) and three spacers (10). Lift out wire harness (12) with exciter lamp socket (11) and capacitor and terminal strip (14 and 15) attached.

z. Disassembly of Elevation Rod and Final Chassis Parts

(l) On projector AS-25A1 (fig. 3-9.1) remove screw (1), washer (2) and lift off standoff (3).

(2) Remove elevation rod (20, fig.3-9 or 23, fig. 3-9.1) by lifting upward, freeing flat washers (21 or 24), upper bearing (23 or 26) and lower bearing (22 or 25).

(3) Remove screw (24 or 27) and elevation control lock lever (25 or 28) from end of clamp stud (26 or 29).

(4) Unthread clamp stud (26 or 29),

remove washers (27 and 28, fig. 3-9) single washer 1, fig. 3-.9.)and remove elevation clamp (29 or, 30).

(5) Remove three screws (30 or 35) and three washers (31 or 34) and lift off housing (32 or 36) from base (33 or 37).

(6) Remove four screws (34 or 32) and four feet (35 or 33) from base (33 or 37).

3-4. Disassembly of Film Pressure Shoe (AQ-9A) (fig. 3-10)

a. Remove the two machine screws (1), the shoe assembly (2), and the two helical pressure shoe springs (3).

b. Remove the upper machine screw (4), spring washer (5), and the upper film guide (6).

c. Repeat the above procedure for the lower film guide.

3-5. Disassembly of Feed Sprocket Shoe (fig. 3-11).

a. Remove the two machine screws (1) and the feed shoe cover (2).

b. Remove the two guide rollers (3) from the bearing post of feed shoe assembly (9).

c. Slide the follower assembly (4) off the bearing post of the feed shoe assembly (9) and remove the follower spring (5) from the follower assembly.

d. Remove the dampener assembly (6) from the bearing post of feed shoe assembly (9). Remove the dampener spring (7) from the dampener assembly (6).

e. Remove the pad (8) from the feed shoe assembly (9).

3-6. Disassembly of Lens Holder Assembly

a. Projector AQ-9A (fig.3-12).

(1) Remove machine screw (1) and lower spring (2).

(2) Remove the machine screw (3) and spring assembly (4).

(3) Drill out the rivet (5) and remove the upper spring (6) if spring is broken or defective.

(4) Unthread and remove the thumb screw (7).

(5) Pull out the groove pin (8) from the lens holder body (9).

b. Projector AS-25A1 (fig. 3-112).

(1) Remove two screws (1), two washers (2) and pressure shoe assembly (3).

(2) Remove screw (4) and separate the spring assembly (5) from the lens holder assembly.

3-7. Disassembly of Aperture Plate Assembly (fig. 3--13)

a. Remove the aperature plate assembly as describe in paragraph 3-3c.

b. Remove the machine screw (1) and disassemble the guide (2), spring (3), and spacer (4) from the aperture plate (5).

3-8. Disassembly of Film Clutch Assembly (fig. 3-14)

a. Remove the stop nut (1), the clutch spring (2), and the clutch plate)3).

b. Remove the toggle spring (3a) from the outer clutch plate assembly (3e).

c. remove the retaining ring (3b) with retaining ring pliers and remove the pawl assembly (3c) and flat washer (3d) from the outer clutch plate assembly (3e).

d. Remove the pin (4) from the shaft of the feed sprocket gear assembly (22) and remove parts (5 through 21) from the shaft.

3-9. Disassembly of Lamp House Cover Assembly. (fig. 3-15)

a. Remove the two self-threading screws (1) and remove the latch assembly (2) from the lamp house cover (7).

b. Remove the retaining ring (3) with retaining ring pliers.

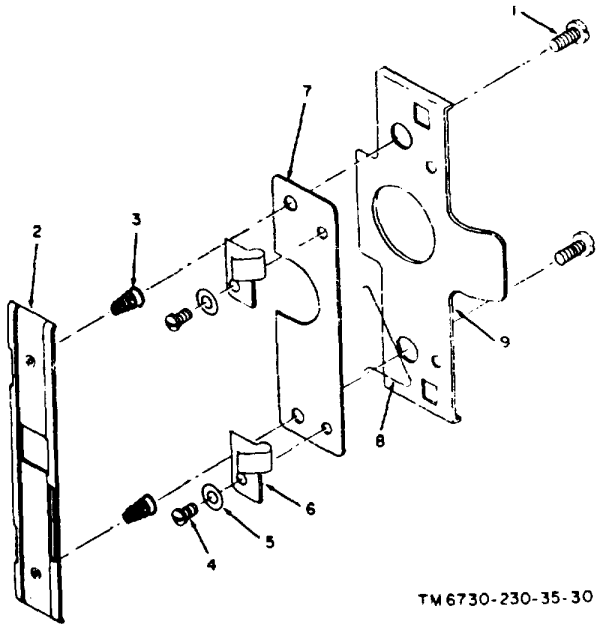
c. Remove the spring (4) and flat washer (5) and withdraw the framing knob assembly (6)from the lamp house cover (7)

3-10. Disassembly of Supply Reel Arm Assembly . (fig. 3-16)

a. Drive out the pin (1) and remove the reel retainer (2) from the spindle (4).

b. Remove the roll pin (3) and disassemble the spindle (4), reel retaining spring (5), steel ball (6), and washer (7) from the shaft of the pulley assembly.

c. Remove the pulley assembly (8), brake (9), and brake spring (10) from the supply reel arm assembly (11).



1 Machine screw (1A6A1H1)
2 Shoe assembly (1A6A1A1)
3 Pressure shoe spring (1A6A1MP1)
4 Machine screw (1A6A1H2)
5 Spring washer (1A6A1H3)
6 Film guide (1A6A1MP2)
7 Shoe adjusting plate (1A6A1MP3)
8 Pressure shoe spring (1A6A1MP4)
9 Mounting plate (1A6A1MP5)

Figure 3-10. Film pressure shoe, exploded view

3-11. Disassembly of Motor and Mounting Plate Assembly

(fig. 3-17)

a. On projector AQ-9A, remove set screw (1) and slip the blower wheel (2) from the motor shaft. On projector AS-25A1 the blower wheel is a friction fit on the motor shaft and is removed by pulling it off the shaft.

b. Remove the, two machine screws (3) and lockwashers (4) and remove the motor mounting plate (5) from the motor assembly (6).

3-12. Disassembly of Drive Unit Assembly

(fig. 3-18)

a. Remove the spiral pin (1) and remove the fan and hub assembly (2) from the motor shaft.

b. Disassemble the fan and hub assembly (2) as follows:

(1) Remove the machine screw (2a) and flat washer (2b).

(2) Remove the grommet (2c) and fan (2d) from the hub assembly (2f)

(3) Remove the spring (2e) from the hub assembly (2f).

c. Remove the two bearings (3) and pulley assembly (4) from the motor shaft.

d. Remove the two setscrews (5) and remove the collar (6) from the motor shaft.

e. Remove the grommet (7), speed nut (8), nut (9), and the adjusting screw- assembly (10) from the motor mounting plate assembly (13).

f. Remove the four machine screws (11) and lockwashers (1) and remove the motor mounting plate assembly (13) from the drive motor assembly (14).

3-13. Disassembly of Drive Belt Shift Fork Assembly

(fig. 3-19)

a. Remove the speed nut (1) and disassemble the washer (2), rollers (3), washer (4), rollers (5), and spacer (6) from each tong of the fork (10).

b. Remove the stop nut (7) and disassemble the washer (8), lever (9), fork (10), bushing (11), and washer (12) from the support assembly. (13).

3-14. Disassembly of Takeup Reel Arm

(fig. 3-20)

a. Drive out the pin (1) and remove the reel retainer (2) from the spindle (4).

b. Remove the roll pin (3) and disassemble the spindle (4), reel retainer spring (5), steel ball (6), collar (7), and flat washer (8) from the shaft of the pulley assembly (9).

c. Remove the pulley assembly (9), two brakes (10), and brake springs (11) from the takeup arm assembly (12).

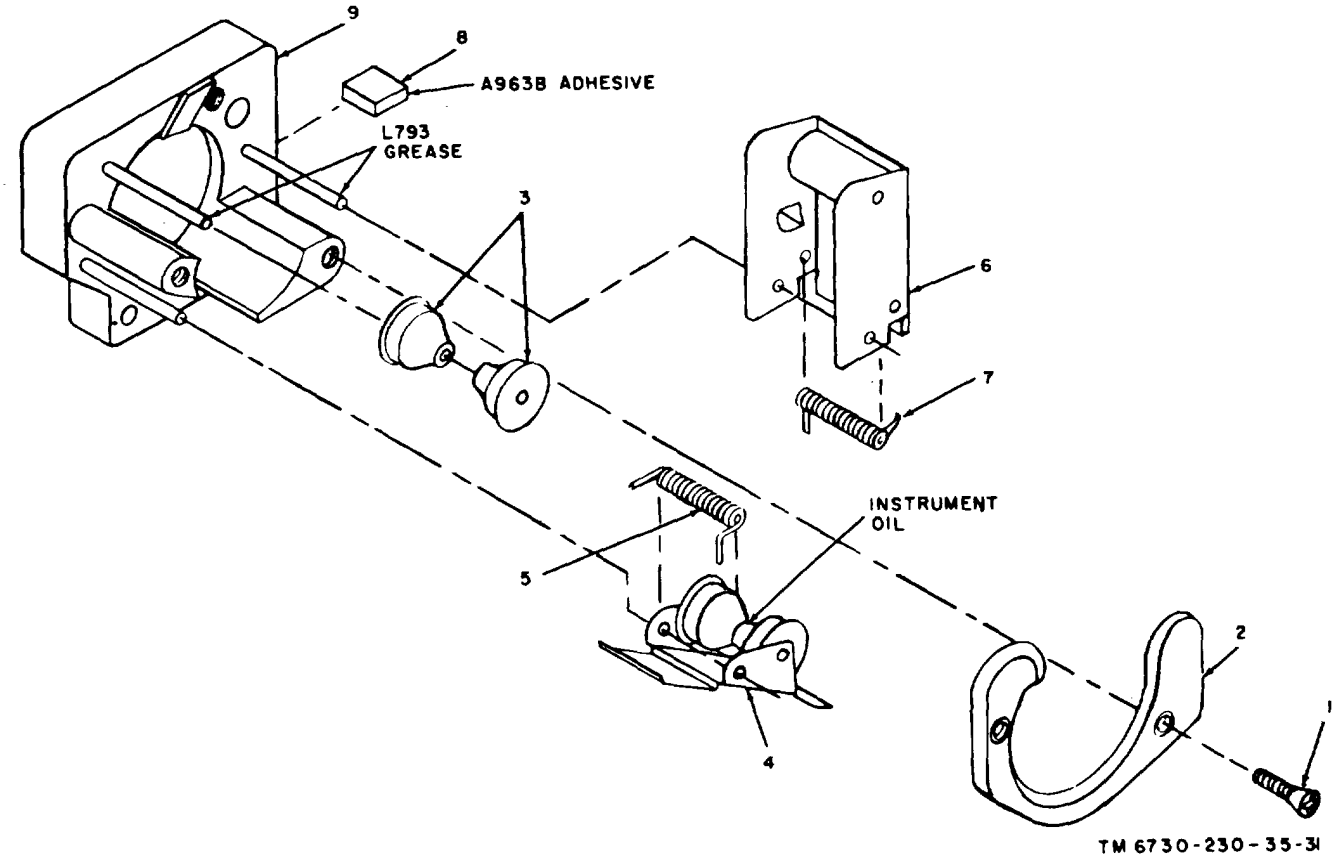
3-15. Disassembly of Takeup Clutch Arm

(fig. 3-21)

a. Unthread the nut (1) and remove the bracket (2) and spring washer (3) from the rod (9).

b. Unthread the nuts (4 and 5) and disassemble the flat washer (6), spring (7), and flat washer (8) from the rod (9). Remove the rod (9) from the arm assembly (13).

c. Remove the retaining ring (10) with retaining ring pliers and disassemble the flat washer (11) and the pulley assembly (12) from the arm assembly (13).



1 Machine screw (1A6A4H1)
2 Feed shoe cover (1A6A4MP1)
3 Guide roller (1A6A4MP)
4 Follower assembly (1A6A4A1)
5 Follower spring (1A6A4MP3)
6 Dampener assembly (1A6A4A2)
7 Dampener spring (1A6A4MP4)
8 Pad (1A6A4MP5)
9 Feed shoe assembly (1A6A4A3)

Projector AS-25A1
1 Machine screw (1A7A3H1)
2 Feed shoe cover (1A7A3MP1)
3 Guide roller (1A7A3MP2)
4 Follower assembly (1A7A3A1)
5 Follower spring (1A7A3MP3)
6 Dampener assembly (1A7A3A2)
7 Dampener spring (lA7A3MP4)
8 Pad (1A7A3MP5)
9 Feed shoe assembly (1A7A3A3)

Figure 3-11. Feed sprocket shoe, exploded view.

3-16. Disassembly of Takeup Sprocket Shoe Arm

(fig. 3-22)

a. Remove the machine screw (1) and remove the cover (2) and the rollers (3) from the takeup sprocket shoe arm assembly (5).

b. Remove pad (4) from takeup sprocket shoe arm assembly (5).

3-17. Disassembly of Threading Control Arm

(fig. -23)

a. Remove the retaining ring (1) with retaining ring pliers and remove the roller (2) from the film tension arm assembly (6). Repeat for retaining ring and roller on the threading control arm assembly (11).

b. Remove thread forming screw (8) and spring washer (4) and disassemble cap (5) and film tension arm assembly (6) from threading control arm assembly (11).

c. Remove the retaining ring (7) with retain ing ring plier and lift off the spring (8).

d. Remove the thread forming two screws (9) and lift off the handle (10) from the threading control arm assembly (11).

3-18. Disassembly of Shutter and Cam Assembly

a. Unhook and remove the two shutter actuating springs (1).

b. Remove the thread forming two screws (2) and setscrews (3 and 4) from the hub (6a).

c. Remove the retaining ring (5) and the press cam (6b) from the hub (6a). Remove the bumper (7) from the cam (6b).

d. Lift the fixed and inner shutter blades (8 and 9), flat washer (10), outer shutter blade assembly (11), and shutter actuator assembly (12) from the hub (6a).

3-19. Disassembly of Claw Arm

(fig. 3-25)

a. Remove the retaining rings (1) with retaining ring pliers and the plate (2) from the rod (3).

b. Unthread the rod (3) from the framing arm assembly (20) and remove the pilot (4).

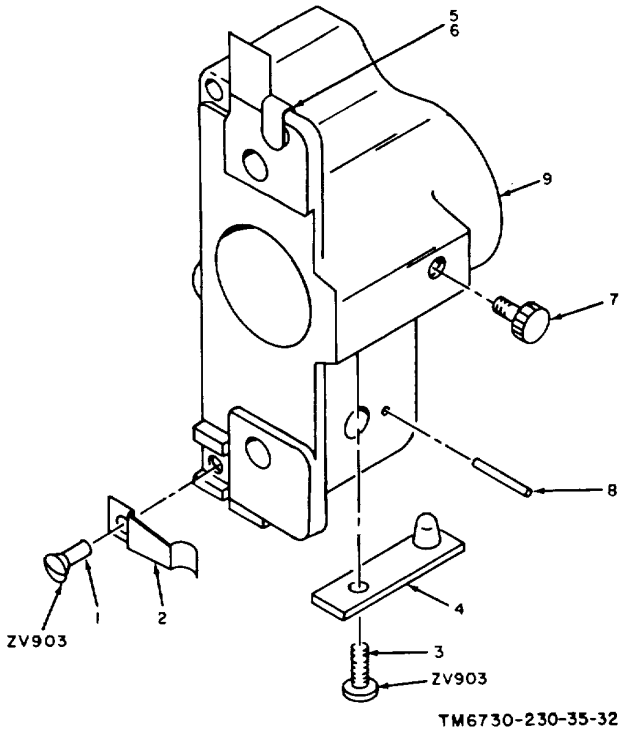
c. Unthread the nuts (5 and 6) to loosen the stud (7) and remove the pin (8). Disassemble the nuts (5 and 6), stud (7), spring (9), and dampener (10).

d. Unthread the nuts (11) and remove the flat washers (12 and 13) from the pivot assembly (19).

e. Lift the claw arm assembly (16) and the flat washer (17) from the pivot assembly (19). Remove the setscrews (14) and remove the bushing (15) from the claw arm assembly (16).

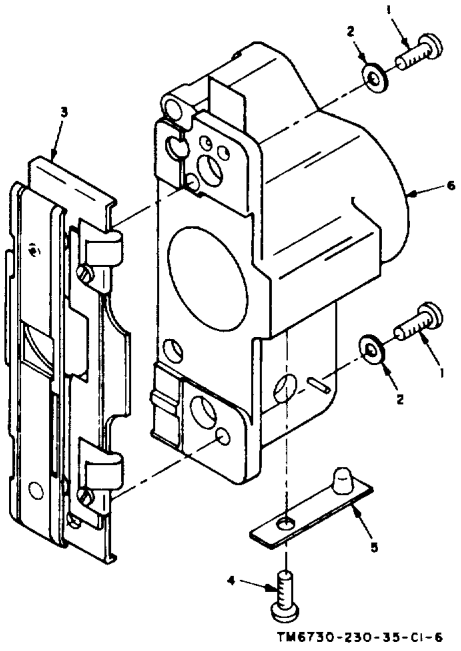
f. Remove the setscrew (18) and remove the pivot assembly (19) from the framing arm assembly (20).

g. Drive out roll pin (21) from framing arm assembly (20) (AQ-9A).



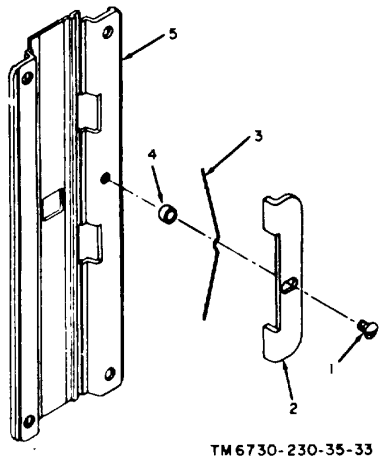
1 Machine screw (1A6A6H1)
2 Lower spring (1A6A6MP1)
3 Machine screw (1A6A6H2)
4 Spring assembly (1A6A6A1)
5 Rivet (1A6A6H3)
6 Upper spring (1A6A6MP2)
7 Thumbscrew (1A6A6H4)
8 Groove pin (1A6A6H5)
9 Lens holder body (1A6A6MP3)

Figure 3-12. Lens holder assembly, exploded view (AQ-9A).



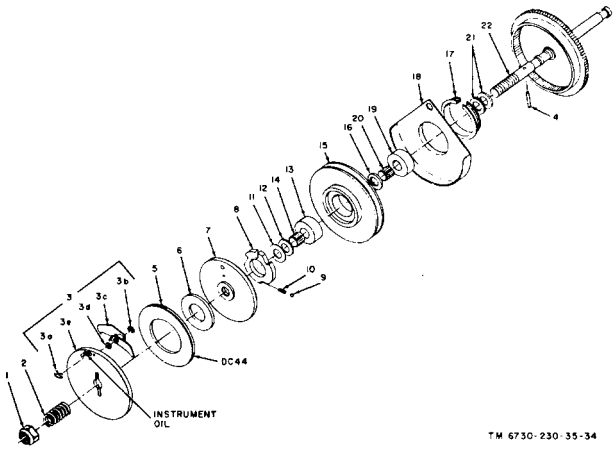
I Screw (1A7A5H2)
2 Washer (1A7A5H3)
3 Shoe assembly (1A7A5MP1)
4 Screw (1A7A5H1)
5 Spring assembly (IA7A5A1)
6 Lens holder body

Figure 3-12.1. Lens holder assembly, exploded view (AS-25A).



	AQ-9A	AS-25A1
1	Machine screw (1A6A8H1)	(1A7A7H1)
2	Guide (1A6A8MP1)	(1A7A7MP1)
3	Spring (1A6A8MP2	(1A7A7MP2)
4	Spacer (1A6A8MP3)	(1A7A7MP3)
5	Aperture plate (1A6A8MP4)	(1A7A7MP4)

Figure 3-13. Aperture plate assembly, .exploded view.



	AQ-9A	AS-25A1		AQ-9A	AS-25A1
I	Sop nut (1A6A5H1)	(17A4H1)	10	Cam plate spring (1A6A5MP5)	(1A’7A4MP5)
2	Clutch spring (1A6A5MP1)	(1A7A4MP1)	11	Washer (1A6A5H4)	(1A7A4H4)
3	Clutch plate assembly (1A6A5A1)	(1A7A4A1)	12	Flat washer (1A6A5H5)	(1A7A415)
3a	Toggle spring (1A6A5A1MP1)	(1A7A4A1MP1)	13	Bearing (1A6A5MP6)	(1A7A4MP6)
3b	Retaining ring (1A6A5A1H1)	(1A7A4A1H1)	14	Tolerance ring (1A6A5H6)	(1A7A4H6)
3c	Pawl assembly (1A6A5A1A1)	(1A7A4A1A1)	15	Feed clutch pulley (1A6A5MP7)	(1A7A4MP7)
3d	Flat washer (1A6A5A1H2)	(1A7A4A1HZ)	16	Flat washer (1A6A5H7)	{1A7A4H7)
3e	Outer clutch plate assembly (1A6A5A1A2)	(1A7A4A1AZ)	17	Belt guide bearing (1A6A5MP8)	(1A7A4MP8)
4	Pin (1A6A5H2)	(1A7A4142)	18	Belt guide (1A6A5MP9)	(1A7A4MP9)
5	Clutch facing (1A6A5MP2)	(1A1A4MP2)	19	Bearing (1A6A5MP10)	(1AA4MP1O)
6	Flat washer, (1A6A5H3)	(1A1A4H 3)	20	Tolerance ring (1A6A5H8)	(1A7A4N8)
7	Inner clutch plate assembly (1A6A5A2)	(1A7A4A2)	21	Flat washer (1A6A5H9)	(1A7A4H9)
8	Cam plate (1A6A5MP3)	(1A7A4MP3)	22	Feed sprocket gear assembly (1A6A5A3)	(1A7A4A3)
9	Steel ball (1A6A5MP4)	(1A7A4MP4)			

Figure 3-14. Film feed clutch assembly, exploded view.

3-20. Disassembly of Amplifier Cover Assembly

(fig. 3-26 and 3-26.1)

a. Remove the thread forming screw (1) and remove the amplifier cover (2) from the control switch cover (20). Remove the speed nut (3) from the amplifier cover (2).

b. Disassemble the amplifier cover components as follows:

(1) Remove the speed nut (4) and the pilot lamp (5), (AQ-9A).

(2) Remove the thread forming four screws (6) and the instruction plate (7) (AQ-9A).

(3) Drill out two the rivets (8) and remove the threading lamp switch (9).

c. Disassemble the control switch cover components as follows:

(1) Remove the two speed nuts (10) and lift off the control switch escutcheon (11).

(2) Inspect the condition of the instruction plate (12) and remove it if damaged or not legible.

(3) Straighten the mounting tabs and remove the circuit breaker (13) (AQ-9A).

(4) Remove the thread forming two screws (14), the flat washers (15), and the control

(5) Remove the machine screw (17), spacer (18), and rubber foot (19).

d. Disassemble the network assembly Projector AS-25Al, as follows:

(1) Remove nut (4), washer (5) and network assembly (13).

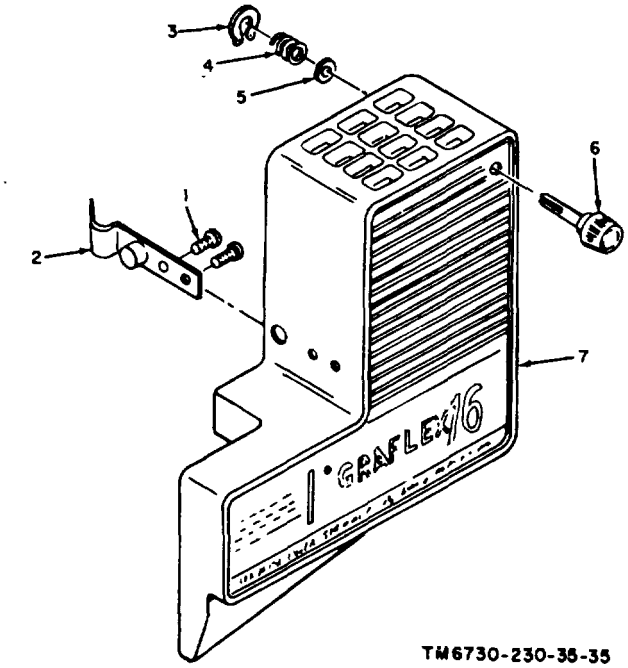
(2) Remove lock washer (6) and nut (7) from the shaft of the volume/tone control (13a).

