

Grp
SERVICE INSTRUCTIONS FOR

CONTINUOUS PRINTER DESIGN 5205

(MODELS D AND J)



**BELL & HOWELL COMPANY 7100 M^ECORMICK RD.
..... CHICAGO 45, ILL.**

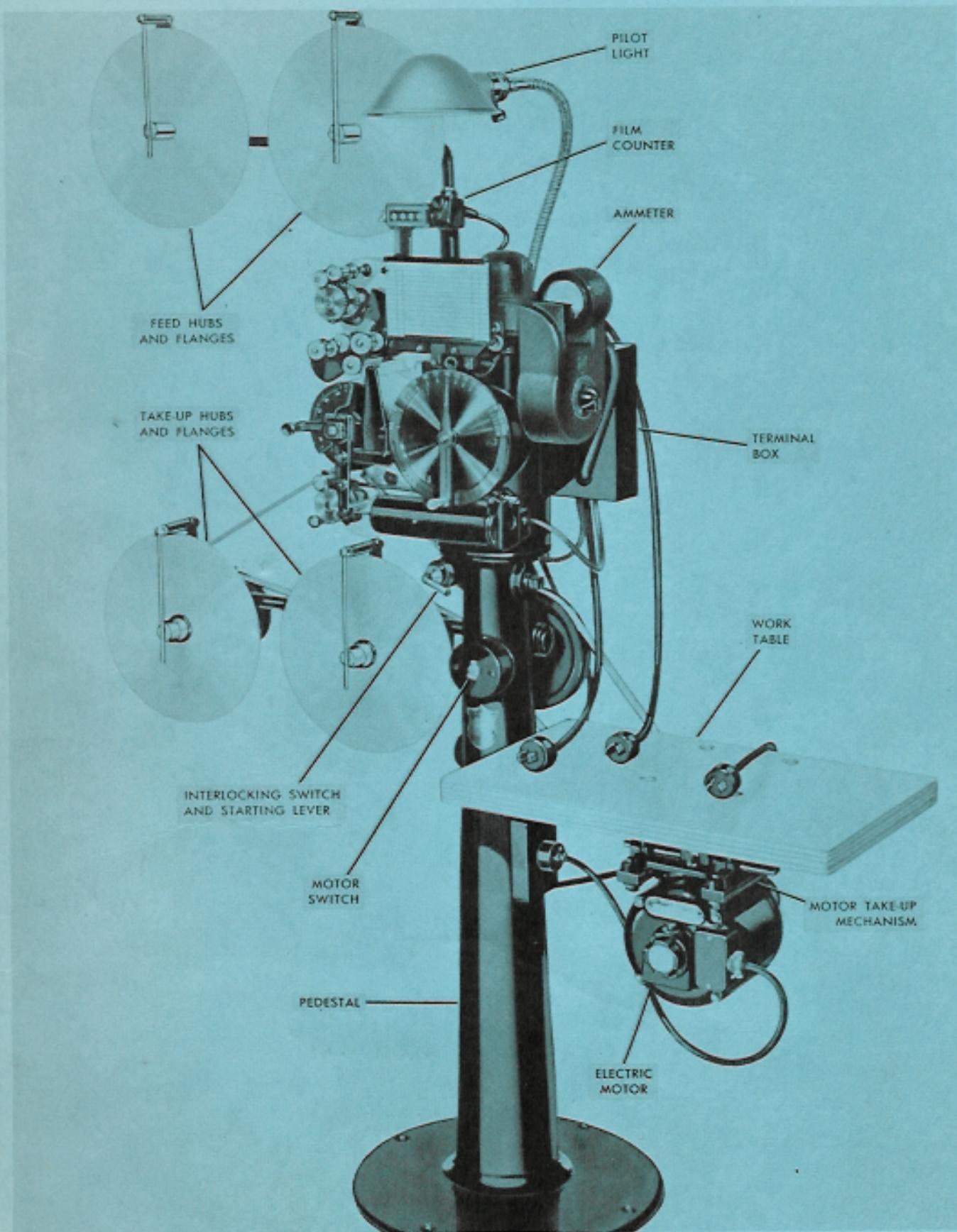


Figure A. 35-mm Continuous Printer - Model D

Introduction

This instruction book has been prepared by the Bell & Howell Company to aid in the operation, maintenance and repair of the Design 5205 semi-automatic continuous printer, Models D and J (Figures A and B).

The method of operation and all practical adjustments for each printer have been discussed in detail, and it is suggested that the operator thoroughly familiarize himself with the operating procedures outlined herein before proceeding with the actual operation of the equipment.

The printer repairs outlined in the Maintenance section of this book are those which may become necessary with continued operation of the equipment. Such repairs should be attempted only by a competent mechanic. All replacement parts for both printers are listed and illustrated in the Parts Catalog section at the rear of the book. The serviceman will find the exploded view illustrations helpful during disassembly of the equipment.

GUARANTEE

X

This product is guaranteed for a lifetime. Any parts that require replacement during the life of this product as a result of defective material or workmanship, will be furnished and installed without cost (except for transportation of the equipment) by any Bell & Howell Company authorized service station - conveniently located throughout the world. Equipment which has been damaged, abused, or worn from constant use will be repaired as promptly as possible at factory established rates. No liability is assumed for film which is damaged or is otherwise unsatisfactory.

GUARANTEE IS VOID:

- (1) If adaptions or accessories of other than Bell & Howell recommendations have been made or attached.
- (2) If equipment has not been registered with Bell & Howell. (Use card supplied with equipment.)
- (3) If equipment has been serviced by other than a Bell & Howell authorized service station.

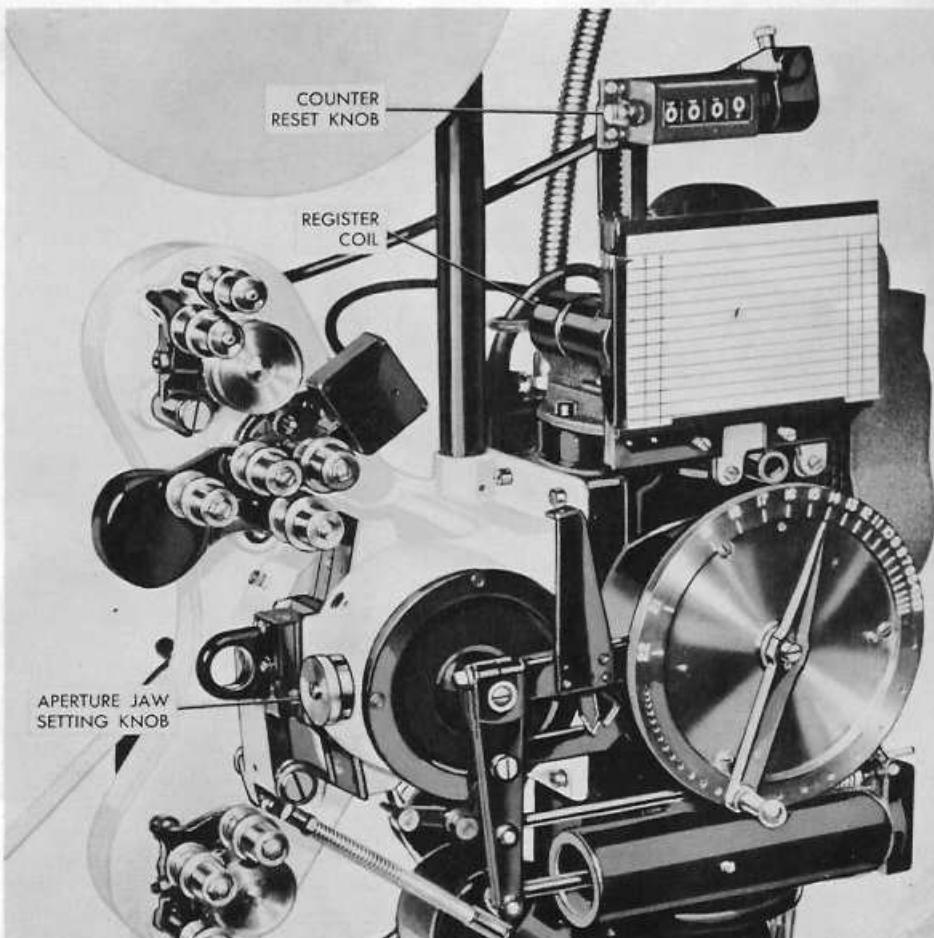


Figure B. 16-mm Continuous Printer - Model J

Operating Instructions

1. UNPACKING THE PRINTER. (See figure C).

a. The continuous printer is partially disassembled when prepared for packing and shipment. Figure C shows the manner in which the printer is packed and braced. Remove the printer equipment as follows:

b. One side of the crate is clearly stenciled "TO UNPACK REMOVE THIS SIDE". Carefully pry this side from the crate as shown in figure C. The

cardboard box fastened to the inner surface of the removed side contains the pilot lamp reflector as well as the film notcher, index cards, and wall receptacles shown in figure F.

c. Remove the electrical clips which secure all leadwire cables to the packing box.

d. Remove the wood screws which fasten the footage counter to the vertical brace at the top of the packing

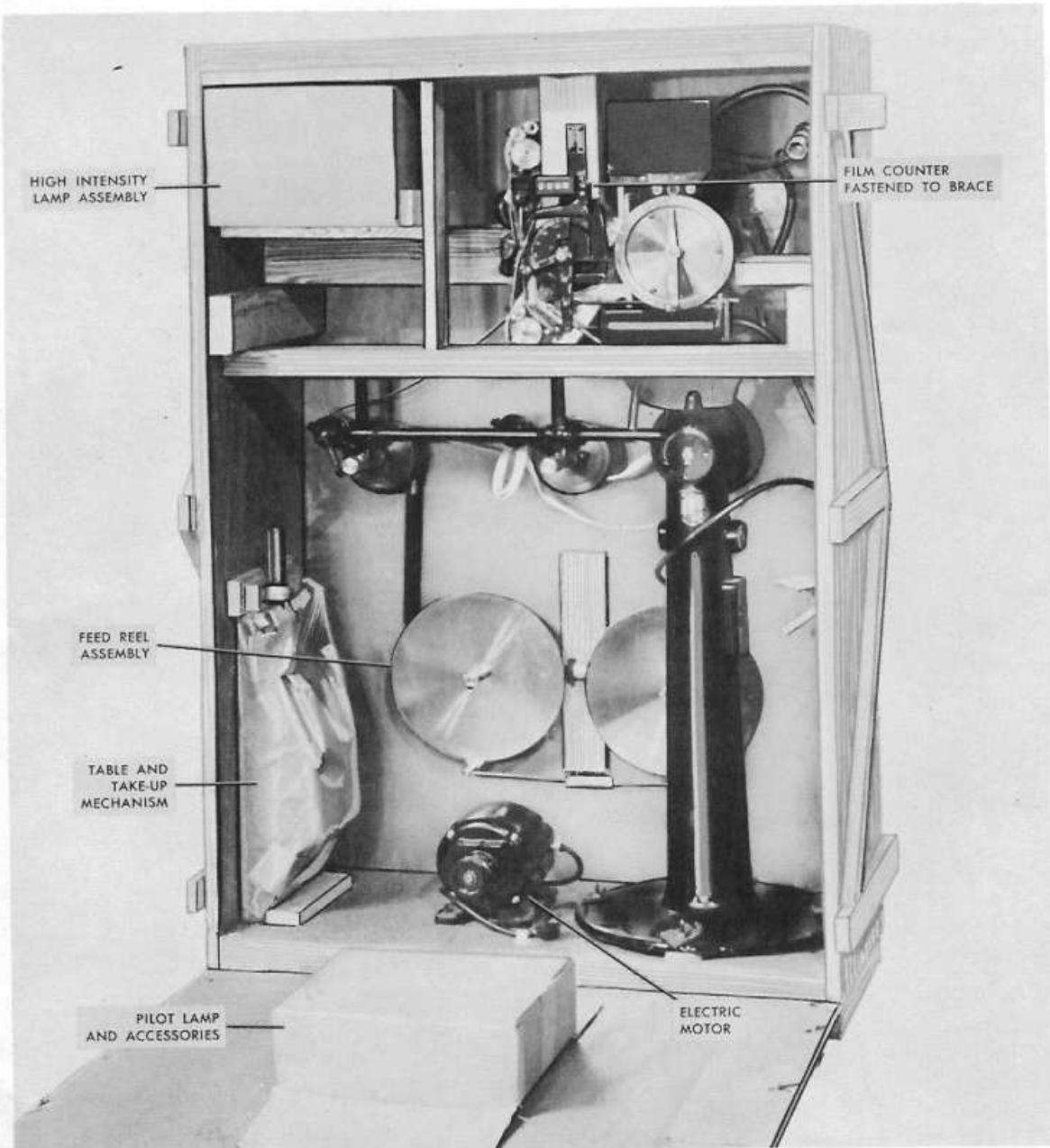


Figure C. Uncrating the Printer

box. Tie the counter temporarily to the printer to keep it out of the way during the remainder of the uncrating.

e. Remove the one-inch bracing which supports the cardboard box in the upper left-hand corner of the crate. This box must be handled carefully, since it contains the high intensity lamp assembly.

f. Pry up the wooden block which is fastened at the left side of packing crate floor. Remove and unwrap the assembled work table and take-up mechanism.

g. Remove the four bolts and nuts which fasten the electric motor to the floor, and lift out the motor.

h. Remove the two-by-four bracing which supports the top half of the printer and the bolts which fasten the pedestal base to the floor of the crate. Slide the printer carefully from the crate.

i. Remove the electrical clamp which fastens the assembled feed reels and support to the back of the crate. Do not drop these parts during removal.

2. SETTING UP THE PRINTER.

a. Fasten the film counter in position on the back of the card holder with the four fillister head screws which will be found partially screwed into the tapped holes in the holder.

b. Install the feed reel and support assembly down into the socket at the top of the gear case and secure the support with the taper pin which was temporarily inserted into the taper pin hole in gear case socket.

c. Remove the taper pin from the hole in the table bracket shaft socket in the pedestal, insert bracket shaft into the socket, and reinstall the taper pin.

d. Attach the electric motor to the automatic take-up mechanism beneath the table with the four bolts provided. The motor pulley must face toward the back of the printer. Then hook the drive belts around their respective pulleys. Note that the automatic take-up mechanism applies the proper amount of tension to the motor drive belt.

e. Remove the fillister head screw from each take-up hub, slide the film flanges into place, and reinstall the screws.

f. Remove the two screws from the top of the lamp case assembly and install the high intensity lamp assembly as shown in figure D. Adjust the position of the lamp assembly slightly until the white index line on the lamphouse is coincident with the white index line on the card holder bracket (figure D). Install and tighten the lamphouse retaining screws.

g. Insert the two Aklo heat filters into the filter holder on the side facing the lamp and the two glass flats on the side facing the printing aperture. Then insert the filter holder into the lamphouse as shown in figure E.

h. The pedestal base is sufficiently large and heavy and the entire printer is balanced so that the printer need not be fastened to the floor. However, holes are provided in the pedestal base for permanent installation when so required.

3. ELECTRICAL CONNECTIONS.

a. Mount the three wall receptacles (figure F) in a convenient location near the spot where the printer is to be used. The two-wire receptacle and one three-wire receptacle must be wired into the 110-

volt, a-c supply. The remaining three-wire receptacle must be wired into the 110-volt, d-c supply.

b. Plug the motor switch lead cord into the two-wire receptacle, the printing lamp lead cord into the three-wire, d-c receptacle, and the magnet lead cord into the three-wire, a-c receptacle. Label all receptacles to avoid confusion.

c. Plug the motor-to-pedestal lead cord into the twist-lock receptacle in the pedestal. Connect the two-prong connector of the lead which issues from the back of terminal box, to the lamphouse cooling motor connector. Bring the printer lamp lead up from the bottom of the terminal box and plug it into the two-prong receptacle behind the lamphouse motor.

4. THREADING THE PRINTER. (See figure H.)

a. Place the roll of negative film, wound emulsion side out, on the right-hand feed reel spool, and swing the feed reel guard down into place to hold the film against the flange.

b. Place the roll of positive film, wound emulsion side in, on the left-hand feed reel spool, and swing the feed reel guard down into place to hold the film against the flange.

c. Bring the ends of both films together, and pull the negative film until its end is approximately one foot in advance (longer) than the positive film. Then take hold of both films together and pull them down until the end of the positive film is approximately at the height of the take-up reel flange.

d. Raise the feed sprocket lever (1, figure H), and pass both films (together) around the film guide roller (2) and over the feed sprocket (3). Engage the film perforations on the sprocket teeth, and lock the film in place by closing the feed sprocket lever (1).

e. Pass the negative film only under the negative tension roller (4) and over the negative aperture guide roller (5). Bring the positive film only down under the positive tension roller (6) and over the positive aperture guide roller (7). At this point, the films once again will have come together.

f. Open the film gate (8) and draw both the negative and positive films over the main printing sprocket, engaging the film perforations with sprocket teeth. The perforations must be so engaged that the tension weights of the tension rollers (4 and 6) are raised to an intermediate position. Avoid getting the tension greater than, or less than, the tension limits set by the limit pin. Then, gently close the film gate.

g. Raise the take-up sprocket roller lever (10) and pass both the negative and positive films under the take-up sprocket guide roller (11) and over the take-up sprocket (12), engaging the film perforations with the sprocket teeth. Note that a loop (9) must be formed between the printing sprocket and take-up sprocket, and that the loop made by the negative film is a trifle larger than that of the positive film. When the loop has been formed, close the take-up sprocket roller lever to lock the film on the sprocket teeth.

h. Insert the end of the negative film in the core of the right-hand take-up flange, keeping the film securely against the flange while taking up the slack. Swing the take-up reel guard down into position.

i. Insert the end of the positive film into the core of the left-hand take-up flange, observing the same pre-

ORIGINAL
-EMULSION
OUT

PRINT-
EMULSION
IN

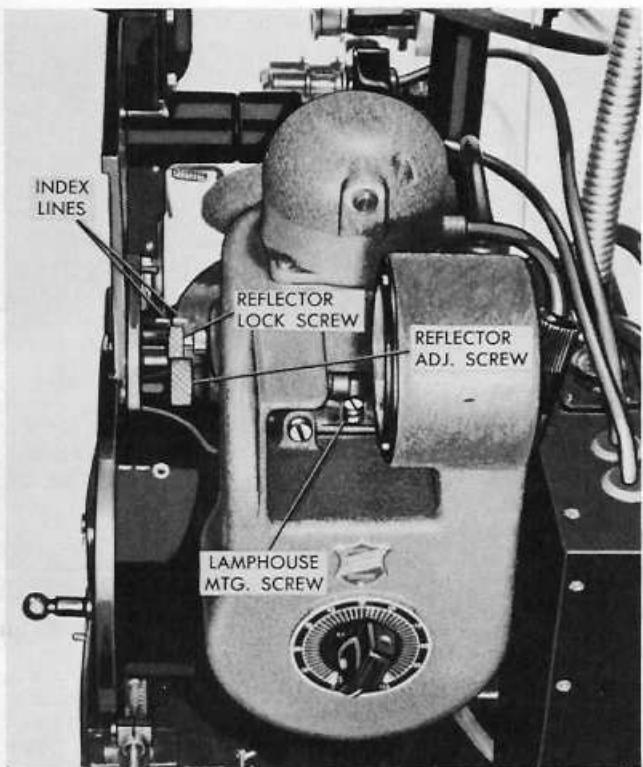


Figure D. High Intensity Lamp Installed

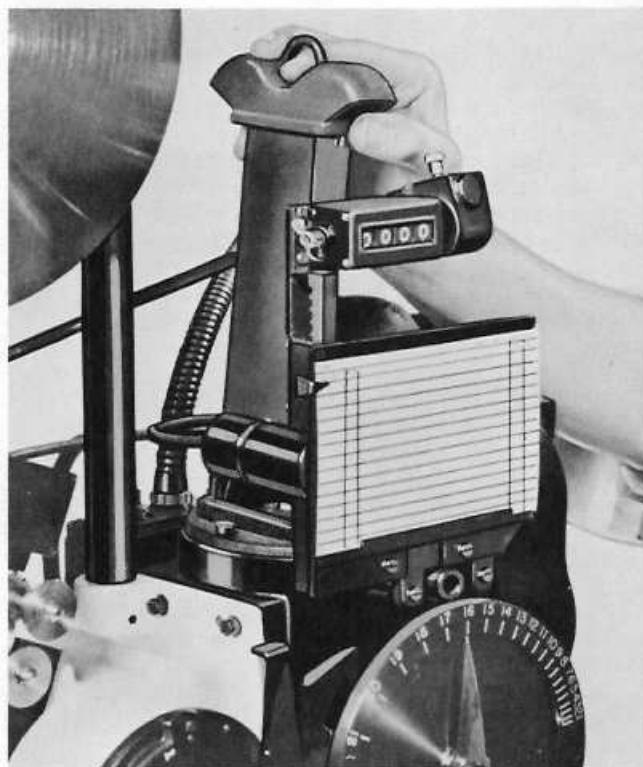


Figure E. Installing the Filter Holder

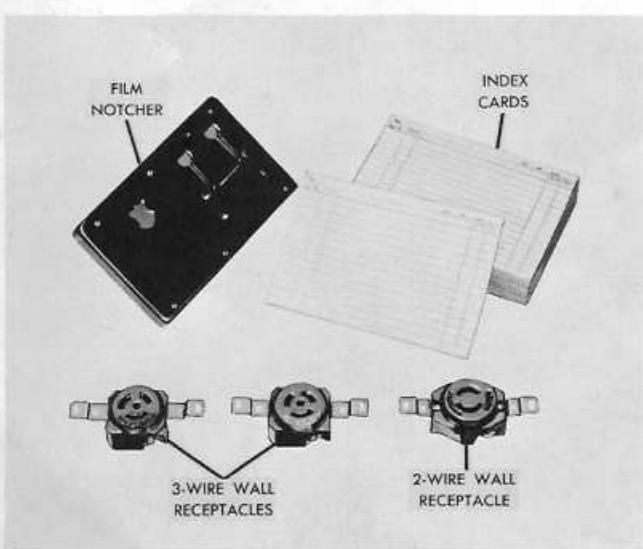


Figure F. Accessory Equipment Supplied

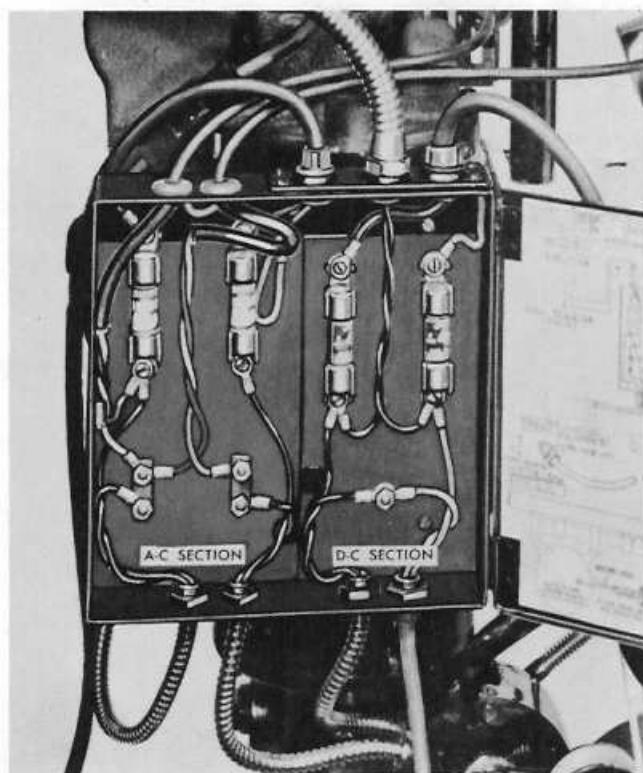


Figure G. Terminal Box and Cables

cautions as for the negative film (step h). If the end of the film does not reach the hub, operate printer manually with the handle on the main drive pulley.

5. OPERATING CONTROLS.

a. Motor Start Switch. The motor is started and stopped with a toggle switch on the front of the pedestal, just above the work table. An "ON-OFF" plate behind the switch mounting nut indicates the two positions of the switch. During actual continuous operation, the motor switch is left in the "ON" position and the printer mechanism is controlled with the interlocking switch and starting lever.