(3) Using a pencil type soldering iron, carefully heat the terminals on the volume/tone control (13a) to disconnect capacitor (13d), resistor (13e), capacitor (13c) and lead wires in the cable assembly (13b)

3-21. Disassembly of Amplifier

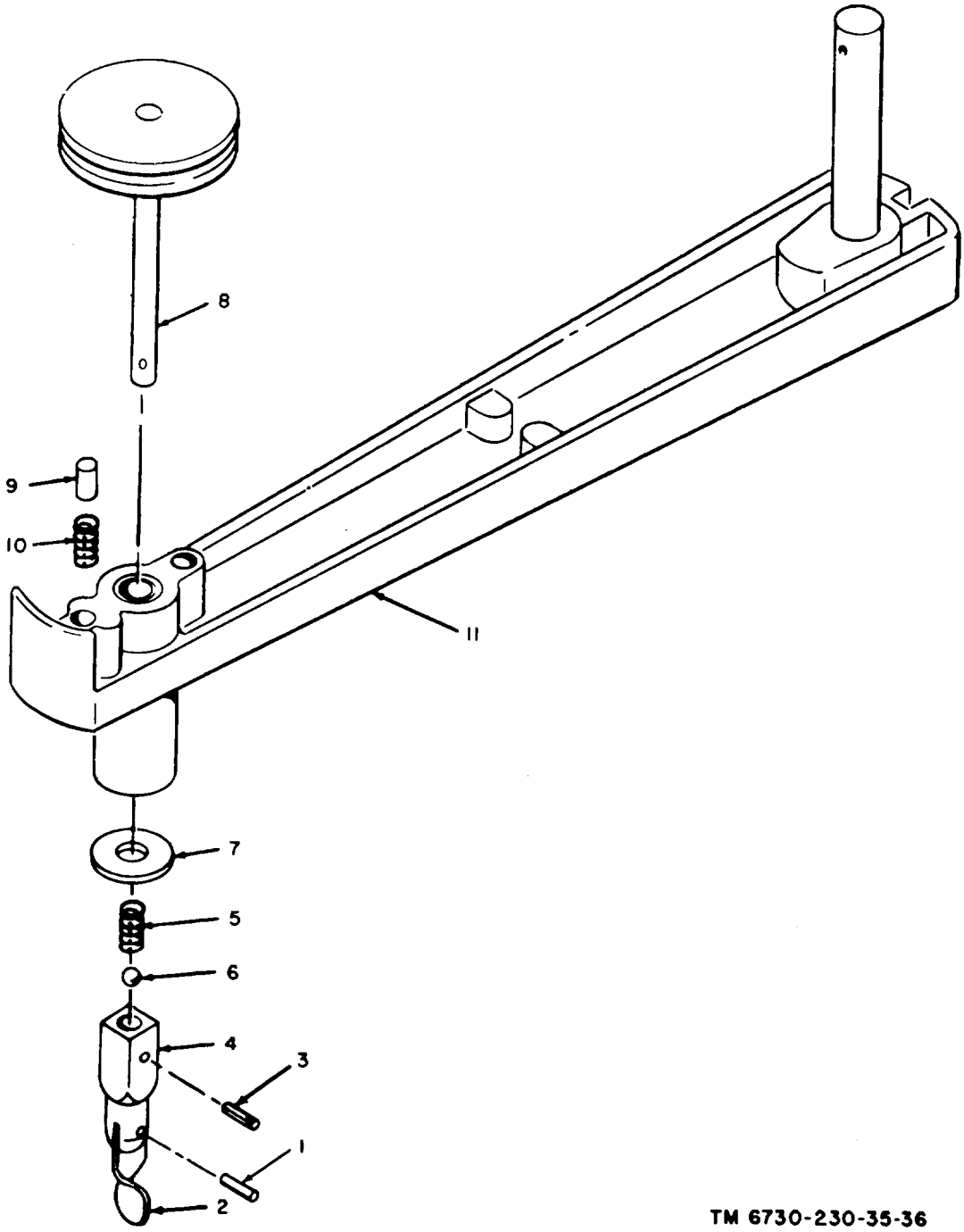
(fig. 3-27)

Disassemble the amplifier only to the extent necessary to make repairs. When making repairs on the printed circuit board, remove the four machine screws (15) and pull the board away from the chassis. This exposes parts with retaining hardware on the chassis bottom.



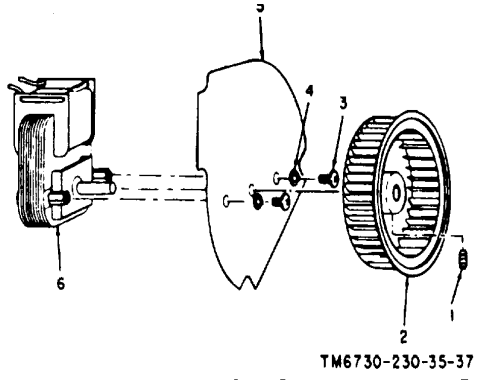
	AQ -9A	AS-25A1
I	Self threading screw (1A6A2H1)	(1A7A1H1)
2	Latch assembly (1A6A2A1)	(1A7A1A1)
3	Retaining ring (1A6A2H2)	(1A7A1H3)
4	Spring (1A6A2MP1)	(1A7A1MP1)
5	Flat washer (1A6A2H3)	(1A7A1H2)
6	Framing knob assembly (1A6A2A2)	(1A7A1A2)
7	Lamp house cover (1A6A2MP3)	(1A7A1MP3)

Figure 3-15. Lamp house cover assembly. Exploded



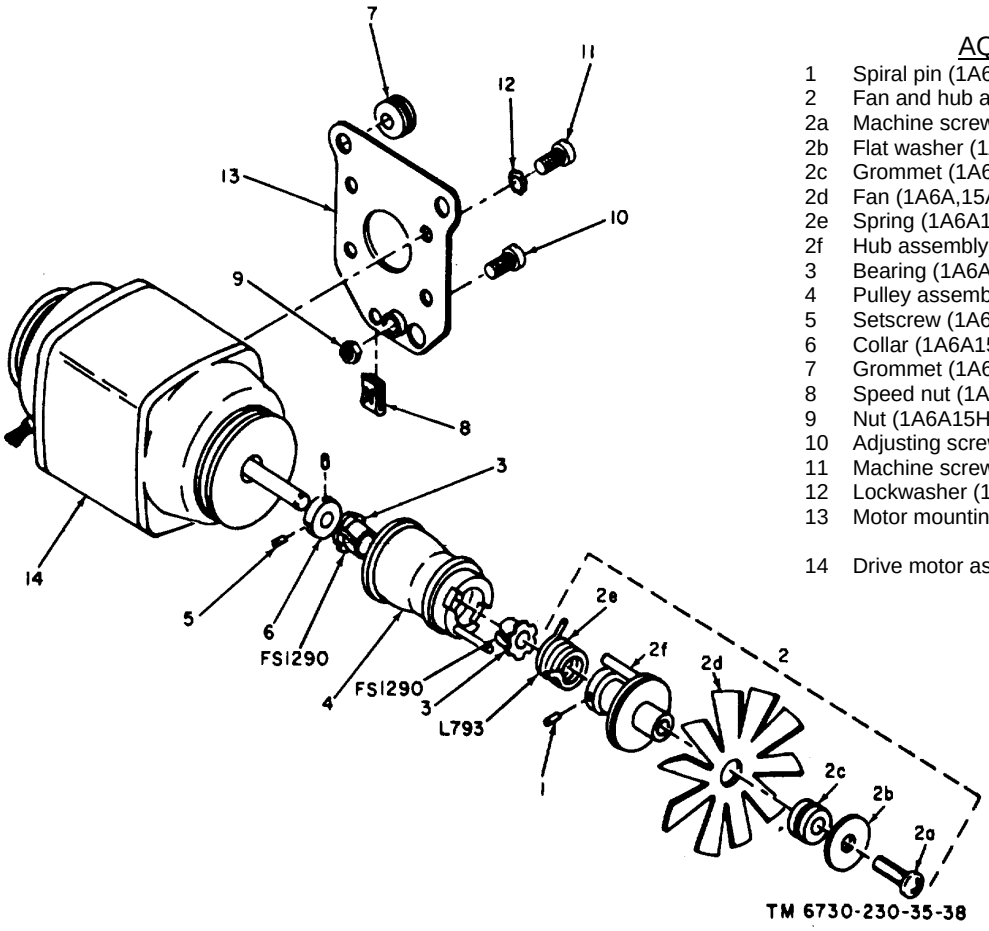
		AQ-9A	AS-25A1			AQ-9A	AS-25A1
1	Pin, plain	(1A6A12H1)	(1A7A11H 2)	7	Washer	(1A6A12H4)	(1A7A11H4)
2	Reel retainer	(1A6A12H2)	(1A7A11H1)	8	Pulley assembly	(1A6A12A1)	(1A7A11IA1)
3	Roll pin	(1A6A12H3)	(1A7A11H3)	9	Brake	(1A6A12MP4)	(1A7A11MP4)
4	Spindle	(1A6A12MP1)	(1A7A11MP1)	10	Brake spring	(1A6A12MP5)	(1A7A1MP5)
5	Reel retainer spring	(1A6A12MP2)	(1A7A11MP2)	11	Supply reel arm assembly	(1A6A12A2)	(1A7A11A2)
6	Steel ball	(1A6A12MP3)	(1A7A11MP3)				

Figure 3-16. Supply reel arm assembly, exploded view.



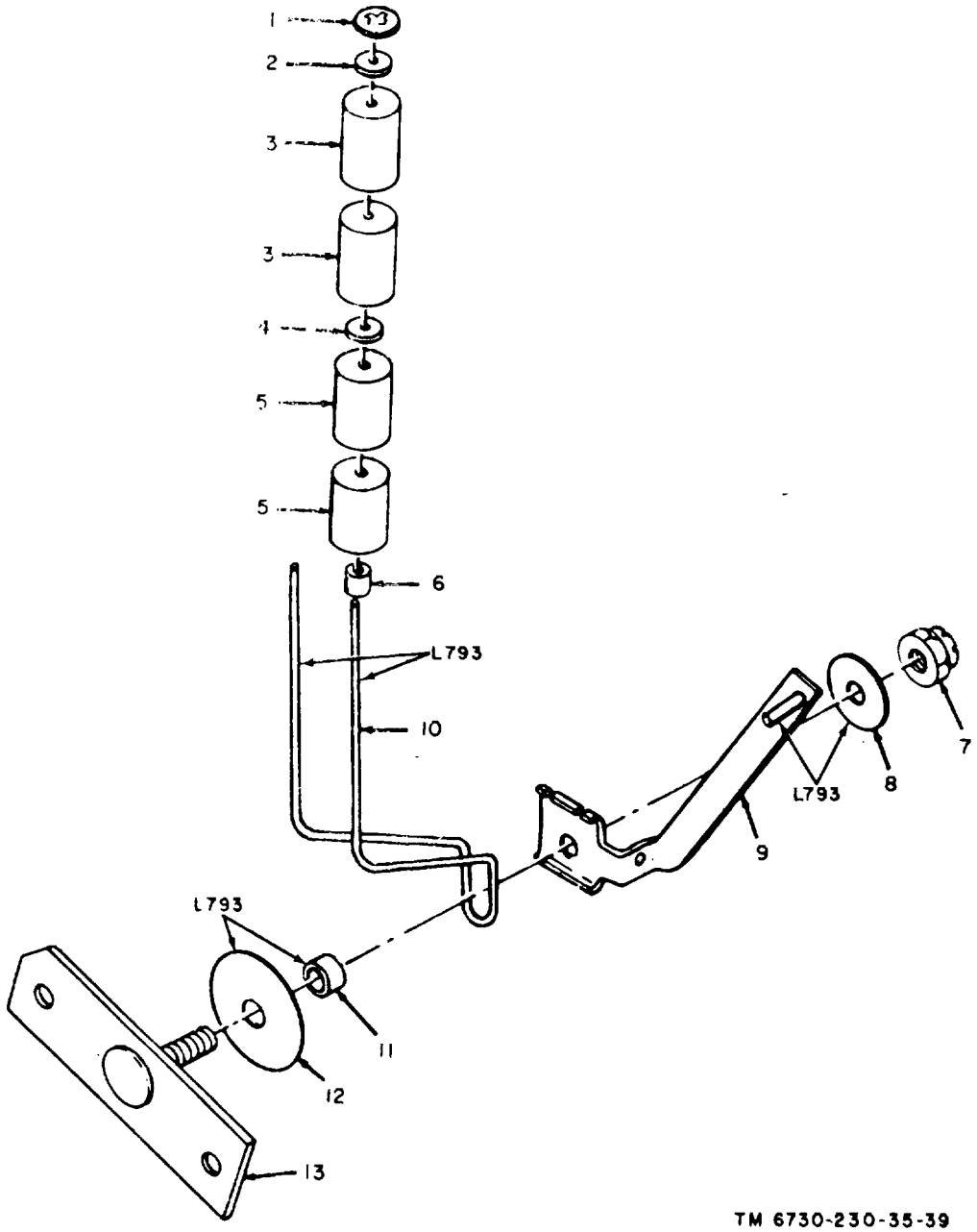
	AQ-9A	AS-25A1
1	Setscrew (1A6A13H1)	(N/A)
2	Blower wheel (1A6A13MP1)	(1A7A11AMP1)
3	Machine screw (1A6A13H2)	(1A7A1AH1)
4	Lockwasher, No. 6 (IA6A13H3)	(1A7A11AH2)
5	Motor mounting plate (1A6A13MP2)	(1A7A11AMP2)
6	Motor assembly (1A6A13A1)	(1A7A11AB1)

Figure 3-17. Motor mounting plate assembly, exploded view.



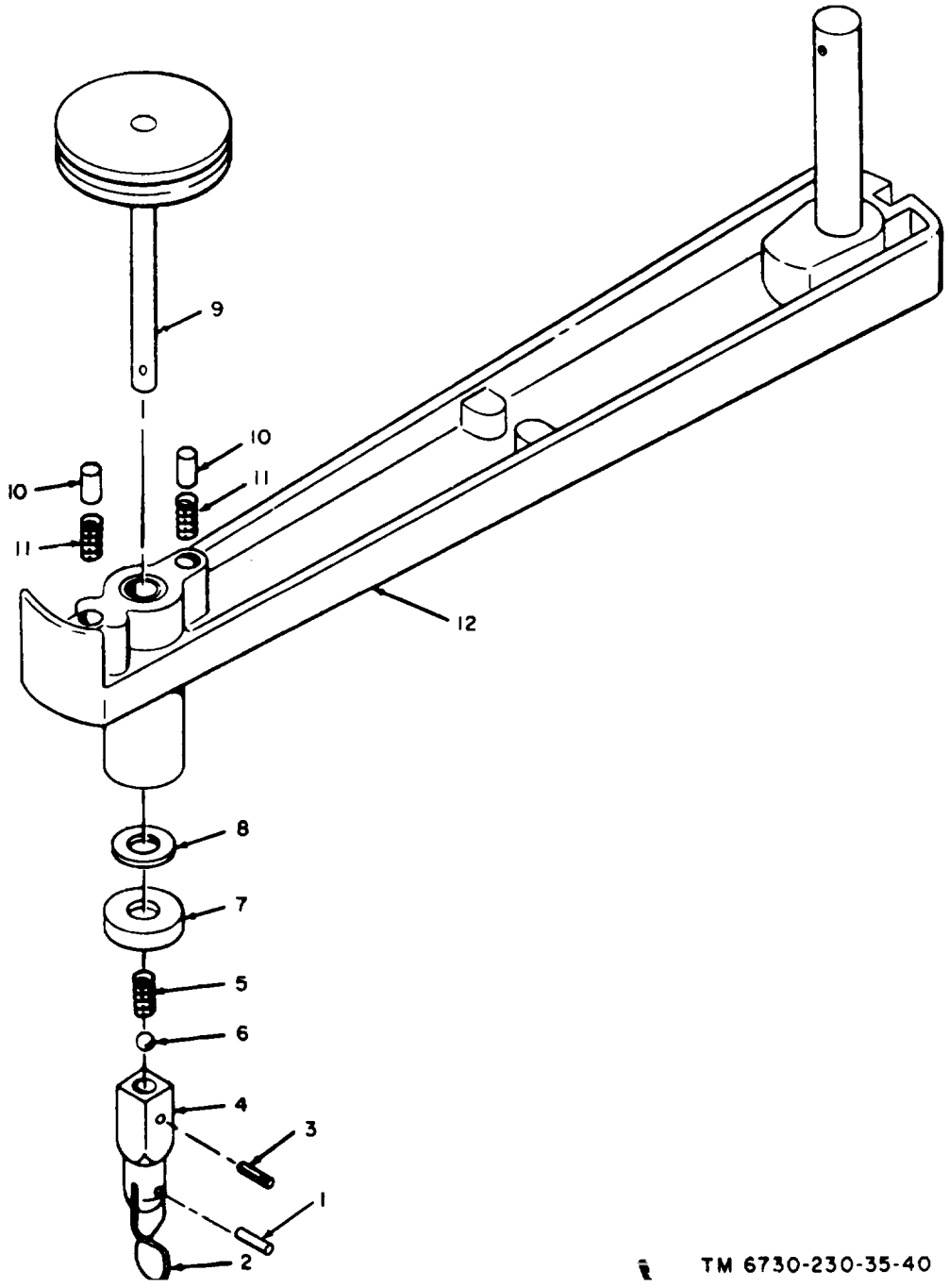
	AQ-9A	AS-25A1
1	Spiral pin (1A6A15H1)	(1A7A13H1)
2	Fan and hub assembly (1A6A15A1)	(1A7A13A1)
2a	Machine screw (1A6A15A1H1)	(1A7A13A1H1)
2b	Flat washer (1A6A15A1H2)	(1A'7A13A1H2)
2c	Grommet (1A6A15A12)	(1A7A13A1H3)
2d	Fan (1A6A,15A1B1)	(1A7A13AB)
2e	Spring (1A6A15A1MP1)	(1A1A13A1M)
2f	Hub assembly (1A6A15A1A)	(1A7A13A1A1)
3	Bearing (1A6A1SMP1)	(1A7A13MP1)
4	Pulley assembly (1A6A15A2)	(1A7A13A2)
5	Setscrew (1A6A15H2)	(1A7A13H2)
6	Collar (1A6A15MP2)	(1A7A13MP2)
7	Grommet (1A6A15H3)	(1A7A13H3)
8	Speed nut (1A6A15H4)	(1A7A13H4)
9	Nut (1A6A15H5)	(1A7A13H5)
10	Adjusting screw assembly (1A6A15A2)	(1A7A13A3)
11	Machine screw (1A6A15H6)	(1A7A13H6)
12	Lockwasher (1A6A15H7)	(1A7A13H7)
13	Motor mounting plate assembly (1A6A15A4)	(1A7A13A4)
14	Drive motor assembly (1A6A15A5)	(1A7A13A5)

Figure 3-18. Drive unit assembly. exploded view.



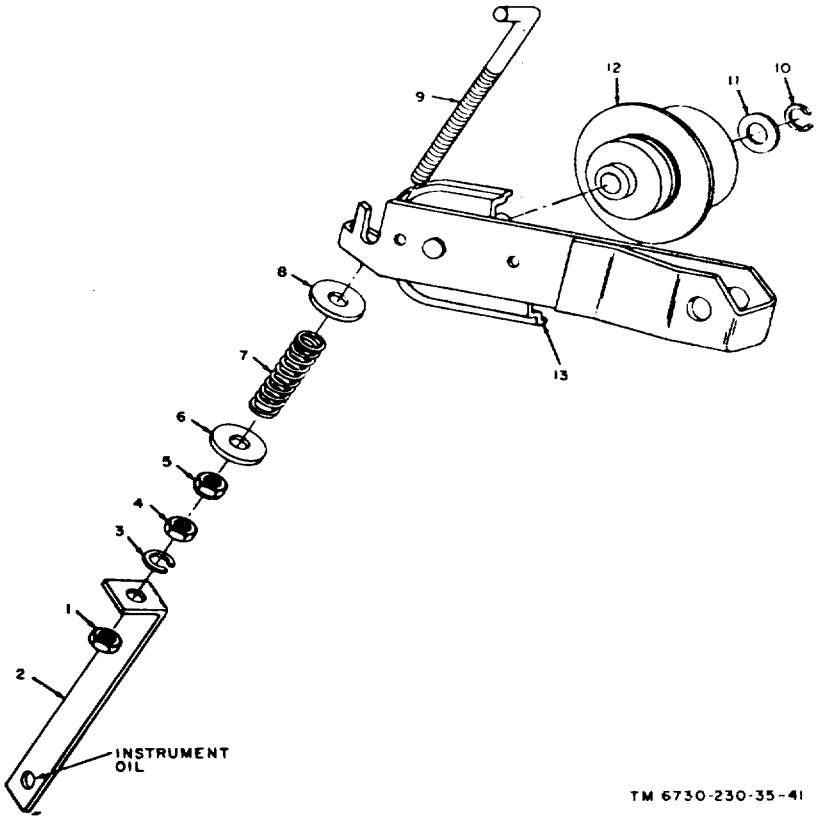
	AQ-9A	AS-25A1		AQ-9AU	AS-25A1
1	Speed nut (1A6A14H1)	(1A7A12H1)	8	Washer (1A6A14MP3)	(1A7A12H5)
2	Washer 1A6A14H2)	(1A7A12H2)	9	Lever (1A6A14MP4)	(1A7A12MP3)
3	Roller 1A6A14MP1)	(1A7A12MP1)	10	Fork (1A6A14MP5)	(1A7A12MP5)
4	Washer 1A6A14H3)	(1A7A12H3)	11	Bushing (1A6A14MP6)	(1A7A12MP4)
5	Roller 1A6A14MP2)	(1A7A12MP1)	12	Flat washer (1A6A14H6)	N/A
6	Spacer 1A6A14H4)	(1A7A12MP2)	13	Support assembly (1A6A14A1)	(1A7A12A1)
7	Stop nut 1A6A14H5)	(1A7A12H4)			

Figure 3-19. Drive belt shift fork assembly, exploded view.



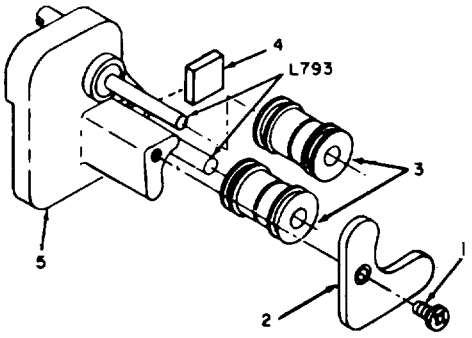
	AQ-9A	AS-25A1		AQ-9A	AS-25A1
1	Pin (1A6A18H1)(1A7A16H2)	7	Collar (1A6A18MP4)		(1A7A16MP4)
2	Reel retainer (1A6A18H2)	(1A7A16H1)	8	Flat washer (1A6A18H4)	(1A7A16H4)
3	Roll pin (1A6A18H3)	(1A7A16H3)	9	Pulley assembly (1A6A18A1)	(1A7A16A1)
4	Spindle (1A6A18MP1)	(1A7A16MP1)	10	Brake (1A6A18MP5)	(1A7A16MP5)
5	Reel retainer spring (1A6A18MP2)	(1A7A16MP2)	11	Brake spring (1A6A18MP6)	(1A7A16MP6)
6	Steel ball (1A6A18MP3)	(1A7A16MP3)	12	Takeup arm assembly (1A6A18A2)	(1A7A16A2)

Figure 3-20. Takeup reel arm, exploded view.



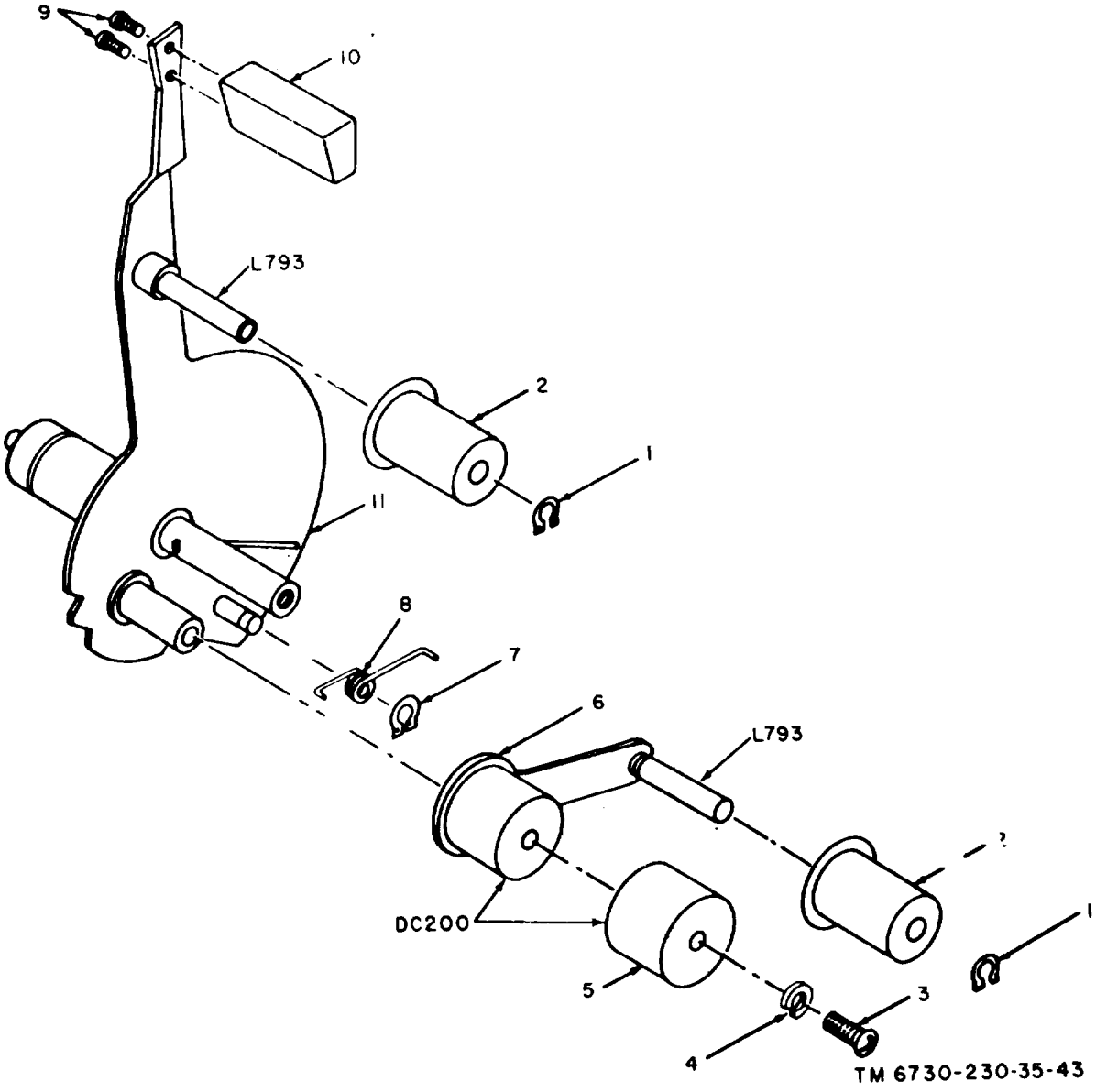
	AQ-9A	AS-25A1		AQ-9A	AS-25A1
1	Nut (1A6A19H1)	(1A7A17H1)	8	Flat washer (1A6A19H6)	(1A7A17H6)
2	Bracket (1A6A19MP1)	(1A7A17MP1)	9	Rod (1A6A19MP3)	(1A7A17MP3)
3	Spring washer (1A6A19H2)	(1A7A17H2)	10	Retaining ring (1A6A19H7)	(1A7A17H7)
4	Nut(IA6A19H3)(1A7A17H3)	11	Flat washer (1A6A19H8)		(1A7A17H8)
5	Nut (1A6A19H4)	(1A7A17H4)	12	Pulley assembly (1A6A19A1)	(1A7A17A1)
6	Flat rasher (1A6A19H5)	(1A7A17H5)	13	Arm assembly (1A6A19A2)	(1A7A17A2)
7	Spring (1A6A19MP2)	(1A7A17MP2)			

Figure 3-21. Takeup clutch arm, exploded view.