CAUTION

If a motor generator is used to supply d-c current to the printing lamp, set it at the lowest possible voltage before starting the motor. Then, after the printer is operating, gradually increase the output to 110 volts. Also, make certain that the lamp cooling motor is operating properly.

b. Interlocking Switch and Starting Lever. The interlocking switch and starting lever (figure A) controls the flow of current to the operating parts of the printer independently of the motor. Thus, the motor can be allowed to run continuously and without loss of efficiency even though the printer mechanism is inoperative. When the lever is pointing downward, it is in the "off" position; when moved one-quarter turn to the right (counterclockwise) it is in the operating position. This combination switch and lever assembly is in the same circuit with the magnets and the printing lamp. Movement of the lever handle to the operating position completes the circuit to the magnets and the lamp, and also shifts the belt tension pulley into the "driving" position. All of these actions are accomplished simultaneously. Movement of the lever handle to the "off" position releases the belt tension pulley from the drive belt, causes a stop to engage the brake arm, and cuts off the current to the magnets and printing lamp.

c. Lamp Rheostat Control. The input voltage of the printing lamp is controlled by a rheostat mounted on the lamp housing (figure D). The rheostat knob must be turned clockwise to increase the voltage, and counterclockwise to decrease the voltage, to the lamp. An ammeter above the rheostat constantly indicates the amount of current flowing through the lamp filaments. When operating at the lamp's capacity of 110 volts, the ammeter should indicate approximately 2.6 amperes. This maximum voltage should not be exceeded, because the resultant excess amount of heat will reduce lamp life and may cause damage to the gelatin filters.

6. NOTCHING THE FILM.

a. Before making density tests, it is essential that the film be notched at the margin for controlling the change in volume of light at the printing aperture. b. Place the negative film, emulsion side up, between the film guides on the notcher. The splice which separates the two scenes must coincide with

the edge of the notcher top plate. Figure I illustrates the use of the notcher for notching 35-mm film. The measurement "A" is the distance from the center of the notch to the splice, or frame, where the light change will take place and is equal to the film distance from the circuit interrupter roller to the film mechanism aperture. This distance is equivalent to six frames of 35-mm film and 15 frames of 16-mm film.

c. Continue to notch the film negative until every desired light change has been recorded on the edge of the film.

7. DETERMINING NEGATIVE LIGHT SETTINGS.

a. Beginning with the first scene, the proper light settings must be indicated on the index cards together with a short description of the scene to which they correspond. A sample index card is illustrated in figure J.

b. Although a printing timer is not supplied with the continuous printer, such a timer can be invaluable in determining a set of exposures. If a printing timer is not available, the printer itself can be used for this purpose.

c. Examine each scene of the negative closely to obtain an approximate printing time, and note the density number of each scene on the index card as shown in figure J. When all lighting changes have been noted on the index card, insert the card into the card holder and set the index card indicator at the first scene on the card. Then set the time indicating pointer to the light setting indicated for that scene.

8. TESTING THE NEGATIVE.

a. Thread the negative film only through the printing mechanism as instructed in paragraph 4.

b. Take a strip of positive film and, eliminating the greater portion of the threading operation, pass this film through the film gate and over the printing sprocket only. Be sure that the emulsion side of the positive film is against the emulsion side of the negative film. Then close the film gate gently.

c. Place the motor start switch (paragraph 5a) in the "ON" position. Then start the printer mechanism with the switch and starting lever (paragraph 5b) and stop it after approximately two feet of film have passed through the printing aperture. Open the film gate, remove the positive film, and mark the point at which the test print was ended.

d. Close the film gate over the negative, set the time indicating pointer to the next density number and scene on the index card, and run the printer (by means of the starting lever) until a click indicates that the timing notch has operated the exposure shutter. Stop the printer, open the film gate, and reinsert the strip of positive film. Make sure that the mark made on the positive film is below the printing aperture to avoid double exposing upon the test just made. Expose a few frames of the second scene and mark the positive film to indicate the end of this test.

e. Prepare a similar short test of each film scene, until every scene has been tested. Then develop, fix and dry the strip of test film, and examine it over a light box or similar light source. If necessary, correct the density numbers on the index card to agree

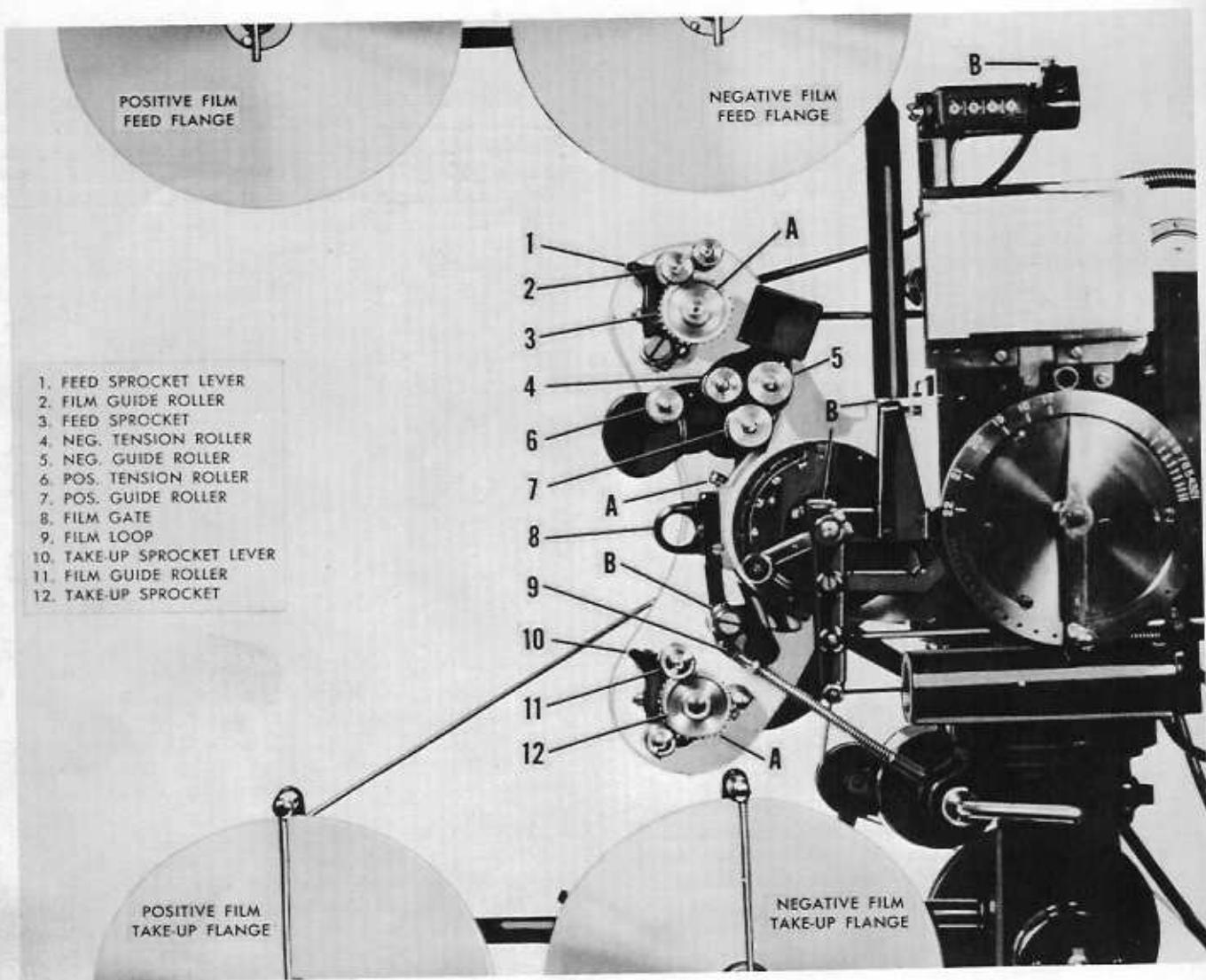


Figure H. Threading the Printer

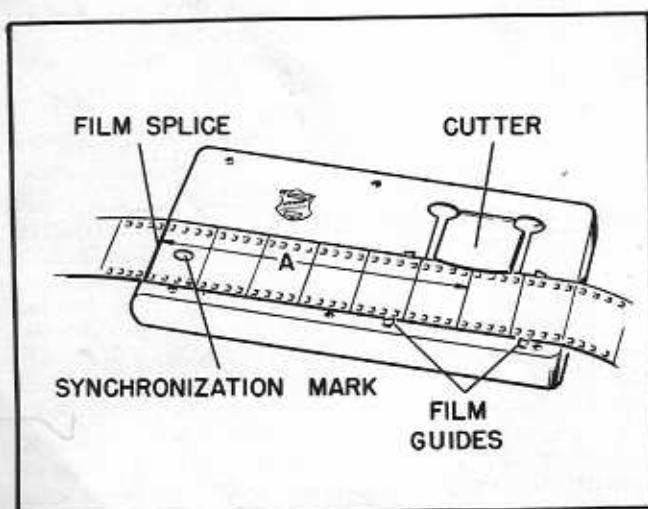


Figure I. Notching the Film (35-mm shown)

Start	THE WORLD AFLAME	End
8	INTRO. TITLE	0
10	SUB TITLE — THE ONLY —	12
12	INTERIOR SET — MAN AT DESK	22
9	EXTERIOR — CROWDS GATHERING	32
12	INTERIOR SET — MAN SMOKING	53
10	SUB TITLE — I WONDER —	62
15	CLOSE UP — MAN AND WOMEN	74
6	INTERIOR — CLUBROOMS	89
8	CLOSEUP — MAN AND WOMEN	108
10	SUB TITLE — A BIG CROWD	128
4	EXTERIOR — BRIDGE SCENE	133
20	EXTERIOR — CROWDS ADVANCING	141
22	CLOSE UP — LEADER OF CROWD	173

Figure J. Sample Index Card

with the results of this examination.

f. Thread the printer with the negative and positive film, and print the entire roll of negative film. After the roll of positive film has been developed, fixed and dried, inspect the complete roll of positive film by projection. It may be necessary to make further corrections to the density numbers on the index card to insure correct printing densities for all the copies which are to be made.

g. After the negative has been properly notched, timed and tested, it should be thoroughly cleaned.

9. SETTING PRINTING APERTURE - MODEL D

a. The aperture ring is mounted inside the printing sprocket and is controlled by means of the aperture ring lever. The five printing apertures permit the printing of silent pictures, sound pictures forward, sound pictures backward, sound records forward and sound records backward.

b. The aperture ring lever (figure A) is spring-loaded, and can be positioned in any one of the five locating holes in the aperture setting plate. These five locating holes are numbered from "1" to "5" and, in order, correspond to the following aperture settings: (1) full width picture and sound aperture; (2) masking out sound track at the right side; (3) masking picture area at right side; (4) masking out sound track at left side; (5) masking picture area at left side.

c. The combination of apertures permits the following printing possibilities: (1) full aperture silent pictures or composite picture and sound; (2) picture area only when the beginning end of the negative film is led to the aperture; (3) sound track only when the beginning end of the film is led to the aperture; (4) picture area only when the tail end of the negative film is led to the aperture; (5) sound track only when the tail end of the film is led to the aperture.

d. The arrangement of aperture openings outlined in step c makes it possible to run the negative many times in succession without the necessity of rewinding. A slot is milled in the main gear case casting at the left of the aperture and main printing sprocket to permit the printing of the footage markings and trademarks which identify each roll of negative film.

10. SETTING PRINTING APERTURE - MODEL J.

a. The printing aperture of the Model J printer is set by revolving the aperture jaw setting knob (figure K) on the side of the gear case casting. The four various aperture openings are clearly marked on the dial beneath the knob.

b. When the knob is set so that the pointer is at "SOUND ONLY") the width of the printing aperture permits the printing of only the sound track.

c. The two "PIC. ONLY" positions permit the printing both of positive and reversal film. When set for "REVERSAL", the printing jaw allows a 0.006-inch unexposed area between the sound and picture on the reversal film. When set on "POSITIVE", the printing jaw allows a 0.006-inch double exposure on the positive film. This provides a black safety margin band between the picture and sound track on all types of film.

d. When the knob pointer is at "SOUND PICTURE" the width of the aperture opening permits the printing



Figure K. Aperture Jaw Setting Knob (Model J)

of the sound track and picture area simultaneously. This last-mentioned operation can be accomplished only by using master 16-mm sound negatives in which the density of the sound and picture area have been matched.

e. The four aperture openings make possible the following five methods of printing: (1) printing on one positive film the sound track and picture area from two separate negatives; (2) printing the picture area and sound track in two operations even though both are on the same negative; (3) printing the picture area and sound track simultaneously from one negative; (4) printing the picture area only; (5) printing the sound track only. Method (1) necessitates two separate operations in which the positive film is run through the printer twice - once with each negative. Method (2) also requires two separate operations in which both the positive and negative film are run through the printer twice - once to print the picture area, and once to print the sound track.

11. STOPPING THE PRINTER.

a. When the end of the negative roll passes the film gate, immediately stop the mechanism by moving the starting lever to the "off" position.

NOTE

Except at the end of the day's operation, it is advisable not to switch off the motor start switch, because the motor will operate more efficiently while warm.

b. Cut or tear off the positive film at a point below the film gate, and put in position for succeeding prints. Then release the film from the take-up sprockets, and swing the take-up reel guards up out of the way. Pull out the stripping flange, which will remove the rolls of film.

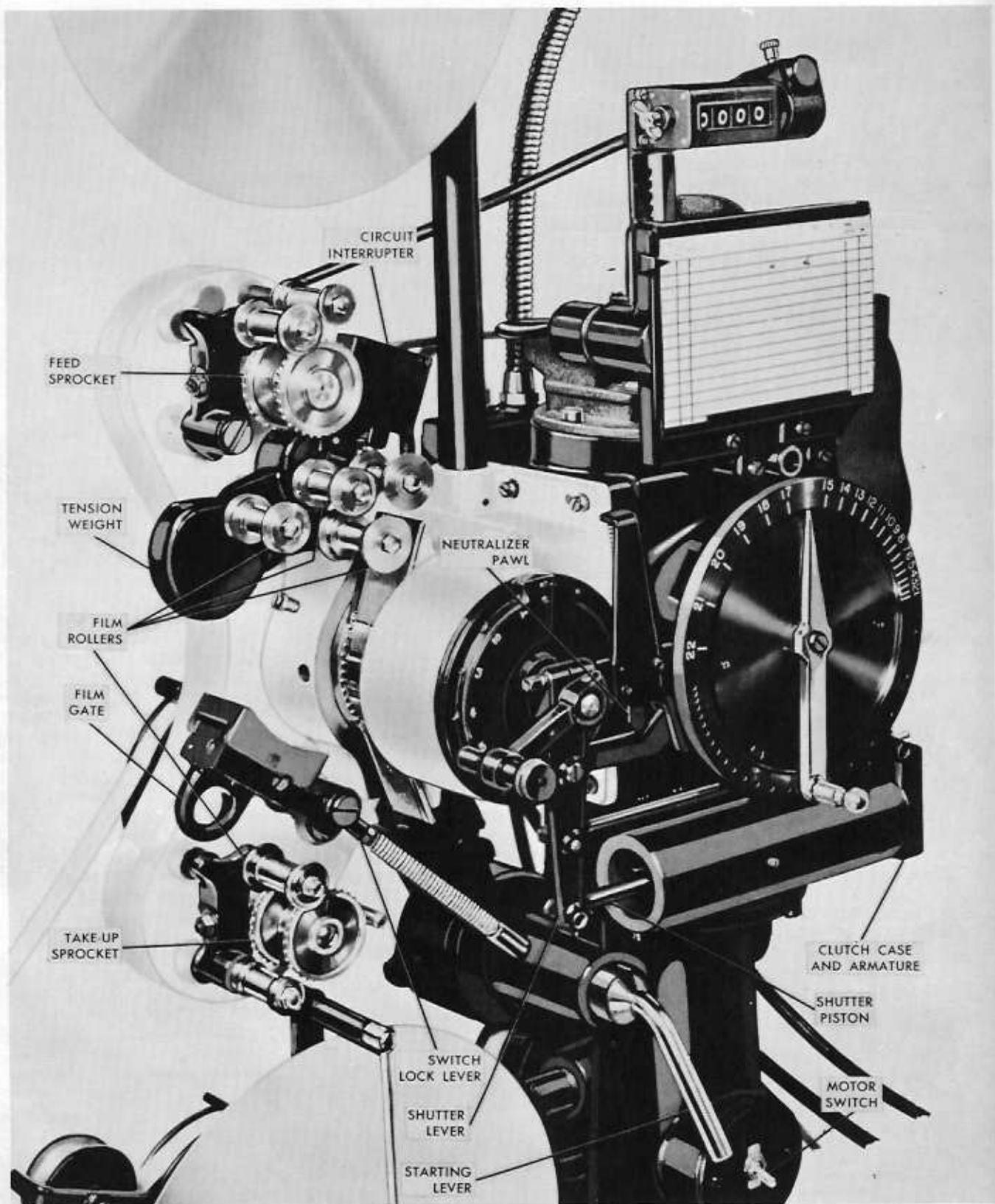


Figure L. Film Moving Mechanism (Model D shown)

c. After the printing of each roll of film, rub over the printing sprocket, aperture openings and upper and lower aperture plates with a clean, dry cloth. Once or twice an hour (or more often, if necessary) saturate a small piece of cheesecloth with acetone or any other quick-drying cleaner, and wipe all of these parts to remove accumulations of dirt and foreign substance. About twice a day, wipe these same parts with a cloth damped with light machine oil; then remove the oil film with a clean, dry cloth.

CAUTION

Do not use a metal instrument of any kind to remove dirt or hardened film emulsion from any of the parts which come in contact with the film. If ordinary cleaning methods do not suffice, use a pointed piece of soft wood, such as a toothpick, to loosen the dirt.

12. OPERATING PRECAUTIONS.

- a. Make certain that all electrical connections have been properly made, particularly that the lamp cord is plugged into the d-c outlet.
- b. If a motor generator is used to supply direct current to the printing lamp, be sure to set the generator at its lowest voltage before starting the motor with the motor start switch. After the printer is

operating, gradually increase voltage to 110 volts.

c. Before turning on the printing lamp (with the interlocking switch and starting lever), check to make certain that the printer magnet coil lead is plugged into its source of supply.

d. Do not exceed the maximum voltage of the printing lamp (110 volts) as the excess heat will result in reduced lamp life and may cause possible damage to the gelatin filters. When operating at 110 volts, the ammeter on the lighthouse will indicate approximately 2.6 amperes.

e. Before and during the operation of the printing mechanism, check to see that the printing lamp is burning by watching the reading on the ammeter to the right of the index card holder. If such an inspection should disclose that the lamp is burned out, stop the printing mechanism immediately and replace the lamp. Development of the portion of the positive film which was run through the mechanism will determine whether splicing is practical or whether the entire negative film must be reprinted.

f. Be sure to keep the printing sprocket, aperture and aperture plates free from dirt and other foreign substance (paragraph 11, step c). This will eliminate the possibility of scratches and abrasion marks on the film.

g. Even the experienced operator should thread and run a trial film in daylight (or bright artificial light) to make certain that the printing mechanism is operating correctly.

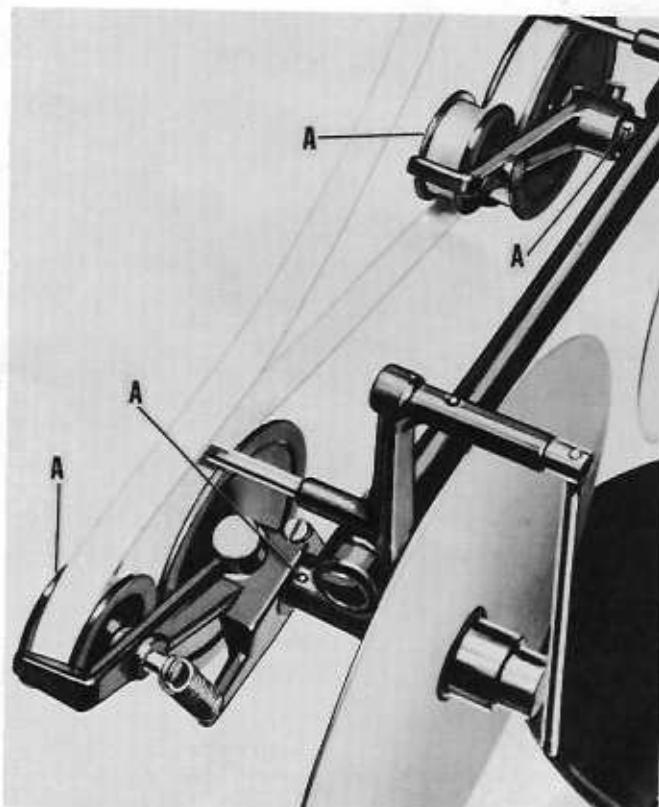
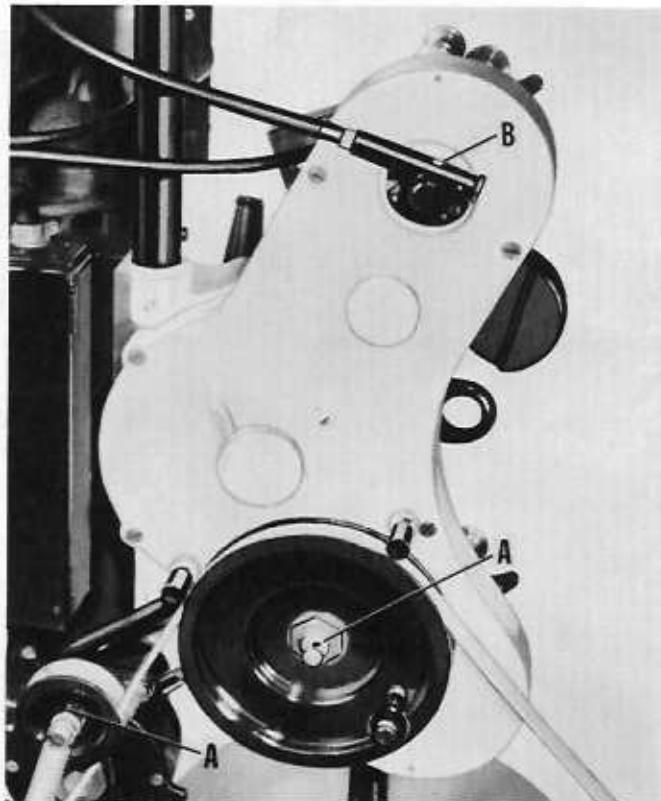


Figure M. Printer Lubrication Points

Cleaning and Lubrication

13. GENERAL INSTRUCTIONS.

a. In order to insure longer mechanical life and trouble-free operation, the continuous printer should be inspected, meticulously cleaned and lubricated at regular intervals. It also is important that precautions be taken to guard against corrosion or damage to highly polished parts which are contacted by film during printer operation.

b. Never use a pointed or sharp metal instrument to remove dirt or accumulation of film emulsion from any of the parts which come in contact with the film. If ordinary cleaning methods do not suffice to remove accumulated dirt, use a spatula-shaped piece of wood (such as an orange stick or toothpick) to loosen the dirt. Then wipe the parts carefully with a soft, clean, lint-free cloth.

14. INSPECTION CHART

Component	Nature of Inspection	Inspection Time
Complete equipment	Clean as instructed in paragraph 15.	Daily (before and after use).
Film sprockets	Check for broken teeth or dirt between teeth.	Daily (before use).
Wiring and terminal connections	Inspect wiring for frayed or worn spots, and make certain that all connections are secure.	Daily (before use).
Lubrication points	Perform the daily lubrication procedure (para. 17a).	Daily (before use).
Printing sprocket and gate shoe	Insert oiled leader to prevent corrosion (para. 16).	Daily (after use).
Film rollers	Check for sticking, burrs, pits or flat spots, and clean (para 15) or replace as necessary.	Every 90 days.
Drive belts	Inspect drive belts for signs of wear or weakness, and replace if necessary.	Every 90 days.
Springs	Check all exposed springs for good condition and proper connection.	Every 90 days.
Attaching parts	Check and tighten all attaching screws and nuts.	Every 90 days.
Printer motor and lamp cooling motor brushes	Remove brushes and inspect for wear or pits. Replace, if necessary.	Every 90 days.
Footage counter flexible shaft	Remove, disassemble, clean, regrease (para. 30).	Annually.
Main drive pulley brake shoe	Inspect for wear and replace, if necessary.	Annually.