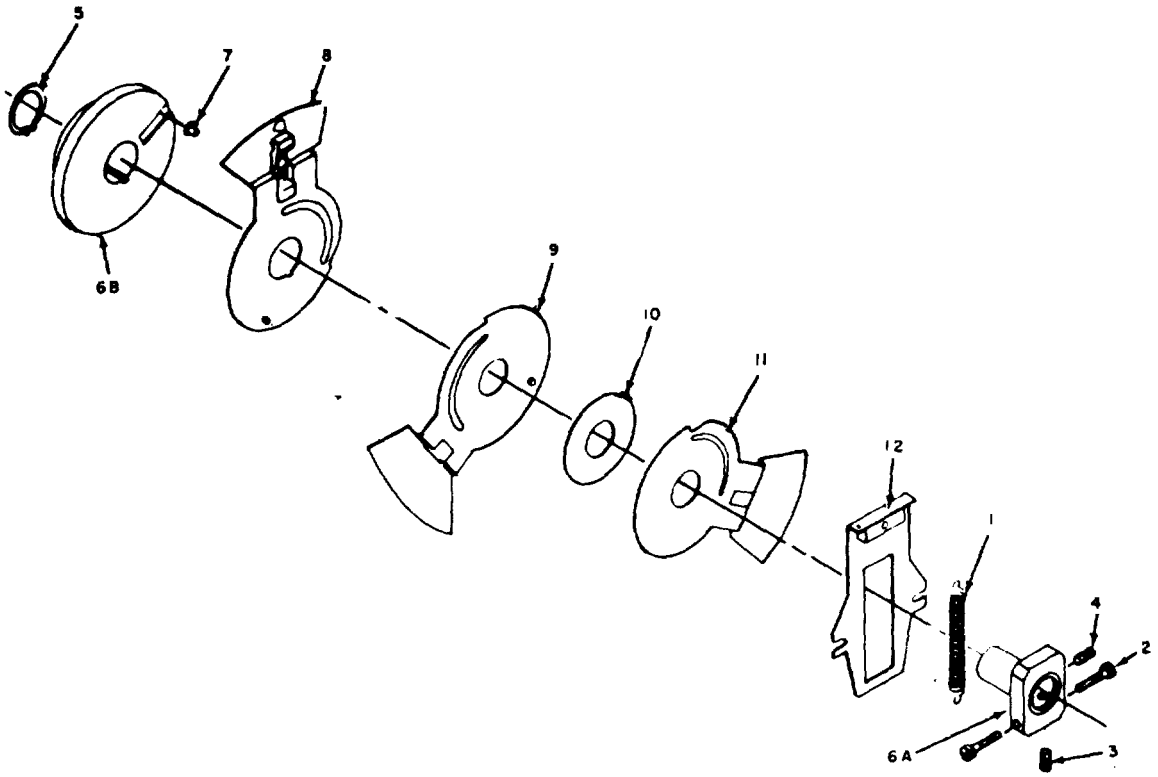
	AQ-9A	AS-25A1
2	Cover (1A6A23MP1)	(1A7A21MP1)
3	Roller (1A6A23MP2)	(1A7A21MP2)
4	Pad (1A6A23MP3)	(1A7A21MP3)
5	'Takeup sprocket shoe arm assembly (1A6A23A1)	(1A7A21A1)

Figure 3-22. Takeup shoe, exploded view.



	AQ-9A	AS-25A1
1	Retaining ring (1A6A26H1)	(1A7A24H1)
2	Roller (1A6A26MP1)	(1A7A24MP1)
3	Thread forming screw (1A6A26H2)	(1A7A24H2)
4	Spring washer (split type)	(1A7A24H3)
5	Cap (1A6A26MP2)	(1A7A24MP2)
6	Film tension arm assembly (1A6A26A1)	(1A7A24A1)
7	Retaining ring (1A6A26H4)	(1A'7A24H4)
8	Spring (1A6A26MP3)	(1A7A14MP3)
9	Thread forming screw (1A6A26H5)	(1A7A24H5)
10	Handle (1A6A26MP4)	(1A7A24MP4)
11	Threading control arm assembly (1A6A26H2)	(1A7A24H2

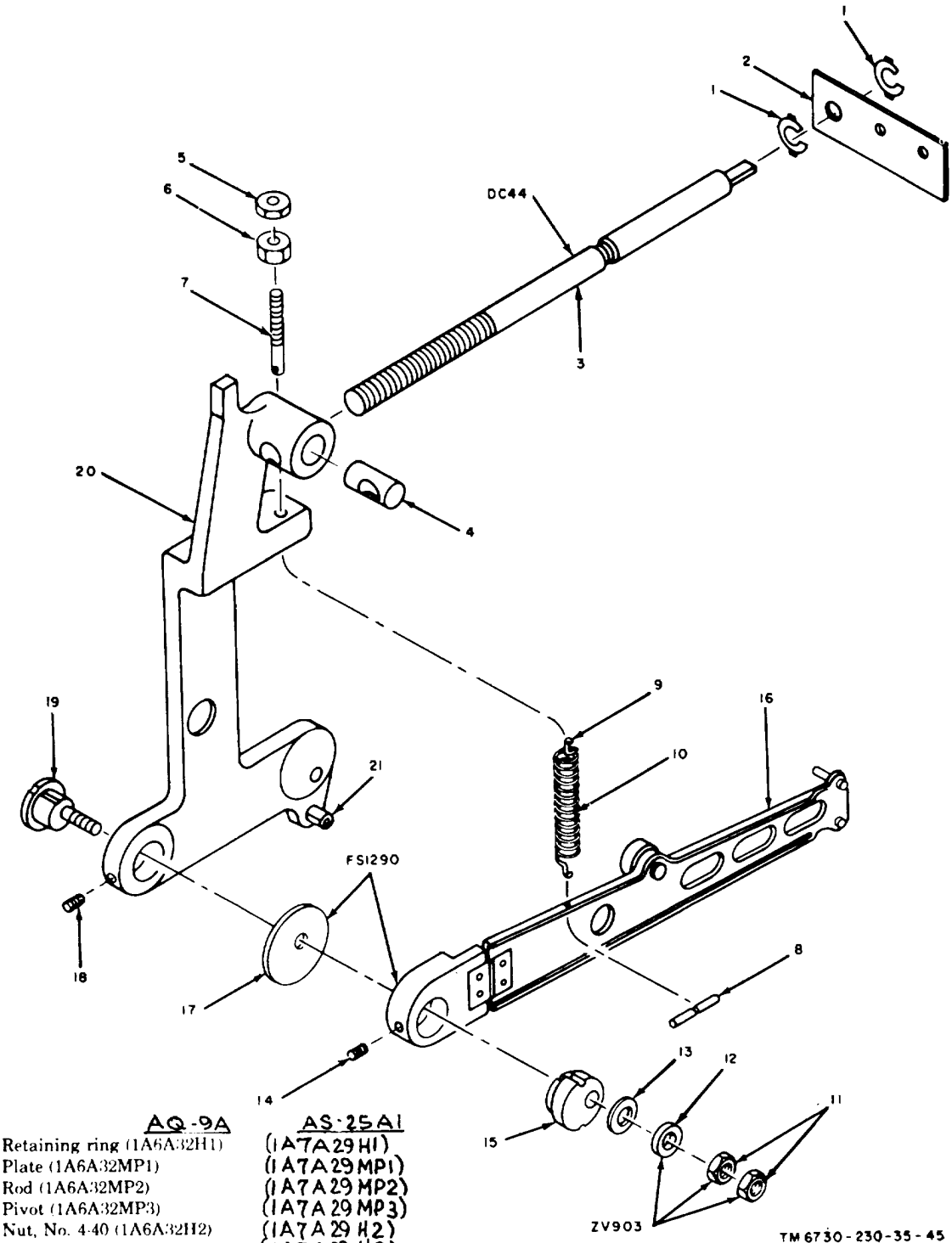
Figure 3-23. Threading control arm, exploded view.



TM 6730-230-35-44

		AQ-9A	AS-25A1
1	Shutter actuating spring	(1A6A29MP1)	(1A7A27MP1)
2	Threading forming screw	(1A6A29H1)	(1A7A27H1)
3	Setscrew	(1A6A29H2)	(1A7A27H2)
4	Setscrew	(1A6A29H3)	(1A7A27H3)
5	Retaining ring	(1A6A29H4)	(1A7A27H4)
6	Cam and hub assembly	(1A6A29A1)	(1A7A27A1)
6a	Hub		
6b	Cam		
7	Bumper	(1A6A29MP2)	(1A7A27MP2)
8	Fixed shutter blade assembly	(1A6A29A2)	(1A7A27A2)
9	Inner shutter blade assembly	(1A6A29A3)	(1A7A27A3)
10	Flat washer	(1A6A29H5)	(1A7A27H5)
11	Outer shutter blade assembly	(1A6A29A4)	(1A7A27A4)
12	Shutter actuator assembly	(1A6A29A5)	(1A7A27A5)

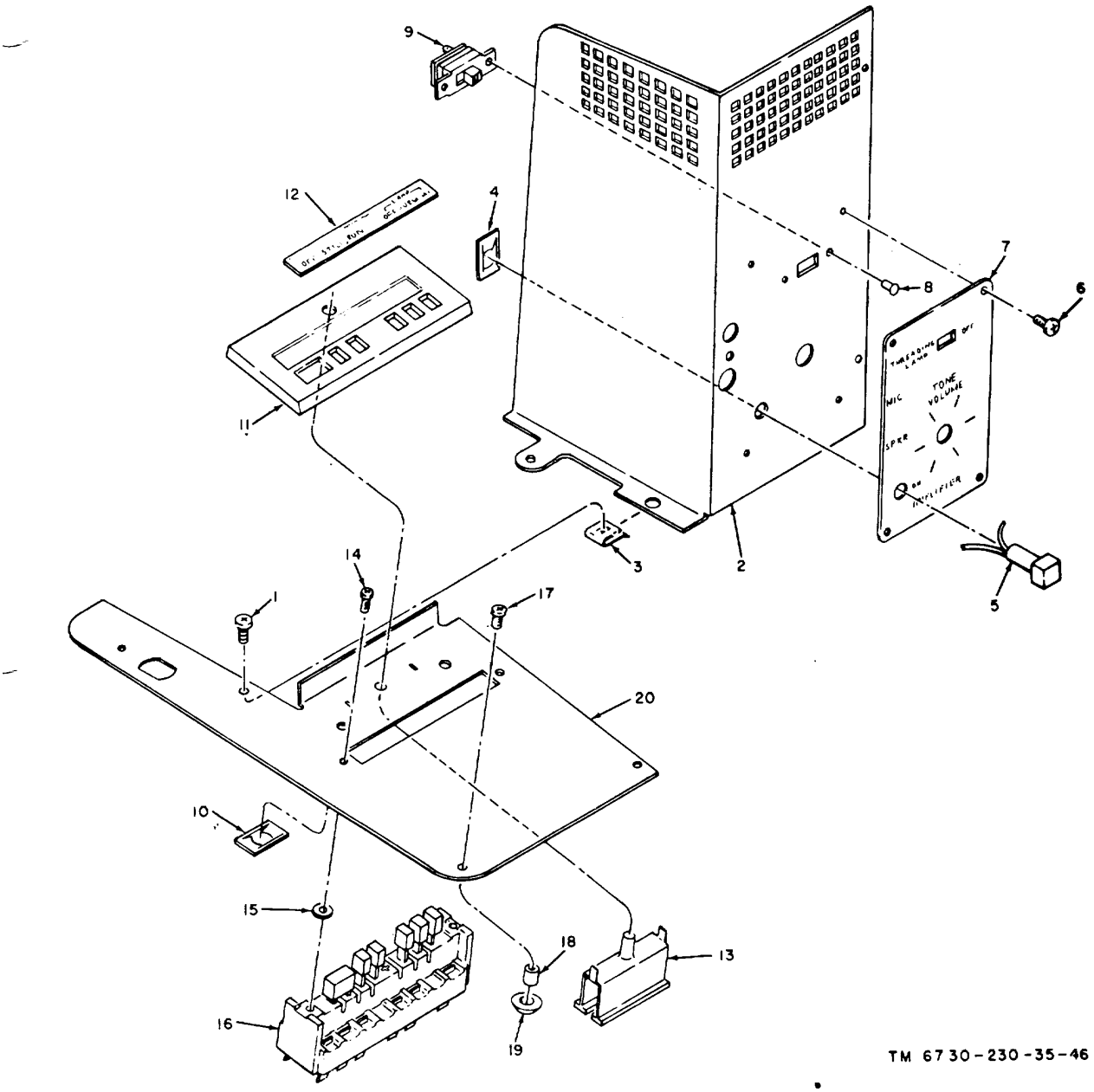
Figure 3-24. Shutter and cam assembly explode view.



	AQ-9A	AS-25A1
1	Retaining ring (1A6A32H1)	(1A7A29H1)
2	Plate (1A6A32MP1)	(1A7A29MP1)
3	Rod (1A6A32MP2)	(1A7A29MP2)
4	Pivot (1A6A32MP3)	(1A7A29MP3)
5	Nut, No. 4-40 (1A6A32H2)	(1A7A29H2)
6	Nut, self-locking (1A6A32H3)	(1A7A29H3)
7	Stud (1A6A32MP4)	(1A7A29MP4)
8	Pin (1A6A32H4)	(1A7A29H4)
9	Spring (1A6A32MP5)	(1A7A29MP5)
10	Dampened spring (1A6A32MP6)	(1A7A29MP6)
11	Nut, (1A6A32H5)	(1A7A29H5)
12	Flat washer (1A6A32H6)	(1A7A29H6)
13	Flat washer (1A6A32H7)	(1A7A29H7)
14	Setscrew (1A6A32H8)	(1A7A29H8)

	AQ-9A	AS-25A1
15	Bushing (1A6A32MP7)	(1A7A29MP7)
16	Claw arm assembly (1A6A32A1)	(1A7A29A1)
17	Flat washer (1A6A32H9)	(1A7A29H9)
18	Setscrew (1A6A32H10)	(1A7A29H10)
19	Pivot assembly (1A6A32A2)	(1A7A29A2)
20	Framing arm assembly (1A6A32A3)	(1A7A29A3)
21	Roll pin (1A6A32A3H1)	N/A

Figure 3-25. Claw arm, exploded view.



1	Thread forming screw (1A6A38H8)	8	Rivet (1A6A38H7)	15	Flat washer (1A6A38H3)
2	Amplifier cover (1A6A38MP7)	9	Threading lamp switch (1A6A38S2)	16	Control switch (1A6A38S1)
3	Speed nut (1A6A38H9)	10	Speed nut (1A6A38H1)	17	Machine screw (1A6A38H4)
4	Speed nut (1A6A38H6)	11	Control switch escutcheon (1A6A38MP2)	18	Spacer (1A6A38MP4)
5	Pilot lamp (1A6A38DS1)	12	Instruction plate (1A6A38MP1)	19	Rubber foot (1A6A38MP3)
6	Thread forming screw (1A6A38H5)	13	Circuit breaker (1A6A38CB1)	20	Control switch cover (1A6A38MP6)
7	Instruction plate (1A6A38MP5)	14	Thread forming screw (1A6A38H2)		

Figure 3-26. Amplifier cover assembly, exploded view (AQ-9A).

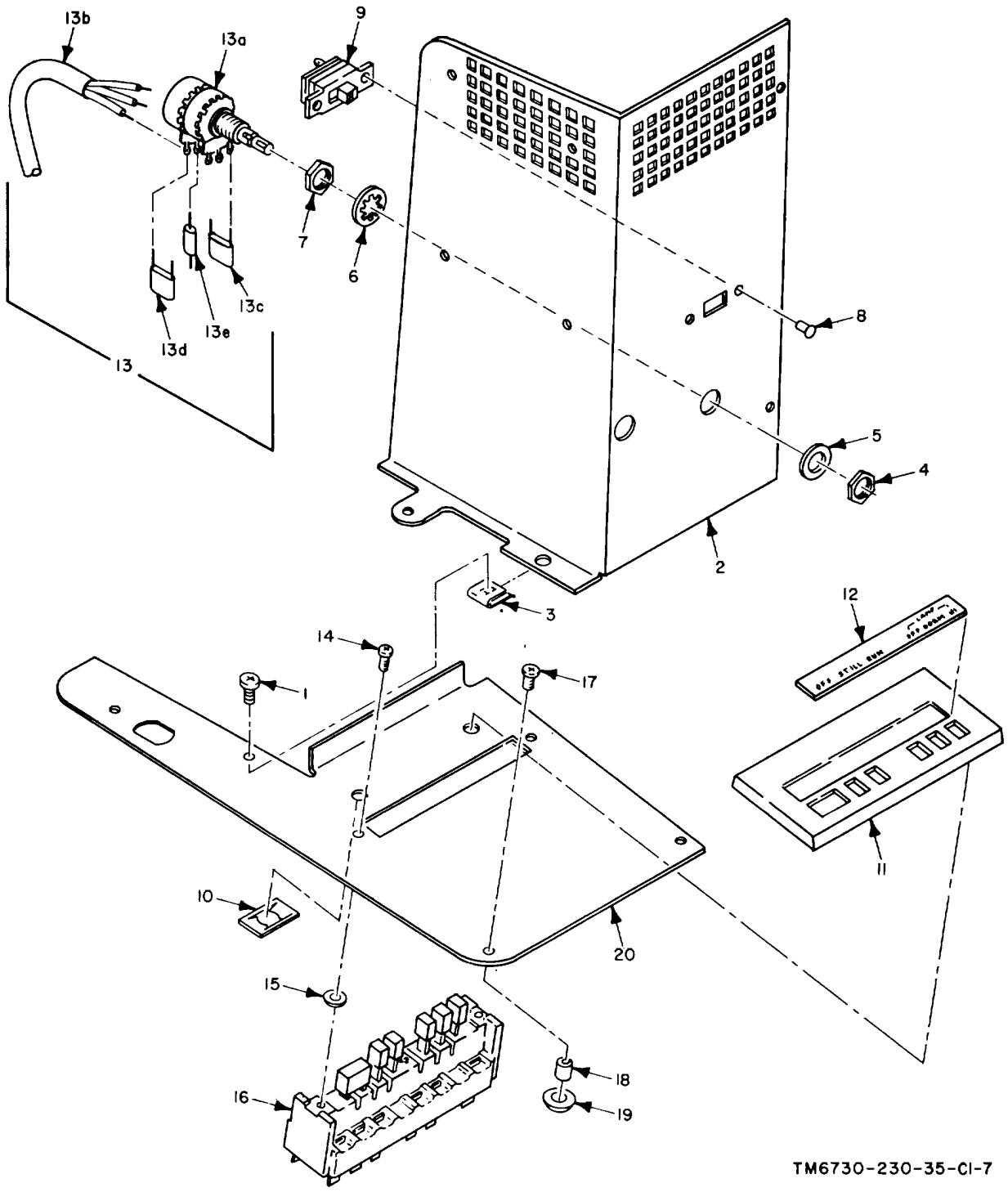
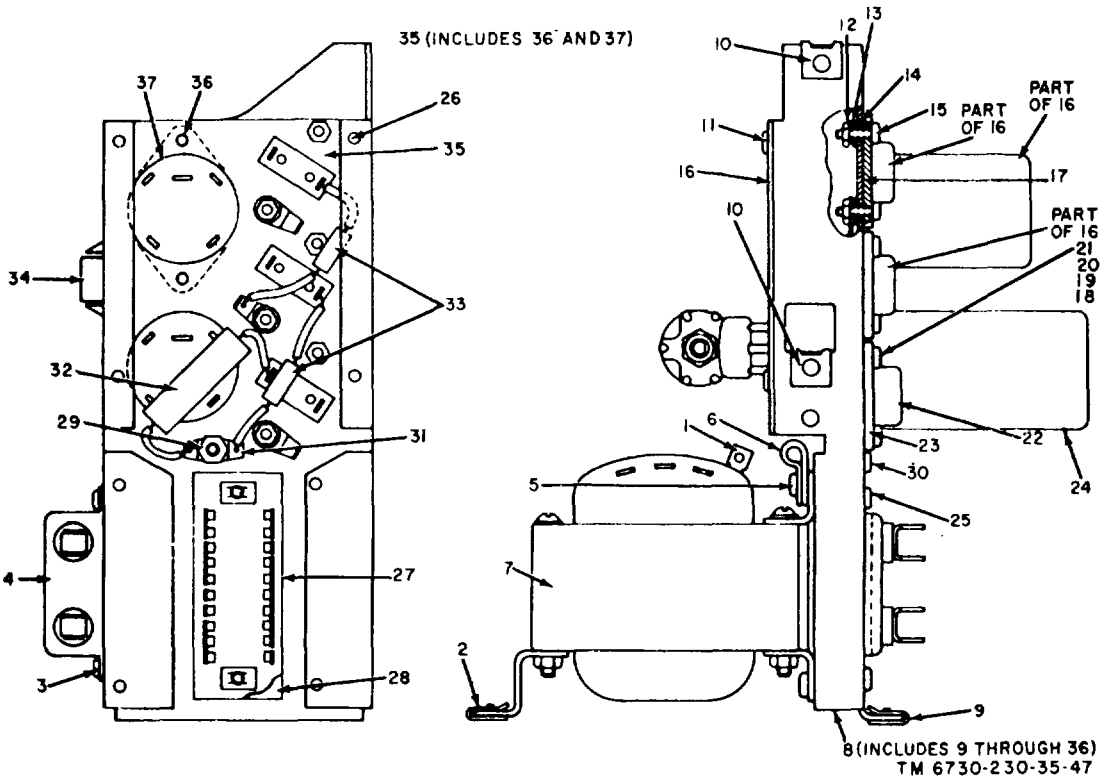


Figure 3-26.1 Amplifier cover assembly, exploded view (AS-25A1).

1 Self-tapping screw (1A7A34H6)
2 Amplifier cover (1A7A34MP5)
3 Stamped nut (1A7A34H7)
4 Nut (1A7A34A1A1H1)
5 Washer (1A7A34A1A1H2)
6 Washer (1A7A34A1A1H3)
7 Nut (1A7A34A1A1H1)
8 Rivet (1A7A34H5)
9 Threading lamp switch (1A7A34S2)
10 Stamped nut (1A7A34H1)
11 Control switch escutcheon (1A7A34MP2)
12 Instruction plate (1A7A34MP1)
13 Network assembly (1A7A34A1)
13a Volume/tone control (1A7A34A1A1)
13b Cable assembly (1A7A34A1W1)
13c Capacitor (1A7A34A1C1)
13d Capacitor (1A7t34A1C2)
13e Resistor (1A7A34A1R1)
14 Self-tapping screw (1A7A34H2)
15 Flat washer (1A7A34H3)
16 Control switch (1A7A34S1)
17 Machine screw (1A7A34H4)
18 Spacer (1A7A34MP4)
19 Rubber foot (1A7A34MP3)
20 Control switch cover (1A7A34MP6)

Figure 3-26.1-Continued.



1	Adapter (CPI)	20	Insulation bushing (A2MP2)
2	Speed nut (HI)	21	Machine screw (A2H9)
3	Thread forming screw (H2)	22	Transistor (A2Q1)
4	Network capacitor (CI)	23	Insulator (A2E2)
5	Thread forming screw (H3)	24	Capacitor (A2C2)
6	Wire clamp (H4)	25	Speed nut (A2H10)
7	Transformer assembly (Al)	26	Thread forming screw (A2Hll)
8	Amplifier subassembly (A2)	27	Power supply board assembly (A2A2)
9	Speed nut (A2H1)	28	Insulator (A3E3)
10	Speed nut (A2H2)	29	Nut (A2I'12)
11	Thread forming screw (A3H3)	30	Machine screw (A2H13)
12	Nut (A2H4)	31	Terminal (A2E4)
13	Lockwasher (A2H5)	32	Electrolytic capacitor (A2CI)
14	Insulation bushing (A2MPI)	33	Resistor (A2RI)
15	Machine screw (A2H6)	34	Plug (A2E5)
16	Circuit board (A2AI)	35	Chassis assembly (A2A3) (includes 36 and 37)
17	Insulator (A2EI)	36	Rivet (A2A3HI)
18	Nut (A2H7)	37	Mounting wafer (A2A3E1)
19	Lockwasher (A2H8)		

Figure 3-27. Amplifier. parts locations (.AQ-9A).

Section II. CLEANING AND LUBRICATION

3-22. Cleaning and Repair of Film Pressure Shoe

(fig. 3-10 and fig. 3-12.1)

WARNING

Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

a. Clean the shoe assembly (2, fig. 3-10 or 3, fig. 3-12,1) shoe adjusting plate (7, fig. 3-10) and mounting p late (9, fig. 3-10) with cleaning compound to remove any emulsion deposits or other foreign matter. Wipe the cleaned parts.

b. Inspect the shoe assembly for burrs or rough spots that can scratch film. Be sure it is not bent. Replace the shoe assembly if it is defective.

c. Check the helical pressure shoe springs (3) for stretch or loss of resiliency and replace if defective (AQ-9A).

d. Check the condition of the pressure shoe spring (8) and replace it if defective (AQ-.9A).

3-23. Cleaning and Repair of Feed Sprocket Shoe

(fig. 3-11)

a. Wash all parts of the feed sprocket shoe in methyl alcohol.

b. Inspect the guide rollers (3) and the rollers on the follower assembly (4) for wear. Replace -if worn.

c. Inspect roller on the dampener assembly (6) for wear. Replace the dampener assembly if the roller is defective.

d. Check the springs (5 and 7) for loss of resiliency or other defects that might prohibit their reuse. Replace if defective.

e. Inspect the feed shoe cover (2) for cracks or breaks and replace if defective.

3-24. Cleaning and Repair of Lens Holder Assembly

(fig. 3-12)

a. Wash the parts of the lens holder assembly in methyl alcohol and wipe dry.

b. Inspect the lens holder body (9) for cracks or other external damage. Be sure the groove pin (8) has not been broken off leaving a part in 'the body. Inspect all threaded holes for stripped threads.

c. Touch up any scratches on the body with blue touchup paint.

d. Be sure the lower spring (2) or the spring assembly (4) is not bent. Replace either of these parts if bent.

3-25. Cleaning and Repair of Aperture Plate Assembly

(fig. 3-13)

a. Clean the guide and aperture plate with a cloth dampened with cleaning compound. Use a toothpick or brush to remove dirt or emulsion deposits.

b. Inspect all parts for wear and damage and replace any that are defective.

3-26. Cleaning and Repair of Film Clutch Assembly

(fig. 3-14)

a. Clean the inner face of the gear assembly with a clean, dry cloth. The bearings (13 and 19) and the clutch facing (5) are permanently lubricated and should not be cleaned in a solvent. All other metal parts of this assembly can be cleaned with cleaning compound.

b. Inspect the clutch facing (5) and the inner and outer clutch plate assemblies (3e and 7) for wear. Replace any of these parts that are worn.

c. Inspect the feed sprocket gear assembly (22) for broken or worn gear teeth, a bent shaft, or wear on the shaft bearing surface. The complete assembly should be replaced if any defects are noted.

d. Inspect the condition of the bearings (13 and 19) and replace them if worn or faulty.

e. Check the pawl assembly (3c) for wear, and replace it if defective.

f. Check the cam plate (8) for wear and replace if bad or worn.

g. Check the belt guide for bends. Straighten any minor bends.

h. Check the condition of the clutch spring (2) and replace it if necessary.

3-27. Cleaning and Repair of Lamp House Cover Assembly

(fig. 3-15)

a. Wash the metal parts of the lamp house cover assembly in cleaning compound. Remove the dust from the lamp house cover, and remove any stubborn dirt or stains with mild detergent.

b. Inspect the lamp house cover (7) for cracks, breaks, or other external damage. Inspect the

nameplate for legibility and replace it if necessary. Touchup any scratches or nicks with blue touchup paint.

c. Inspect the latch assembly (2) and replace it if bent or broken.

d. Inspect the framing knob assembly (6) and replace it if broken or damaged.

3-28. Cleaning and Repair of Supply Reel Arm

(fig. 3-16)

a. Wash all parts except the supply reel arm in cleaning compound. Wipe the supply arm with a clean cloth and remove any stubborn dirt or stains with detergent.

b. Inspect all parts and replace any that are worn or bad. Touchup any nicks or scratches on the supply arm with blue touchup :paint.

3-29. Cleaning and Repair of Mounting Plate Assembly

(fig. 3-17)

a. Clean the exterior of the motor assembly (6) 1)by wiping with a cloth moistened in cleaning compound. I)o not saturate.

b. Inspect the condition of the motor wiring, bearing, and exterior in general. Frayed insulation on wires should be taped. Replace the complete motor assembly if other repairs are required.

c. Check the fins on the blower wheel (2). If fins are damaged or warped, replace the wheel.

3-30. Cleaning and Repair of Drive Unit Assembly

(fig. 3-18)

a. Wash all the metal parts in cleaning compound. Clean the motor and pulley assembly with methyl alcohol.

b. Inspect the condition of the motor and wiring. Repair any frayed wire insulation tape. If wires are broken or the motor is otherwise damaged, replace the complete assembly.

3-31. Cleaning and Repair of Drive Belt Shift Fork Assembly

(fig. 3-19)

a. Wash the metal parts of the drive belt shift fork assembly in cleaning compound and dry with a clean cloth.

b. Inspect all parts and replace any that are worn or damaged.

3-32. Cleaning and Repair of Takeup Reel Arm

(fig. 3-20)

a. Wash all parts except the takeup arm in cleaning compound. Wipe the takeup arm with a clean cloth and remove any stubborn dirt or stains with detergent.

b. Inspect all parts and replace any that are worn or defective. Touch lip any nicks or scratches on the takeup reel arm with blue touchup paint.

3-33. Cleaning and Repair of Takeup Clutch Arm

(fig. 3-21)

a. Wash all metal p1tilts except the pulley assembly (12) in cleaning compound and dry with a clean cloth.

b. Inspect the pulley assembly (12) for wear on the pulley and/'or shaft bearing surface. Replace if worn.

c. Inspect the arm assembly (13) and replace it if damaged or bent.

d. Inspect all other parts and replace any that are defective.

3-34. Cleaning and Repair of Takeup Shoe Arm

(fig. 3-22)

a. Wash the parts of the takeup shoe in methyl alcohol and dry with a clean cloth.

b. Inspect the rollers (3) and replace them if worn or damaged.

c. Inspect the roller studs on the takeup shoe assembly (5) for wear or damage. Replace takeup shoe assembly if the studs are bad.

d. Inspect the cover (2) for cracks or other damage and replace if defective.

3-35. Cleaning and Repair of Threading Control Arm

(fig. 3-23)

a. Wash all metal parts of the threading control arm in cleaning compound and dry with a clean cloth. Wash the rollers (2) with methyl alcohol and dry with a clean cloth.

b. Inspect the rollers and replace them if worn or damaged.

c. Inspect the condition if the threading control arm assembly (11). Replace complete arm if defective.

d. Inspect other parts of the assembly and replace if defective.

3-36. Cleaning and Repair of Shutter and Cam Assembly

(fig. 3-24 and fig. 3 -26.1)

a. Wipe the parts of the shutter and ,cam assembly with cleaning compound and dry with a clean cloth.

b. Inspect -the parts of the cam and hut) assembly (6) for wear. if either the hub (6a) or cam (6b) are defective, replace the complete assembly, since these parts are manufactured as a matched set.

c. Inspect the other parts of the shutter and cam assembly and replace any that are bent, worn, or broken.

3-37. Cleaning and Repair of Claw Arm

(fig. 3-25)

a. Wash all except the oil impregnated parts of the claw arm in cleaning compound and dry with a clean cloth.

b. Inspect the pins and the follower portion on the claw aim assembly for wear or damage. Inspect the spring hinge for damage. Replace the complete claw arm assembly if any parts are worn or damaged.

c. Inspect the condition of the pivot assembly (19) and bushing (15). Replace either of these parts if worn.

d. Check the framing arm assembly (20) for damage and replace it if necessary.

3-38. Cleaning and Repair of Amplifier Cover Assembly

(fig. 3-26)

a. Wipe all parts with a dry cloth to remove surface dirt. Stubborn grease or oil stains may be removed with a cloth moistened in cleaning compound.

b. Inspect the control switch (16) for broken or inoperative push-buttons and replace if defective.

c. Check the condition of all parts and replace any that are defective.

3-39. Cleaning and Repair of Amplifier

a. *Cleaning*. Remove any dust from the amplifier -with a vacuum cleaner or a soft-bristled brush. Do not use cleaning compound on the circuit board.

b. *Inspection*. Inspect the printed circuit board for cracks or breaks. Check the amplifier wiring for damaged insulation or burns. Check the mounting of parts.

CAUTION

On projector AS-25A1, the amplifier should never be operated with a fuse larger than that specified by the manufacturer. On projector AQ-9A, the amplifier should never be operated with the circuit breaker disconnected.

c. *Checking for Shorted Transistors*. Transistors cannot be tested ill the circuit with an in (ci1rcu?it tester, but, as a preliminary test, a 20,000-ohm-per-volt ohmmeter should be used 'to check front-to-back resistance ratio. Use the R x 10 or R. x 100 scale of the ohmmeter for all checks except power transistors. Power transistors should be tested on the R x 1 scale. Measure the resistance from emitter to collector (fig. 1--7 and fig. 1-7.1) Reverse the polarity of the test prods. This same test is performed from emitter to base and base to collector. There should be a significant difference in the readings obtained. If a very low reading is obtained and there is little or no difference when the polarity is reversed, the transistor should be removed and replaced. If there is an extremely high resistance in both directions, the transistor is open.

d. Checking for shorted Diodes. Diodes are checked in the same manner as transistors (c above), except test prods should be connected to anodes and cathodes and reversed.

e. Checking Transistor "Leakage" (K.-9A).

(1) Attach a dummy 8-ohm, 10-watt (minimum) load in place of the speaker.

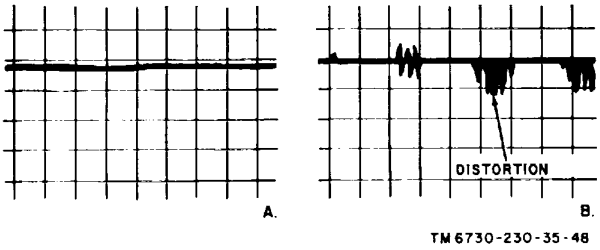
(2) With projection lamp and amplifier at OFF, connect the projector to a 125-volt ac line.

(3) Connect the vertical sweep of an oscilloscope across the dummy load.

(4) Turn the amplifier on and off; observe the wave shape on the oscilloscope. Repeat the test two or three times. Operate the amplifier only for short periods of time at this high voltage. If the waveform al)pears exactly as in A, figure 3- 28, proceed to (5.) below. If high-frequency spikes are present as shown in B, figure 3-28, replace Q5 immediately.

(5) Apply a 1.000-cps audio signal into the microphone jack. With the tone control in normal position, increase the volume until the sine wave is distorted, as shown in -A, figure 3-29. If high-frequency distortion pulses are p)resent as shown in B, figure 3-29, replace Q3. If this does not eliminate distortion, change Q4.

(6) After any transistor replacement, repeat test in (4) above to be certain the amplifier is operating correctly.



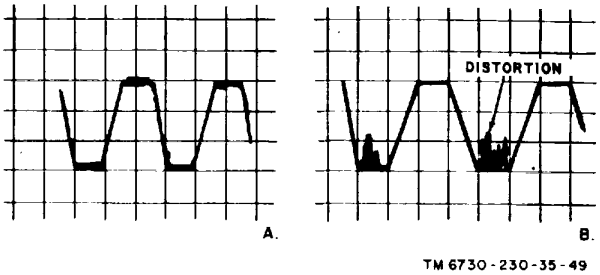


Figure 3-28. Test wareforms for transistor Q5.

f. *Checking Continuity of Signal Through Amplifier (Projector AS-25A1).*

(1) Connect an audio oscillator to a 40-db attenuator with the VTVM connected across the output of the attenuator. Also connect output of the attenuator to pins J7 and J8 (fig. 1-8) of preamplifier, pin J8 being the ground connection. Connect an 8-ohm resistive load to the output of the power amplifier at the speaker jack.

(2) Set power amplifier at ON.

NOTE

No film should be in the projector. Apply a 15-mv signal, as measured on the VTVM, to the preamplifier. Set volume and tone controls at midposition. Make checks at the collectors of Q2, Q3, and Q4 in that order using the oscilloscope probes. An undistorted sine wave should be observed at all collectors if the pre-amplifier is functioning properly. If a distorted signal or no signal is noted, the point at which this occurs isolates the defective area in the circuit board. Replace the defective board. Identify the defective area on the board for repair at a later date.

(3) Test across the 8-ohm dummy resistive load. An undistorted sine wave should be noted. Any distortion indicates a defective power amplifier. Replace. Identify the defective area on the board for repair at a later date.

Figure 3-29. Test waveforms for transistor Q4 and Q3.

(4) If the total sound system performs as specified above, normal output (8 ohms) should be obtained across the resistive load with a standard 400-cycle test film in the projector. Thread film in the projector, set tone control at mid- position and volume control at 3/4 position for the test across the resistive load. If the 8-ohm reading is not obtained, check for dc voltage loss using a 20,000 ohm per volt meter at test points shown in the schematic diagram. Replace any faulty components found while testing.

g. A*mplifier Printed Circuit board Parts*. The locations of components on the amplifier printed circuit boards are shown in figures 3-30, AQ-9A projector, and 3-30.1 AS-25A1 projector. The respective wiring diagrams are figures 3-32 and 3-32.1. On projector AQ-9A only, capacitor (1) and transistors (2 and 3) are loose items but are considered part of the circuit board.

h. *Power Supply Printed Circuit Board Parts*. The location of parts on the power supply printed circuit boards are shown in figure 3-31, AQ-9A projector, and figure 3-31.1, AS-25A1 projector.

3-40. Replacement of Takeup and Feed Sprocket Shaft Bearing

These two bearings are press-fitted into the housing. To replace, push out the old bearings and press new bearings into place. Lubricate the new bearings as described in paragraph 3-41.

3-41. Lubrication and Sealing

CAUTION

Do not vary the lubrication requirements outlined in c below. Excessive, incorrect, or inadequate lubrication of certain parts can cause a projector malfunction.

a. *Lubrication.*

(1) Lubrication points for the projector outlined in c below. Lubricate the project during reassembly procedures as indicated. lubricants used are Lubricating Oil, Instrument (OAI) (FSN 9150-664-6r518) and Grease; Silicon (FSN 9150-753-4588).

(2) Be careful to avoid getting lubricants on optical parts of the projector. If lubricant is accidentally spilled on these parts, clean the parts carefully.

b. *Sealing.*

(1) Points of the projector requiring sealant are outlined in d below. Apply sealant during reassembly or after adjustment as indicated. The sealant used is Glyptal.

(2) Be careful when using sealants to avoid sealing parts other than these specified. Be particularly careful to keep sealants off optical parts.

c. Lubrication Points.

Fig. No	Item	Remarks	Lubricant
8, fig. 3-2	Flat washer	Coat both sides	Grease.
9, fig. 3-2	Flat washer	Coat both sides	Grease.
18, fig. 3-2	Film gate lever eccentric	Apply to area that interfaces with lens holder assembly.	Grease
21, fig. 3-2	Cower lens holder spring	Apply to side that interfaces with projector housing	Grease
22, fig. 3-2	Film gate lever assembly	Apply to side that interfaces with projector housing.	Grease.
Fig. 3-2	Lens holder guide rod	Coat completely	Grease.
28, fig. 3-2	Film feed clutch assembly	Apply to bearing interface and gear teeth.	Grease
29, fig. 3-2	Flat washer	Coat both sides	Grease
Fig. 3-2	Film feed clutch bearing	3 drops on bearing	Oil- (OAI).
6, fig. 3-3	Lubricator' pad assembly	16 drops on pad every 500 hours and during reassembly.	Oil (OAI}
14, fig. 3-3	Belt guide post	Coat lightly	Grease.
15, fig. 3-3	Supply reel belt guide	Coat interface areas. I)o not get grease on belt contact areas.	Grease.
20, fig. 3-3	Supply reel arm	Coat pivot	Grease
21, fig. 3-3	Arm locking plunger	Coat lightly	Grease
23, fig. 3-3	Reel arm guard	Lightly coat area that contacts housing.	Grease.
31, fig. 3-4	Belt shift eccentric	Coat pivot and bearing interfaces and fig. 3-4.1	Grease.
38, fig. 3-4w	Reversing switch assembly	Bearing surface and fig. 3-4.1	Grease.
3, fig. 3-5	Takeup reel arm	Coat pivot completely	Grease
5, fig 3-5	Reel arm guard	Coat area that interfaces with projector housing.	Grease
6, fig 3-5	Arm locking plunger	Bearing surface	Grease
(16 and 17) fig. 3-5	Flat washers	Coat both sides	Grease.
18, fig. 3-5	Takeup sprocket gear assembly	Coat gear teeth and bearing interface.	Grease
19, fig. 3-5	Flat washer	Coat both sides	Grease
Fig. 3-6	Takeup sprocket gear bearing	Apply :t drops of bearing surface	Oil (OAI).
4, fig. 3-6	Reel tension arm	Coat pivot and area that interfaces with projector housing.	Grease.
9, fig. 3-6	Shoe lever assembly	Shaft	Grease
8, fig. 3-6	Takeup shoe	Coat pivot and area that interfaces with projector housing	Grease.
10, fig. 3-6	Flat washer	Coat both sides	Grease

C1

Fig. No.	Item	Remarks	Lubricant
9, fig. 3-6	Shoe lever assembly	Coat pivot and area that interfaces with projector housing and takeup shoe.	Grease.
18, fig. 3-6	Spacer	Coat both sides	Grease.
17, fig. 3-6	Threading control arm	Coat pivot	Grease.
17, fig. 3-6	Threading control arm	Coat edge which contacts spring (29).. Fig :3-5.	Grease.
20, fig. 3-6	Pressure roller arm assembly	Coat pivot and area that interfaces with projector housing.	Grease.
12, fig. 3-6	Loop set lever	Coat pivot and area that interfaces with projector housing.	Grease.
9, fig 3-7	Drive shaft hearing	Pack all moving surfaces	Grease.
10. fig. 3-7	Spring washer	Apply to interface surfaces	Grease.
12, fig. 3-7	Takeup drive gear	Apply to worm surface	Grease.
18, fig. 3-7	Drive shaft hearing	Pack all moving surfaces	Grease.
22, fig. 3-7	Safety shutter link	Apply to inside edges	Grease.
20, fig. 3-7	Feed drive gear	Apply to worm surface	Grease
31, fig. 3-7	Framing arm pivot	Apply to interface surfaces	Grease.
17, fig 3-7	Rewind knob assembly	Apply a light coating on bear- ing surfaces	Oil (OAI).
26, fig. 3-9 and fig. 3-9.1	Elevation clamp stud	Apply to, hearing and interface sur- face.	Grease.
4. fig. 3-11	Follower assembly	Apply 2 drops between rollers after assembly.	Oil (OAI).
9, fig :3-11	Feed shoe assembly	Apply a light coating to rol- ler shafts.	Grease.
3a, fig. 3-14	Toggle spring	Apply 2 drops after assembly	Oil (OAI).
3 fig. 3-11	Clutch plate	Apply light coating to plate contact surface.	Grease.
2e, fig. 3-18	Spring	Apply a light coating to interface	Grease.
3, fig. 3-18	Bearings	Apply t inside diameter and outside face.	Grease.
8, fig :3-19	Washer	Coat both sides	Grease.
9, fig 3-1	Lever	Apply to eccentric slot	Grease
10. fig. 3-19	Fork	Coat roller contact area	Grease.
11, fig :3-19	Bushing	Coat interface areas	Grease.
12, fig :3-19	Flat washer	Coat both sides	Grease
5, fig :3-22	Takeup shoe arm	Apply a light coating to roller shifts.	Grease.
5, fig :3-2:1	Cap	Apply a light coating. to inside dii- meter	Oil (OAI).
6, fig :3-2:1	Film tension arm assembly	Apply a light coating to cap mount- ing surface and control arm inter- face area.	Oil (OAI).
6, fig :3-2:3	Film tension arm assembly	Apply a light coating to rol- ler rod.	Grease.
11, fig :3-2:1	Threading control arm assembly	Apply a light coating to roller rod	Grease.
3, fig. 3-2	Rod	Apply to pivot periphery, threads, and hearing surfaces	Grease.
6. Fig. 3-25	Claw arm assembly	Apply to interface between arm and washer	Grease.

d.Sealant Points. Apply Glyptal as indicated below:

Fig. No.	Item	Remarks
12. fig. 3-2	Setscrew	Apply to threads during assembly.
7. fig 3-3	Lamp base capscrew	Apply to threads during adjustment.
8, fig 3-31	Lamp socket	Apply to bottom of mounting surface during adjustment.
10. fig. 3-4 and fig. 3-4.1	Nut	Apply to threads and back during assembly.
14, fig. 3-6	Machine Screw	Apply to threads during assembly.
29, fig 3-6	Threading control arm spring	Apply coating to interface during assembly.

Fig. No.	Item	Remarks
29, fig. 3-7	Rewind lever stop	Apply coating to mounting side during adjustment.
7, fig. 3-8 and fig. 3-8.)	Machine screw	Apply to threads during assembly.
30, fig. 3-7	Limit plate	Apply coating to mounting side during adjustment.
4, fig. 3-9	Nut	Apply coating to threads during assembly.
8, fig.3-11	Pad	Use for mounting.
30, fig. 3-9	Machine screw	Apply to threads during assembly.
3, 16, 19 and 30, fig. 3-9.1	Machine screw	Apply to threads during assembly.
1, fig. 3-12	Machine screw	Apply to threads during assembly.
1, fig. 3-10	Screw	Threads.
3, fig. 3-12 and fig. 3-12.1	Machine screw	Apply to threads during assembly.
11, fig. 3-25	Nut	Apply during adjustment.
12, fig. 3-25	Flat washer	Apply during adjustment.
13, fig. 3-25	Flat washer	Apply during adjustment.
4, fig. 3-22	Pad	Use for mounting.

Section III. ASSEMBLY

3-42. Assembly of Amplifier Projector AQ-9A (fig. 3-27)

Be careful when installing new parts in the amplifier. Check all solder joints to assure against cold solder joints or shorts. After repair, reinstall the printed circuit board to the chassis with the for machine screws (15).

3-43. Assembly of Amplifier Cover Assembly (fig. 3-26 and pg. 3-26 .1)

a. Assemble the control switch cover (2 to the amplifier cover (2) and secure with the thread forming screw (1) and speed nut (3).

b. Position the threading lamp switch (9) the back of the control switch cover (20) and cure with the two rivets (8).

NOTE

Before riveting the switch in place, be sure the ON and OFF positions of the switch correspond to the markings on the instruction plate (7).

c. Position the instruction plate (7) on control switch cover (20) and secure with the four thread forming screws (6),(AQ-9A).

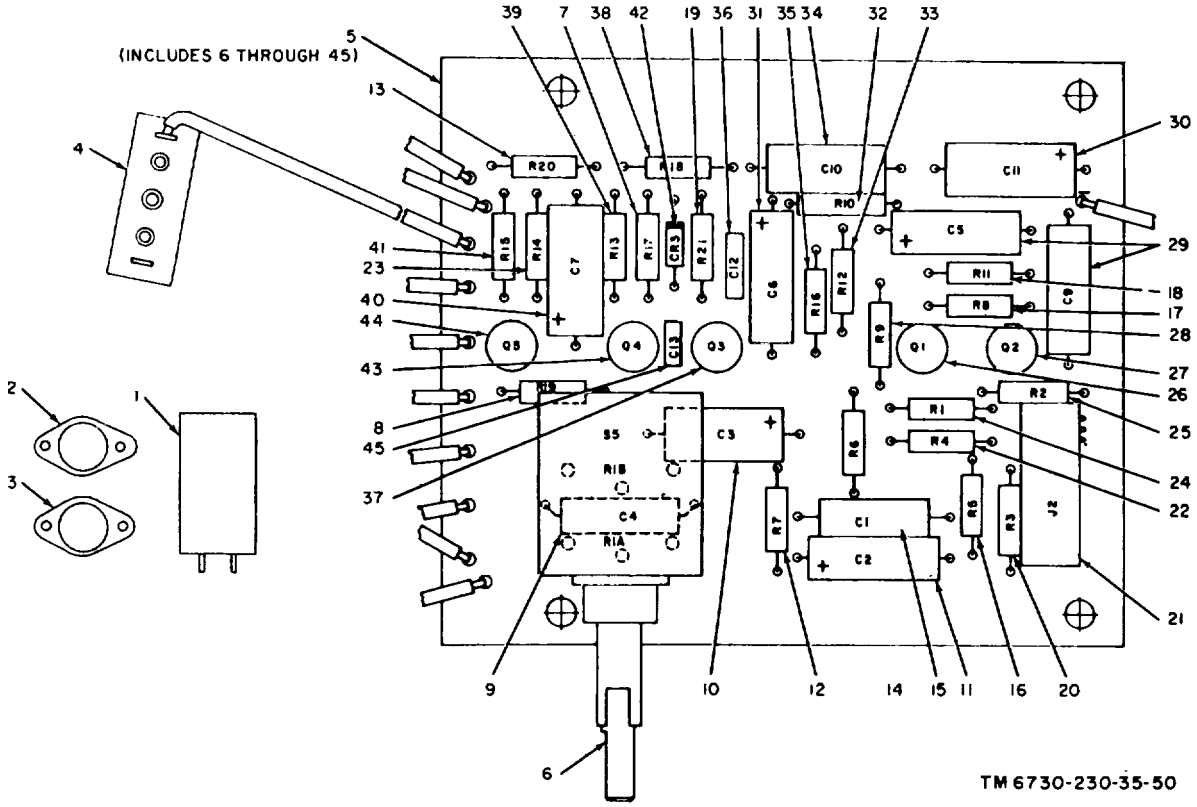
d. On projector t -9-A (fig. 3-26), apply a coat of Res-N-Bond cement to the back of pilot lamp (5) and insert lamp through opening in the instruction plate (7) and amplifier cover (2). Secure with speed nut (4). On projector AS-25A1 (fig. 3-26,1), place nut (7) and lock washer (6) on shaft of the volume/tone control in the network assembly (13) and insert through the amplifier cover (2). Secure with washer (5) and nut (4).

e. Assemble the spacer (18), rubber foot (19), and machine screw (17) to the corner of the control switch cover (20).

f. Position the circuit breaker (13) on the bottom of the control switch cover (20) and secure by bending the tabs (AQ-9A).