15. CLEANING INSTRUCTIONS.

- a. Wipe the entire exterior of the continuous printer with a cloth dampened with carbon tetrachloride.
- b. Remove the oiled paper leader from between the printing sprocket and film gate (refer to paragraph 16), and wipe the polished surface of the gate shoe, printing sprocket, and the convex surface on which the film rides with a soft, lint-free cloth. This will remove dust and dirt, as well as the oil left by the paper leader.
- c. Inspect the sprocket teeth carefully, and remove accumulated dirt with an orange stick or toothpick.
- d. Thoroughly clean the printing apertures with a soft camel's hair brush. Any dirt in these apertures will leave a fuzzy frame line that might extend into the picture or sound area.
- e. Thread a loop of film through the printer mechanism (paragraph 4) and run the printer for several minutes. This not only will enable the operator to see that the mechanism is operating properly, but will serve to remove any oil that may have been left in the film channel.

16. PREVENTING CORROSION.

- a. At the end of each day's run, wipe the polished surface of the gate shoe, the printing sprocket, and the convex surface on which the film rides with a soft, lint-free cloth.
- b. Moisten a piece of paper leader (either 16-mm or 35-mm) with lubricating oil. Do not saturate the paper leader to a point where it will drip oil; it should not spread oil to parts other than those with which it comes into direct contact.

- c. Thread this oiled paper leader over the printing sprocket and the convex surface over which the film rides. Then close the film gate so that the gate shoe bears against the leader and holds it in position.

17. LUBRICATION.

NOTE

Only two types of lubricant are required for the lubrication and maintenance of the continuous printer. When oil is specified, use Houghton AAA stainless oil; when grease is specified, use General Electric ball bearing grease.

a. Daily Lubrication. With an oil can, apply approximately three drops of oil to all points indicated by the letter A in figures L and M. You will note that these lubrication points consist of drilled oil holes which permit access to revolving parts, such as the shafts for the sprockets. All excess oil must be wiped from the outer surface of the operating parts after lubrication.

b. Weekly (40-hour) Lubrication. Once every 40 hours of operation, apply four drops of oil to all points indicated by the letter B in figures L and M. All excess oil must be wiped from the outer surface of operating parts.

c. Annual Lubrication. Remove and disassemble the footage counter and flexible shaft (paragraph 34), clean out the old grease, and apply a small amount of clean, new grease to all gear teeth.

Adjustments

18. CIRCUIT INTERRUPTER ADJUSTMENT.

- a. Thread the printer with a test loop of notched film as instructed in paragraph 4.
- b. With the circuit interrupter roller riding the edge of the film, run the film through the mechanism manually (by means of the main drive pulley) until the roller engages a film notch (figure N).
- c. Carefully rotate the interrupter case until a definite click indicates that the switch circuit has been "closed"; tighten clamp bracket screw securely.

19. TAKE-UP MECHANISM ADJUSTMENT.

- a. Loosen the square head set screws that lock the guide rods in place (figure P).
- b. Press the motor assembly away from the pedestal as far as possible and hold in this position while adjusting the rear guide rod (nearest motor pulley) so that it remains engaged in the rod opening in the lower take-up bracket. Tighten the square head set screw and hex nut securely.

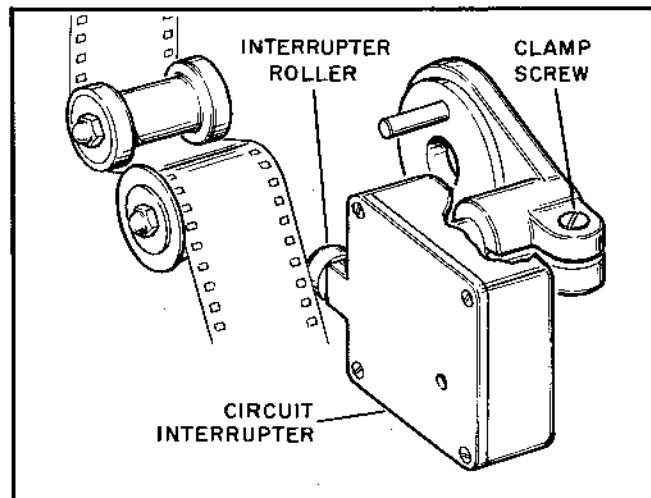


Figure N. Circuit Interrupter Adjustment

c. Press the motor assembly toward the pedestal as far as possible and hold in this position while adjusting the front guide rod so that it remains engaged in the rod opening in upper take-up bracket. Tighten the square head set screw and hex nut securely.

20. BRAKE LEVER ADJUSTMENT. Move the interlocking switch and starting lever to the "on" position, and screw the brake shoe in or out until the shoe clears the braking surface of the drive pulley by approximately 1/4-inch. Tighten the brake shoe set screw securely.

21. FILM TAKE-UP TENSION ADJUSTMENT.

a. It is very important that the film take-up tension be correctly set so that the film winds onto the take-up reel hubs securely and evenly. The tension must be such that the film perforations will not be strained or torn at the beginning of a "run", yet strong enough to take up a full 1000-foot roll of film.

b. Thread the printer with a 1000-foot roll of test film (paragraph 4) and watch the winding of the film during operation. If the tension appears to be too strong at the beginning, loosen the adjustment cap, or caps, (figure Q) to weaken the tension. If the tension appears to weaken as size of the film roll increases on the take-up hubs, tighten the adjustment cap until the film takes up securely and evenly.

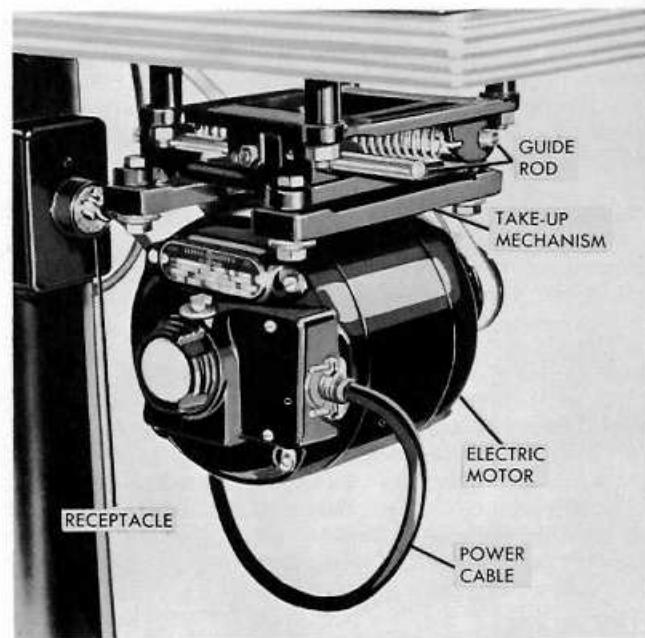


Figure P. Motor and Take-up Mechanism

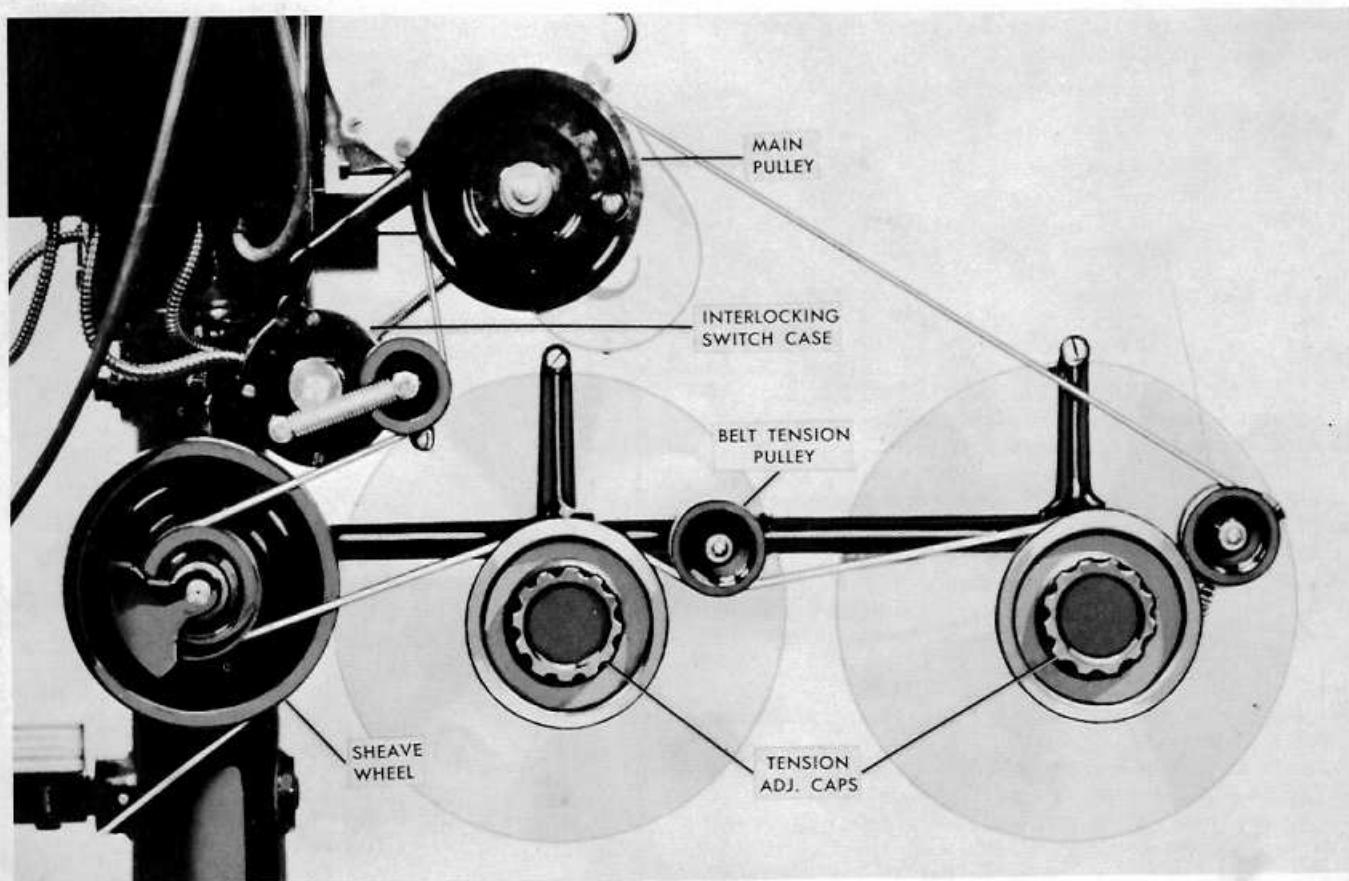


Figure Q. Feed and Take-up Hubs

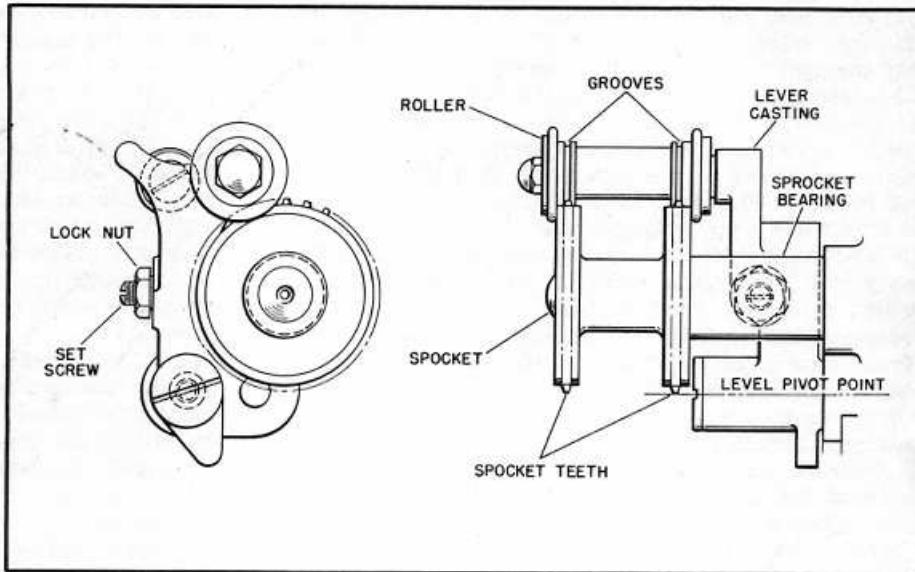


Figure R. Sprocket Roller Adjustment

22. SPROCKET ROLLER ADJUSTMENT.

a. The guide rollers for feed and take-up sprockets are mounted on lever studs just above their corresponding sprockets (see figure L). These rollers must revolve freely and with an absolute minimum of end play. Furthermore, the grooves at each end of the rollers must center over the corresponding sprocket teeth.

b. Thread two thicknesses of film around sprocket (figure R). A set screw extends through the lever casting so that the flat point of the screw bears against the sprocket bearing. Loosen the lock nut on this set screw, and turn the screw in or out until the guide roller just contacts the film. Then tighten the lock nut securely.

NOTE

The guide roller must not press tightly against the film. It must be free enough so that it can be turned with ease even though it is in contact with the film.

23. FILM GATE ADJUSTMENT.

a. The aperture lever assembly is so constructed that the gate shoe pivots in the center and operates against spring tension to permit the passage of film splices while maintaining contact with the film. To maintain proper film clearance and alignment, the following adjustments are necessary.

b. To adjust the parallelism of the shoe, close the film gate and check points "D" and "E" (figure S) with a feeler gage having a total thickness equal to that of the negative and positive films plus 0.004-inch. Turn adjusting screw "A" until the clearance is the same at points "D" and "E", then tighten the locking set screw "A1" securely.

c. Using the same feeler gage, adjust screw "B" until the clearance between the shoe and the drum is equal at points "D", "E", "F" and "G". Then tighten set screw "B1" securely.

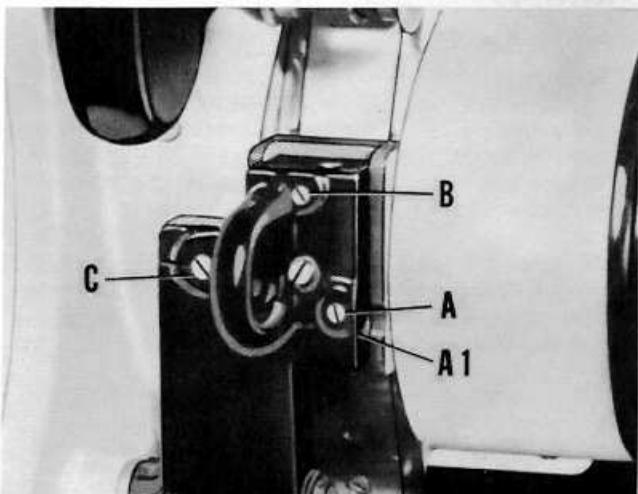
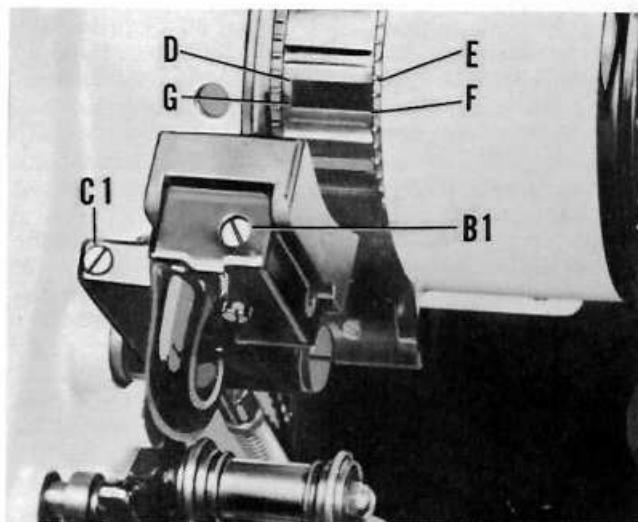


Figure S. Aperture Gate Lever Adjustment

d. Thread a negative and positive film through the printing mechanism (paragraph 4) making certain that the negative and positive tension weights are in the intermediate position as instructed.

e. Grip both thicknesses of film at a point just below the printing sprocket and carefully pull the film downward as far as the size of the film perforations will permit. This is possible because the film perforations are slightly larger than the sprocket teeth. As the film is pulled downward, you will note that the tension weights will be raised slightly. At this point, tighten screw "C" until the film gate holds the film securely when the film is released. Then loosen the screw slowly and carefully to the point where the weights will pull the film back to original position. When proper adjustment has been obtained, tighten locking screw "C1" securely.

f. Test the film gate adjustment by pressing alternately at the top and bottom of the gate. When properly adjusted, it should be possible to rock the gate a barely perceptible amount.

24. LIGHT SHUTTER ADJUSTMENT.

a. The light shutter must be adjusted so that a full range of light setting (from "1" to "22") can be accurately obtained. Refer to figure 20 (Parts Catalog) and remove three screws (29) that fasten the assembled indicating dial and pointer to the lamp case. Remove the dial and press the quadrant down to the bottom of the lamp case casting (figure T). Adjustment is made by properly meshing the teeth of the quadrant and pinion gear (figure 20, item 30).

b. With the pointer set at the "22" position, hold the dial assembly in its approximate position in front of the lamp case so that the dowel pin just below the number 16 on the dial is slightly to the left of its corresponding dowel hole in the lamp case casting. Press the dial inward until the pinion gear teeth engage the quadrant gear teeth and temporarily secure the dial with the three oval head screws. Swing the indicating pointer from the "22" position to the "1" position. A dowel pin on the underside of the pointer should strike the dowel stops in the dial at the extreme positions.

NOTE

If the pointer dowel pin strikes one of the dowel stops but will not turn far enough to strike the other, the dial assembly must be removed and the gears re-meshed to obtain the proper results. Then tighten the three dial attaching screws securely.

c. Remove the lamphouse (reverse of paragraph 2f) and reach down into the lamp case until the shutter can be gripped through the light mask. Work the shutter toward the front of the gear case until all

shutter end movement has been removed.

d. Set the indicating pointer at the number "1" position on the indicating dial and insert a small, metal gage (0.156-inch thick for Model D printers; 0.125-inch thick for Model J printers) between the top edge of the shutter blade and the top edge of the opening in the light mask. Hold the shutter firmly in this position (meanwhile maintaining pressure to eliminate end movement) and tighten the shutter operating lever clamping screw securely.

e. Remove the metal gage and reinstall the lamp-house assembly (paragraph 2f).

25. LAMPHOUSE REFLECTOR ADJUSTMENT.

a. Set the continuous printer aperture for full width printing. This is accomplished on Model D printers by setting the aperture ring lever into the hole marked "1" on the engraved quadrant and on Model J printers by turning the aperture index dial to "SOUND AND PICTURE".

b. Disconnect the lock lever from the aperture gate lever (figure 2, items 5 through 10) and pull back the aperture gate lever.

c. Place any good exposure meter in front of the aperture and turn on the printing lamp. Adjust the lamp reflector horizontally by means of the knurled horizontal adjustment screw (figure D). When maximum meter reading has been obtained, lock the adjustment by means of the knurled locking screw.

d. Connect the lock lever to the aperture gate lever (figure 2, items 5 through 10).

26. ARMATURE STROKE AND AIR VALVE ADJUSTMENT.

a. Two screws are visible through the hole in the end of the armature case (figure T). The countersunk flat head screw adjusts the length of the armature stroke, and the fillister head screw is used to lock the adjustment. The length of armature travel should be approximately 1/16 inch.

b. To adjust the stroke, loosen the fillister head screw and turn the flat head screw a fraction of a turn clockwise to lengthen the stroke (or counter-clockwise to shorten the stroke). Be sure to tighten the locking screw securing before making the test.

c. The shutter operating lever plunger (which is inserted into the lamp case cylinder casting) is equipped with a slotted set screw, or release valve, which controls the volume of air entering into or escaping from the cylinder. This release valve can be adjusted to speed up or slow down the action of the clutch mechanism.

d. Make a film loop from six feet of test film and notch it at short intervals. Start the printer and operate the time indicating pointer, setting it from "1" to "22" and from "22" to "1". Screw the air release valve in or out until the plunger makes one complete stroke on each notch.

Maintenance

27. GENERAL REPAIR INSTRUCTIONS.

a. Removing Burrs and Scratches. Those parts which come in contact with the film (such as the aperture plates, film rollers, etc.) must be absolutely free of nicks, burrs or grooves which might cause scratches on the film. Minor abrasions usually can be removed by a light buffing with a soft polishing wheel. If such a polishing should fail to remove the abrasions satisfactorily, the damaged part must be replaced.

b. Electrical Contact Repair. All electrical contact points which have become blackened or pitted may be temporarily restored by polishing with a contact file. Polish only until the contacts become clean and bright. If the pitting is too extreme, the affected component must be replaced.

c. Cable and Leadwire Maintenance. For the most part, electrical components of the printer (pilot light, cables, leadwires, lamphouse motor brushes, terminal box fuses, etc.) can be inspected and repaired, or replaced, with little difficulty. Most electrical troubles can be avoided by an occasional inspection for frayed or broken leadwires and loose terminal connections. Lamphouse blower motor brushes can be inspected or replaced by unscrewing the brush caps from the blower motor housing. A pictorial wiring diagram is located on the inside of the terminal box door.

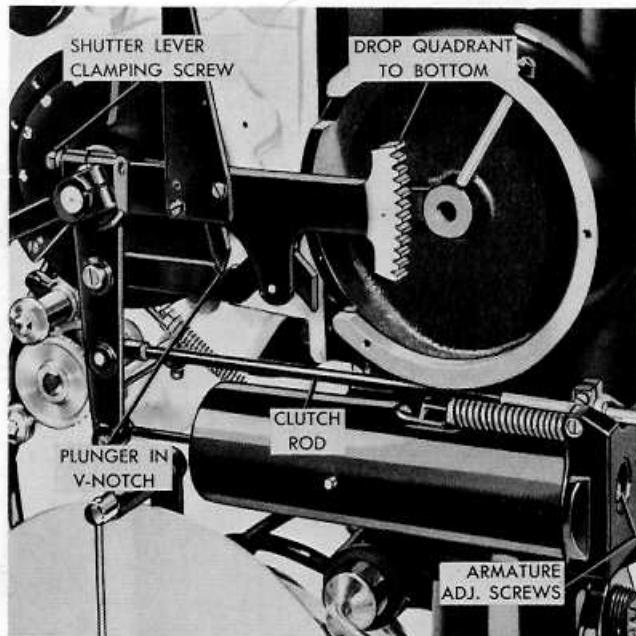


Figure T. Installing the Indicating Dial and Pointer

d. Replacing Damaged Parts. The replacement of a great percentage of printer parts (especially such visible external parts as rollers, levers, sprockets, etc.) is a simple procedure requiring no detailed instructions. Complete disassembly, repair and reassembly instructions for those assemblies which may require occasional attention will be found in paragraphs 29 through 36. Further disassembly, beyond that discussed in this section, should be attempted only by the Bell & Howell factory or an authorized Bell & Howell service station representative.

28. TROUBLE SHOOTING CHART.

TROUBLE	CAUSE AND REMEDY
Film does not take up evenly	Take-up tension requires adjustment (par. 19).
Motor drive belt slipping; clean and lubricate motor take-up.	
Main drive belt slipping; replace worn belt or check pulleys and rollers for sticking.	
Negative and positive films not registering at aperture	Film improperly threaded (par. 4).
	Improper adjustment of aperture lever (par. 23).
Films not making contact at printing aperture	Improper adjustment of aperture lever (par. 23).
Scratches on negative and/or positive film	Remove dirt and emulsion from film path parts.
Card holder indicator does not move downward	Replace register bar if teeth are worn (par. 35).
	Replace register coil if shorted (par. 35).
	Replace circuit interrupter switch (par. 31).
Magnetic clutch does not operate	Check clutch magnet resistance (4 ohms) and current draw (6 amps); replace magnet, if necessary.