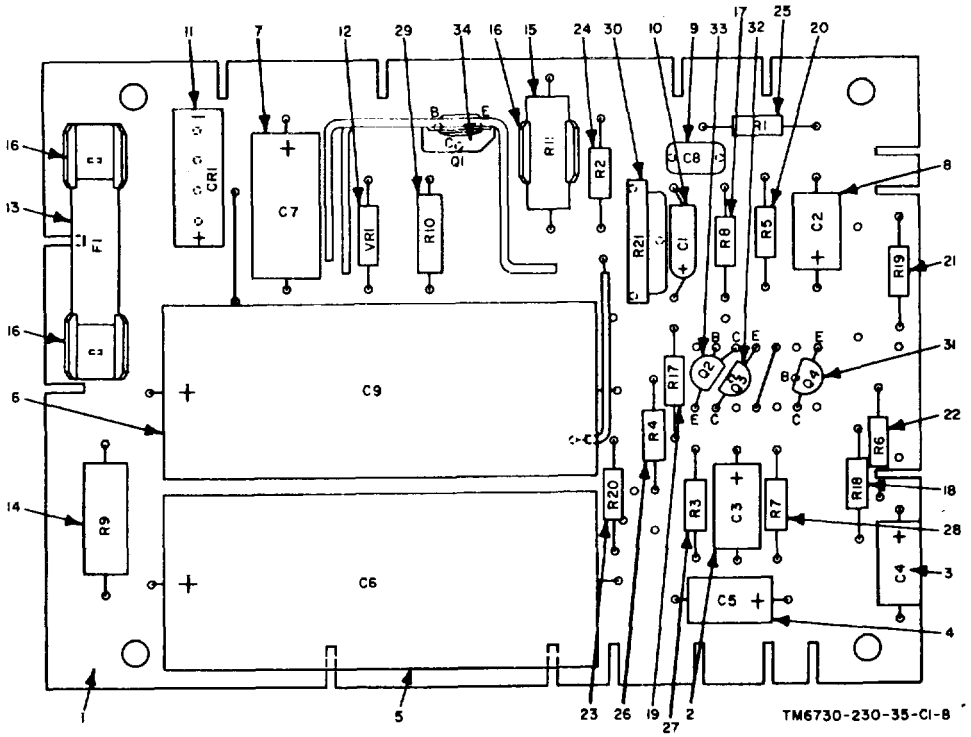
g. Position the control switch (16) and flat washers (15) on the bottom of the control switch cover (20) and secure with the two thread forming screws (14).

h. Position the control switch escutcheon (11) on the control switch cover (20) and secure with the two speed nuts(10).



1 Capacitor (1A6A39A2A1C1)
2 Transistor (1A6A39A2A1Q6)
3 Transistor (1A6A39A2A1Q7)
4 Transistor socket (1A6A39A2A1XQ1)
5 Circuit board assembly (1AGA39A2A1A1) (includes 6 through 45)
6 Volume and tone control (1A6A39A2A1A1S1)
7 Resistor (1A6Ao9A2AlA1R1)
8 Resistor (1A6A39A2A1A1R2)
9 Capacitor (1A6A39A2A1A1C1)
10 Capacitor (1A6A39A2AIA1C2)
11 Capacitor (1A6A39A2 k2A1C3)
12 Resistor (1A6A39A2A1A1R3)
13 Resistor (1A6A39A2A1AlR4)
14 Resistor (1A6A39A2A1A1R5)
15 Capacitor (1A6A39A2AlA1C4)
16 Resistor (1A6A39A2A1A1R6)
17 Resistor (1A6A39A2 k1R7)
18 Resistor (lA6A39A2A1A1R8)
19 Resistor (1A6A39A2A1A1R9)
20 Resistor (1A6A39A2A1A1R10)
21 Cap assembly (1A6A39A2AIA1A1)
22 Resistor (1A6AA39A2A1A1Rll)
23 Resistor (1A6A39A2A1A1R12)
24 Resistor (1A6A39A2AlA1R13)
25 Resistor (1A6A39A2A1A1R14)
26 Transistor (1A6A39A2AIA1Q1)
27 Transistor (1A6A39A2A1A1Q2)
28 Resistor (1A6A39A2A1AlR15)
29 Capacitor (1A6A39A2A1A1C6)
30 Capacitor (1A6A39A2A1A1C7)
31 Capacitor (1A6A39A2A1A1C8)
32 Resistor (1AGA39A2Al1AR16)
33 Resistor (1A6A39A2AIA1R17)
34 Capacitor (1A6A39A2A1A1C9)
35 Resistor (1A6A39A2A1A1R18)
36 Capacitor (1A6A39A2A1A1C9)
37 Transistor (1AGA39A2AAl1Q3)
38 Resistor (1A6A39A2A1A1R19)
39 Resistor (1A6A39A2AlA1R20)
40 Capacitor (1AGA39A2A1A1R21)
41 Resistor (1A6A39A2A1A1R21)
42 Diode (1A6A39A2A1A1CR3)
43 Transistor (1A6A39A2AlAlQ4)
44 Transistor (1A6A39A2AIAlQ5)
45 Capacitor (1A6A39A2A1AIC13)

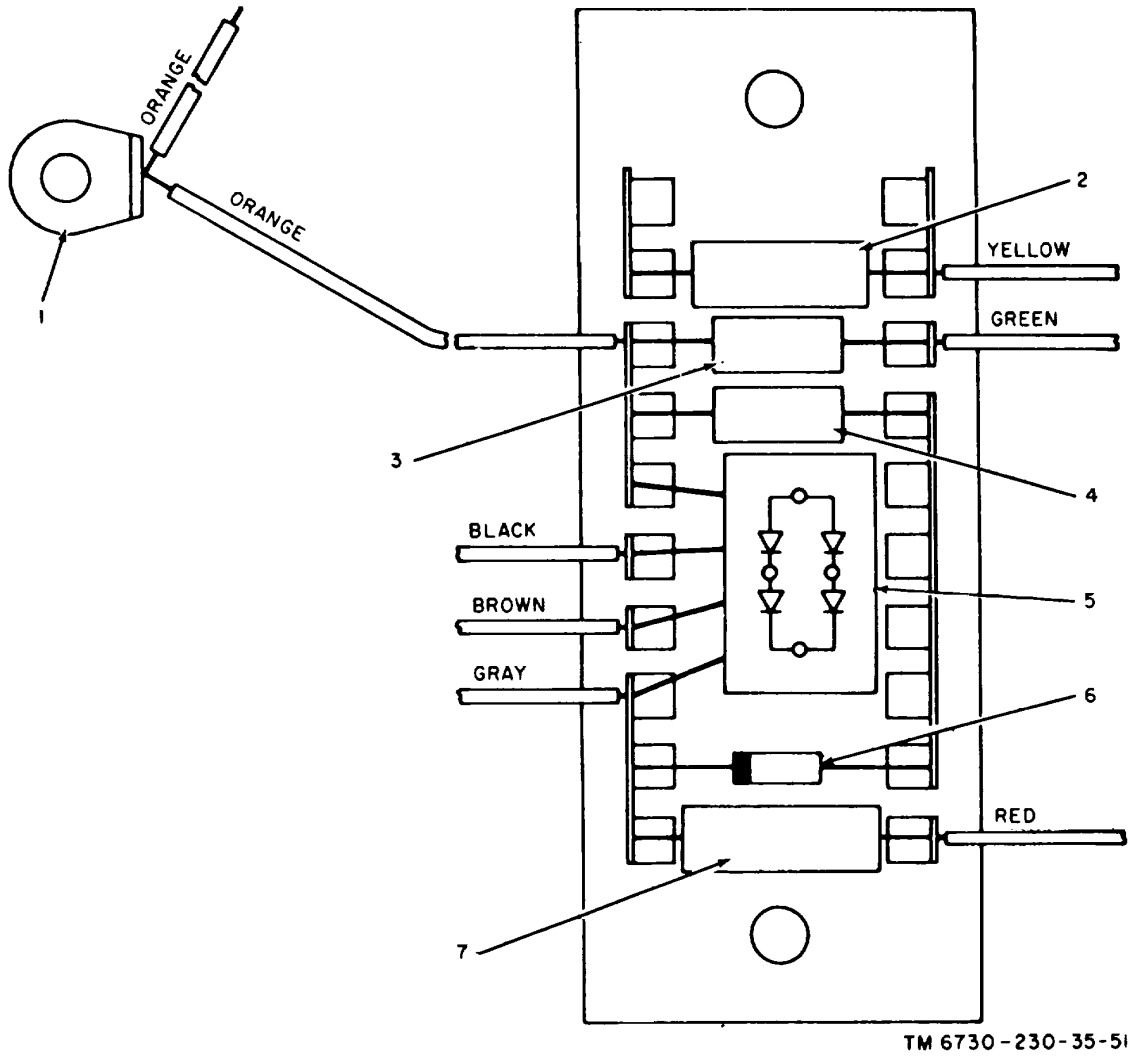
Figure 3-30. Amplifier printed circuit board parts (AQ-9A).



Note: Pretix reference symbol designations with 1A7A36.

1	Printed circuit board (MP1)	13	Fuse (F1)	25	Resistor (R1)
2	Capacitor (C3)	14	Resistor (R9)	26	Resistor (R4)
3	Capacitor (C4)	15	Resistor (R11)	27	Resistor (R3)
4	Capacitor (C5)	16	Fuse clip (XF1)	28	Resistor (R7)
5	Capacitor (C6)	17	Resistor (R8)	29	Resistor (R10)
6	Capacitor (C9)	18	Resistor (RIR)	30	Potentiometer (R21)
7	Capacitor (C7)	19	Resistor (R17)	31	Transistor (Q4)
8	Capacitor (C2)	20	Resistor (R5)	32	Transistor (Q3)
9	Capacitor (C8)	21	Resistor (R19)	33	Transistor (Q2)
10	Capacitor (C1)	22	Resistor (R6)	34	Transistor (Q1)
11	Bridge diode (CR1)	23	Resistor (R20)		
12	Zener diode (VR1)	24	Resistor (R2)		

Figure 3-30.1 Amplifier printed circuit board parts (AS-25A1).



1	Terminal (1A6A39A2A2E1)	5	Diode, Bridge (1A6A39A2A2CR1)
2	Resistor (1A6A39A2A2R1)	6	Diode, Zener (1A6A39A2A2CR2)
3	Resistor (1A6A39A2A2R2)	7	Resistor (1A6A39A2A2R4)
4	Resistor (1A6A39A2A2R3)		

Figure 3-31. Power supply printed circuit board parts (AQ-9A).

i. Install the instruction plate (12) on the control switch escutcheon (11), if required, as follows:

(1) Activate the adhesive backing on the instruction plate with a small amount of trichloroethylene.

(2) Check activation; adhesive should pull away in string-like fashion. If only slightly tacky, use more cleaning compound. If gummy, excessive cleaning compound has been applied and the instruction plate should be allowed to dry.

(3) When the instruction plate has been properly activated, apply it to the control switch escutcheon and smooth with dry cloth or roller to eliminate wrinkles or air bubbles. Apply moderate pressure only.

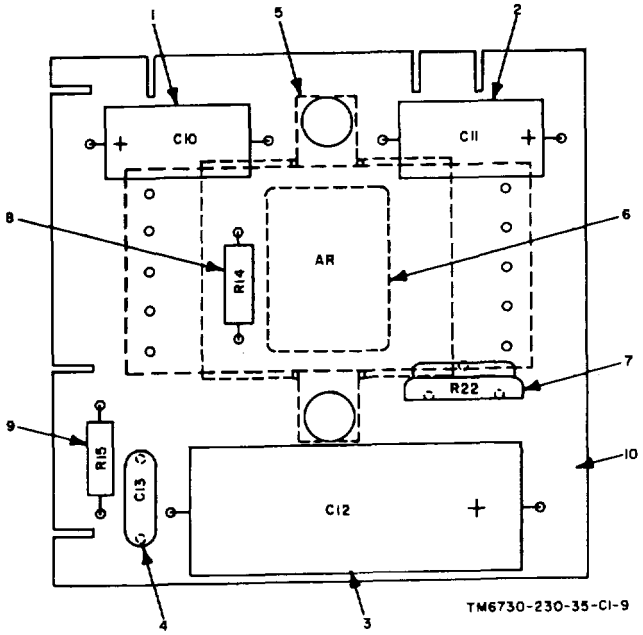
3-44. Assembly of Claw Arm

(fig. 3-25)

a. Insert the roll pin (21) into the framing arm assembly (20)

b. Insert the pivot assembly (19) into the framing arm assembly (20) and install the setscrew (18).

c. Insert the bushing (15) into the claw arm assembly (16) and insert the setscrew (141.



1	Capacitor (1A7A35C10)	7	Potentiometer (1A7A35R2)
2	Capacitor (1A7A35C11)	8	Resistor (1A7A35R14)
3	Capacitor (1A7A35C12)	9	Resistor (1A7A35R15)
4	Capacitor (1A7A35C13)	10	Printed circuit board (1A7A35MP2)
5	Bracket (1A7A35MP1)		
6	Integrated circuit (1A7A35AR)		

Figure 3-31.1 Power supply printed circuit board parts (AS-25A1).

d. Install the flat washer (17) and the claw arm assembly (16) on the pivot assembly (19) and secure with the flat washers (12 and 13) and the two nuts (11).

e. Thread the nuts (5 and 6) on the stud (7) and place the stud through the hole in the framing arm assembly (20).

f. Insert the dampener (10) into the spring (9) and attach one end of the spring to the stud (7).

g. Slide the other end of the spring (9) through the cutout in the claw arm assembly (16) and insert the pin (8) through the loop of the spring to secure in position.

h. Insert the pivot (4) into the framing arm assembly (20) and thread the rod (3) into the pivot. Install the plate (2) and the retaining rings (1) with retaining ring pliers.

3-45. Assembly of Shutter and Cam Assembly (fig. 3-24)

a. Assemble the shutter actuator assembly (12), outer shutter blade assembly (11), and flat washer (10) on the hub (6a).

b. Assemble the inner shutter blade assembly (9), engaging its pin in the slots of the outer shutter blade assembly (11) and the shutter actuator assembly (12).

c. Assemble the fixed shutter blade assembly (8), engaging its pin with the slots of the inner shutter blade assembly (9) and the shutter actuator assembly (12).

d. Install the bumper (7) on the cam (61)) and slide the cam on the hl,) (6a).

e. Position the cam (61)) so that the bumper engages the slot in the fixed shutter blade assembly (8) and assemble the retaining ring (5).

f. Press the cam (61)) onto the hub (6a) with an arbor press.

g. Install the screws (2, 3, and 4) in the hub (6a).

h. Install 'he shutter actuating springs (1).

3-46. Assembly of Threading Control Arm (fig. 3-23)

a. Secure the handle (10) to the threading control assembly (11) with the two thread forming screws (9).

b. Place the spring (8) on the holder of the threading control assembly (11) and secure with the retaining ring (7); use retaining ring pliers.

c. Assemble the film tension arm assembly (6) and cap (5) to the threading control arm assembly (11) and secure with the thread forming screw (3) and spring washer (4).

d. Place the roller (2) on the film tension arm assembly (6) and secure with the retaining ring (1); use retaining ring pliers. Repeat for the roller on the threading control arm assembly (11).

3-47. Assembly of Takeup Sprocket Shoe Arm. (fig. 3-22)

a. Attach the pad (1) to the takeup shoe assembly (5) with Glyptal.

b. Apply a coating of grease to the studs in the takeup shoe assembly. Place a roller (3) on each stud and check to be sure both rollers rotate freely. wipe off any excess grease.

c. Attach the cover (2) to the takeup shoe assembly (5) with the machine screw (1).

3-48. Assembly of Takeup Clutch Arm (fig. 3-22)

a. Assemble the pulley assembly (12) and the flat washer (11) to the arm assembly (13) and secure with the retaining ring (10); use retaining ring pliers.

b. Insert the rod (9) into the slot in the arm assembly (13). Assemble the flat washer (8), spring (7), and flat washer (6) in the rod.

c. Assemble the nut (5) approximately 25 revolutions into the rod (9) and assemble the nut (4) to approximately 3/4 inch from the nut (5).

d. Complete the assembly b installing the spring washer (3) and the bracket (2) and secure wit the nut (1).

3-49. Assembly of Takeup Reel Arm (fig. 3-20)

a. Assemble the brake spring (11) and brake (10) into each brake hole of the takeup aim assembly (12) and install the pulley assembly (9). Hold the pulley in position.

b. Assemble the flat washer (8) and collar (7) on the shaft of the pulley assembly (9).

c. Install the steel ball (6) and the reel retainer spring (5) in the spindle (4) and slide the complete assembly onto the shaft of the pulley assembly (9). Secure the spindle to the shaft with the roll pin (3).

d. Position the reel retainer (2) on the spindle (4) and secure with the pin (1).

3-50. Assembly of Drive Belt Shift Fork Assembly (fig. 3-19

a. Assemble the flat washer (12 Projector AQ-9A) and the bushing (11) on the stud of the support assembly (13).

b. Position the fork (10) on the lever (9) and assemble the lever on the stud of the support assembly (13). Install the washer (8) and secure pivot about the support assembly (13) with a slight drag.

c. Assemble the spacer (6), two rollers (5), washer (4), two rollers (3), and washer (2) on each tong of the fork and secure with the speed nut (1), insuring that the rollers (3 and 5) turn freely after assembly.

3-51. Assembly of Drive Unit Assembly (fig. 3-18)

a. Assemble the motor mounting plate assembly (13) to the drive motor assembly (14) with the four machine screws (11) and lockwashers (12).

b. Install a grommet (7) in each of the two top corner holes of the motor mounting plate assembly (13).

c. Install the speed nut (8), adjusting screw assembly (10), and nut (9) on the motor mounting plate assembly (13).

d. Install the collar (6) on the shaft of the drive motor assembly (14) and loosely assemble the two setscrews (5).

e. Apply a coating of grease to the inner race of the two bearings (3) and assemble with the pulley assembly (4) on the shaft of the drive motor assembly (14).

f. Assemble the fan and hub assembly (2) as follows:

(1) Install the grommet (2c) in the mounting hole of the fan (2d).

(2) Slide the fan (2d) on the hub assembly (2f) and secure with the machine screw (2a) and flat washer (2b).

(3) Lubricate the inside of the spring (2e) with grease and slide it on the back of the hub assembly (2f).

g. Install the assembled fan and hub assembly (2) on the shaft of the drive motor assembly (14) and secure with the spiral pin (1).

h. Position the collar (6) on the shaft to allow the free rotation of the pulley assembly (4) and tighten the setscrews (5).

3-52. Assembly of Motor Mounting Plate Assembly

(fig. 3-17)

a. Install the motor mounting plate (5) on the motor assembly (6) with the two machine screws (3, and lockwashers (4).

b. Install blower wheel (2) on the shaft of the motor allowing 1/8inch clearance between the wheel and motor mounting plate (5). On projector AQ9A, the wheel is secured with setscrew (1); on projector AS25A1 the wheel is a friction fit on the motor shaft and must be a force fit.

3-53. Assembly of Supply Reel Arm

(fig. 3-16)

a. Assemble the brake spring (10) and brake (9) into the outer brake hole of the supply reel arm assembly (11) and install the pulley assembly (8). Hold the pulley in position.

b. Assemble the washer (7) on the shaft of the pulley assembly (8).

c. Install the steel ball (6) and the reel retainer spring (5) in the spindle (4) and slide the complete assembly onto the shaft of the pulley assembly (8). Secure the spindle to the shaft with _the roll pin (3).

d. Position the reel retainer (2) on the spindle. (4) and secure with the pin (1).

3-54. Assembly of Lamp House Cover Assembly

(fig.3-15)

a. Assemble the framing knob assembly (6), flat washer (5), and spring (4) to the lamp house cover (7) and secure with the retaining ring (3); use retaining ring pliers.

b. Position the latch assembly (2) in the lamp house cover (7) and secure with the two selfthreading screws (1).

3-55. Assembly of Film Feed Clutch Assembly

(fig. 3-14)

a. Assemble the two flat washers (21) on the shaft of the feed sprocket gear assembly (22).

b. Assemble the belt guide bearing (17) to the belt guide (18) and slide it over the shaft of the feed sprocket gear assembly (22).

c. Assemble the bearing (19), tolerance ring (20), flat washer (16), freed clutch pulley (15), bearing (13), tolerance ring (14), washers (11 and 12), and cam plate (8) on the shaft of the feed sprocket gear assembly (22).

d. Install the three sets of steel balls (9) and the cam plate springs (10) in the slots of the cam plate.

e. Assemble the inner clutch plate assembly (7), flat washer and clutch facing (5), and install the pin (4) in the hole of the feed sprocket gear assembly shaft.

f. Assemble the flat washer (3d) and the pawl assembly 3c) and secure with the retaining ring (31b).Apply 1 drop ,f oil (OAT) to the pawl assembly (3c).

g. Install the toggle spring (3a) and apply 1 drop of oil (OAI).

h. Apply a light coat of grease to the plate contact surface of the clutch plate assembly (3) and install the assembly on the shaft of the feed sprocket gear assembly.

i. Install the clutch spring (2) and stop nut (1) on the shaft to secure the assembly.

3-56. Assembly of Aperture Plate Assembly

(fig. 3-13)

Assemble the spacer (4), spring (3), and guide (2). Assemble these parts to the aperture plate (5) and secure with the machine screw (1).

3-57. Assembly of Lens Holder Assembly

a. AQ-9A projector (fig. 3-12)

(1) Install groove pin (8) and thump screw (7) in lens holder body (9).

(2) Rivet upper spring (6) on the lens holder body with rivet (5) and attach spring assembly (4) with screw (3) (Use a light coating of Glyptal on threads of screw.)

(3) Attach lower spring (2) to holder body with screw (1). (Use a light coating of Glyptal on threads of screws

b. AS-25A1 projector (fig. 3-12.1)

(1) Attach pressure shoe assembly (3) to holder body (6) with washers (2) and screws (1).

(2) Attach lower spring (5) to holder body (6) with screw (4). (Use a light coating of Glyptal on threads of screw.)

3-58. Assembly of Feed Sprocket Shoe

(fig. 3.11)

a. Cement the pad (8) to the feed shoe assembly (9).

b. Apply a coating of grease to each of the three roller shafts on the feed shoe assembly (9).

c. Preload the dampener spring (7) with 1 complete turn and assemble the dampener spring (7) and the dampener assembly (6) on the feed shoe assembly (9).

d. Preload the dampener spring (5) with 1 complete turn and assemble the follower spring (5) and follower assembly (4) on the feed shoe assembly (9).

e. Assemble the two guide rollers (3) on the feed shoe assembly (9).

f. Position the feed shoe cover (2) and secure with the two machine screws (1).

3-59. Assembly of Film Pressure Shoe

(fig. 3-10)

a. Position the shoe adjusting plate (7), pressure shoe spring (8), and mounting plate (9) for assembly. Install the machine screw (4), spring washer (5), and film guide (6) at the top and bottom.

b. Assemble the shoe assembly (2), helical pressure shoe spring (3), and machine screws (1) to complete the assembly.

3-60. Assembly of Basic Projector

a. Assembly of Elevation Foot and Chassis Parts(fig. 39 and fig. 39.1)

(1) Attach four feet (35, fig.39 or 33, fig. 39.1) to the base (33 or 37) with four screws (34 or 32).

(2) Attach housing (32, fig. 3-9 or 33, fig. 3-9.1) to the base (33 or 37) with four screws (34 or 32).

(3) Stack washers 27 and 28, fig 3-9) or single washer (31, fig. 3-9.1) on elevation clamp (29 or 30). 'Position elevation clamp on housing (32 or 36) and thread clamp stud (26 or 29) into elevation clamp.

(4) Attach elevation control lock lever (25, fig. 39 or 28, fig. 39.1) to end of clamp stud(26 or 29) with screw (24 or 27).

(5) Locate lower bearing (22, fig. 39, or 25, fig. 39.1), upper bearing (23 or 26), flat washers (21 or 24) on housing (32 or 36). Carefully insert elevation rod (20 or 23) through bearings, washers and housing lugs.

(6) On projector AS25A1 (fig. 39.')position standoff (3) and secure with washer (2)and screw (1).

b. Installation of Amplifier, Exciter Lamp Socket and Wiring Harness (fig. 39, AQ9A Projector)and Installation of Amplifier, Exciter Lamp Socket and Transformer (fig. 39.1 AS25A1 Projector)

Note: Paragraphs(l)through(4)apply to Projector AQ9A only. The remaining paragraphs apply only to Projector AS25A1.

(1) Position the amplifier (19) on the base assembly (33) and secure with the thread forming screws (16) and the flat washers (17 and 18).

(2) Carefully route the exciter lamp socket cable and the harness assembly (11 and 12) along the edge of the housing assembly. Position the exciter lamp socket (12) in position for mounting and secure with' the three thread forming screws (9) and flat washers (10).

(3) Lay the wiring harness in position for routing to the various points and connect the leads

to the transforlmer and capacitors (fig. 332). Connect the terminal cap (14) to connector J2 on the amplifier.

(4) Lay the wiring harness in the cable clamps (7 and 8) and connect the clamps to the amplifier chassis.

(5) Position three spacers (10), three springs (9) and three spacers (8) on exciter lamp socket (11); position plate (7) over stacked parts and secure to housing (36) with three screws (6).

(6) Replace adapters (4 and 5) on the previously identified terminals in the wire harness (12).

(7) Carefully dress wire harness (12) along housing wall and bring capacitors (15), with terminal strips (14) attached, into position on the base (37). Secure with two rivets (13).

(8) Slip three stamped nuts over the mounting holes on the transformer bracket. Attach transformer to base using two washers (18), two screws (19), washer (17) and screw (16). Replace adapter (21) on the common tap on the transformer.

(9) Reconnect all leads to the transformer.

c. *Installation of Interlock Switch* (fig. 3-9).

(1) Position the interlock switch (6) on the .base assembly (33) and secure the interlock screw guide (5) and nut (4).

(2) Slide the interlock switch shield (1), interlock switch liner (2), and tubing (3) over the wires to be soldered to the interlock switch (fig. 332). Solder the wires and position the tubing shield and liner to the interlock switch.

d. Installation of Threading Lamp Components (fig. 3-8 and fig. 3-8.1).

(1) Place the speed nut (17, fig.38 or 14, fig. 3,8.1)on the threading lamp socket (17 or 15) and position socket for mounting. Secure with thread forming screw (15 or 13).

(2) Install threading lamp (14 or 12).

e. Installation of Amplifier Cover Assembly (fig. 3-8 and fig. 3-8.1).

(1) Install the speed nut (11) over the hole in the lip of the housing assembly.

(2) Install the jack (13) in position on the amplifier cover assembly (10) and secure with the machine screw (12) (AQ--k).

(3) Place the amplifier cover assembly (10) in the relative mounting position and connect the wiring harness leads to the pushbutton control switch (fig. 3-32 and fig. 3-32.1).

(4) Slide the strain relief bushing (6) over the open end of the power cord assembly (.5) and up) the cord about 12 inches. Press the strain relief bushing into the base plate hole to lock the cord in position,

(5) Position the amplifier cover assembly (10) for mounting and secure it with the screws (7, 8, and 9).

(6) Secure the terminal eye of the power cord ground lead to the amplifier chassis; use the machine screw (3) and lockwasher (4).

(7) Remove the shield and liner of the interlock switch and solder the black and ,white power cord leads to the switch terminals (fig. 3- 32) (AQ-9A).

(8) On projector AS25A1 only, assemble bushing (19) to jack (20), position jack through hole in amplifier cover (10), assemble insulator (18), washer (17) and fasten in place with nut (16). Position circuit board assembly (21) and secure in place with four screws (22).

(9) Install the tone control knob (2) and the volume control knob (1) on the shafts of the tone and volume control.

f. *Installation of Claw Arm* (fig. 3-7).

(1) Apply a coating of oil (OAI) to the rewind knob assembly (37) and slide the shafts of the knob into the mounting holes. Install the retaining ring (36).

(2) Assemble the rewind lever spring (34) to rewind the lever assembly (3r5) and slide the assembly on the shaft of the rewind lever knob. Secure the rewind lever assembly to the shaft of the rewind lever knob by inserting the end of the spring into the 'hole of the shaft.

(3) Assemble the rewind lever stop (29), limit plate (30); and speed nut (28) in the mounting position and secure with the two thread forming screws (27).

(4) Position the speed nut (41) and the shutter stop bracket assembly (42) and install the thread forming screw (49).

(5) Place the stabilizer (39) on the machine screw (38) and thread the screw into the speed nut (41). Tighten the screws (38 and 40).

(6) Place the claw arm (33) in the mounting position and secure with the framing arm pivot (31) and the spring washer (32).

(7) Position the shutter spring bracket (26) and speed nut (25) and install the two thread forming screws (24).

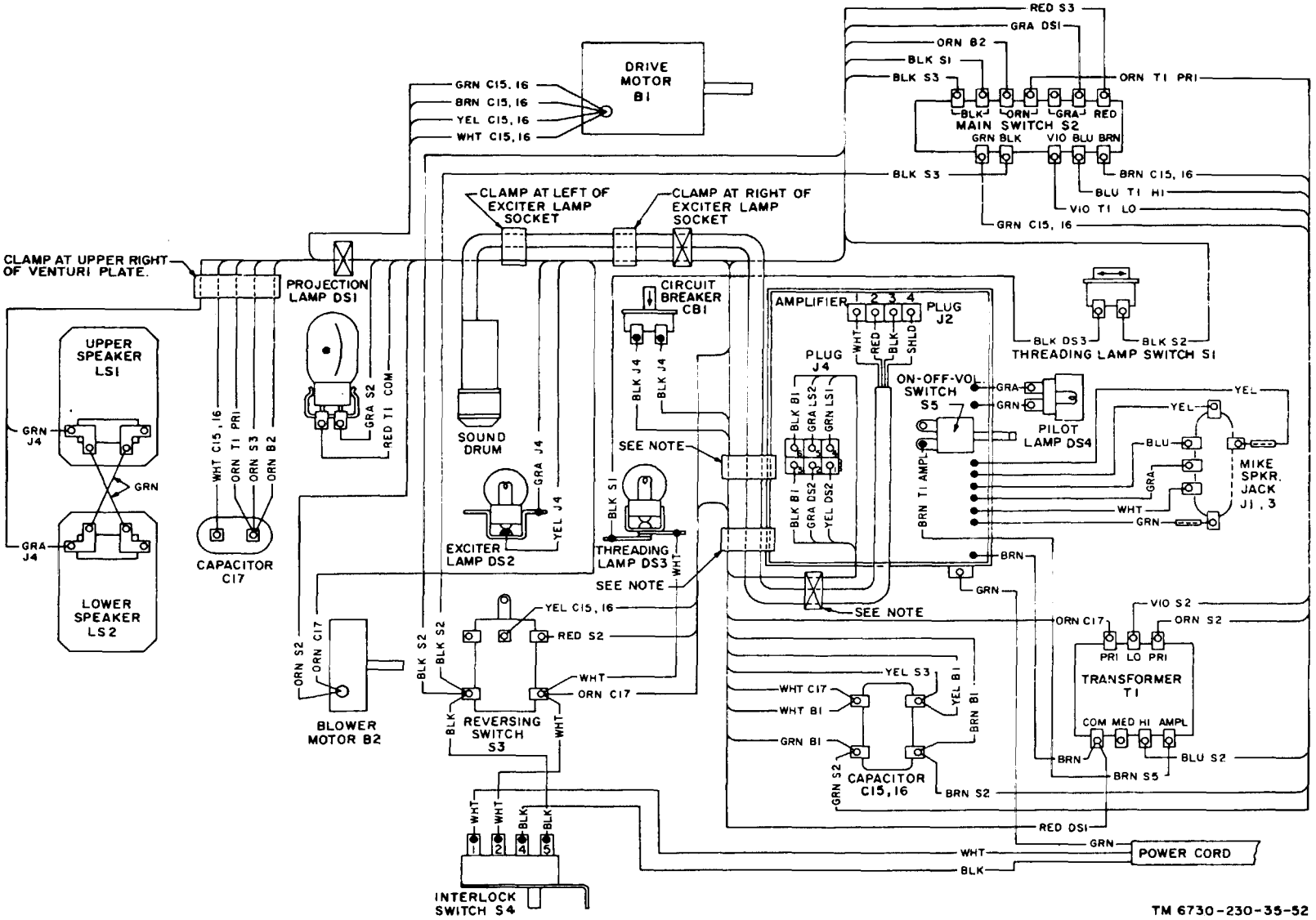


Figure 3-32. Projector wiring diagram (AQ-9A).

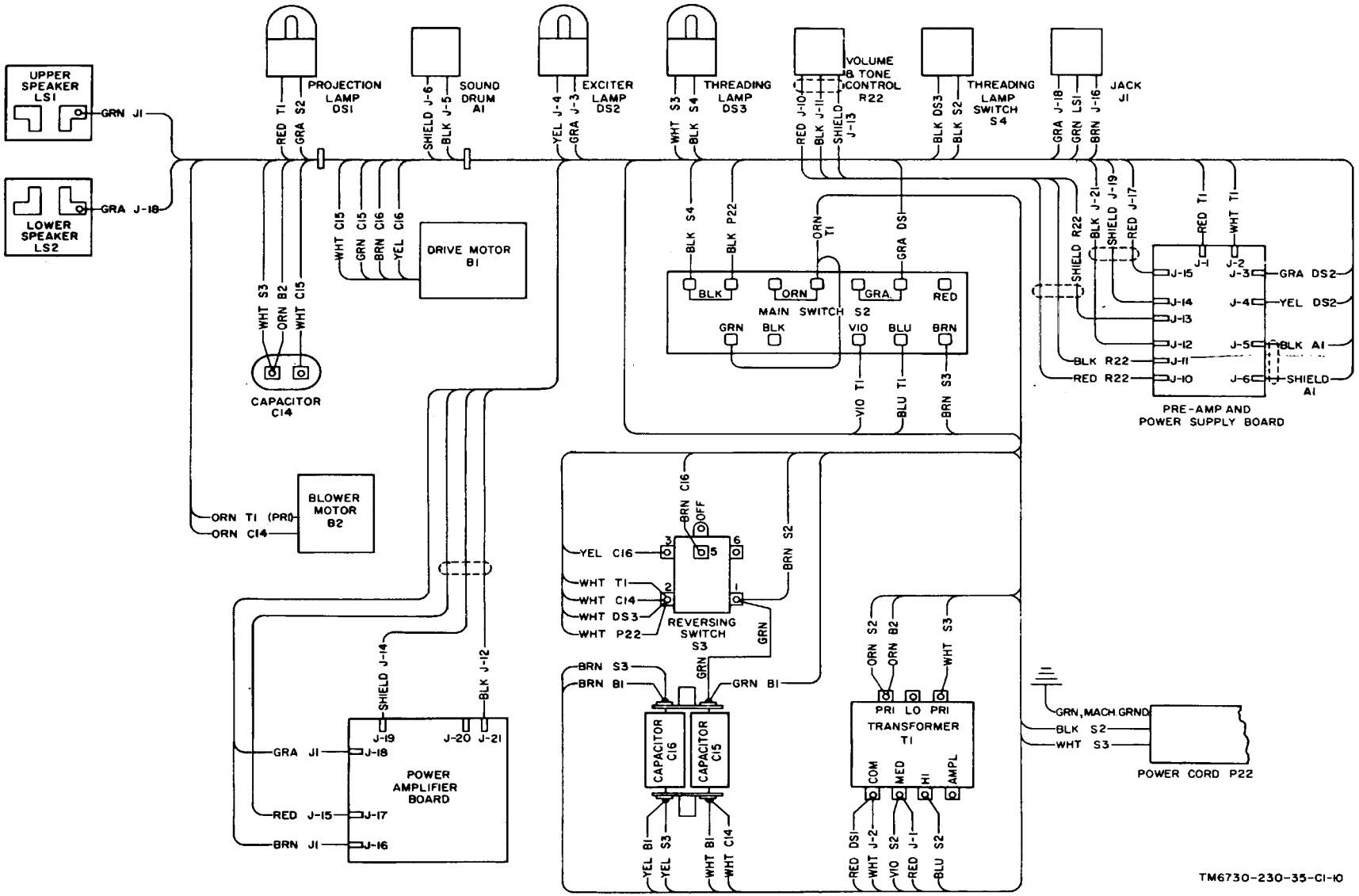


Figure 3-32.1 Projector wiring diagram (AS-25A1).

(8) Attach the safety shutter spring (23) the shutter spring bracket (26) and attach the safety shutter link (22) to the spring.

g. *Installation of Drive Shaft Components* (fig. 3-7).

(1) Assemble the feed drive gear (20), cord (19), and bearing (18) on the drive shaft (21 Fit and tighten the setscrews (16) and install the retaining ring (17); use retaining ring plier

(2) Install the spiral pin (15) to secure the feed drive gear (20); use roll pin inserting to T-38000-N (fig. 2-2).

(3) Slide the end of the drive shaft through the forward bearing mounting hole and assemble the shutter and cam assembly (14, fig. 3-7 safety shutter (13), drive gear (12), and cord: (11) on the end of the shaft.

(4) Continue sliding the shaft rearward al -through the rear bearing mounting hole. Assessable the spring washer (10) and the bearing (9) on the end of the shaft.

(5) Install the retaining ring (4) with retaining ring pliers T-38000-U.

(6) Slide the shutter and cam assembly (1 forward so that the claw arm is riding on the cam and tighten the setscrews (8).

(7) Slide the safety shutter back or forward to align the shutter' arm with the centeir of tl pin of the shutter stop and tighten the se screw (7). Connect the safety shutter link (22) the hook on the safety shutter (13).

(8) 'Align the pinhole in the drive gear with the pinhole in the shaft. and install the spiral pin; use pin inserting tool T-38000-N.

(9) Slide the drive shaft pulley (3) on the shaft and install the two setscirevs (2).

(10) Insert the manual advance knob (1) c .the end of the shaft and press it home.

h. *Installation of Loop Set Lever* (fig. 3-6).

(1) Apply a light coating of grease the shaft of the loop set lever (32) and insert the shaft into the mounting hole.

(2) Assemble the spring (31) on the shaft wind 1 revolution, and secure with the retainer ring (30). Use retaining ring pliers T-38000-1

i. *Installation of Threading Control Arm ax Pressure Roller Assembly* (fig. 3-6).

(1) Coat the interfaces of the threading control arm spring (29) with grease, position the spring (29), and secure with the (2 and 27) and machine screw (26). Apply a coating of Glyptal to the screw and washers.

(2) Assemble -the pressure roller spring (25), flat washer (24), and ,pressure roller (2' on ,the shaft of the pressure roller arm assembly (20) and secure with the nut (22).

(3) Apply)]- a coating of grease to the pivot shaft of the prlessure rolle'r am assemble (20), assemlble the spring washer (21) to the shaft, ring
insert the shaft in the mounting hole.

(4) Secure the pressure roller arm assembly(20) with the two retaining springs (19); use, retaining ring pliers T-38000-V.

(5) Apply a light coating of grease to the spacer (18) and the shaft of the threading control arm (17).

(6) Assemble the spacer (18) on the shaft of the threading control arm (17) and assemble the arm to the projector.

(7) Apply a thin coating of Glypt4tl to the threads of the machine screw (14), position the lockwasher (16) and guard (15) for mounting and secure them with the machine screw (14).

(8) Position the two speed nuts (13) and the soundhead cover (12) for mounting and secure with the two thread forming screws (11).

j. Installation of Takeulip Shoe and Press7ure Roller (fig. 3-6).

(1) Position the flat washer (10) over the lever mounting hole.

(2) Apply a light coating of grease to the pivot of the shoe lever assembly (9) and install the lever on the housing.

(3) Apply a light coating of grease to the pivot of the takeup shoe (8) and install the assembly on the housing.

(4) Install the bottom retaining ring (7) with retaining ring pliers T-38000-U.

(5) Apply a coating of Glyptal to the threads of the machine screw (5) and insert the screw through the loop of the takeup shoe spring (6); thread the screw into the mounting hole.

(6) Position the lever to the open position and rotate the takeup shoe spring (6) clockwise until the short tail of the spring engages the slot on the arm pivot; tighten the machine screw (,5), and assemble the top retaining ring (7); use retaining ring pliers T-38000-U.

(7) Apply a coating of grease to the pivot of the reel tension arm (4) and install the reel tension arm.

(8) Install the bottom retaining ring (3) on the reel tension arm pivot with' retaining ring pliers T-38000-U.

(9) Install the reel tension arm spring (2).

(10) Apply a coating of Glyptal to the threads of the machine screw (1) and insect the screw through the loop of the reel tension aim spring (2); thread the screw into the mounting hole.

(11) Engage the short tail of the spring and, using spring-loading tool T-38000-M(fig. 2-7), preload the spring by rotating it 220° clockwise.

Adjust the pivot slot to the spring and insert the short tail of the spring in the pivot slot; assemble the top retaining ring (3) with retaining ring liers T-38000-U.

k. Installation of Belt Slack Post Takeup Sprocket Drive Gear (fig. 3-5).

(1) Assemble the belt slack post (22) to the busing with the thread forming screw (21).

(2) Install the clutch liner (20) on the inner surface of the gear assembly (18).

(3) Assemble the flat washer (19) on the gear assembly shaft and install the gear assembly.

(4) Assemble the flat washers (16 and 17) and the takeup sprocket assembly (15) on the gear assembly shaft. Set the end play in the shaft by pushing the gear assembly and the sprocket together with feeler gage T-38000-Y (fig. 2-3) sandwiched between the flat washer (16, fig. 35) and the sprocket (15); install the seetscrew (14).

(5) Snap the sprocket button (13) in place on the end of the sprocket (AQ-9A).

(6) Apply a light coating of grease to the teeth of the drive gear.

l. *Installation of Takeup clutch Arm* (fig. 3-5).

(1) Apply a coating of grease to the reversing snitch cam (11) operating slot.

(2) Assemble the spacer (12) and the reversing switch cam (11) on the pivot shaft of the threading control arm and secure with the two retaining rings (10); use retaining ring pliers T38000-V.

m. *Installation of Takeup Clutch Arm* (fig. 3-5).

(1) Insert the clutch facing of the takeup clutch arm (9) into the cup of the gear assembly (18); be careful to seat it on the clutch liner (20).

(2) Position the lower portion of the aim on the end of the threading control arm pivot and secure with the retaining ring (8); use retaining ring pliers T-38000-V.

n. *Installation of Takeup Reel Arm* (fig. 3-5)

(1) Apply a light coating of grease to the pivot of the takeup reel arm (3), the exterior side of reel arm guard (5), and arm locking plunger (6).

(2) Assemble the reel arm guard (5) on the takeup reel arm and assemble the arm locking spring (7) and arm locking plunger (6) in the housing. Insert the shaft of the arm in the healing for mounting.

(3) Assemble the flat washer (4) on the shaft of the arm and secure the takeup reel arm (3) and upper half of the takeup clutch arm (9) with the roll pin (2).

NOTE

The driven end of- the roll pin (2) must be flush with the bottom of the takeup arm shaft.

(4) Feed the end of the drive belt through the guard of the takeup clutch arm (9) and up level the upper pulley wheel and secure the ends of the belt together.

o. Installation of Reversing Switch (fig. 3 ;-.4o1)

(1) Assemble the two adapters (39). to the reversing switch assembly (38) and position the switch for mounting.

(2) Secure the switch with the thread forming two screws (37).

(3) Connect the eight leads to the switch assembly (fig. 3-32 and fig. 3-32.1).

p. Installation of Support and Sound Drum and Flywheel.

(1) Insert the sound drum (36) in the hous- ing and install the two machine screws (35); do not tighten.

(2) Insert sound drum locating plug T--38001-G (fig. 2-6) in the mounting hole for the sound optics cartridge (fig. 3-33).

(3) Seat the locating plug so that the phonemic rod just clears the phototransistor sound drum. Center the clear area of the phot',tr;ansist4'r under the rod and push the sound drum toward the casting from the rear until the edge of the sound drum just touches the rod.

(4) Tighten the .sound drum machine screws (35, fig. 3-4) and remove the sound drum locating]g plug.

(5) Position washer (34) on shaft of sound drum (36), slip flywheel (33) on shaft and secure with machine screw (32).

(6) On projector AQ-9A, route the soundhead drum cable into the wiring harness and connect plug into the amplifier printed circuit board connector (fig. 3-32). On projector AS-25A1, connect soundhead cable leads to preamplifier board at J5 and J6 (fig. 3-32.1).

q. *Installation of Drive Belt Shift Fork Assembly and Belt Shift Eccentric* (fig. 3-4 and 3-4.1

(1) Apply a coating of grease to the shaft and interfaces of the belt Shift eccentric ;and install the eccentric in the .mounting hole.

(2) Position the drive belt shift fork assembly] (28) for mounting by placing the slot in the lever over the eccentric pint an)d aiiL!.i1)g the two

mounting holes. Secure in posit in -with the thread forming screw (25).

(3) Assemble the cable harness into the cable clamp (27) and assemble the clamp to the drive belt shift fork assembly (28) with the thread forming screw (26).

(4) Attach the belt shift fork spring (24) between the lesser and the eccentric' spring.

(5) Use the control! lever (30) and locate] the eccentric fully clockwise when viewed from the operator's side. Install the lever on the eccentric shaft with the pointer straight up and secure with the machine screw (29).

r. *Installation of Drive Unit Assembly and Drive Motor Mounting Plate Assembly* (fig. 3-4 and fig. 3-4.1)

(1) Position the drive motor controlling plate assembly (23) on the housing assembly and secure with the three machine screws (21) and the lockwashers (22).

(2) On projector AQ-9A, assemble two flat washers (20), spacer (19), flat washer (18) and spacer (17) on each stud of the motor mounting plate (23). On projector AS-25A1, assemble on left stud washer (42), washer (20), spacer (19), washer (18) and spacer (17). On right stud assemble two washers (20), spacer (19), washer (18) and spacer (17).

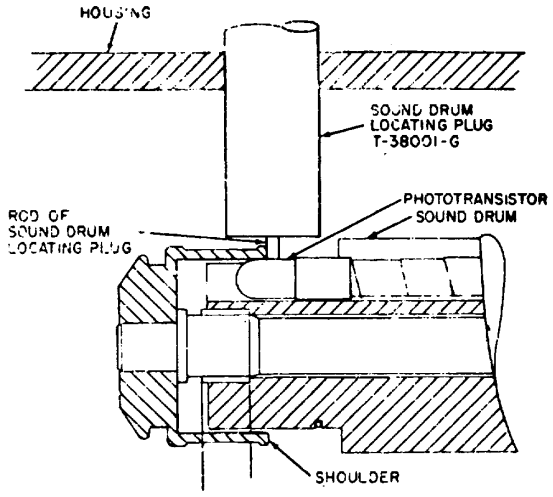
(3) Assemble the eyelet (16) and the motor spring (15) to the drive unit assembly (14) and position the drive unit assembly for mounting. Secure the drive unit assembly with the two flat washers (13), spacers (12), flat washers (11), and nuts (10).

(4) Install the drive motor belt (9) and align the pulley (refer to TM 11-6730-230-12).

s. Assemble of Motor and Motor Mounting Plate Assembly (fig. 3-4 and fig. 3-4.1)

(1) Dress the leads from the motor mounting plate assembly (8) through the hole in the vent cavity on the housing. Position plate assembly(8) and fasten securely to the housing with three screws (7).

(2) On projector AQ-9A (fig. 3-4), attach venture plate (6) with four washers (5) and four screws (4). Snap the cable strap (3) into mounting hole on the venture plate.



NOTE: SO$UND DRUM SHALL BE LOCATED SO THAT ROD OF SOUND DRUM LOCATING PLUG IS POSITIO AGANST SHOULDER AS SHOWN ABOVE- AND LOCATED APPROXIMATELY ON AXIAL CENTER OF PHOTOIRANSIS FOR

TM6730-23$- 35-53

Figure 3-33. Sound drum locating plug T-38001-G installed for use.

(3) On projector AS-25A1 (fig. 34.1) align venture plate (6) and bracket (3) and attach both using two washers (5) and two screws (4). Use two additional washers (5) and screws (4) to complete attachment of the venture plate to the housing. Attach power supply board (40) with two screws (41).

(4) Slip retaining spring (2) into position on the housing and insert capacitor (1). Note that shoulder of the capacitor must be locatedbehind the lip of the venture plate. Both spring and capacitor are retained by spring tension only.

t. Installation of Supply Reel Arm and Supply Peel Belt Guides (fig. 3-3).

(1) .a thin coating of grease to) the friction surfaces of the reel arm guard (23), arm locking plunger (21), and the shaft of the sup ply reel arm (20).

(2) Assemble the reel arm guard (,23) on the supply reel aim (20).

(3,) Assemble the reel arm lock spring (22) and the,, arm locking plunger (21) into, the housing and install the supply reel arm (20).

(4) Assemble the washers (18 and 19) and secure the supply arm with the roll pin (17).

(5) Assemble the washer (16), supply reel belt guide (15), and the belt guide post (14) and secure with the machine screw (12) and the spring washer (13).

u. Assembly of Lamp House Components and Installation of Lamp House Cover Assembly (fig. 3-3).