29. COUNTER DRIVE SHAFT MAINTENANCE.

REMOVAL - FIG. 1

- a. Unscrew the two fillister head screws (6) and carefully pry the gear bearing end of the counter drive shaft assembly (5) from the two dowel pins (7) in the back side of the gear case.
- b. Unscrew the flexible shaft casing from the counter mounting bracket.

DISASSEMBLY - FIG. 7

- a. Unscrew and remove the flexible shaft casing (1) from the lower intermediate bearing (5).
- b. Remove the fillister head screw (3) and pull the end thrust bearing (2) and flexible shaft (4) from the lower intermediate bearing (5).
- c. Inspect the shaft splines for damage and the gears for worn, chipped or broken teeth. Damaged parts must be replaced.

REASSEMBLY - FIG. 7

- a. Grease the gear teeth of the gear on the end of the flexible shaft (4) and assemble the shaft into the lower intermediate bearing (5).
- b. Press the thrust bearing (2) into the bearing (5) and install the fillister head screw (3).
- c. Slip the flexible shaft casing (1) over the flexible shaft and screw the casing into the bearing.

INSTALLATION - FIG. 7

- a. Insert the spline end of the flexible shaft (5) into the end of the intermediate gear located in the foot-age counter mounting bracket, and screw the shaft casing into the bracket casting.
- b. Locate the drive shaft lower bearing on the two dowel pins (7) in the back of the gear case and install the two fillister head screws (6). Make certain that the gears mesh properly when seating the bearing on the gear case casting.

30. REGISTER COIL MAINTENANCE - FIG. 1.

- a. To remove the register coil (9), first disconnect the two leads that run from the coil to the terminal box and withdraw the leads from the box. Unscrew the round wire receptacle (8) from the register coil and slide the receptacle back on the leads until the two fillister head screws (10) are exposed. Remove the screws and disassemble the coil from the register bar frame.
- b. Test the coil with a test lamp hook-up for shorts. Replace coil if defective.
- c. Insert the coil (9) into its receptacle on the back of the index card holder assembly and install the two fillister head screws (10). Screw the round wire receptacle (8) into the card holder receptacle. Thread the register coil leadwires into the terminal box and connect them to the proper terminals as indicated in the wiring diagram inset, figure 1.

31. CIRCUIT INTERRUPTER MAINTENANCE.

REMOVAL - FIG. 1

- a. Disconnect the circuit interrupter leads from the terminals inside the terminal box, and withdraw the leads from the box.

- b. Remove the film roller from directly in front of the circuit interrupter (11) by taking off the acorn nut and bearing washer which hold it in place. Note that the mounting stud of the circuit interrupter is held securely by the clamping action of a split holder. Loosen the fillister head screw in this split holder and remove the circuit interrupter.

DISASSEMBLY - FIG. 8

- a. Unscrew the four fillister head screws (2) and lift the cover (1) from the case (18).
- b. Remove the four fillister head screws (4) and bronze washers (5), disconnect the terminals (9) from the switch (3), and remove the switch and the insulator (6) from the switch case. It may be necessary to disassemble the strain relief bushing (8) from the cord (7) so that the switch can be pulled out far enough to expose the terminals.
- c. The large set screw (10) is locked in place by a small set screw (11) and friction plug (12). These parts need not be removed from the case.
- d. Disassemble the roller (13) from the switch lever (15) by removing the roller stud (14). The switch lever is secured to the case with a dowel pin (16) and need not be removed unless damaged and in need of replacement.
- e. Check the switch for positive "make" and "break" action and the switch roller for flat spots. Replace all worn, damaged or faulty parts.

REASSEMBLY - FIG. 8

- a. Install the switch lever (15) to the interrupter case (18) with the dowel pin (16) and fasten the pin in place. Assemble the roller (13) to the lever with the roller stud (14).
- b. Solder the leadwires of the cord (7) to the switch (3), and fasten the switch and insulator (6) into the case with the four fillister head screws (4) and washers (5). Do not tighten the screws until the switch is adjusted.
- c. Assemble the strain relief bushing (8) around the cord (7) and press the bushing into the opening in the rear of the case.
- d. With the roller (13) in its correct operating (90-degree) position as illustrated in figure U, loosen the

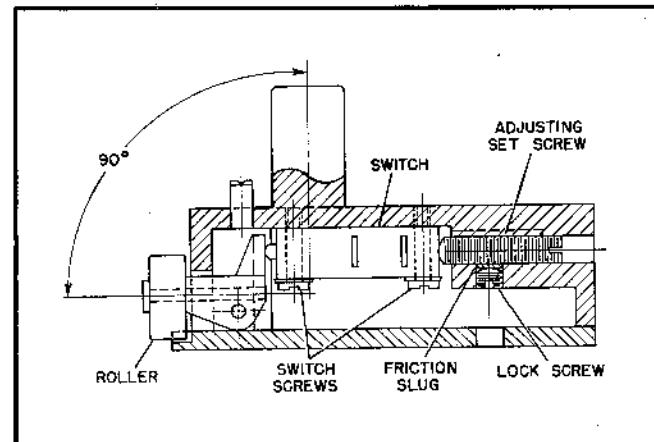


Figure U. Circuit Interrupter Contact Adjustment

lock screw and move the switch forward with the adjusting set screw until the switch trips to open the circuit. At this point, tighten the lock screw and switch screws securely.

e. Fasten the cover (1) to the switch case (18) with the four fillister head screws (2).

INSTALLATION - FIG. 1

a. Insert the mounting stud of the signal circuit interrupter (11) into the interrupter holder, and securely tighten the clamping screw in the holder.

b. Thread the circuit interrupter leadwires up into the terminal box and connect them to the terminals at the upper ends of the bus bars.

c. Adjust the circuit interrupter as instructed in paragraph 18.

32. CLUTCH MAGNET MAINTENANCE.

REMOVAL - FIG. 2

a. Before the clutch magnet (18) can be removed, the clutch case and armature (figure 20, item 9) must be disassembled from the lamp case.

b. Grasp the flattened end of the dowel pin (19) with a smooth-jaw pliers, and turn and pull the pin from the casting. Press the clutch magnet from the casting, and disconnect the magnet leads from the terminals in the terminal box.

c. Check the magnet for shorts or grounds. The normal ratings are 4 ohms, 6 amps at 110 volts. If the magnet does not meet these requirements, it must be replaced.

INSTALLATION - FIG. 2

a. If a new magnet is being installed, slip the magnet into the cylinder until the contact (right-hand) end of the magnet is 0.006 from the right-hand end of the cylinder casting. Using the hole in the cylinder wall as a guide, drill and ream a hole through the brass end of the magnet to receive a No. 1 taper pin. Secure the magnet with the taper pin (19).

b. Reassemble the clutch case and armature (figure 20, item 9) to the lamp case as follows: install the spring (13, fig. 20) on the armature plunger (12, fig. 20) and position these two parts on the lamp case casting so that the plain end of the plunger enters the plunger hole in the casting. Hold the plunger and spring compressed while installing the clutch case and armature (9, fig. 20) with the two fillister head screws (10, fig. 20). The pin end of the plunger must be inserted into the small hole below the armature clutch bushing.

33. APERTURE LEVER MAINTENANCE.

REMOVAL

a. Disassemble the lock lever parts (items 5 through 10, figure 2) from the aperture lever.

b. Remove the fillister head screw (53, figure 12) and pull the aperture lever (52, figure 12) from its mounting stud.

DISASSEMBLY - FIG. 17

a. Drive out the aperture gate pivot (2) and separate the aperture gate (1) from the guide shoe lever (13).

Unscrew the fillister head screw (4) from the bearing stud (3), and remove the stud and the spring (5) from the lever.

b. The remaining screws in the aperture gate lever are used for adjustment purposes and need not be removed unless replacement is necessary.

c. Inspect the polished contact surface of the gate shoe for burrs or scratches. Minor defects can be removed by polishing (paragraph 27a). If the damage is extensive, the gate must be replaced.

REASSEMBLY - FIG. 17

a. Assemble the bearing stud (3) to the aperture gate (1) with the pivot (2). Position the gate against the lever (13) so that the stud (3) enters the stud hole, and install the spring (5) and fillister head screw (4).

b. The two pilot screws (7) and the set screw (9) are used for adjustment purposes and are locked in place after adjustment by the special head screws (6) and fillister head screw (8), respectively.

INSTALLATION

a. Install the assembled aperture lever (52, fig. 12) onto its mounting stud and secure it with the fillister head screw (53, fig. 12).

b. Adjust the film clearance at the aperture lever as instructed in paragraph 23. Then reassemble the lock lever parts (5 through 10, fig. 2) to the aperture lever and printer gear case.

34. FILM COUNTER MAINTENANCE.

DISASSEMBLY - FIG. 21

a. Unscrew the flexible shaft casing from the film counter mounting bracket, and remove the four screws that attach the bracket to the card holder.

b. Remove the four fillister head screws (6) and carefully shift the film counter assembly (5) to the left until the drive gear on the end of the counter shaft breaks mesh with the intermediate gear (4). Drive out the taper pin (8) and slide the drive gear (7) and washer (9) from the counting machine (10).
c. Unscrew the sleeve and oiler (1) from the bracket (11). Drive out the taper pin (3) and press the end thrust bearing (2) and the gear and spline assembly (4) from the bracket.

d. Check the counting and resetting action of the film counter. If faulty, replace the counter.

REASSEMBLY - FIG. 21

a. Assemble the washer (9) and the drive gear (7) to the shaft of the film counting machine (10) and install the taper pin (8). Coat all gear teeth with grease.

b. Insert the intermediate gear and spline assembly (4) into the bracket (11), press the end thrust bearing (2) into place, and install the taper pin (3). If a new end thrust bearing is being used, it must be drilled and reamed for a No. 5/0 taper pin, using the holes in the bracket as a guide. If a new bracket is being used, the end thrust bearing also must be replaced and both must be drilled and reamed for a No. 5/0 taper pin. The center of the drilled hole in the bracket must be 3/32-inch in from the surface of the hole which receives the bearing. Press the bearing in place and drill through bracket and bearing.

c. Assemble the film counter assembly (5) to the bracket, carefully meshing the drive gear (7) with the intermediate gear (4), and install the screws (6).
d. Screw the revolving oiler (1) down into the tapped hole in the bracket and apply four or five drops of lubricating oil through the oiler.

e. Install the counter and bracket assembly to the card holder assembly with the four fillister head screws (figure 20, item 2).

35. CARD HOLDER MAINTENANCE.

DISASSEMBLY - FIG. 22

a. Remove the counter and bracket assembly from the card holder and take out the two fillister head screws that fasten the card holder assembly to the shiftover bracket (3 and 4, fig. 20).

b. Remove the six fillister head screws (2) and separate the exposure card holder (1) and register bar assembly (3) from the pawl and frame assembly. To remove the pointer (4), take out the flat head screw (5).

c. Unhook the spring (7) from the pawl spring holder (11) and the dowel pin (10). Drive out the dowel pin (9) and lift the operating pawl (8) from the register bar frame (13). The spring holder (11) is pressed into the frame (13).

d. Examine the card holder register bar for chipped, broken or badly worn teeth, and replace if necessary. If the pawl spring is weak or broken, it also must be replaced.

REASSEMBLY - FIG. 22

a. Press the dowel pins (12) and pawl spring holder (11) into the register bar frame (13).

b. Press the small dowel pin (10) into the operating pawl (8) and hook the spring (7) between the dowel pin (10) and holder (11).

c. Fasten the pointer (4) to the register bar (6) with the flat head screw (5). Assemble the register bar to the exposure card holder (1) with the "V" of the

pointer hooked around the edge of the holder. Then fasten the register bar frame to the card holder with the six fillister head screws (2).

d. Install the card holder (3, fig. 20) to the shiftover bracket with the two screws (4, fig. 20).

36. CLUTCH AND SHAFT MAINTENANCE.

DISASSEMBLY - FIG. 29

a. Unscrew the set screw (2) and remove the spring (1) and plunger (3) from the hole in the rim of the drive pulley (13).

b. Unscrew the adjustment cap (4) from the drive pulley and remove it carefully so that the three pressure plugs (5) and the springs (6) do not jump out.

c. Slide the eared driving discs (7), friction discs (8) and plain driving discs (9) from the spline (10). Loosen the set screws (11) and disassemble the spline (10) and drive shaft (12) from drive pulley (13).

d. Inspect the canvas discs for wear or glazing, and replace if necessary.

REASSEMBLY - FIG. 29

a. Assemble the drive shaft spline (10) to the take-up drive shaft (12) with the two Bristol set screws (11). The face of the spline must be flush with the flat end of the shaft. Lubricate the drive shaft sparingly with lubricating oil and insert the shaft into the drive pulley (13).

b. Make certain that the inside of the drive pulley is perfectly clean before assembling the discs (7, 8 and 9) onto the spline (10). Note that the steel driving discs (7 and 9) are, in all cases, separated by a canvas friction disc (8). Install the discs in the exact sequence shown in figure 29.

c. Insert the three compression springs (6) and pressure plugs (5) into the cups inside of the adjustment cap (4), and carefully screw the cap onto the pulley. The three plugs bear against the outer steel driving disc (7) and the springs supply the pressure which controls the take-up tension.

d. Install the clutch and shaft assembly and adjust the film take-up tension (paragraph 21).

Parts Catalog

The following pages illustrate and list, by part number and part name, all serviceable parts of the Models D and J continuous printers. The exploded views serve a two-fold purpose: (1) They will prove an invaluable aid during disassembly and reassembly of the printers; (2) They will help to make a more positive identification of parts when ordering replacements. When ordering replacement parts, be sure to indicate the part number and part name, as well as the model and serial numbers of your printer.

Before ordering replacement parts, check the "Quantity Required" columns to make certain that you are ordering the correct part for the particular model printer being serviced. For example, in the parts list for Figure 1, you will note that two items 19 are listed. The first item 19 listed (part no. 05982) is used only on the Model D printer, as indicated by the quantity (2) in the "D" column and a dash (-) in the "J" column. The second item 19 (part no. 05985) is used only on the Model J printer.

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
1-1	4961	REFLECTOR, light	1	1
-2	01797	ARM ASS'Y, pilot light (see Fig. 4 for details)	1	1
-3	01795	LEAD ASS'Y, magnet (see Fig. 5 for details)	1	1
-4	01796	LEAD ASS'Y, main lamp (see Fig. 6 for details)	1	1
-5	01786	SHAFT ASS'Y, counter driving (see Fig. 7 for details)	1	1
-6	7758	SCREW, fillister hd	2	2
-7	7793	PIN, dowel	2	2
-8	22729	RECEPTACLE, wire	1	1
-9	07060	COIL ASS'Y, card register	1	1
-10	2143	SCREW, fillister hd	2	2
-11	05829	INTERRUPTER ASS'Y, circuit (see Fig. 8 for details)	1	1
-12	22055	GROMMET, rubber	2	2
-13	0489	ARMOR AND INSERT ASS'Y	1	1
-14	7211	SCREW, fillister hd	2	2
-15	7930	NUT, lock, conduit	2	2
-16	01798	ARMOR ASS'Y, clutch lead	1	1
-17	7758	SCREW, fillister hd	2	2
-18	7945	NUT, conduit	1	1
-19	05982	FEED REEL AND GUARD ASS'Y (see Fig. 9 for details)	2	-
-19	05985	FEED REEL AND GUARD ASS'Y (see Fig. 9 for details)	-	2
-20	12641	SETSCREW	2	2
-21	10204	SPACER, feed reel spindle	-	2

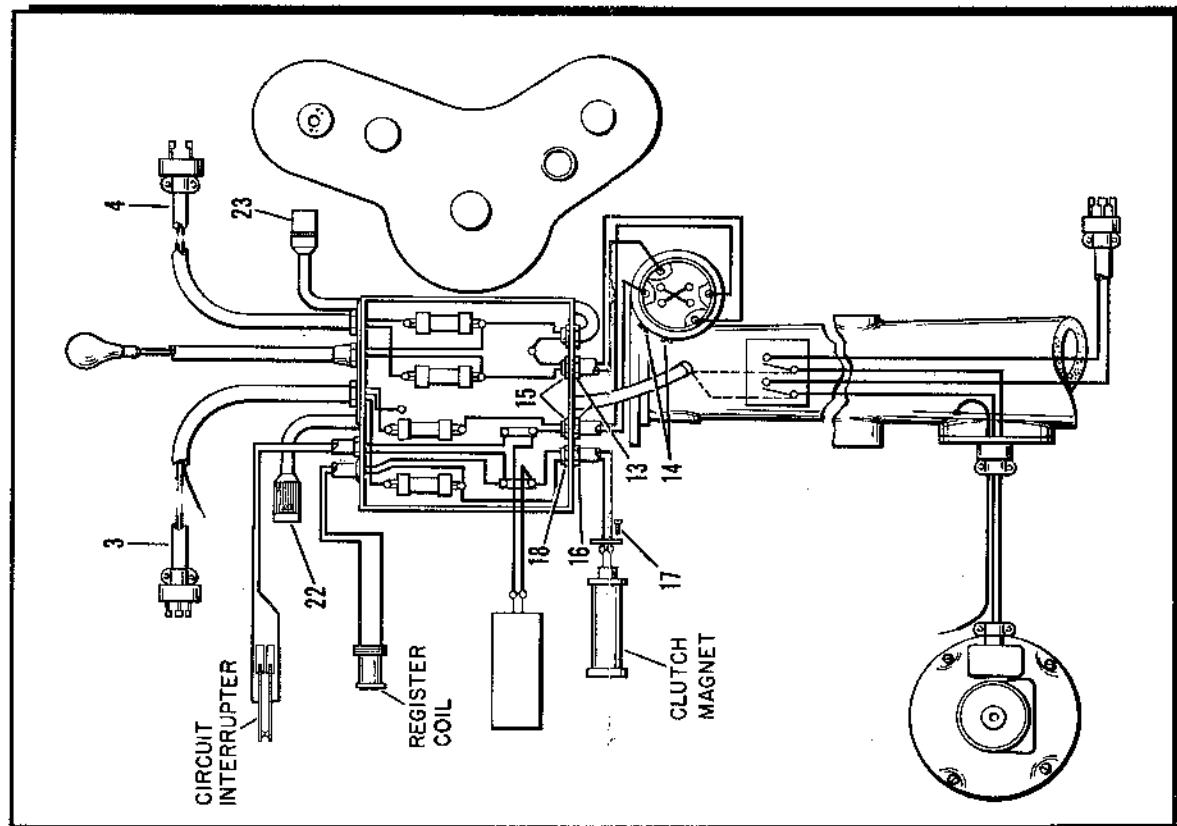
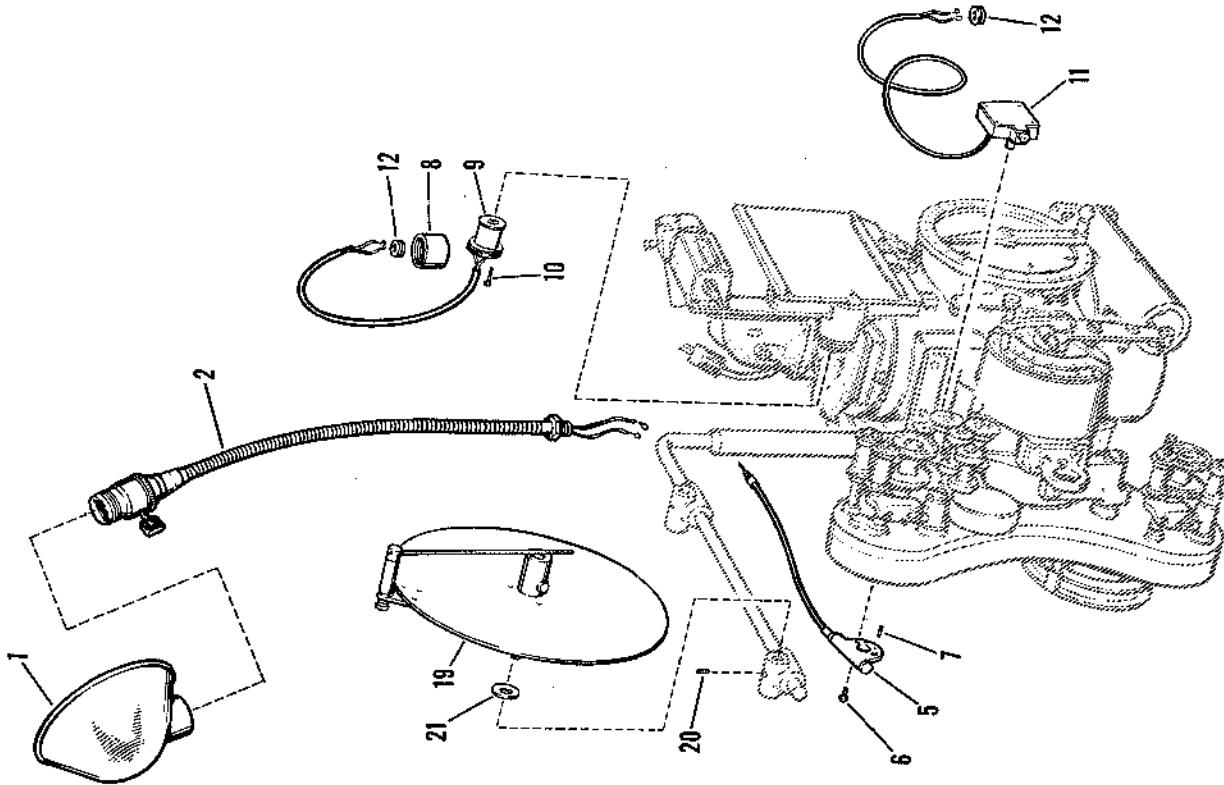


Figure 1. Printer Assembly, Complete - Sheet 1 of 3 Sheets

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
2-1	01777	LEVER ASS'Y, shutter operating (see Fig. 10 for details)	1	1
-2	01776	QUADRANT AND ROLLER ASS'Y (see Fig. 11 for details)	1	1
-3	7409	ROD, push, neutralizer pawl	1	1
-4	7442	SPRING, push rod	1	1
-5	7631	SCREW, fillister hd	1	1
-6	7634	GUIDE, lock lever	1	1
-7	7641	SPRING, lock lever	1	1
-8	7654	CONNECTION, switch lock lever	1	1
-9	7658	NUT, hex	1	1
-10	7626	LEVER, switch lock	1	1
-11	01774	MAIN FRAME AND ROLLERS ASS'Y (see Fig. 12 for details)	1	-
-11	02058	MAIN FRAME AND ROLLERS ASS'Y (see Fig. 12 for details)	-	1
-12	2617	SCREW, fillister hd	4	4
-13	080100	LAMPHOUSE ASS'Y, high intensity (see Fig. 18 for details)	1	1
-14	7754	SCREW, fillister hd	2	2
-15	01768	CASE ASSY, lamp (see Fig. 20 for details)	1	1
-16	2617	SCREW, fillister hd	4	4
-17	7780	PIN, dowel	2	2
-18	01711	MAGNET, clutch, 115 v, 60 cycle	1	1
-19	7433	PIN, dowel	1	1