(1) Assemble the sound optics cartridge (11), plug (10), and the setscrew (9) in position. Adjust after final assembly (para 4-9).

(2) Connect the two wires to the projection lamp socket (8), (fig. 3--3) and position the base for mounting. Install t.., capscrew-e(7). Align the base after final assembly (para'4-3).

(3) Position the indicator Tad (6) and secure with the retainer (r)). Apply a couple of drops of oil (OAT) to the pad.

NOTE

If the lubricator pad is new, apply drops of oil (OAI).

(4) Install the excite]r lamp (4) (refer to TM 11-6730-230-12).

(5) Install the projection lamp (3) and the lamp chimney (2) on the lamp socket (8).

(6) Install the lamp house cover assembly (1).

v. *Installation of Film 12 Feed Clutch Assembly* (fig. 3-2)

(1) Apply a light coating of grease to the drive shaft of the film feed clutch assembly (28) and So the flat washer (29).

(2) Assemble the flat washer (29) on the shaft of the film feed clutch assembly (28) and install the clutch assembly.

(3) Secure the clutch assembly with the thread forming screw (26) and the flat washer (27).

(4) Install the supply reel belt (2r5) (refer to TM 6730-230-12).

w. *Installation of Aperture Plate Assembly* (fig. 3-2).

(1) Position the aperture plate assembly 24) for mounting and install the four machine screws (23).

(2) Align the aperture plate after final assembly (para 4-8).

x. *Installation of Lens Holder Assembly* (fig. 3-2).

(1) Apply a light' coating of grease and assemble the film gate lever assembly (22) and the upper and two lens holder springs (20 and 21) to the lens holder assembly (19).

NOTE

The upper lens holder spring. when new, is supply as a straight piece. To install, fold spring into three thickness.

(2) Apply a light coating of grease to the lens holder guide rods on the housing and to the interface area the lens holder and install the lens holder on the guide rods.

(3) Apply a light coating of grease to the gate lever eccentric (18) and install the eccentric in the lens holder body.

(4) Apply a coating of Glyptal to the threads of the setscrew (12). Assemble the ball (15), flat washer (14), and the lens holder eccentric spring (13) and secure with the setscrew (12).

(5) Assemble the control lever (14) and machine screw (16) to the lens holder and adjust the film pressure (para 4-9).

(6) Position the feed sprocket shoe (11) for mounting and secure with the three machine screws (10).

(7) Apply a light coating of grease to the flat washers ((8) and (9)) and assemble the washers on the shaft of the film feed clutch assembly (28).

(8) Using feeler gage T-38000-U between the flat washer (9) and housing, slide the film sprocket assembly (7) on the shaft and secure with the setscrew (6).

(9) Install the sprocket button (5) on the end of the film sprocket assembly (7) (AQ-9A).

(10) Install the film stripper (4) and secure with the thread forming screw (3).

(11) Install the projection lens (2) in the lens holder assembly (19).

(12) Install the film pressure shoe (1). (AQ-9A).

v. *Basic Projector Assembly* (fig. 3-1).

(1) elevation foot assembly (23) and attach with set screw (22). Attach elevation spring (21) by hooking one end of spring to the stud on the housing and the other end around the elevation rod.

(2) Attach frame assembly (20) to the housing with four screws (19).

(3) Position bracket (18), carrying handle (17) and cap (16) on the frame assembly (20) and secure with two screws (15).

(4) Align rear cover (14) and attach with screws (13). On projector AQ-9A only, install the interlock screw (12). 6

(5) If previously removed, attach threading diagram plate (11). (See paragraphs 3-43i(1) and (2).) Attach the gum-backed dampener (10) to the identification plate (9) and secure with screws (8).

(6) If latcheshave been removed, position spacers (4) and latches (3) and attach to front cover (1) with rivets (2).

(7) On projector AQ-9A only, attach adapter (6) to power cord and wind cord about reel (5) for storage.

CHAPTER 4
ADJUSTMENT AND ALIGNMENT
Section I. ADJUSTMENTS

4-1. Film Pressure Adjustment

a. Open the film gate and remove the projections lens (2, fig. :3-2).

b. Insert the film pressure gage G8-38000 (fig. 2-8) in place of the removed projection lens and set FILM PRESS ADJUST to LO

c. Seat the contact button of the gage against the pressure shoe until the gage is slightly deflected. Lock the gage in place with the iris locking screw.

d. Set the dial of the gage to zero.

e. Thread a piece of black and white film in the film channel and close the film gate Record the gage deflection.

f. Move FILM PRESS ADJUST to HI and record the gage deflection.

g. Gage deflection must be between 0.000 and 0.004 with FILM PRESS ADJUST at LO and between 0.025. and 0.035 at HI.

h. If indications are not correct, remove the machine screw (16, fig. 3-2) and the control lever (17), rotate the gate lever eccentric (18) until a deflection of 0.030 is observed on the gage. Replace the lever and the screw so that the lever touches the stop pin when FILM PRESS ADJUST is at HI.

4-2. Adjustment of Reverse Drive Film Tension

a. Start the projector and set it for reverse operation (TM 11-6730-230-12).

b. With the projector running in reverse, the front spindle reverse drive torque must be 14 inch-ounces ±2 measured with supply reel spindle torque gage G17-38000 (fig. 2-12). Turn the handle of the gage counter clockwise obtain the proper reading.

c. If the film feed clutch assembly torque is too high, reduce it by backing off the stop nut (1, fig. 3-14). If it is too low, tighten the stop nut.

4-3. Adjustment of Takeup Clutch Film Tension

NOTE

Check the adjustment takeup lift-off linkage (TM 11-6730-230-12) before proceeding.

a. Thread the projector and run approximately 300 feet of film onto a 400 foot takeup reel.

b. Stop the projector and pull a 12-inch loop of film up between the takeup sprocket and the roller of the reel tension arm.

c. Insert the roller of film tension gage T-38000-S (fig. 2-10) in the loop of the film.

d. Start the projector and check the gage reading. The gage should indicate 8 ounces (-2 oz. +4). (This is a double true value equivalent to 4 ounces of film tension. If the indication does not meet the specified tension measurement, tighten the nut (1, fig. 3-21) to increase the tension or loosen the nut to decrease the tension.

4-4. Adjustment of Rewind Engagement and Framing Limits

a. Loosen the thread forming screws (27, fig. 3-7) and adjust the limit plate (30) for lateral placement of the rewind lever assembly (35) and equal picture framing at the top and bottom of the picture.

b. The ramp of the rewind lever assembly (35) should throw the pawl assembly of the film feed clutch to its limits with the REWIND control positioned *in* or *out* positions. The ramp should clear the pawl assembly by 0.020 inch minimum in both *in* and *out* positions. Adjust the tab on the limit plate (30) by bending if necessary.

c. Tighten the thread forming screws (27) and check the operation by rotating the inching knob (1).

4-5. Adjustment of Drive Motor Belt Tracking and Drive Belt Shift Forks

a. Check the position of the drive motor belt (9, fig. 3-4). The correct position for the belt should be 1/16 inch from the flange edge (nearest the motor) of the motor pulley assembly when the projector is operated in FORWARD drive.

b. Align the main drive pulley in accordance with TM 11-6730-230-12.

4-6. Adjusting Claw Arm

a. Pin Protrusion. The claw arm pin protrusion should be set at 0.040 inch using claw arm pin protrusion gag G14-38000 (fig. 2-5) as follows:

(1) Place the gage flush against the aperture plate as shown in figure 4-1. The claw arm pin should just clear step 1 of the gage and touch step 2 as shown.

(2) To change the claw arm pin protrusion, remove the setscrew (2, fig. 4-2). Loosen the setscrews (1 and 3) in the hub of the assembly and move the assembly forward or backward on the shaft until the correct claw arm pin protrusion has been reached. Relock the hub of the assembly on the shaft, tightening the setscrews (1,2,3) in that order.

(3) Note the orientation of the flat on drive shaft. Failure to adjust the screws to the torques specified in figure 4-2 may cause a bind in automatic shutter operation.

(4) If the required claw arm pin protrusion cannot be obtained, replace the entire claw arm assembly.

CAUTION

Do not bend the claw arm.

b. Side Clearance. Side clearance is measured by inserting a short length of 0.042-inch rod between the claw arm pins and the edge of the aperture plate. The claw arm pins should just touch the rod but should not bind against it when the claw arm assembly is rotated through 1 complete cycle. Do not force the claw arm during adjustment as this may result in breakage of claw arm pins. To adjust side clearance, turn the framing arm pivot (31, fig. 3-7) with shuttle cam adjusting tool ST-5884 (fig. 2-4). Always tighten the setscrew before rotating the inching knob.

NOTE

When making side clearance adjustments, pulldown adjustments (c below) must also be checked. If side clearance adjustment are necessary, make the pulldown and side clearance adjustments simultaneously.

c. Claw Arm Pulldown Stroke. Claw pulldown is measured with stroke setting gage ST-3880 (fig. 2-9) and is adjusted with shuttle cam adjusting tool ST-5884 (fig. 2-4) as follows:

(1) Depress STILL and LAMP-NORM pushbuttons to illuminate the projection lamp at normal brightness.

(2) Insert the stroke setting gage into the film aperture and close the gate. Rotate the inching knob to bring the step wedge of she gage into the projection aperture.

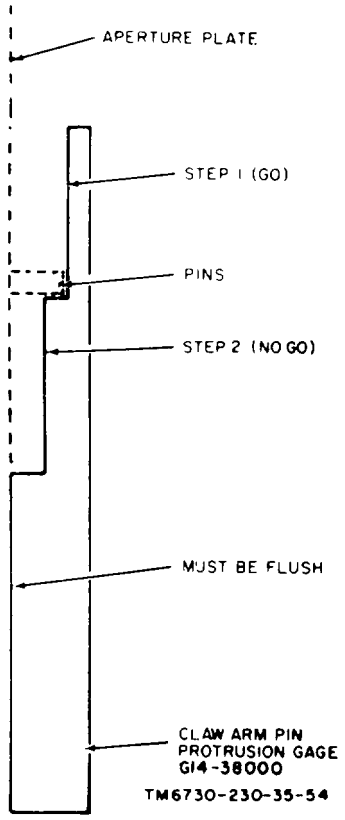


Figure 4-1.

minimum height of 8 inches on the screen. To make the image larger, increase the distance from projector to screen. Continue turning the inching knob until the claw arm has reached the bottom of its stroke, has withdrawn from the gage, and is returned to the top of the stroke. Stop turning the inching knob when the claw arm pins have just entered the gage but have not started the next downward stroke.

(4) Draw a straight reference extension line -at the lowest gage step on the surface used as a screen.

(5) Push upon the gage until it seats lightly against the claw arm pins. The image on the screen will move downward. The distance of downward movement of the image is the distance downward movement of the image is the distance used to determine pulldown stroke and should be as shown in B, figure 4-3.

CAUTION

If stroke adjustment is necessary, side clearance must be rechecked after the stroke adjustment is completed and before the main shaft is rotation.

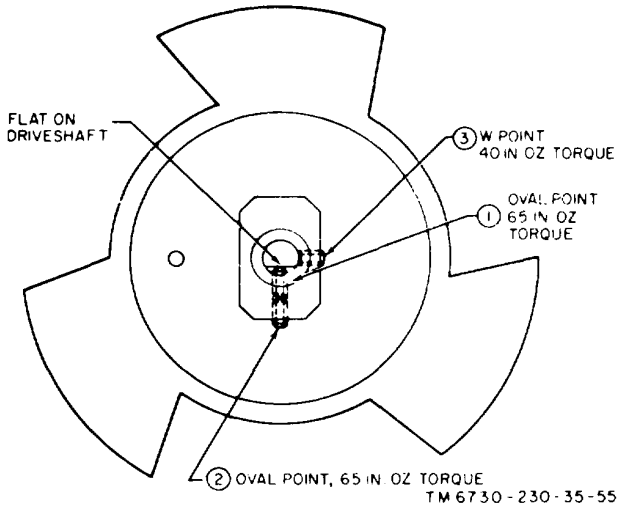


Figure 4-2. Shutter and cam assembly securing points.

(6) To adjust pulldown stroke, loosen the setscrews (4 and 5) and, while holding the pivot assembly with the shuttle cam adjusting tool, rotate the pivot bushing and pivot assembly simultaneously, by hand. When facing the projector front, a good starting point is seen -hen the pivot of the pivot assembly is in the 7 o'clock position. This pivot is never rotated out of 6 to 9 o'clock position. Rotating the pivot toward the main shaft lengthens the stroke, and rotating the pivot away from the main shaft shortens the stroke. Always tighten the pivot bushing setscrews before rotating the inching knob.

d. Claw Arm Pivot End Play. Adjust the gap between the washer and framing arm at the pivot joint for maximum clearance of 0.002 inch by tightening the nuts (11, fig. .3-25). (This is equivalent to 0.001 =inch end play when the claw arm has complete freedom.)

*e. Cla*mp *Arm Spring.* Tension of the dampener spring (10, fig. 3-25) has been factory-adjusted and should not normally require adjustment. Correct tension on the claw arm spring is maintained by proper positioning of the nut (6) on the spring stud. The nuts ((5) and nut (6)) are locked against each other, and the nut (6) must be flush with the end of the spring stud.

4-7. Adjustment of Shutter Location

Visually align the safety shutter midway between the lamp chimney and the closest moving part on the shutter and cam assembly. The safety shutter spring must clear the shutter and cam assembly by 1/8 inch. Adjust by bending the safety shutter spring bracket.

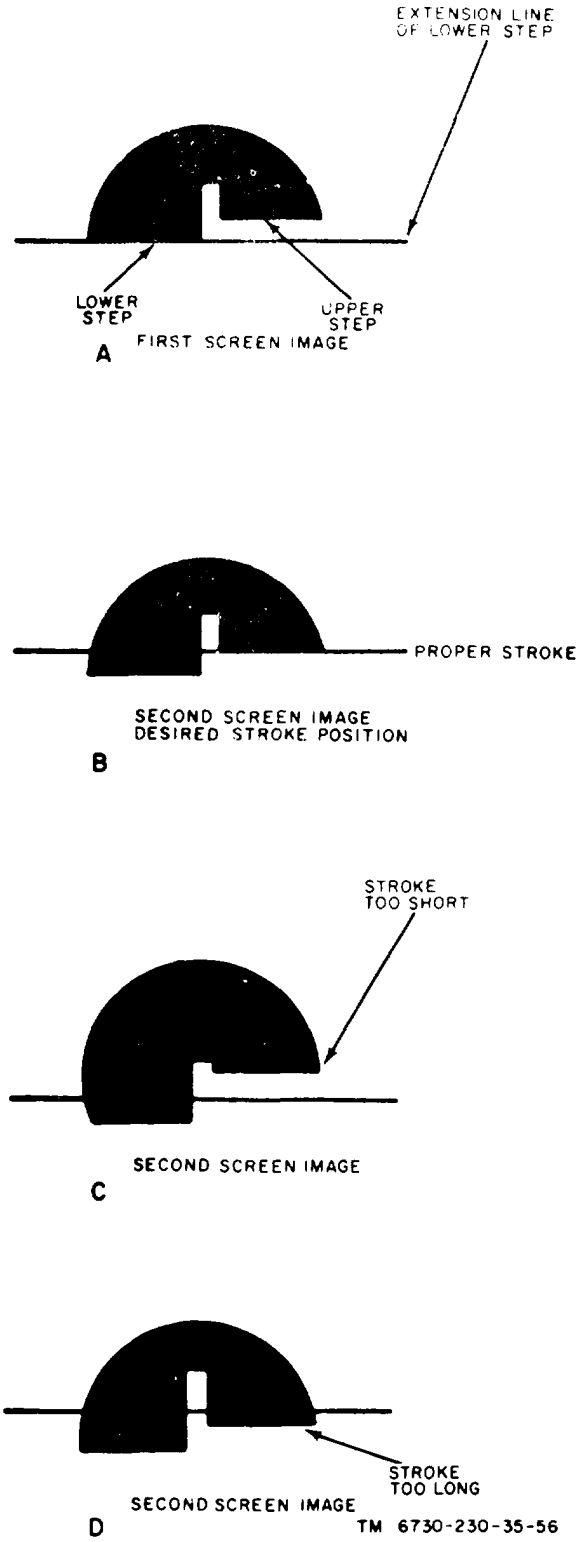


Figure 4-3. Measuring claw pulldown stroke

Section II. ALIGNMENT

4-8. Optical System Alignment

(fig. 4-4)

WARNING

Disconnect the power cord from the power source before inserting the aligning plug in the projection lamp socket.

a. Remove the lens holder assembly from the projector and loosen the four machine screws (23, fig. 3-2) slightly so that the aperture plate assembly can be moved. Replace the lens holder assembly but do not secure it in position. Remove the projection lamp.

b. Use lamp and optical path alignment tool G3-38000 (fig. 2-11) to align the aperture plate assembly as follows:

(1) Remove the projection lens and insert the lamp and optical path alignment tool into the lens holder assembly. (Be sure the film gate is closed.).

(2) Engage the lens holder guide rod with the alignment tool and carefully slide the tool rearward so that the aperture locating tip engages the aperture plate. (This tip is tapered to accommodate insertion of the tool.).

(3) Press the tool firmly against the sides of the aperture in the aperture plate; be sure the top and bottom edges are in positive contact and tighten the machine screws (23, fig. 3-2) securely.

(4) Secure the lens holder assembly to the projector.

(5) Adjust the claw arm pin side clearance (para 2-66) and check the framing limits (para 2-64).

c. Use lamp and optical path alignment tool G3-38000 and align the projection lamp socket as follows:

(1) Loosen the projection lamp socket attaching screw (7, fig. 3-3).

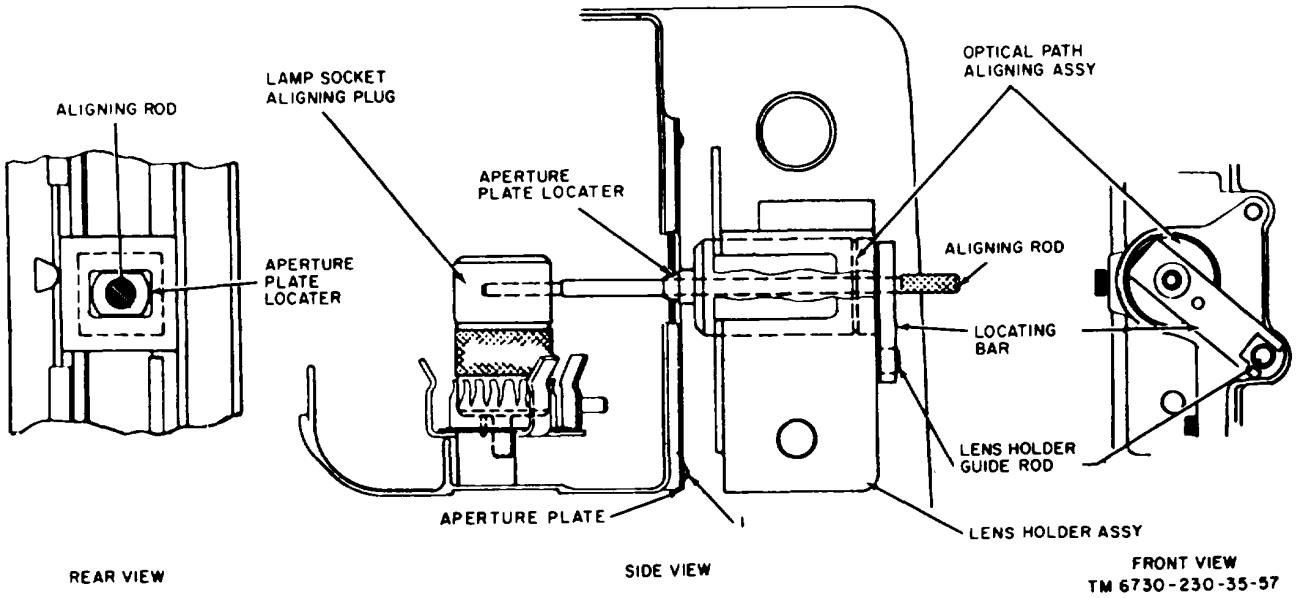
(2) With the projection lamp socket aligning plug in position, slide the aligning rod through the optical path alignment tool and into the projection lamp socket aligning plug as a basis for vertical and lateral alignment.

(3) To establish the lateral alignment, rotate the plug until the aligning rod can' be inserted into the alignment hole of the aligning plug.

(4) To establish vertical alignment, bend the projection lamp socket bracket upward or down-ward slightly.

(5) When aligned, apply Glyptal to the threads of the lamp socket screw (7) and tighten the screw. Also apply Glyptal to the tab of the lamp socket (8), (fig. 3-3) which engages the projector casting.

(6) Replace the projection lamp and check screen illumination. If the illumination is uneven, replace the projection lamp.



4-9. Sound Optical System Alignment

a. Adjusting Sound Drum Support (Photo-transistor).

(1) Insert the sound drum locating plug T-38001-G (fig. 2-6) in place of the sound optics cartridge (11, fig. 3-3).

(2) Seat the plug so that the phenolic rod just clears the phototransistor.

(3) Center the clear area of the phototransistor under the 'rod and push the support and sound drum (36, fig. 3-4) toward the casting until the edge of the sound drum just touches the rod.

(4) Tighten the support and sound drum retaining screws(35, fig. 3-4).

b. Focusing Sound Optics Cartridge.

(1). Connect the ac voltmeter across the speaker terminals.

(2) Thread loop of 7, 000-cycle test film (PH22. 42) into the projector and set the tone control for maximum treble output.

(3) Set the voltmeter on lowest the scale.

(4) Focus the cartridge by moving it up or down, and rotating it until the maximum output is indicated on the voltmeter. If the voltmeter goes off-scale, reduce the volume. Check the buzz track and reset if necessary.

CHAPTER 5

DEPOT OVERHAUL STANDARDS

5-1. Applicability of Depot Overhaul Standards

Projection Set, Motion Picture, Sound AS-25A and Projector, Motion Picture Sound AS-25A1 must be tested thoroughly after rebuild or repair to insure that it meets adequate performance requirements for return to stock and reissue. Use the tests described in this chapter to measure the performance of the repaired projection set. Repaired equipment to be reissued or returned stock for reissue must meet all the performance standards given in these tests.

5-2. Applicable References

a. Repair Standards. Applicable procedures the depot performing these tests and the general standards for repaired electronic equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

b. Technical Publications. The technical publication listed below is applicable as indicated:

Equipment and subject	*Publication*
Projection Set, Motion Picture, Sound AS-25A Operator and Organizational Maintenance	TM 11-6730-230-12

c. Modification Work Or1ders. Perform the work specified by modification work order (MWO's) applicable to this equipment before making the test specified DA PAM 310-7 list all available MWO's.

5-3. Test Equipment and Material Required

Use the following equipment, or suitable equivalents, to determined compliance with the requirements of these overhaul standards.

Equipment	Federal Stock No.
Torque gage G17-.38000	5220-116-5359
Film pressure gage G8-:3800	5220-116-5357
Push-pull gage, John Chatillon & Son, 516--.-0 (1 lb x 1/4 oz).	
Claw arm pin protrusion gage G14-38000.	5220-116-5360
Shuttle cam adjusting tool ST-5884.	5120-116-5355
Audio oscillator HP200AB	
Film tension gage T-38000-S	
Lamp and optical path alignment tool G3-38000.	
Sound drum locating plug T-38001-G.	5935-119-3999
Oscilloscope AN/USM-140C.	6625-987-603
Voltmeter, Electronic ME-30E/V.	6625-643-1670
Wrench T-38000-W Generator, Signal AN/URM-127.	6625-783-5965
Harmonic Distortion Heathkit Mod. HD-1	
16mm black and white film (5 in. lg).	
Torque screwdriver (65 in. oz)	
Torque screwdriver (95-105 in. oz).	
8-ohm, 20-watt wire wound resistor (dummy load).	
1.6 neutral density filter, metal holder.	
Torque screwdriver (40 in. oz)	
1, 600-ft reel of film	
400-ft reel of film	
SMPTE Jiffy test film	6770-116-7046
Buzz track test film PH22.57	6770-116-7048
7, 000-cycle focusing film loop PH22.42 (type A).	
Multifrequency test film PH22 44.	6770-116-7067
400-cycle test film loop ASA PH22.45.	6770-116-7047
3, 000-cycle test film PH22.43	6770-117-2834

5-4. General Check of Projection Set

a. Visual Checks.

(*1) External appearance.* Examine the external surfaces of the speaker and projector for damage to finishes. Remove the cover from the projector and visually examine its overall appearance, noting any obvious misalignments.

(*2)Sprockets and rollers.* Examine all the sprockets and rollers for nicks and cuts. They should lie smooth and free from nicks or cuts. Rotate the free-turning rollers manually. They should rotate freely without binding.

(*3) Reel arm belts.* Examine the takeup and supply reel arm belts. Gaps between the hook ends should be closed and must appear to be in

line with each other when tension is placed on belt.

b. Performance Checks

(1) *Mechanical noise.* with the power cord plugged into 105- to 125- volt 60-cycle outlet, the supply and takeup reel arms locked in the using position and RUN button depressed, set the master control lever to FORWARD. allow the projector to run. Set the master control lever in reverse and allow the projector to operate. While the projector is operating, listen for unusual noise which might be caused by lack of lubrication, loose or worn bearings, insufficient clearance, or improper tension adjustments.

(2) *Lamp circuits.* With the power cord plugged into 105- to 125-volt 60-cycle outlet, master control lever set to FORWARD, and the takeup and supply reel arms locked in the using position, proceed as follows:

(a) Press the STILL and LAMP-NORM pushbuttons. The projection lamp lights.