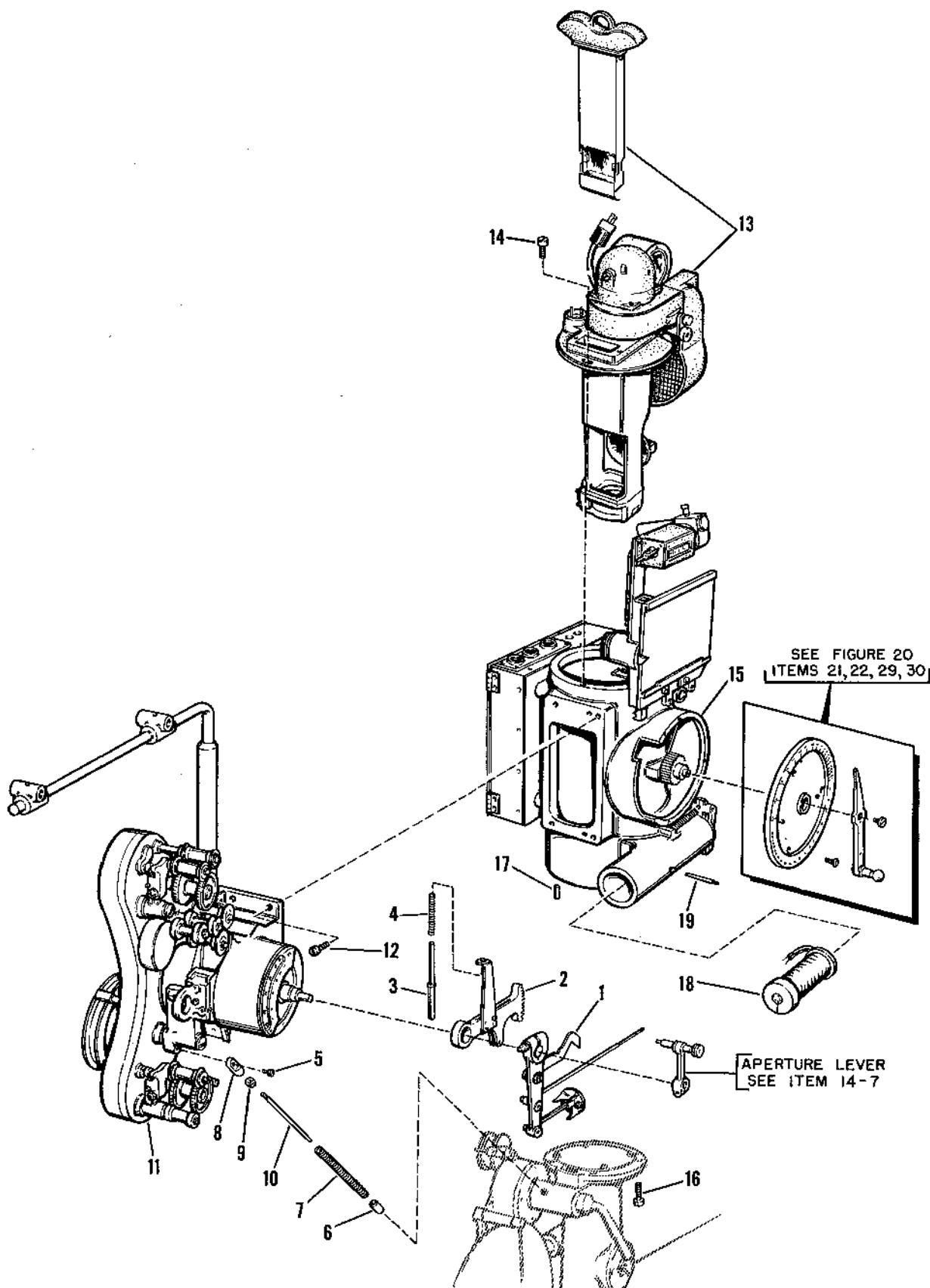


Figure 2. Printer Assembly, Complete - Sheet 2 of 3 Sheets

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
3-1	22073	BELT, driving	1	1
-2	7567	BELT, motor	1	1
-3	7568	PULLEY, motor	1	1
-4	7951	SETSCREW	1	1
-5	0894	MOTOR AND BASE ASS'Y (see Fig. 25 for details)	1	1
-6	7900	NUT, hex	4	4
-7	7899	BOLT, hex hd	4	4
-8	945-5	WASHER, plain	8	8
-9	01721	TAKE-UP MECHANISM ASS'Y, motor belt (see Fig. 26 for details)	1	1
-10	7900	NUT, hex	4	4
-11	7877	SPACER, motor support	4	4
-12	7988	WASHER, plain	4	4
-13	7805	SCREW, rd hd	4	4
-14	Com'l	WASHER, burr	4	4
-15	21635	COVER, switch	1	1
-16	21636	SCREW, binding hd	2	2
-17	25988	SWITCH, toggle	1	1
-18	8130	PLATE, indicating, on-off	1	1
-19	21634	RING, switch mounting	1	1
-20	1396	COVER, receptacle	1	1
-21	3816	SCREW, french hd	2	2
-22	10872	RECEPTACLE, 3 wire	1	1
-23	1577	SCREW, flat hd machine	2	2
-24	05720	LEAD ASS'Y, motor switch	1	1
-25	7969	LEAD, switch-to-motor connection	2	2
-26	7941	ARMOR, lamp lead	1	1
-27	22063	BUSHING, anti-short	1	1
-28	7241	PLUG, pipe	1	1
-29	1572	PLATE, name	1	1
-30	3121	PIN, escutcheon	3	3
-31	02708	PEDESTAL ASS'Y (see Fig. 27 for details)	1	-
-31	02056	PEDESTAL ASS'Y (see Fig. 27 for details)	-	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
4-1	7954	SOCKET, pilot lamp (with set screw)	1	1
-2	7936	ARM, pilot light	1	1
-3	7963	WIRE, lead, black	2	2

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
5-1	7567	CAP, connector	1	1
-2	250	CONNECTOR, wire	1	1
-3	11048	LEAD, magnet	1	1
-4	25547	TERMINAL	3	3

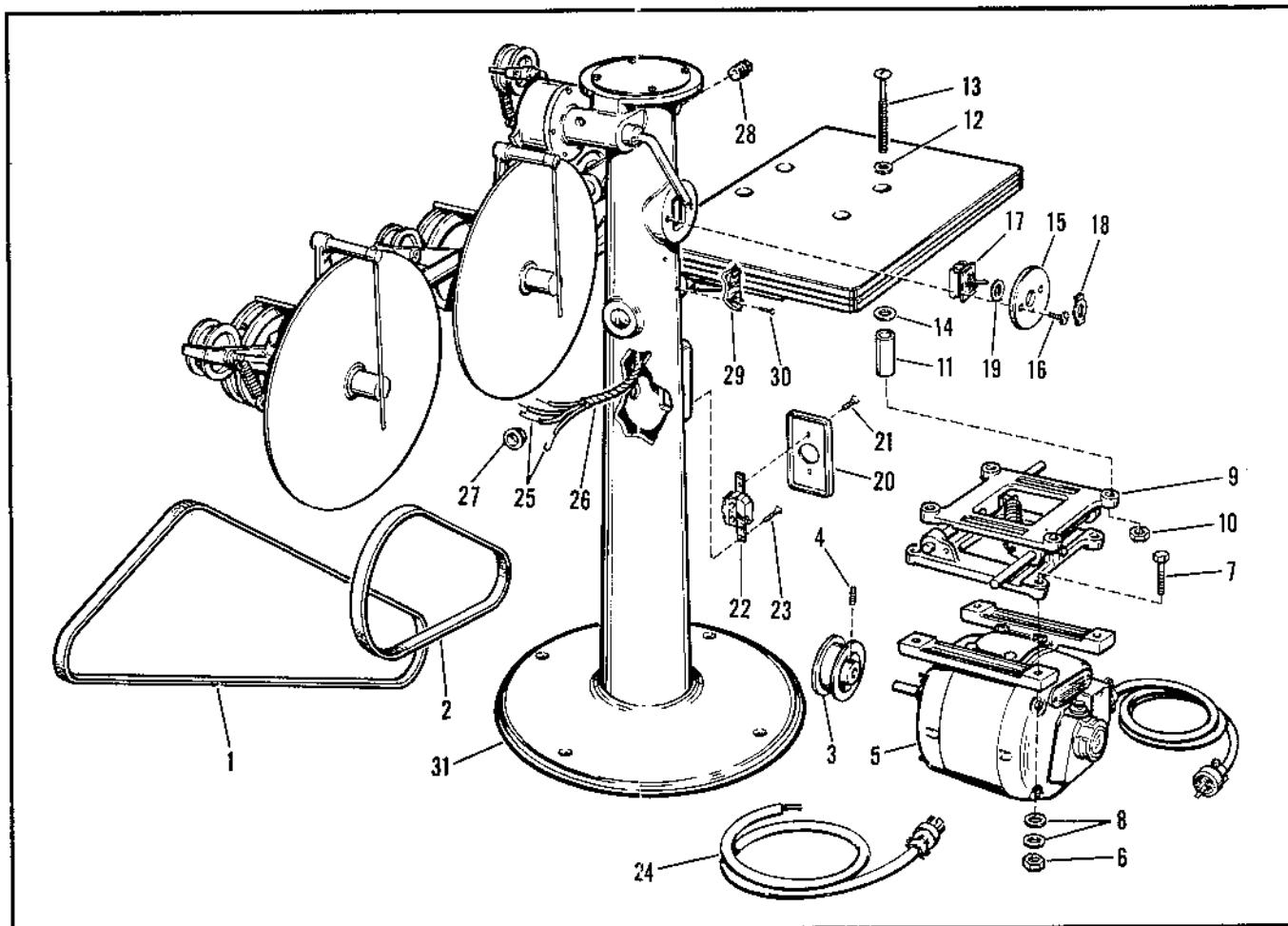


Figure 3. Printer Assembly, Complete - Sheet 3 of 3 Sheets

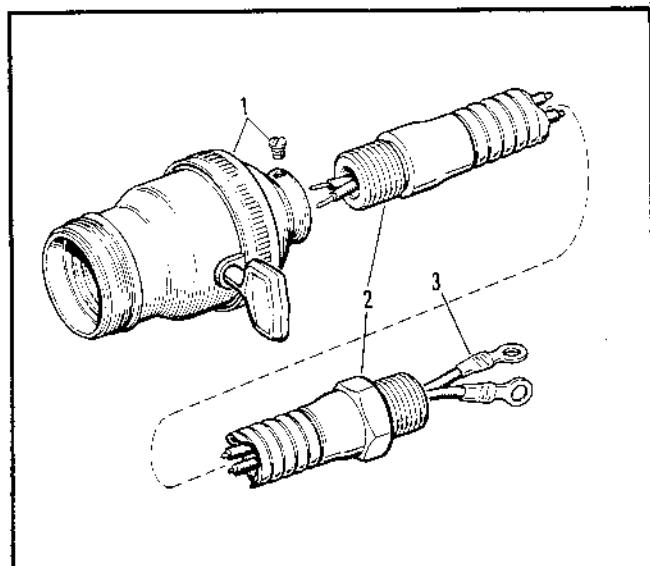


Figure 4. Pilot Light Arm Assembly

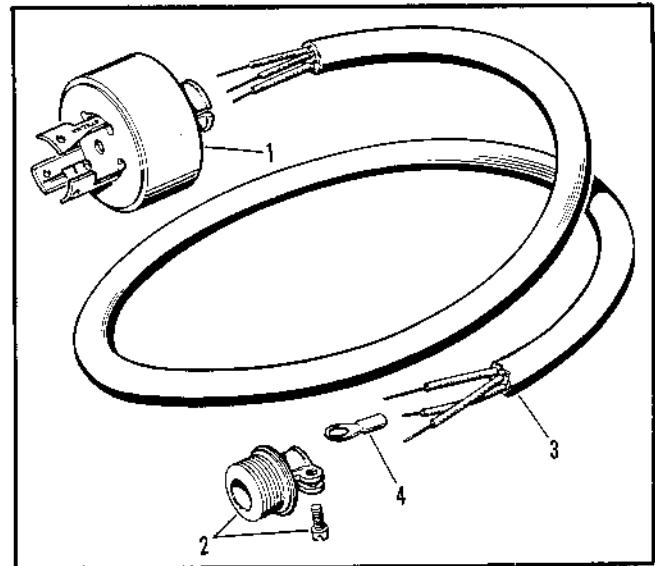


Figure 5. Magnet Lead Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
6-1	5700	CAP, connector	1	1
-2	250	CONNECTOR, wire	1	1
-3	11047	LEAD, main lamp	1	1
-4	25547	TERMINAL	2	2

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
7-1	01375	CASING, flexible shaft	1	1
-2	7719	BEARING, end thrust	1	1
-3	5248	SCREW, fillister hd	1	1
-4	01808	SHAFT, flexible	1	1
-5	7731	BEARING, lower intermediate gear	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
8-1	21882	COVER, circuit interrupter case	1	1
-2	5248	SCREW, fillister hd	4	4
-3	21884	SWITCH, circuit interrupter	1	1
-4	21885	SCREW, fillister hd	4	4
-5	13172	WASHER, bronze	4	4
-6	21891	INSULATOR, switch terminal	1	1
-7	21890	CORD, circuit interrupter	1	1
-8	21889	BUSHING, strain relief	1	1
-9	25547	TERMINAL	2	2
-10	21887	SETSCREW	1	1
-11	7779	SETSCREW	1	1
-12	21888	SLUG, friction	1	1
-13	528	ROLLER	1	1
-14	527	STUD, roller	1	1
-15	21883	LEVER, circuit interrupter switch	1	1
-16	5343	PIN, dowel	1	1
-17	2546	PIN, dowel	1	1
-18	21881	CASE, circuit interrupter	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
9-1	0880	GUARD, film	1	-
-1	04213	GUARD, film	-	1
-2	7656	SCREW, fillister hd	1	1
-3	2858	SPRING, compression	1	1
-4	7619	BRACKET, film guard carrier	1	-
-4	4629	BRACKET, film guard carrier	-	1
-5	2551	SCREW, flat hd	3	3
-6	22128	HUB, feed reel	1	-
-6	22110	HUB, feed reel	-	1
-7	5506	SCREW, fillister hd	1	1
-8	22108	PLUNGER, film core friction	1	1
-9	22106	SHOE, friction	1	1
-10	4454	SPRING, compression	1	1
-11	9360	FLANGE, feed, 1200 ft	1	1
-12	2551	SCREW, flat hd	3	3
-13	22070	SPINDLE, feed reel	1	1
-14	12641	SETSCREW	1	1
-15	2926	HUB, feed reel flange	1	1

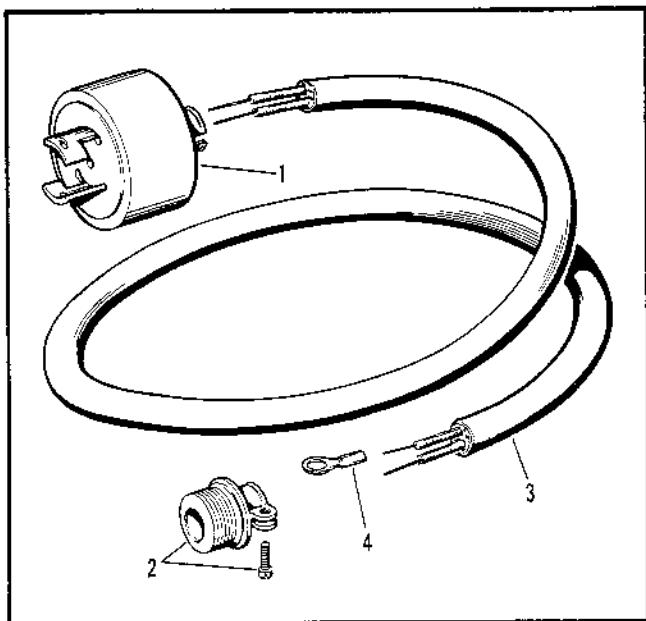


Figure 6. Main Lamp Lead Assembly

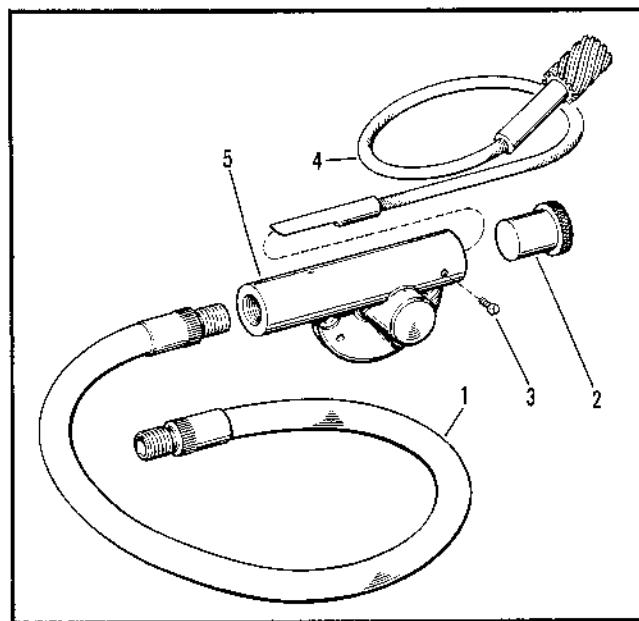


Figure 7. Counter Driving Shaft Assembly

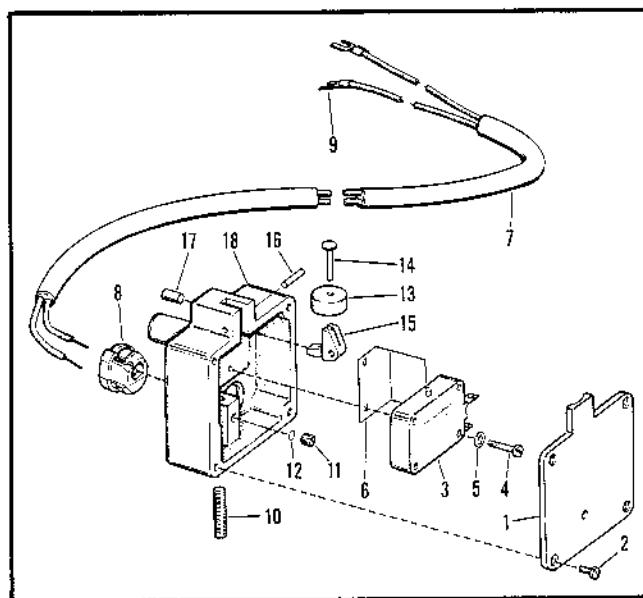


Figure 8. Circuit Interrupter Assembly

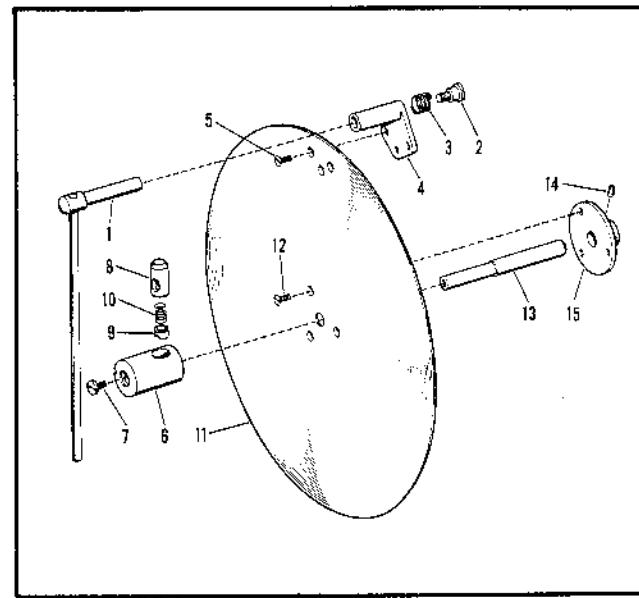


Figure 9. Feed Reel and Guard Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
10-1	7438	SCREW, locking	1	1
-2	7419	PAWL, neutralizer	1	1
-3	7211	SCREW, fillister hd	1	1
-4	7424	STUD, neutralizer pawl	1	1
-5	01788	ROD ASS'Y, clutch	1	1
-6	7432	SCREW, fillister hd	1	1
-7	7431	STUD, clutch rod connecting	1	1
-8	01806	PISTON AND LINK ASS'Y, shutter lever . . .	1	1
-9	7411	STUD, lever link	1	1
-10	7414	VALVE, air release	1	1
-11	7408	PISTON, shutter lever	1	1
-12	7788	PIN, dowel	1	1
-13	7410	LINK, shutter lever piston	1	1
-14	7402	LEVER, shutter operating	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
11-1	7420	ROLLER, neutralizer	1	1
-2	7423	PIN, roller bearing	1	1
-3	7421	BEARING, neutralizer roller	1	1
11-	01775	BRACKET ASS'Y, quadrant and guide	1	1
-4	7412	BRACKET, push rod guide	1	1
-5	7764	SCREW, fillister hd	2	2
-6	1256	PIN, dowel	2	2
-7	7417	QUADRANT	1	1

Figure 10. Shutter
Operating Lever
Assembly

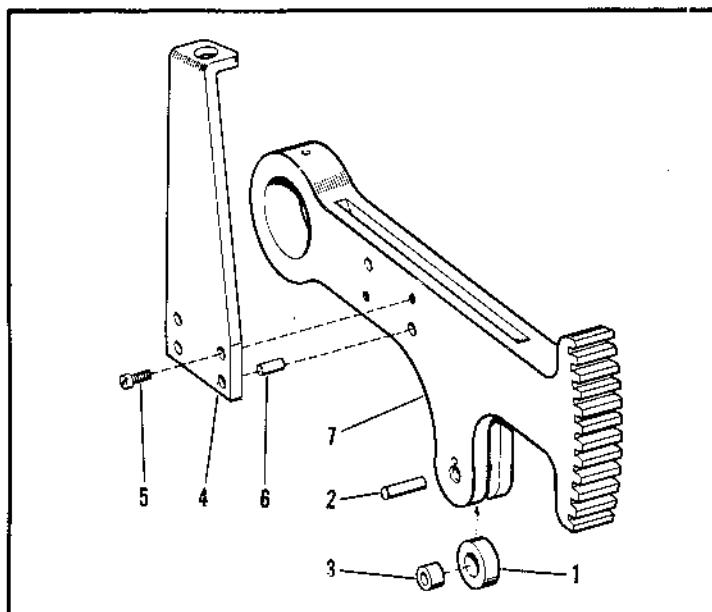
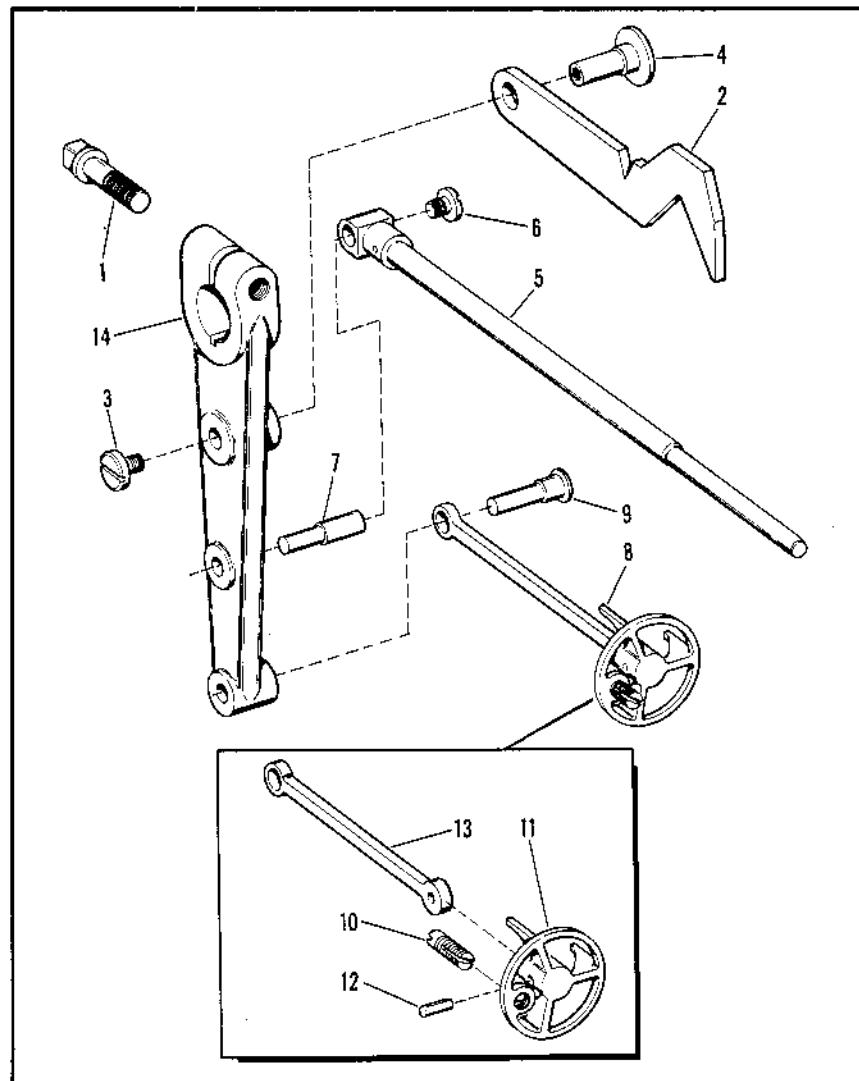


Figure 11. Quadrant and Roller Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
12-1	05812	ROLLER AND BEARING ASS'Y (includes 4, 5 and 6)	1	-
-1	05814	ROLLER AND BEARING ASS'Y (includes 4, 5 and 6)	-	1
-2	22062	NUT, acorn	1	1
-3	21871	WASHER, bearing guard	1	1
-4	12224	BEARING, radial	1	1
-5	21859	BEARING, radial, single row	1	1
-6	21862	ROLLER, film guide	1	-
-6	21864	ROLLER, film guide	-	1
-7	05804	ROLLER AND BEARING ASS'Y (includes 10, 11 and 12)	1	-
-7	05818	ROLLER AND BEARING ASS'Y (includes 10, 11 and 12)	-	1
-8	22062	NUT, acorn	1	1
-9	21871	WASHER, bearing guard	1	1
-10	12224	BEARING, radial	1	1
-11	21859	BEARING, radial, single row	1	1
-12	21853	ROLLER, negative aperture guide	1	-
-12	21868	ROLLER, negative aperture guide	-	1
-13	05806	ROLLER AND BEARING ASS'Y (includes 16, 17 and 18)	1	-
-13	15817	ROLLER AND BEARING ASS'Y (includes 16, 17 and 18)	-	1
-14	22062	NUT, acorn	1	1
-15	21871	WASHER, bearing guard	1	1
-16	12224	BEARING, radial	1	1
-17	21859	BEARING, radial, single row	1	1
-18	21856	ROLLER, positive aperture guide	1	-
-18	21867	ROLLER, positive aperture guide	-	1
-19	21855	SPACER	2	2
-20	05810	ROLLER AND BEARING ASS'Y (includes 23, 24 and 25)	1	-
-20	07258	ROLLER AND BEARING ASS'Y (includes 23, 24 and 25)	-	1
-21	22062	NUT, acorn	1	1
-22	21871	WASHER, bearing guard	1	1
-23	12224	BEARING, radial	1	1
-24	21859	BEARING, radial, single row	1	1
-25	21861	ROLLER, take-up sprocket	1	-
-25	23186	ROLLER, take-up sprocket	-	1
-26	05803	ROLLER ASS'Y, positive tension (includes 27 thru 34)	1	-
-26	05821	ROLLER ASS'Y, positive tension (includes 27 thru 34)	-	1
-27	05801	ROLLER AND BEARING ASS'Y (includes 30, 31 and 32)	1	-
-27	05816	ROLLER AND BEARING ASS'Y (includes 30, 31 and 32)	-	1
-28	22062	NUT, acorn	1	1
-29	21871	WASHER, bearing guard	1	1
-30	12224	BEARING, radial	1	1
-31	21859	BEARING, radial, single row	1	1
-32	21851	ROLLER, tension	1	-
-32	21866	ROLLER, tension	-	1
-33	21852	STUD, tension roller	1	1
-34	8112	LEVER, positive tension roller	1	-
-34	7349	LEVER, positive tension roller	-	1
-35	05802	ROLLER ASS'Y, negative tension (includes 36 thru 43)	1	-
-35	05820	ROLLER ASS'Y, negative tension (includes 36 thru 43)	-	1
-36	05801	ROLLER AND BEARING ASS'Y (includes 39, 40 and 41)	1	-
-36	05816	ROLLER AND BEARING ASS'Y (includes 39, 40 and 41)	-	1
-37	22062	NUT, acorn	1	1
-38	21871	WASHER, bearing guard	1	1
-39	12224	BEARING, radial	1	1
-40	21859	BEARING, radial, single row	1	1
-41	21851	ROLLER, tension	1	-
-41	21866	ROLLER, tension	-	1
-42	21852	STUD, tension roller	1	1
-43	8111	LEVER, negative tension roller	1	-
-43	7350	LEVER, negative tension roller	-	1
-44	7221	ROLLER, lever latch	2	2
-45	7211	SCREW, fillister hd	2	2
-46	05809	ROLLER ASS'Y, feed sprocket (see Fig. 15 for details)	1	-

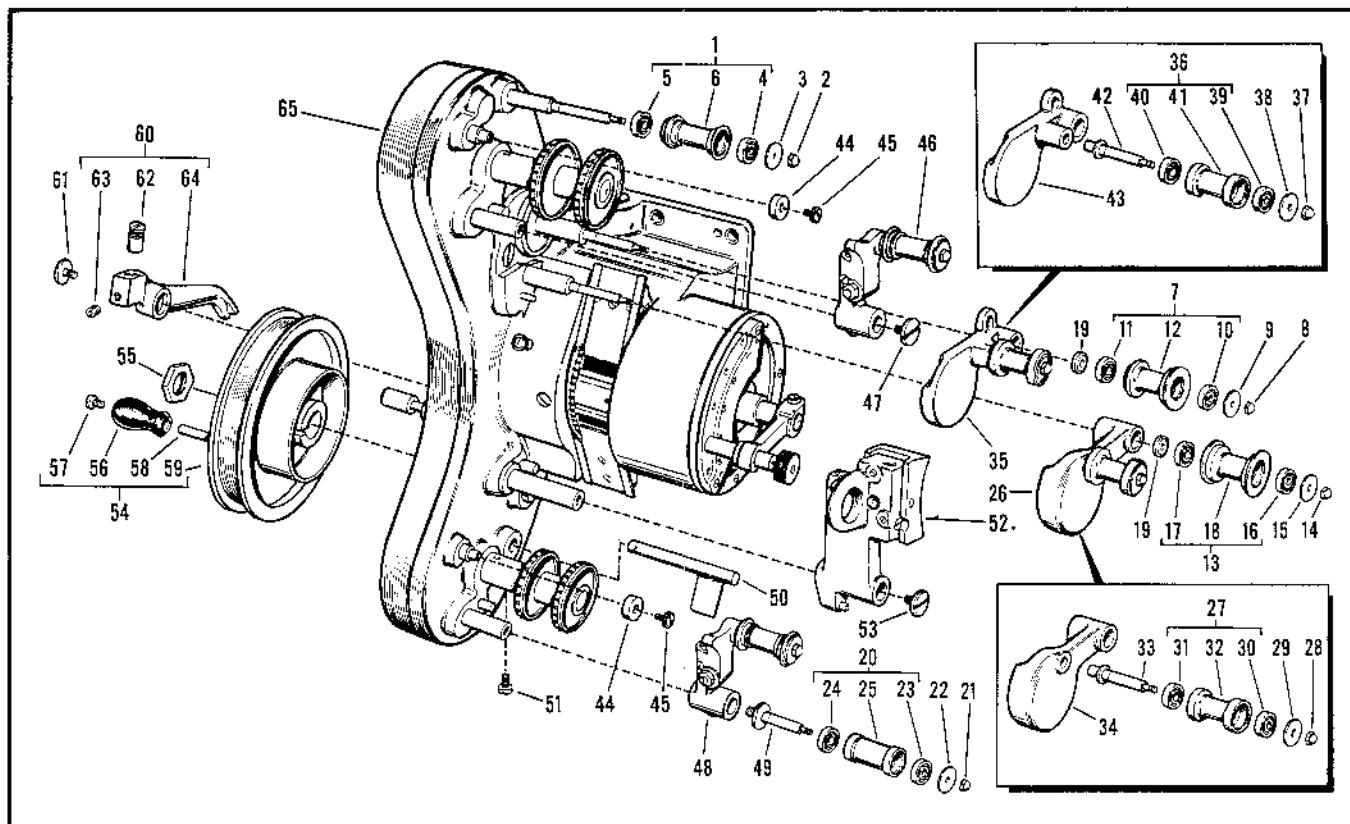


Figure 12. Main Frame and Roller Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
12-46	05824	ROLLER ASS'Y, feed sprocket (see Fig. 15 for details)	-	1
-47	7212	SCREW, fillister hd	1	1
-48	05809	ROLLER ASS'Y, take-up sprocket (see Fig. 15 for details)	1	-
-48	07257	ROLLER ASS'Y, take-up sprocket (see Fig. 16 for details)	-	1
-49	21860	STUD, take-up sprocket roller	1	1
-50	01716	GUARD ASS'Y, sprocket film	1	-
-51	2565	SCREW, fillister hd	1	-
-52	01787	LEVER ASS'Y, aperture guide shoe (see Fig. 17 for details)	1	-
-52	02643	LEVER ASS'Y, aperture guide shoe (see Fig. 17 for details)	-	1
-53	7212	SCREW, fillister hd	1	1
-54	01783	PULLEY ASS'Y, main drive	1	1
-55	7318	NUT, pulley	1	1
-56	4905	HANDLE, crank	1	1
-57	4906	SCREW, fillister hd	1	1
-58	7607	PIN, take-up crank	1	1
-59	7555	PULLEY, main drive	1	1
-60	01782	LEVER ASS'Y, brake	1	1
-61	7212	SCREW, fillister hd	1	1
-62	7738	SHOE, brake	1	1
-63	12245	SETSCREW, Bristol	1	1
-64	7747	LEVER, brake	1	1
-65	01773	FRAME AND GEAR CASE ASS'Y, main (see Fig. 13 for details)	1	-
-65	02057	FRAME AND GEAR CASE ASS'Y, main (see Fig. 13 for details)	-	1

Fig. and Index No.	Part No.	Part Name	Qty.	Req'd.
			D	J
13-1	7204	CASE, gear	1	1
-2	7752	SCREW, fillister hd	6	6
-3	7781	PIN, dowel	2	2
-4	7797	GUARD, belt	2	2
-5	7873	OILER, revolving sleeve	1	1
-6	01791	PINION ASS'Y, main drive (includes 9 and 10)	1	1
-7	7311	NUT, hex	1	1
-8	7319	STUD, main drive pinion	1	1
-9	7316	PIN, dowel	1	1
-10	7317	PINION, main drive	1	1
13-	01803	SHAFT ASS'Y, feed sprocket (includes 11 thru 15)	1	-
13-	02640	SHAFT ASS'Y, feed sprocket (includes 11 thru 15)	-	1
-11	7193	SPROCKET, feed	1	-
-11	21945	SPROCKET, feed	-	1
-12	1918	PIN, taper	1	1
-13	7314	GEAR, intermediate	1	1
-14	7882	PIN, taper	1	1
-15	7732	SHAFT, feed sprocket	1	-
-15	10192	SHAFT, feed sprocket	-	1
13-	01770	SHAFT ASS'Y, take-up sprocket (includes 16 thru 21)	1	-
13-	02639	SHAFT ASS'Y, take-up sprocket (includes 16 thru 21)	-	1
-16	7509	SPROCKET, take-up	1	-
-16	21945	SPROCKET, take-up	-	1
-17	1918	PIN, taper	1	1
-18	7314	GEAR, intermediate	1	1
-19	7882	PIN, taper	1	1
-20	7510	SHAFT, take-up sprocket	1	-
-20	10190	SHAFT, take-up sprocket	-	1
-21	7519	BEARING, sprocket shaft	2	2
-22	7744	SCREW, oval hd	1	1
-23	7743	HOLDER, signal circuit interrupter	1	1
-24	7741	PLATE, retaining	1	1
-25	7225	PIN, dowel	1	1
-26	3707	SCREW, fillister hd	1	1
-27	7315	GEAR, feed sprocket intermediate	1	1
-28	3482	SCREW, fillister hd	1	1
-29	22064	STUD, feed sprocket intermediate gear	1	1
-30	21854	STUD, aperture guide roller	2	2
-31	7311	NUT, hex	2	2
-32	21863	STUD, top guide roller	1	1
-33	7216	STUD, aperture guide shoe	1	1
-34	7311	NUT, hex	1	1
-35	7222	PIN, dowel	3	3
-36	7223	STUD, sprocket roller lever	2	2
-37	7225	PIN, dowel	2	2
-38	7226	STUD, lever latch roller	2	2
-39	7234	STOP, guide shoe lever	1	1
-40	7780	PIN, dowel	2	2
-41	04819	BACK SHUTTER AND SPROCKET ASS'Y, (see Fig. 14 for details)	1	-
-41	02054	BACK SHUTTER AND SPROCKET ASS'Y, (see Fig. 14 for details)	-	1

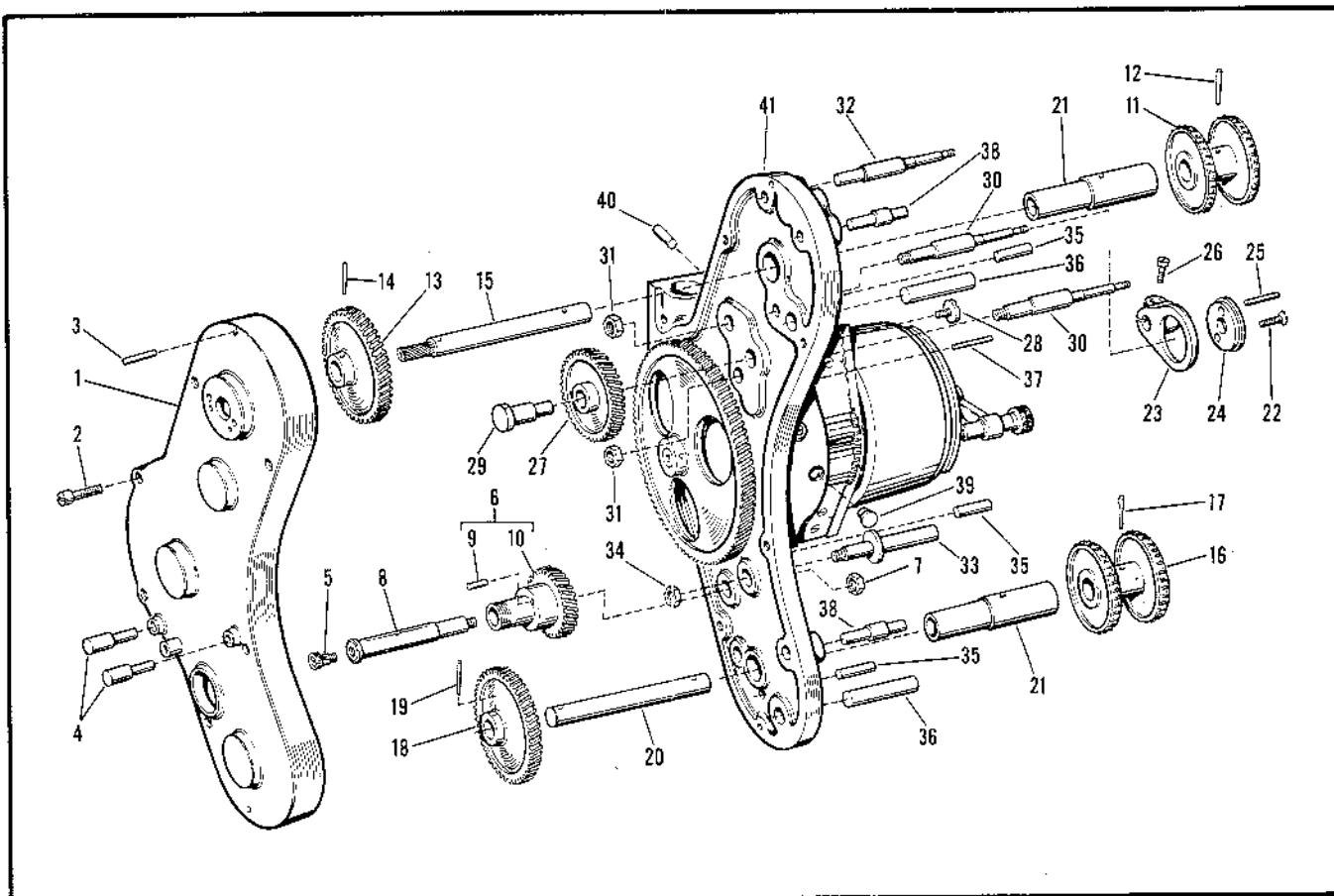


Figure 13. Frame and Gear Case Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
14-1	01704	BRACKET ASS'Y, feed reel (includes items 2 thru 5)	1	1
-2	7879	PIN, taper	1	1
-3	7618	BRACKET, feed reel	2	2
-4	7882	PIN, taper	2	2
-5	7506	ARM AND SUPPORT ASS'Y	1	1
-6	7330	REFLECTOR, glass	1	1
-7	03821	LEVER ASS'Y, aperture ring (includes 7A thru 7H)	1	-
-7A	3707	SCREW, fillister hd	1	-
-7B	12857	KNOB	1	-
-7C	23563	PIN, dowel	1	-
-7D	12856	PIN	1	-
-7E	12855	SPRING, compression	1	-
-7F	12859	LEVER	1	-
-7G	2829	PIN, dowel	1	-
-7H	12858	SLEEVE	1	-
-8	12799	QUADRANT	1	-
-9	1221	SCREW, fillister hd	2	-
-10	7788	PIN, dowel	2	-
-11	7309	FLANGE, shutter bearing	1	1
-12	7758	SCREW, fillister hd	2	4

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Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
14-13	7242	PLUG, shutter shaft	-	1
-14	01697	SHUTTER ASS'Y, back	1	1
-15	2334	OILER	1	1
-16	7303	PLATE, aperture, upper	1	-
-16	10239	PLATE, aperture, upper	-	1
-17	14234	SCREW, flat hd	1	1
-18	2441	PIN, dowel	2	2
-19	13423	PLATE, aperture, lower	1	-
-19	21947	PLATE, aperture, lower	-	1
-20	14234	SCREW, flat hd.	2	2
-21	2441	PIN, dowel	2	2
-22	8819	GLASS, ground.	1	1
-23	15642	STUD	1	-
-24	01771	SPROCKET AND DRIVE GEAR ASS'Y, aperture, (includes 26 thru 31)	1	-
-24	05106	SPROCKET AND DRIVE GEAR ASS'Y, aperture, (includes 26 thru 31)	-	1
-25	7758	SCREW, fillister hd	4	4
-26	7313	GEAR	1	1
-27	7882	PIN, taper	1	1
-28	7312	BEARING, aperture sprocket	1	-
-28	13873	BEARING, aperture sprocket	-	1
-29	7331	SPRING, reflector retaining	1	1
-30	3164	SCREW, fillister hd, special	1	1
-31	02044	SPROCKET ASS'Y, aperture	1	-
-31	16383	SPROCKET, aperture	-	1
-32	03822	DRUM ASS'Y, light, (includes 32A thru 32H)	1	-
-32A	12797	PLATE, drum, L.H.	1	-
-32B	1920	SCREW, flat hd	11	-
-32C	1638	PIN, dowel	2	-
-32D	12798	PLATE, drum, R.H.	1	-
-32E	1920	SCREW, flat hd	11	-
-32F	1638	PIN, dowel	2	-
-32G	12796	DRUM, light	1	-
-32H	03823	CARRIER ASS'Y, aperture ring	1	-
-33	03902	CLAMP ASS'Y, light mask	1	-
-33	8809	WASHER, mask plate	-	1
-34	2846	NUT, hex	1	-
-35	12997	WASHER, brass	1	-
-36	8811	SCREW, fillister hd	-	1
-37	04818	MASK ASS'Y, light	1	-
-37	01707	MASK ASS'Y, light	-	1
-38	13874	JAW, sound and picture	-	1
-39	10226	SCREW, fillister hd	-	2
-40	1253	PIN, dowel	-	2
-41	21749	SLIDE, aperture	-	1
-42	1703	SCREW, fillister hd	-	6
-43	21754	PLATE, aperture slide cover	-	1
-44	21750	RAIL, tension	-	1
-45	21758	SCREW, shoulder	-	2
-46	21759	SPRING, compression	-	2
-47	05745	SPINDLE AND PIN ASS'Y	-	1
-48	21765	SCREW, fillister hd	-	1
-49	21752	DIAL, index	-	1
-50	21755	SETSCREW	-	1
-51	21756	PLUNGER, index	-	1
-52	21757	SPRING, compression	-	1
-53	23186	ROLLER, take-up sprocket	-	1
-54	11521	SETSCREW	-	1
-55	21751	BUSHING, spindle	-	1
-56	6808	SCREW, fillister hd	-	2
-57	4608	PIN, dowel	-	2
-58	7203	FRAME, main	1	-
-58	10238	FRAME, main	-	1

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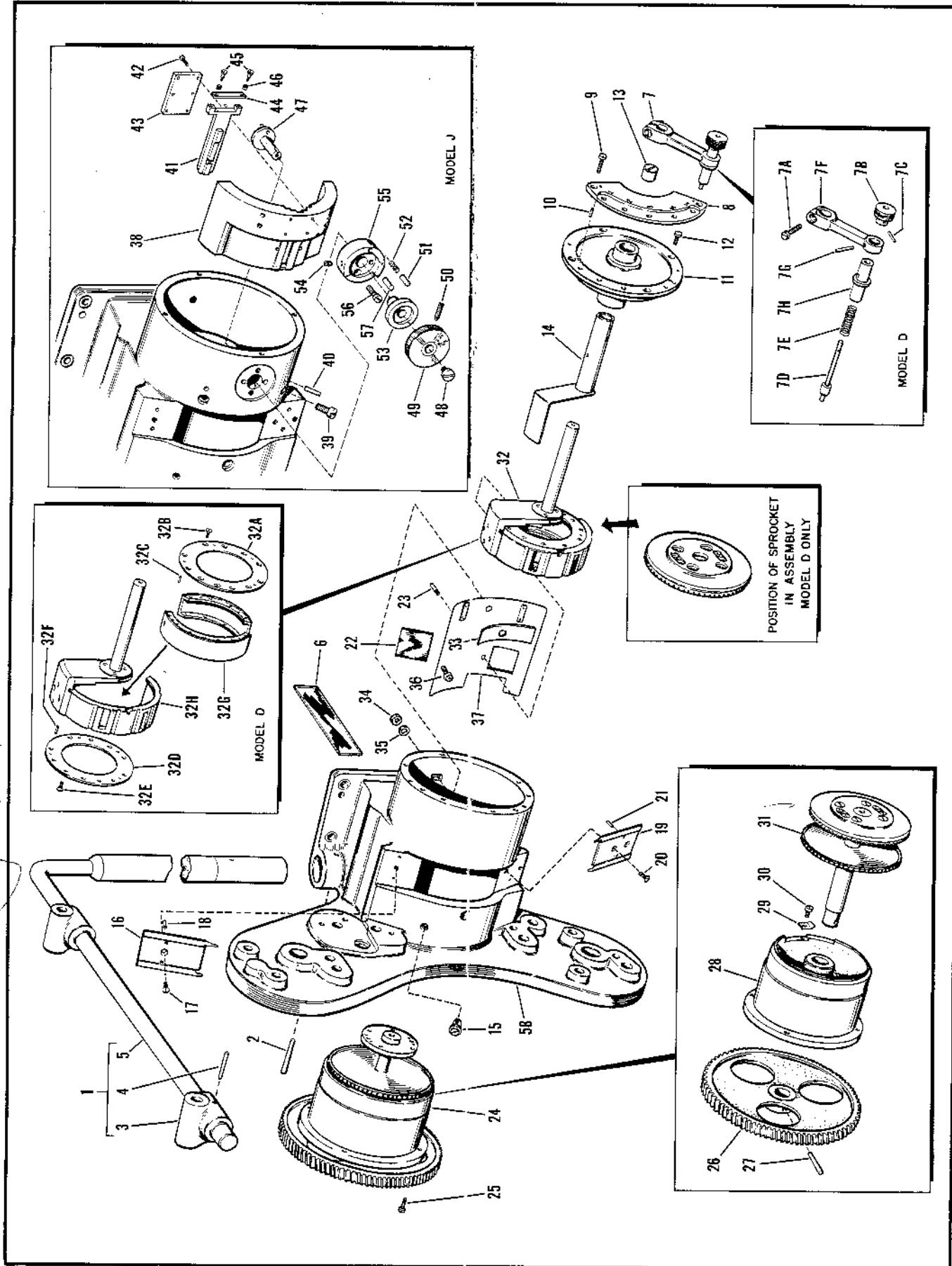