(b) Set the threading lamp switch to *on*. The threading lamp lights.

(c) Turn the amplifier on. The ON indicator lamp lights.

(d) Press the RUN pushbutton. the exciter lamp lights.

(3) *Pushbuttons*. With the projector set up as described in (2) *(b)* above, proceed as follows:

(a) Press the OFF pushbutton. The projector and blower motor must not operate.

(b) Press the STILL pushbutton. The projector must not operate; blower metro operates.

(c) Press the RUN pushbutton. the takeup spindle and fed and take up sprockets rotate.

(d) Press LAMP OFF and STILL pushbuttons. Only the blower motor operates.

(e) Press the LAMP NORM and STILL pushbuttons. the blower motor and projection lamp operate.

(f) Press the LAMP HI and STILL pushbuttons. the blower motor operates and intensity of the projection lamp is higher than that noted with LAMP NORM or STILL pushbuttons depressed.

5-5 Film Handling

Check the film handling characteristics by operating the projector by use of a 1,600-foot reel of film. Load a 1,600-foot reel of film. Load a 1,600-foot reel of film onto the supply spindle and empty the reel onto the takeup spindle. Thread the projector; press the RUN button. focus the projector and observe the film path. Listen for unusual sounds, and watch the projected image.

a. Film should not slap, and both the upper and lower loops should be maintained. Films takeup must be smooth with no evidence of erratic or intermittent takeup. Stop the projector and examine the film for possible handling damage. There must be no film scratches and no evidence of damage at the sprocket holes.

b. Press the RUN button and allow several feet of film to run through. Reverse the film feed. Film must not spill at the, supply reel when in the reverse mode and there must be no evidence of stall during rewind. Switch the master control lever to the forward mode. There must be no film spill at the takeup reel, and takeup action should be smooth.

c. In the observed projected image, the picture must remain steady with no jump on vertical streaming, and there must be no lateral picture shift. Continue projection; the picture must remain in focus.

d. Press the STILL button and observe the image at the screen. The film must not burn or show evidence of heat distortion.

5-6. Illumination

Operate the projector as specified in paragraph 5-5*b* and observe the light intensity at the screen. There must be no change in light intensity when changing from *forward, reverse,* or *still* mode.

5-7 Sound

Operate projector as specified in paragraph 5-5*b*. Operate the sound controls. The sound must have a volume range from low to high. There must be no excessive hum; all tones must be clear with no evidence of microphonic noise, motor boating, or distortion. There must be no change in pitch.

NOTE

Upon completion of the above performance checks, if performance cannot be certified at this point, proceed to perform the more detailed tests given below.

b. Using SMPTE jiffy test film, set up the projector to project film. Connect the extension speaker to the projector. Set the tone control to midrange and the volume control to the normal listening level. Project the film from its beginning.

(1) Observe the projected image for steadiness at tops and sides. Watch for white streaking on lettering which would indicate ghosting. Look for picture brightness. Projected image must

be bright and exhibit no jumping or wavering sides and top of image.

(2) Listen for the full range of the orchestra noting the smoothness of the music. The sound must be reproduced through the entire orchestration with no evidence of quaver (flutter} Listen for buzz sounds. Two buzz sounds may be heard; both shall be equally loud, or equally inaudible. Listen for the 700-cycle tone, which must be audible with the volume control set in the normal position. Listen for three high tones (5, 000 cycles), and seven distance tones having frequencies of 50 to 5, 000 cycles. All tones must be audible and reproduce well.

NOTE

Parameters of this check are based on the subjective evaluation of the test operator.

58. Pressure Roller Arm

Connect the projector to a 117-volt 60-cycle power source; allow the amplifier to warm up for minimum of 15 seconds. Thread the buzz track test film loop, PH22.57; through the projector. Set the volume and tone controls at midrange of the control movement and depress the RUN pushbutton. The exciter lamp must light and the film begin travel through the projector. Listen for a 300- or 1, 000-cycle tone. Neither tone shall be audible.

NOTE

Slight 300- or 1, 000-cycle tone may be detected intermittently caused by snaking travel of film. This is acceptable.

5-9. Frequency Response Test AS-25A1

a. Connect the projector to the proper power source.

b. Connect Spectrum Analyzer TS-723C/U to the speaker jack through an 8-ohm, 20-watt resistor (dummy load).

c. Disconnect the input to the preamplifier circuit board and connect the output of the TS-382/U through the ME-30A/U to the preamplifier.

d. Set the ME-30A/U to the 0.3-volt scale, and the TS-382/U to an output of 400 cycles and 0.02 volt as indicated on the ME-30A/U.

e. Adjust the tone control to midrange.

f. Set the TS-723C/U to the 3-volt scale.

g. Adjust the projector volume control for an indication of 0 db on the TS-723CIU.

h. The db measurements should be as shown in the chart below for each frequency indicated.

Freq in c**ycles**	**400**	50	100	200	300	500	1K	2kc	3kc	4kc	5kc	6kc	7kc	400
Acceptable Level	**"0"** Ref	**-2** -7	**0** *3.0	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	Ref

5-10. Frequency Response Test AQ-9A

a. The frequency test for the AQ-9A is the same as described in paragraph 5-9, except that the AQ-9A does not have a preamplifier and the input is connected directly to the audio amplifier.

b. The db measurements should be as shown in the chart below for each frequency indicated.

Oscillator	400**cps**	**50cps**	100cps	**400**cps	1**kc**	**4kc**	7kc
Hi db	0	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5
Lo db	0	-6.0	-1.5	-1.5	-1.5	-1.5	-1.5

5-11. Distortion Measurement

a. Projector AS-25A1 (fig. 18).

(1) Connect the projector to proper power source

(2) Disconnect Al from the preamplifier a connect the output of TS-382E/U through the ME-30A/U to the input of the preamplifier (J5 and J6).

(3) Disconnect the speakers from the amplifier and connect an 8-ohm dummy load to the amplifier output.

(4) Connect the TS-723C/U to the dummy load.

(5) Set the tone control to midrange, and set the volume control for an indication of 6 volts on the TS-723C/U.

(6) Set the output of the TS-382E/U to 400 cycles and 0.02 volt.

(7) Turn the distortion meter range to set level. Set the sensitivity to obtain a reading of 100 percent. Change the function switch distortion range scale to 10 percent, and adjust tuning and balance to obtain lowest reading.

(8) Repeat the procedures as given above with the TS-382E/U set to 1 kc and 7 kc.

(9) In each case, the distortion shall not exceed 5 percent.

b. ProjectorAQ-9A (fig. 1-7). Perform the distortion measurements for the AQ-9A as described in a above.

NOTE

When checking the AQ-9A, do not permit the input signal frequency to exceed 7 kc. If the input signal does exceed 7 kc, the circuit breaker will open.

5-12. Dynamic Range of Projector Sound System

a. Projector AS-25A1 (fig. 1-8).

(1) Set up the projector as described in paragraph 5*11*a(l) through (4).

(2) Set the tone control to midposition.

(3) Disconnect Al and apply a 400-cycle signal to the preamplifier.

(4) Set the TS-723C/U on 3-volt scale and adjust the volume control for a 0-db indication on the output meter.

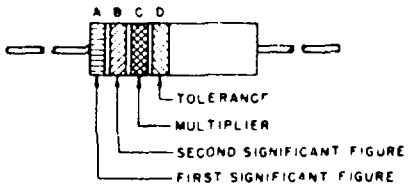
(5) With the projector operation remove the input signal

(6) The TS-723C/U should indicate a minimum -30d.

b. Projector AQ-9A (fig. 1-7). Repeat the procedure given in a above, except that signal is applied to microphone jack and putput meter should indicate 30d or higher.

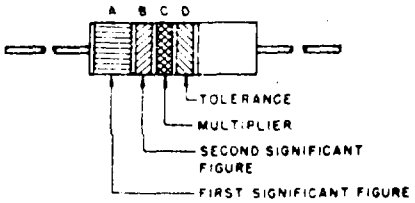
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS

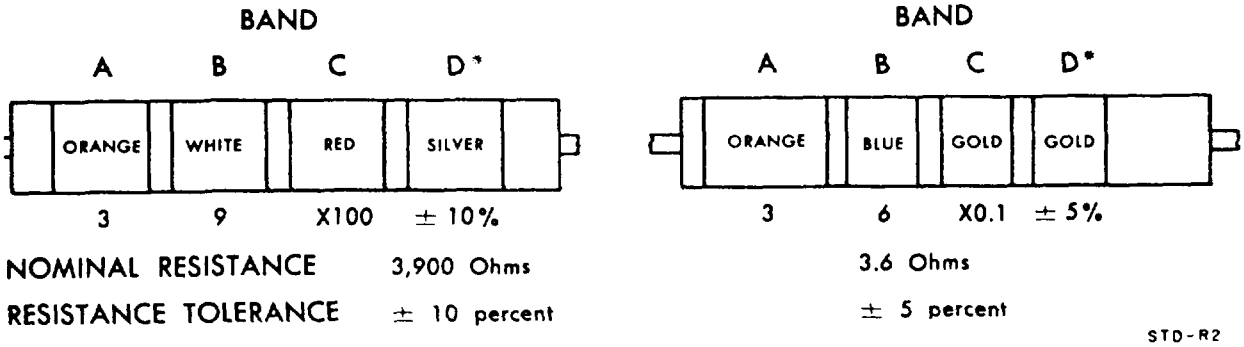


BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING



*If Band D is omitted, the resistor tolerance is ±20%, and the resistor is not Mil-Std.

Figure 5-1. Color-code marking for MIL-STD resistors.

APPENDIX A

REFERENCES

The following is a list of applicable references available to the repairmen of Projection Set, Motion Picture Sound AS-25A.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Index of Modification Work Orders.
TB SIG 355-1	Depot Inspection Standards for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standards for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TM 11-6730-230-12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Projection Set, Motion Picture Sound AS-25A (Sound Motion Picture Projection Set Graflex Model 920 EX).

INDEX

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:
Active Army:
USASA (2)
CNGB (1)
ACSC-E (2)
Dir of Trans (1)
CofEngrs (1)
TSG (1)
CofSptS (1)
USAARENBD (2)
USACDC Agcy (1)
USAMC (1)
USCONARC (5)
ARADCOM (5)
ARADCOM Rgn (2)
OS Maj Comd (4)
LOGCOMD (2) except
First (10)
Ninth (10)
USAMICOM (4)
USATECOM (2)
USASTRATCOM (4)
USAESC (70)
MDW (1)
Armies (2)
Corps (2)
Ist Cav Div (5)
Div (2)
Regt (2)
Bde (2)
Bn (2)
Svc Colleges (2)
USACSC (5)
USASESS (10)
USAADS (2)
USA FA Sch (2)
USAARMS (2)
USAIS (2)
USAES (2)
USAINTS (3)
USATC Armor (2)
USATC Inf (2)
USASTC (2)
WRAMC (1)
Army Pic Cen (2)
USACDCEC (10)
NG: None
USAR: None
Instl (3) except
Fort Gordon (10)
Fort Huachuca (10)
Fort Carson (21)
Fort Knox (12)
WSMR (5)
APG (5)
Army Dep (2) except
LBAD (14)
SAAD (:30)
TOAD (14)
1LEA*I)* (7)
SHAD (3)
NAAD (5)
SVAD (5)
CHAD (3)
ATAD (10)
Gen Deps (2)
Sig Sec Gen Deps (5)
Sig Dep (12)
Sig FI.DMS (2)
TOPOCOM (1)
USAERDAA (2)
USAERDAW (13)
USACRREI, (2)
USAPA (2)
MAAG (2)
USARMIS (2)
USARMA (2)
USMACV (50)
Units org under fol TOE:
(2 copies each)
11-57
11-96
11-117
11-127
11-155
11-157
11-158
11-500 (AA-AC)
11-587
11-592
11-597
For explanation of abbreviations used, see AR :120-.)O.

*U.S. GOVERNMENT PRINTING OFFICE: 1994 - 300-421 (82980)

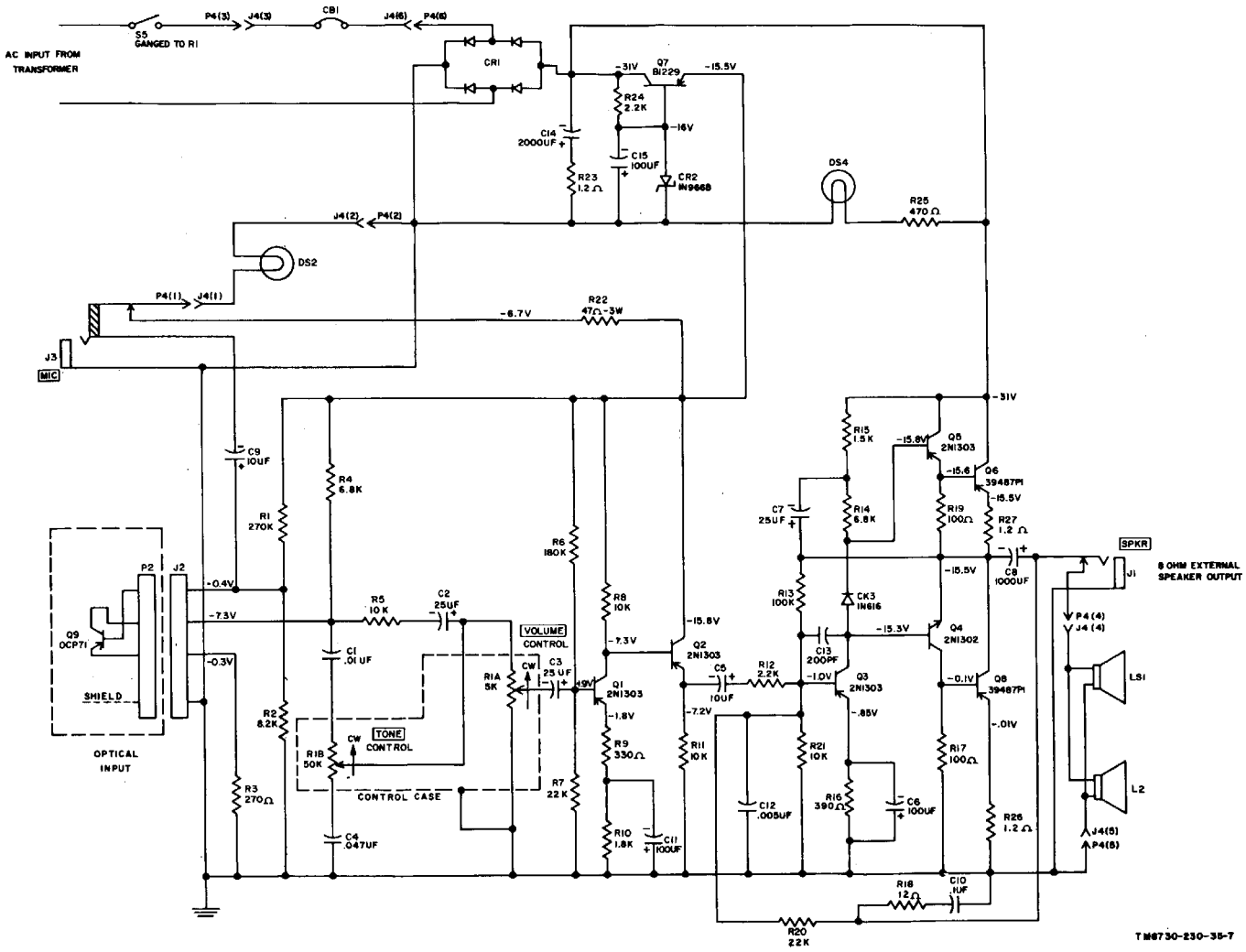


Figure 1–7. Audio amplifier, schematic diagram (AQ–9A).

Figure 1-7. Audio amplifier, schematic diagram (AQ-9A).

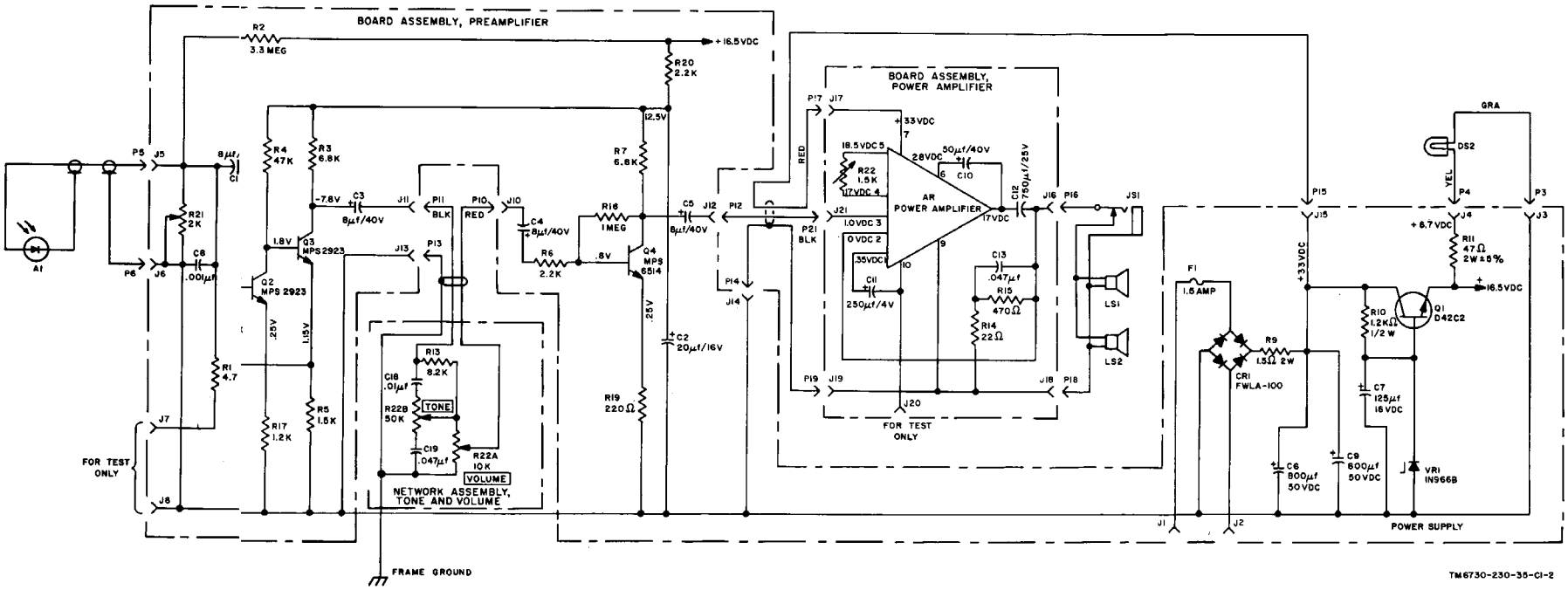
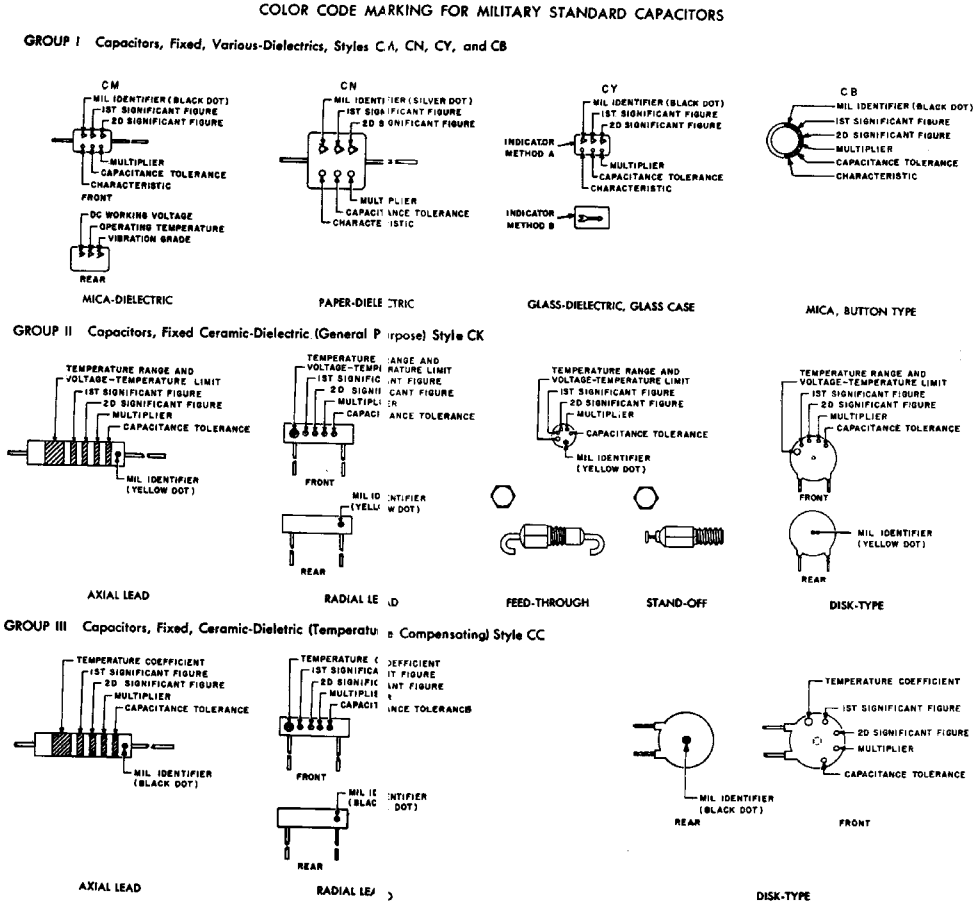


Figure 1-8. Audio amplifier, schematic diagram (AS-25A1).



COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

STD–CS

Figure 5-2. Color-code marking for MIL-STI) capacitors.

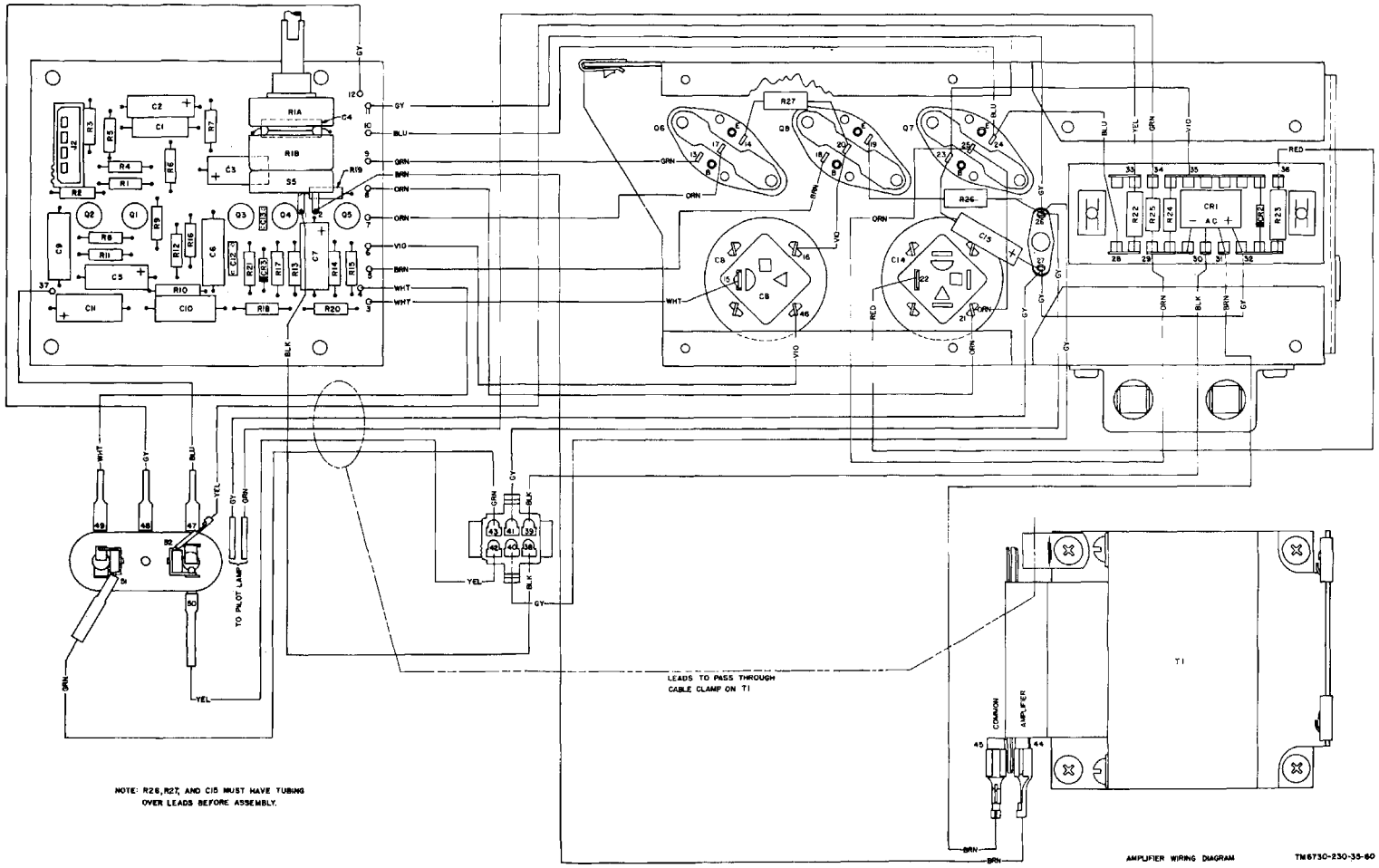


Figure 5-3. Amplifier wiring diagram (AQ-9A).

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ▸ ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

PIN: 016254-002