Figure 14. Back Shutter and Sprocket Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
15-1	05808	ROLLER AND BEARING ASS'Y, (includes 4, 5, and 6)	1	-
-1	05815	ROLLER AND BEARING ASS'Y, (includes 4, 5, and 6)	-	1
-2	22062	NUT, acorn	1	1
-3	21871	WASHER, bearing guard	1	1
-4	12224	BEARING, radial	1	1
-5	21859	BEARING, radial, single row	1	1
-6	21858	ROLLER, film guide	1	-
-6	21865	ROLLER, film guide	-	1
-7	21857	STUD, roller	1	1
-8	7214	NUT, hex	1	1
-9	7227	SETSCREW	1	1
-10	01807	LATCH AND PIN ASS'Y, roller lever	1	1
-11	7215	SCREW, pilot	1	1
-12	7230	SPRING	1	1
-13	7210	LEVER, feed sprocket roller	1	-
-13	22056	LEVER, feed sprocket roller	-	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
16-1	05815	ROLLER AND BEARING ASSY, (includes 4, 5, and 6)	-	2
-2	22062	NUT, acorn	-	2
-3	21871	WASHER, bearing guard	-	2
-4	12224	BEARING, radial	-	1
-5	21859	BEARING, radial, single row	-	1
-6	21865	ROLLER, film guide	-	1
-7	21857	STUD, roller	-	2
-8	7214	NUT, hex	-	1
-9	7227	SETSCREW	-	1
-10	01807	LATCH AND PIN ASS'Y, roller lever	-	1
-11	7215	SCREW, pilot	-	1
-12	7230	SPRING	-	1
-13	23184	LEVER, take-up sprocket roller	-	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
17-1	8105	GATE, aperture	1	-
-1	21946	GATE, aperture	-	1
-2	8106	PIVOT, aperture gate	1	1
-3	8104	STUD, aperture gate bearing	1	1
-4	7631	SCREW, fillister hd	1	1
-5	8110	SPRING	1	1
-6	8107	SCREW, special hd	2	2
-7	8109	SCREW, pilot, hds	2	2
-8	7756	SCREW, fillister hd	1	1
-9	7213	SETSCREW	1	1
-10	7632	STUD, safety lock lever	1	1
-11	5953	PIN, taper	1	1
-12	8108	STUD, guide shoe lever	1	1
-13	8101	LEVER, aperture guide shoe	1	1

Figure 15. Feed Sprocket Roller Assembly

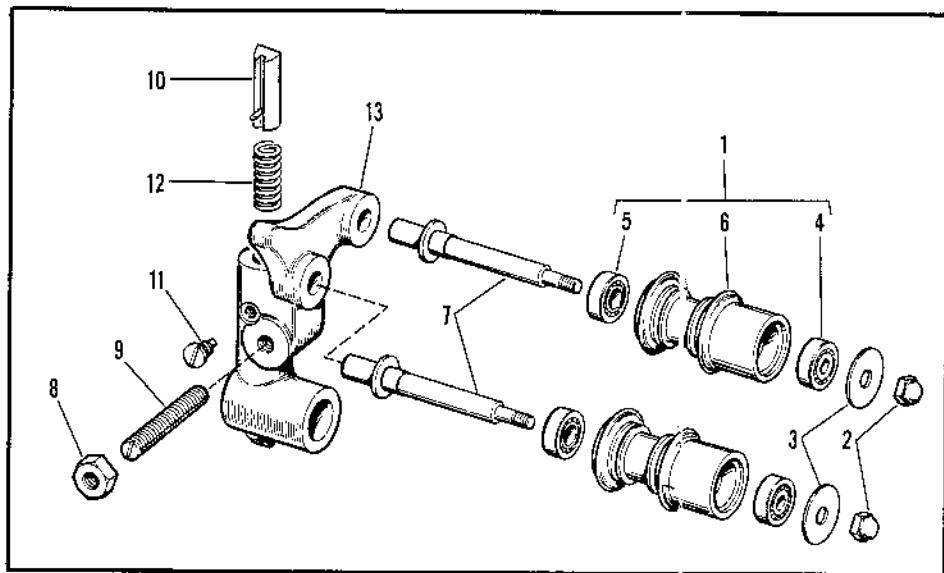
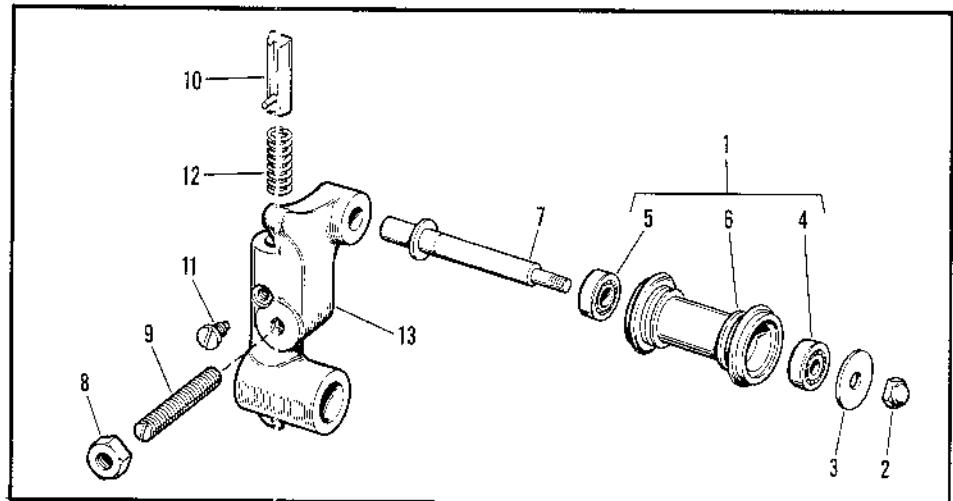


Figure 16. Take-up Sprocket Roller Assembly
(Model J only)

Figure 17. Aperture Guide Shoe Lever Assembly

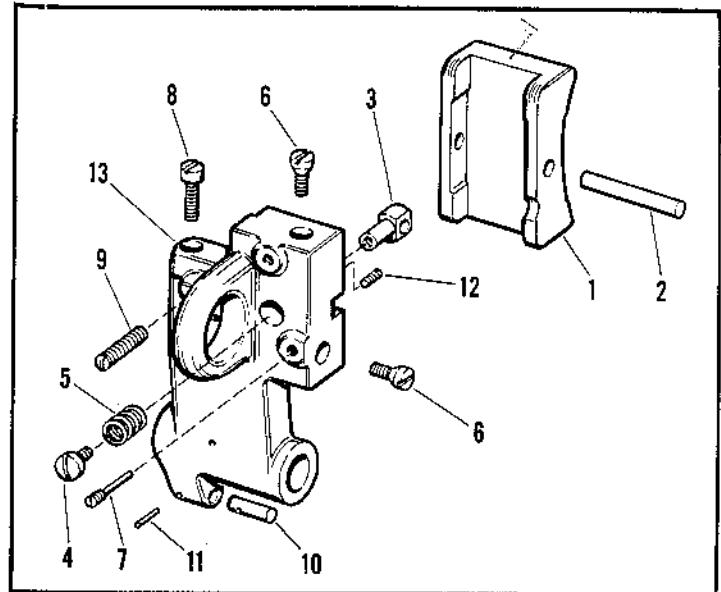


Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
18-1	Q85101	HOLDER ASS'Y, filter (includes 1A thru 1E)	1	1
-1A	85293	HANDLE, filter holder	1	1
-1B	85271	SCREW, pilot	2	2
-1C	085093	RETAINER ASS'Y, filter	2	2
-1D	11945	SCREW, flat hd	2	2
-1E	085100	TUBE ASS'Y, filter holder	1	1
-2	08111	LAMP, high intensity, 300 w, 110 v	1	1
-3	085099	MOTOR AND FAN ASS'Y (see Fig. 19 for details)	1	1
-4	12696	SCREW, shoulder	4	4
-5	12695	WASHER, steel	4	4
-6	12630	GROMMET, neoprene	8	8
-7	85254	HOUSING, blower	1	1
-8	3681	SCREW, flat hd	3	3
-9	85255	HOUSING, lamp rheostat	1	1
-10	2557	SCREW, fillister hd	2	2
-11	85266	COVER, rheostat	1	1
-12	16556	SCREW, fillister hd	4	4
-13	6064	WASHER, steel	4	4
-14	85288	KNOB, rheostat (with set screw)	1	1
-15	85287	DIAL, rheostat	1	1
-16	Com'l	NUT, hex, 3/8-32 x 3/32 in. thick (supplied with item 17)	1	1
-17	85289	RHEOSTAT	1	1
-18	Com'l	SCREW, flat hd, No. 10-32 x 1/2 in. (supplied with item 17)	2	2
-19	85286	AMMETER - DC	1	1
-20	2144	SCREW	3	3
-21	85256	HOUSING, ammeter	1	1
-22	7756	SCREW, fillister hd	2	2
-23	085097	REFLECTOR ASS'Y (includes 25 thru 28)	1	1
-24	85264	PIVOT, reflector holder	1	1
<u>-25</u>	<u>85290</u>	REFLECTOR	1	1
-26	6563	SCREW, fillister hd	2	2
-27	85259	RETAINER, reflector	2	2
-28	85253	HOLDER, reflector	1	1
-29	1913	SPRING, compression	1	1
-30	14904	SCREW, set, hdls	1	1
-31	85261	KNOB, lock	1	1
18-	085095	CONTROL UNIT ASS'Y, reflector (includes 32 thru 37)	1	1
-32	85258	SUPPORT, reflector holder	1	1
-33	85260	KNOB, control	1	1
-34	447	SETSCREW	1	1
-35	085096	BAR ASS'Y, elevating	1	1
-36	85265	SPRING, compression	1	1
-37	85257	SUPPORT, reflector adjustment	1	1
-38	03668	COVER ASS'Y, terminal box	1	1
-39	10934	SCREW, fillister hd	4	4
-40	12394	COVER, insulating	1	1
-41	6964	SCREW, fillister hd	2	2
-42	085102	BOX AND CAP ASS'Y, terminal	1	1
-43	5211	SCREW, fillister hd	4	4
-44	1193	RECEPTACLE, male, two-prong	1	1
-45	8756	SCREW, fillister hd	2	2
-46	85267	COVER, wire duct	1	1
-47	4459	SCREW, fillister hd	3	3
-48	85284	RETAINER, filter, glass	2	2
<u>-49</u>	<u>85285</u>	FILTER, heat	2	2
-50	85294	FRAME, lamp support	1	1

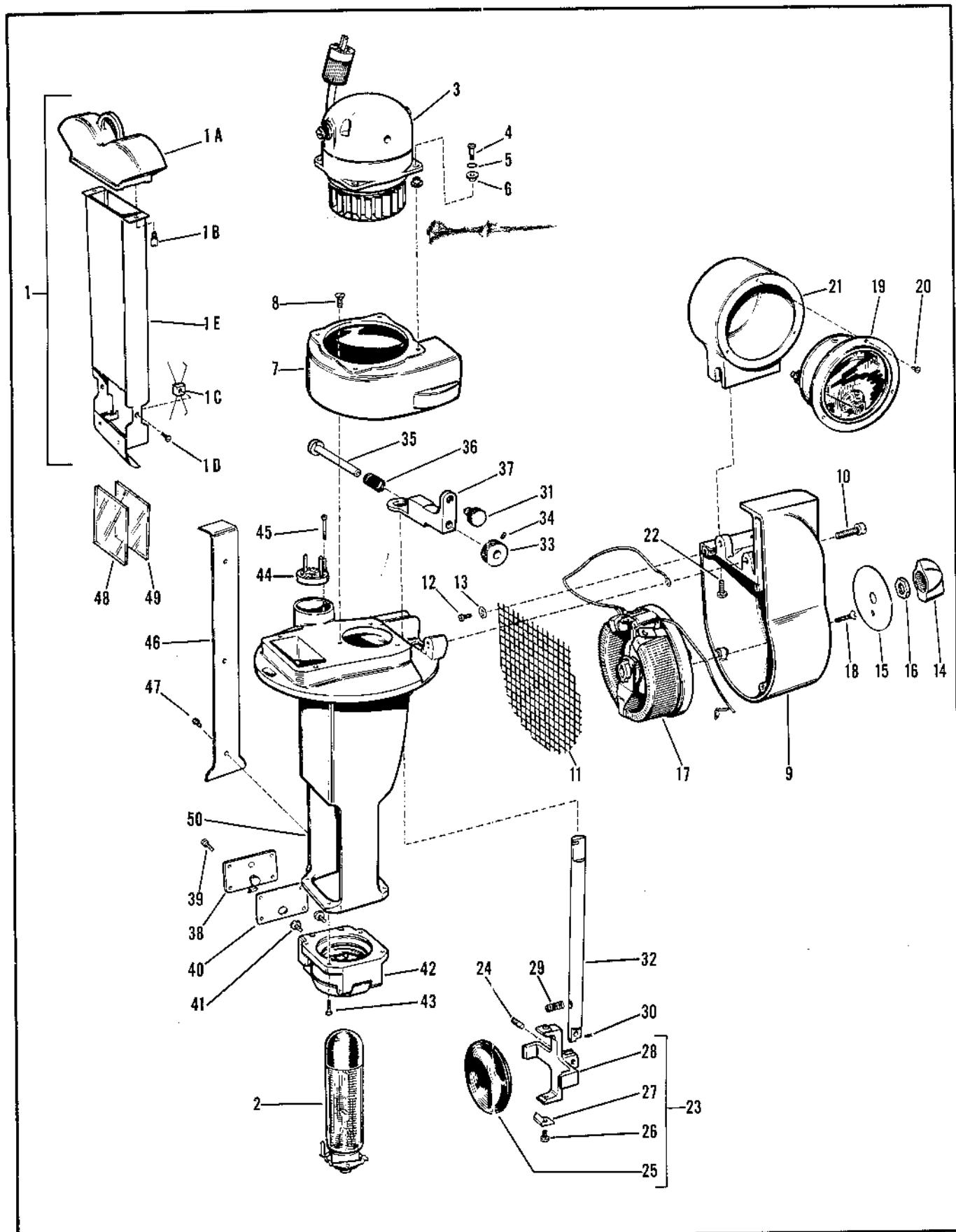


Figure 18. High Intensity Lamphouse Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
19-1	11888	CAP, motor brush	2	2
-2	21992	SPRING, brush	2	2
-3	21993	BRUSH, motor	2	2
-4	03755	FAN ASS'Y	1	1
-5	12599	SCREW, fillister hd	1	1
-6	85202	CAP, motor	1	1
-7	5945	SCREW, fillister hd	2	2
-8	12571	SPRING, preloading	1	1
-9	9097	BEARING, radial	1	1
-10	9089	SPACER, steel	1	1
-11	12987	WASHER, fiber	2	2
-12	21991	HOLDER, motor brush	2	2
-13	447	SETSCREW	2	2
-14	85292	CONNECTOR, midget, male	1	1
-15	85277	CABLE, motor	1	1
-16	12573	ARMATURE, motor	1	1
-17	12970	BEARING, radial	1	1
-18	9093	RETAINER, bearing	1	1
-19	085098	STATOR ASS'Y	1	1
-20	12178	STUD, motor stator	2	2
-21	85250	HOUSING, motor	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
20-1	01767	COUNTER AND BRACKET ASS'Y (see Fig. 21 for details)	1	1
-2	7758	SCREW, fillister hd	4	4
-3	01765	BAR AND CARD HOLDER ASS'Y, register (see Fig. 22 for details)	1	1
-4	7756	SCREW, fillister hd	2	2
-5	01785	BOX ASS'Y, terminal (see Fig. 23 for details)	1	1
-6	3707	SCREW, fillister hd	2	2
-7	7975	SCREW, fillister hd	2	2
-8	648	BARRIER, terminal box	1	1
-9	01762	CASE AND ARMATURE ASS'Y, clutch (see Fig. 24 for details)	1	1
-10	3707	SCREW, fillister hd	2	2
-11	2448	PIN, dowel	2	2
-12	7415	PLUNGER, armature	1	1
-13	7405	SPRING	1	1
-14	85251	BRACKET, card holder shift-over	1	1
-15	7756	SCREW, fillister hd	2	2
-16	01789	VIEW GLASS AND HOLDER ASS'Y (includes 17 thru 20)	1	1
-17	7440	GLASS, view	1	1
-18	7779	SETSCREW	1	1
-19	7441	RETAINER, view glass	1	1
-20	7439	HOLDER, view glass	1	1
-21	01761	LEVER AND INDEX PIN ASS'Y (includes 23 thru 27)	1	1
-22	7436	SCREW, fillister hd	1	1
20-	01759	PIN ASS'Y, index (includes 24 and 25)	1	1
-23	7889	PIN, taper	1	1
-24	7426	KNOB, index pin	1	1
-25	7427	PIN, index	1	1
-26	7428	SPRING	1	1
-27	01760	LEVER ASS'Y, shutter time setting	1	1
-28	01758	DIAL ASS'Y, time indicating	1	1
-29	7767	SCREW, oval hd	3	3
-30	7437	SHAFT, pinion, shutter timer	1	1
-31	7326	TUBE, oil	1	1
-32	7401	CASE, lamp	1	1

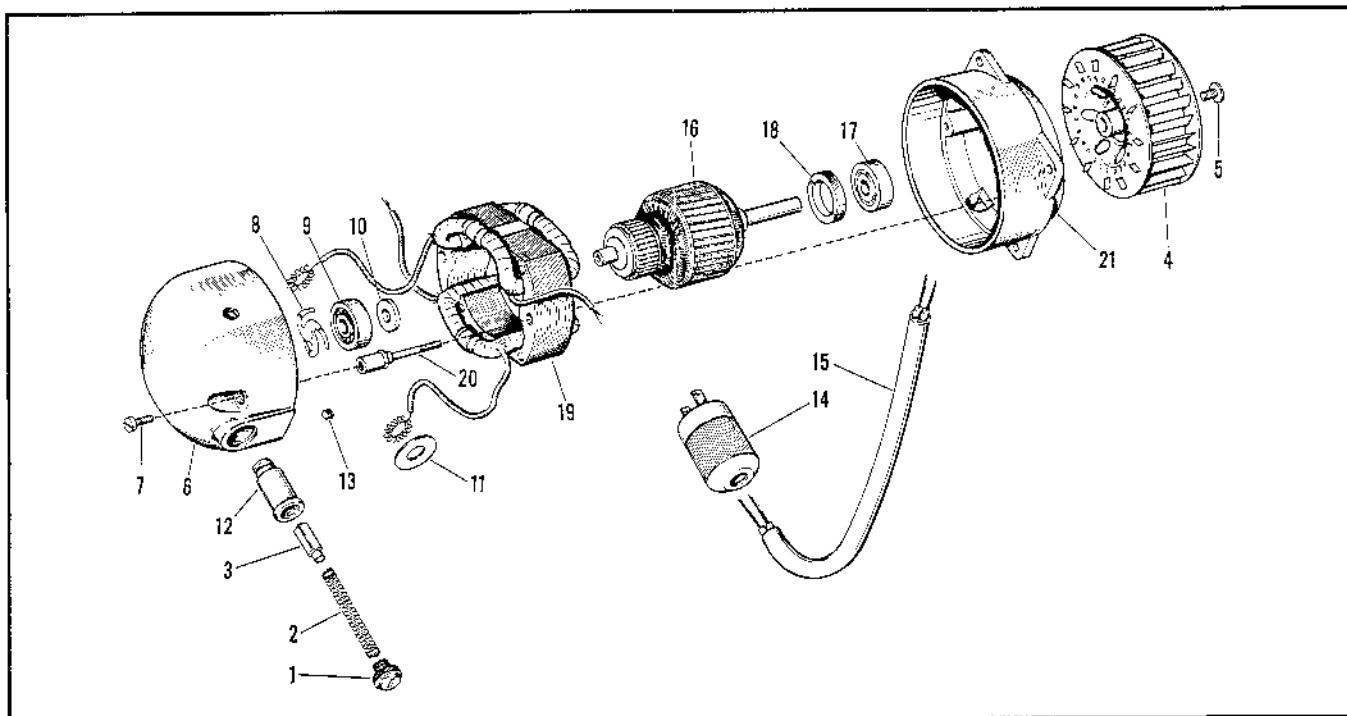


Figure 19. Motor and Fan Assembly

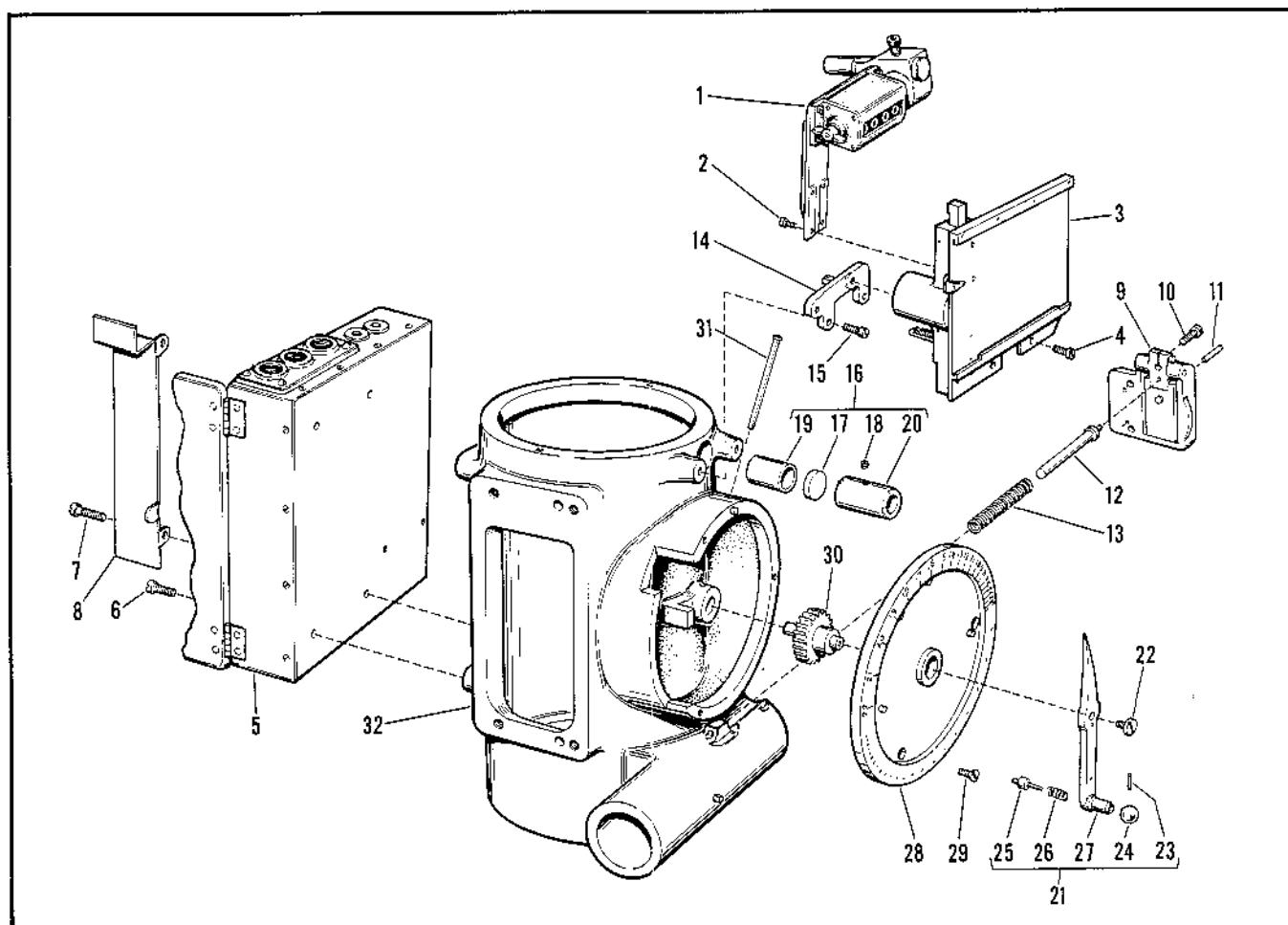


Figure 20. Lamp Case Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
21-1	7873	SLEEVE AND OILER, revolving	1	1
-2	7725	BEARING, end thrust	1	1
-3	7887	PIN, taper	1	1
-4	01766	GEAR AND SPLINE ASS'Y, intermediate	1	1
-5	01633	COUNTER ASS'Y, film (includes 7 thru 10)	1	1
-6	7764	SCREW, fillister hd	4	4
-7	7716	GEAR, drive	1	1
-8	4819	PIN, taper	1	1
-9	7726	WASHER, dust	1	1
-10	7715	MACHINE, film counting	1	1
-11	7737	BRACKET, counting machine	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
22-1	01714	HOLDER ASS'Y, exposure card	1	1
-2	7765	SCREW, fillister hd	6	6
-3	01763	BAR ASS'Y, register (includes 4, 5, and 6)	1	1
-4	7526	POINTER	1	1
-5	1920	SCREW, flat hd	1	1
-6	7524	BAR, register	1	1
22-	01764	PAWL AND FRAME ASS'Y (includes 7 thru 13)	1	1
-7	7527	SPRING	1	1
-8	7530	PAWL, operating	1	1
-9	7528	PIN, dowel	1	1
-10	7523	PIN, dowel	1	1
-11	7522	HOLDER, pawl spring	1	1
-12	7787	PIN, dowel	2	2
-13	7507	FRAME, register bar	1	1

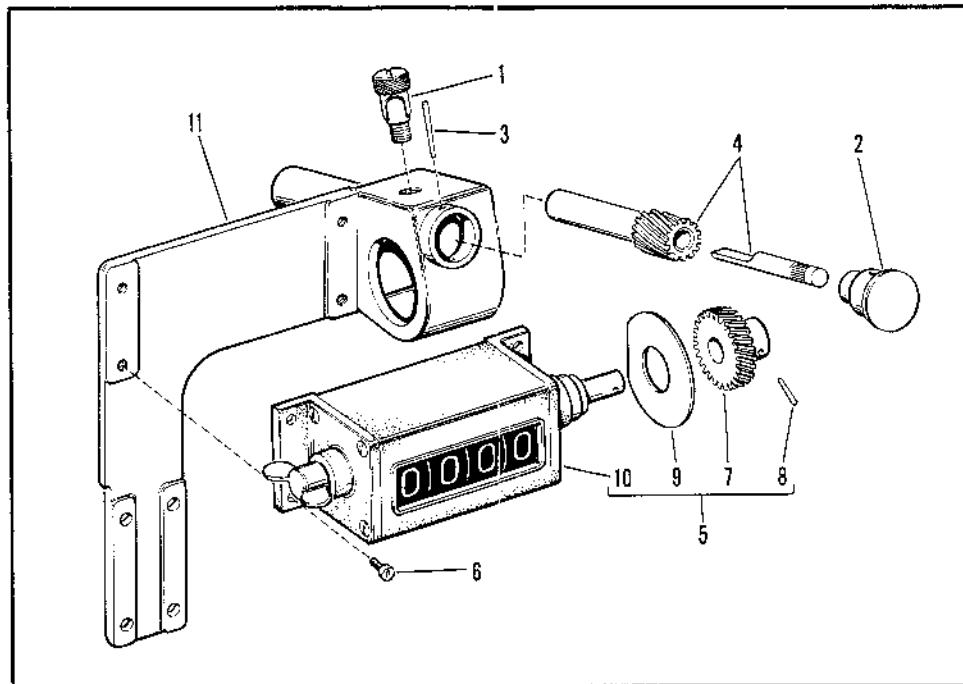


Figure 21. Counter and Bracket Assembly

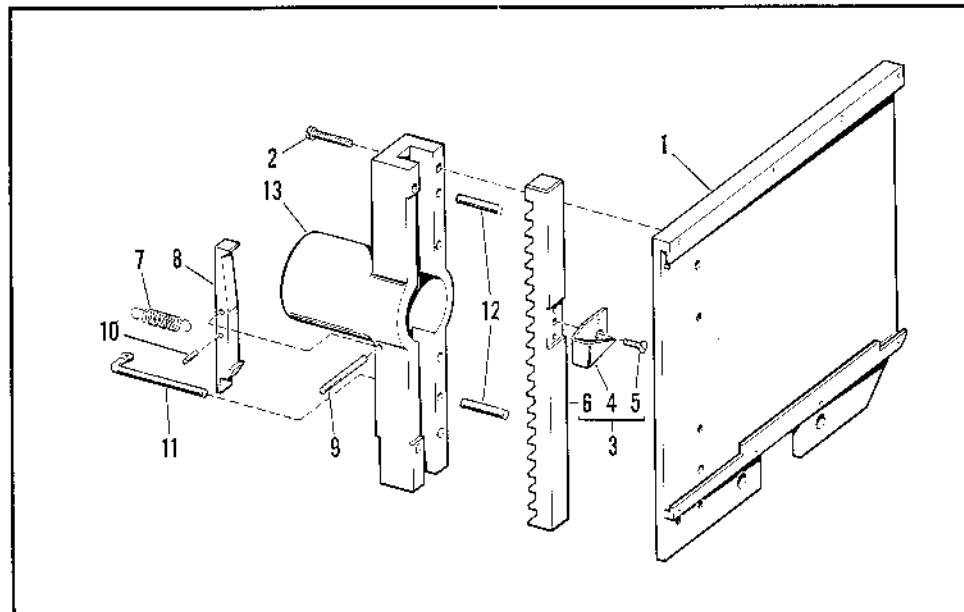


Figure 22. Register Bar and Card Holder Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
23-1	01784	BOARD ASS'Y, terminal (includes 3 thru 12) . . .	1	1
-2	5252	SCREW, flat hd.	16	16
-3	7971	BAR, bus, short	2	2
-4	7915	NUT, hex	4	4
-5	7914	SCREW, fillister hd	4	4
-6	7927	FUSE, 10 amp, 250 volt	2	2
-7	7972	FUSE, 6 amp, 250 volt	2	2
-8	7925	CLIP, fuse, with mtg. screws	8	8
-9	7916	WASHER	1	1
-10	7915	NUT, hex	1	1
-11	7914	SCREW, fillister hd	1	1
-12	7923	BOARD, terminal	1	1
-13	01654	BOX ASS'Y, terminal	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
24-1	7443	CASE, clutch	1	1
-2	7712	SCREW, pilot	2	2
24-	01715	ARMATURE ASS'Y (includes 3 thru 9)	1	1
-3	7434	BUSHING, clutch	1	1
-4	1577	SCREW, fillister hd	1	1
-5	7458	SCREW, adjusting	1	1
-6	7460	HOLDER, armature clutch	1	1
-7	7456	PIN, dowel	1	1
-8	7457	SCREW, flat hd	1	1
-9	7459	ARMATURE	1	1

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
25-1	16728	BASE, motor	1	1
-2	13543	BOLT, hex hd	4	4
-3	8179	WASHER, spring lock	4	4
-4	05688	LEAD ASS'Y, pedestal to motor (includes 5 thru 8)	1	1
-5	7567	CAP, connector	1	1
-6	21472	CONNECTOR	1	1
-7	7919	TERMINAL, solderless	3	3
-8	11050	LEAD, pedestal to motor	1	1
-9	16723	MOTOR, electric, 115v, 60 cycle	1	1

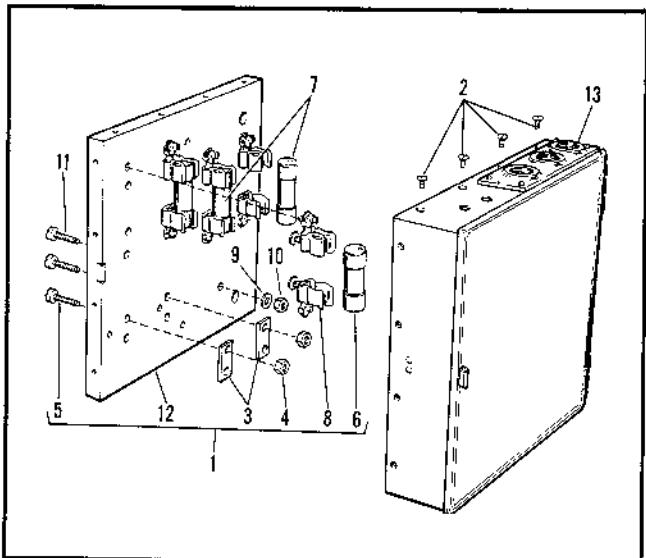


Figure 23. Terminal Box Assembly

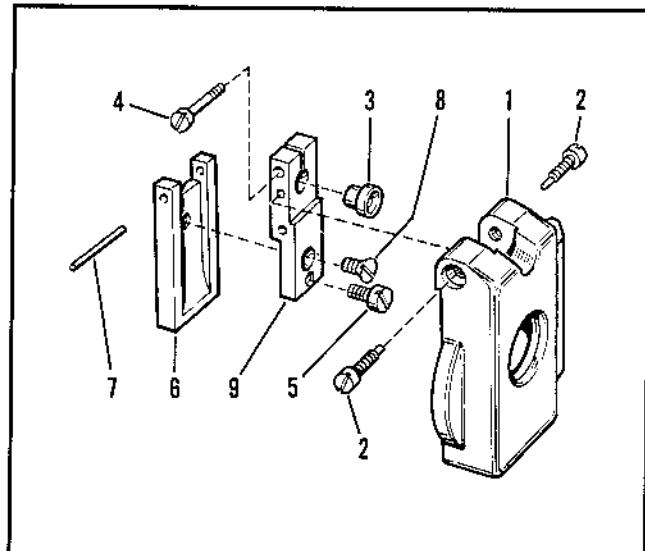


Figure 24. Clutch Case and Armature

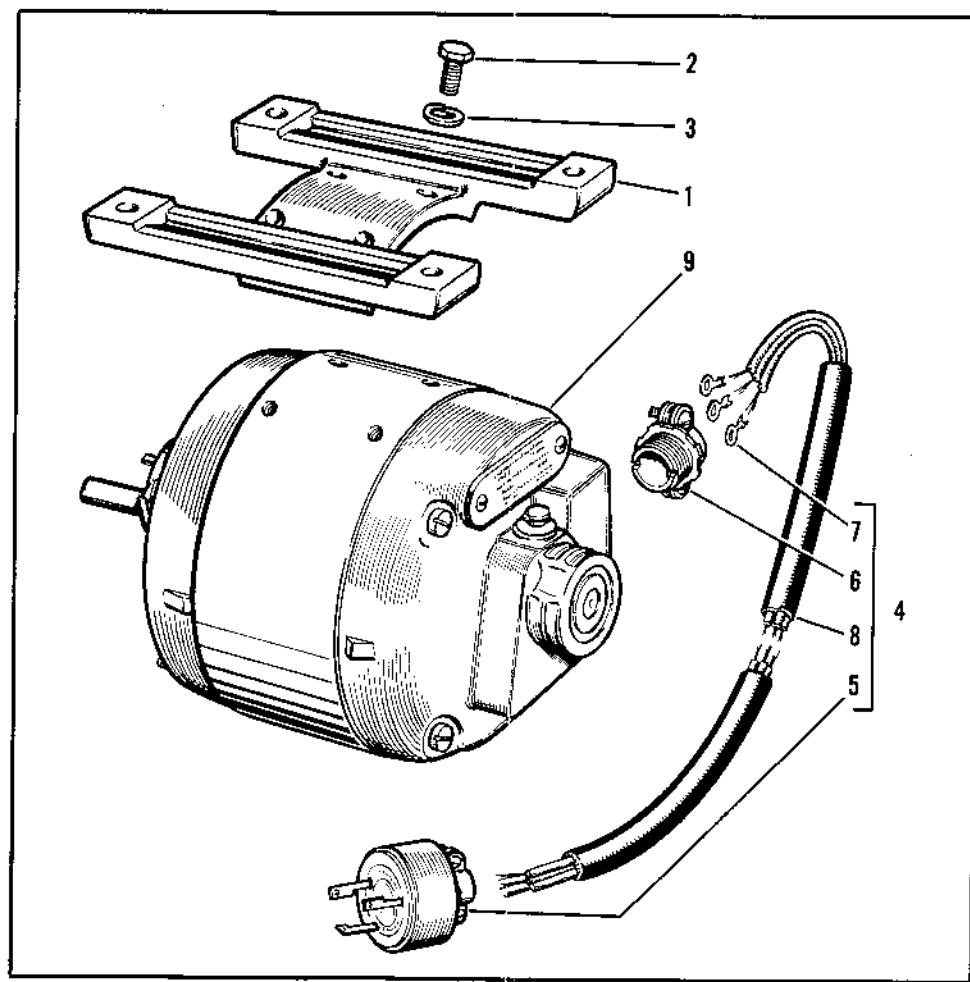


Figure 25. Motor and Base Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
26-1	7894	ROD, guide, take-up bracket	2	2
-2	7898	NUT, plain hex	2	2
-3	7896	SETSCREW, square head	2	2
-4	7895	SPRING	1	1
-5	7893	BRACKET, motor take-up	2	2

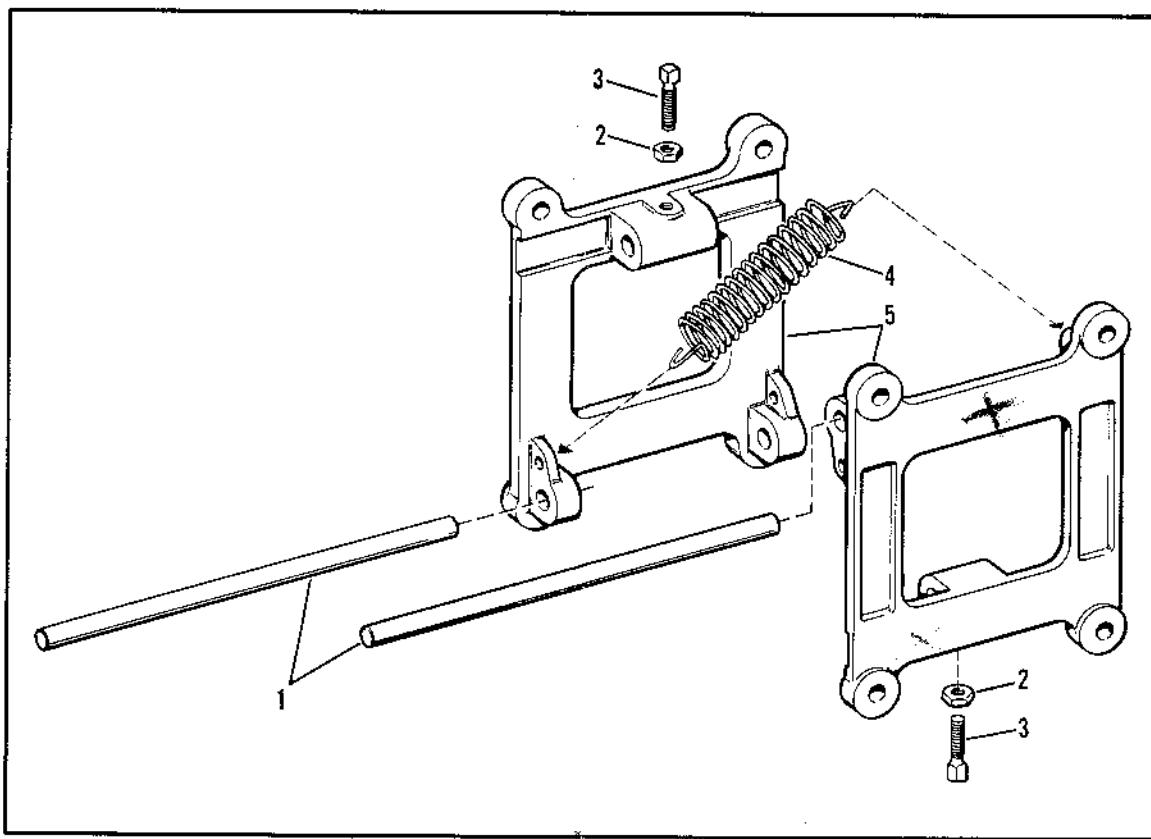


Figure 26. Motor Belt Take-up Mechanism Assembly

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
27-1	05981	GUARD ASS'Y, take up	2	-
-1	0880	GUARD ASS'Y, take up	-	2
-2	7656	SCREW, fillister hd	2	2
-3	2858	SPRING	2	2
-4	11043	WASHER, shim	2	2
-5	05835	FLANGE ASS'Y (includes 7, 8, and 9)	2	2
-6	22102	SCREW, pilot	2	2
-7	22101	HUB, take-up flange	1	1
-8	22109	RING, retaining	1	1
-9	22071	FLANGE, take-up reel	1	1
-10	22127	HUB, take-up reel, 35-mm	2	-
-10	22103	HUB, take-up reel, 16-mm	-	2
-11	12271	SETSCREW	2	2
-12	22111	KEY, film core	2	2
-13	11920	SPRING, push rod	2	2
-14	11042	WASHER, shim	2	2
-15	05838	PULLEY ASS'Y	2	2
-16	22113	RING, retaining	2	2
-17	7980	SPRING	1	1
-18	03047	CLUTCH AND SHAFT ASS'Y (see Fig. 29 for details)	2	2
-19	05839	ARM AND STUD ASS'Y, take up	1	1
-20	7978	ARM, idler tension spring	1	1
-21	7752	SCREW, fillister hd	1	1
-22	05837	ARM AND STUD ASS'Y, take up	1	1
-23	7751	SCREW, fillister hd	1	1

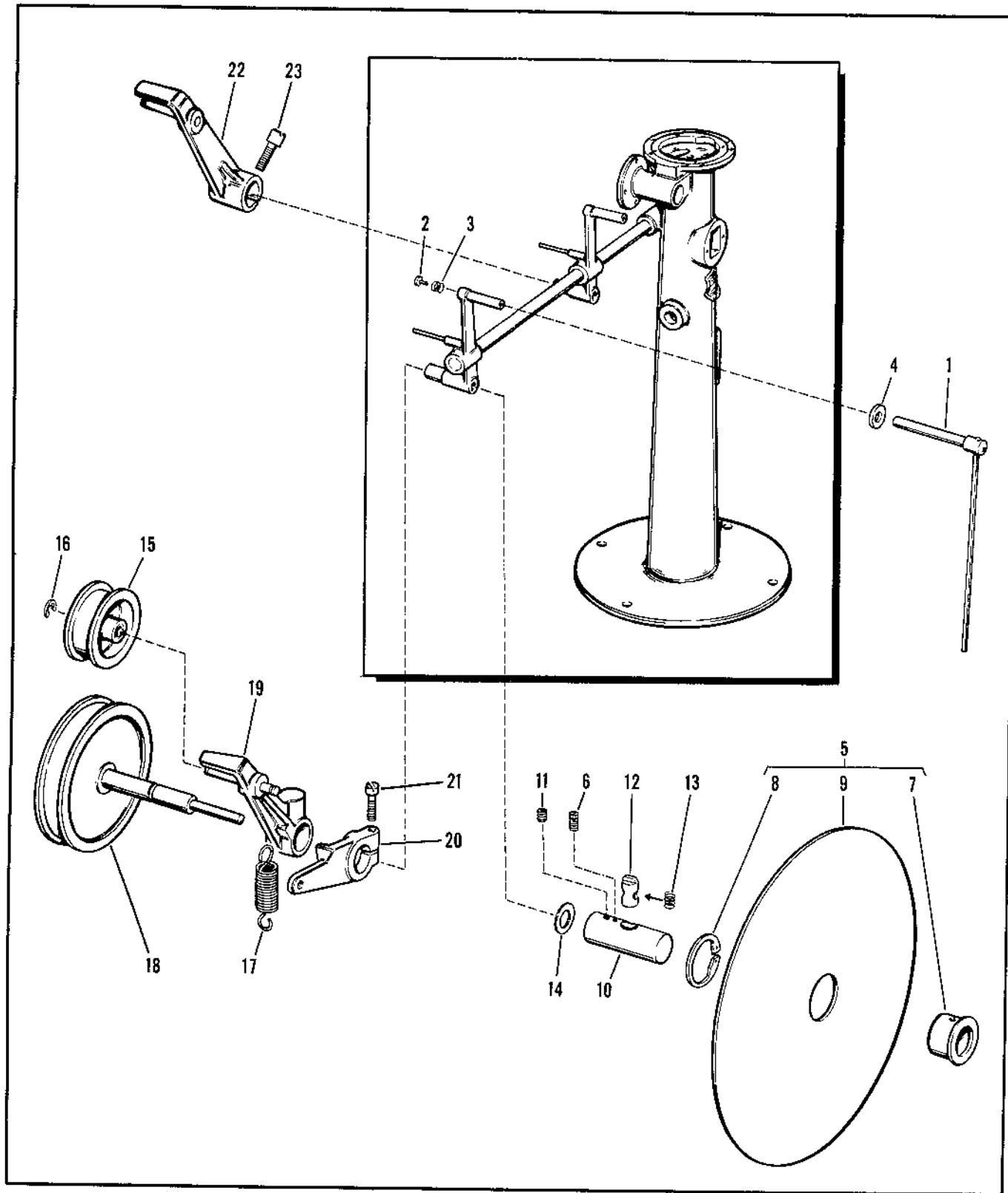


Figure 27. Pedestal Assembly - Sheet 1 of 2 Sheets

Fig. and Index No.	Part No.	Part Name	Qty. Req'd,	
			D	J
28-1	7640	SPRING	1	1
28-	0488	HANDLE, SWITCH AND PULLEY ASS'Y (includes 2 thru 12)	1	1
-2	01720	LEVER AND PULLEY ASS'Y, belt tightener	1	1
-3	7880	PIN, taper	1	1
-4	05838	PULLEY AND BEARING ASS'Y	1	1
-5	7211	SCREW, fillister hd	1	1
-6	7639	COLLAR, switch lock spring	1	1
-7	22083	STUD, pulley	1	1
-8	7548	PIN, dowel	1	1
-9	7550	LEVER, belt tightener	1	1
-10	0487	BRUSH ASS'Y, switch	1	1
-11	7884	PIN, taper	1	1
-12	7670	HANDLE, switch	1	1
-13	7639	COLLAR, switch lock spring	1	1
-14	7211	SCREW, fillister hd	1	1
-15	01754	CASE ASS'Y, switch	1	1
-16	7760	SCREW, fillister hd	4	4
-17	0490	BLOCK ASS'Y, terminal, AC	1	1
-18	7761	SCREW, fillister hd	2	2
-19	0498	BLOCK ASS'Y, terminal, DC	1	1
-20	7948	INSULATION, switch case	1	1
-21	01945	WHEEL ASS'Y, sheave (includes 23 thru 27)	1	1
-22	12245	SETSCREW	1	1
-23	7564	RETAINER, belt, sheave wheel	1	1
-24	7883	PIN, taper	1	1
-25	10402	STUD, counter transmission	1	1
-26	1382	BEARING, radial	2	2
-27	10401	WHEEL, sheave, counter transmission	1	1
-28	7802	TABLE, pedestal	1	1
-29	2716	SCREW, wood, flat hd	12	12
-30	05836	BRACKET ASS'Y, take-up (includes 34 thru 37)	1	-
-30	05983	BRACKET ASS'Y, take-up (includes 34 thru 37)	-	1
-31	882	SETSCREW	2	2
-32	884	NUT, plain hex	1	1
-33	883	PIN, taper	1	1
-34	22129	BRACKET, take up	2	-
-34	22107	BRACKET, take up	-	2
-35	7880	PIN, taper	2	2
-36	7740	PIN, dowel	2	2
-37	7663	SHAFT, take-up bracket	1	1
-38	01752	BRACKET ASS'Y, pedestal table (includes 40, 41, and 42)	1	1
-39	7809	PIN, taper	1	1
-40	2703	BRACKET, pedestal table	2	2
-41	7808	PIN, taper	2	2
-42	7804	SHAFT, table bracket	1	1
-43	85272	PLATE, cap, pedestal hole	1	1
-44	2709	SCREW, fillister hd	4	4
-45	7801	PEDESTAL, floor	1	1

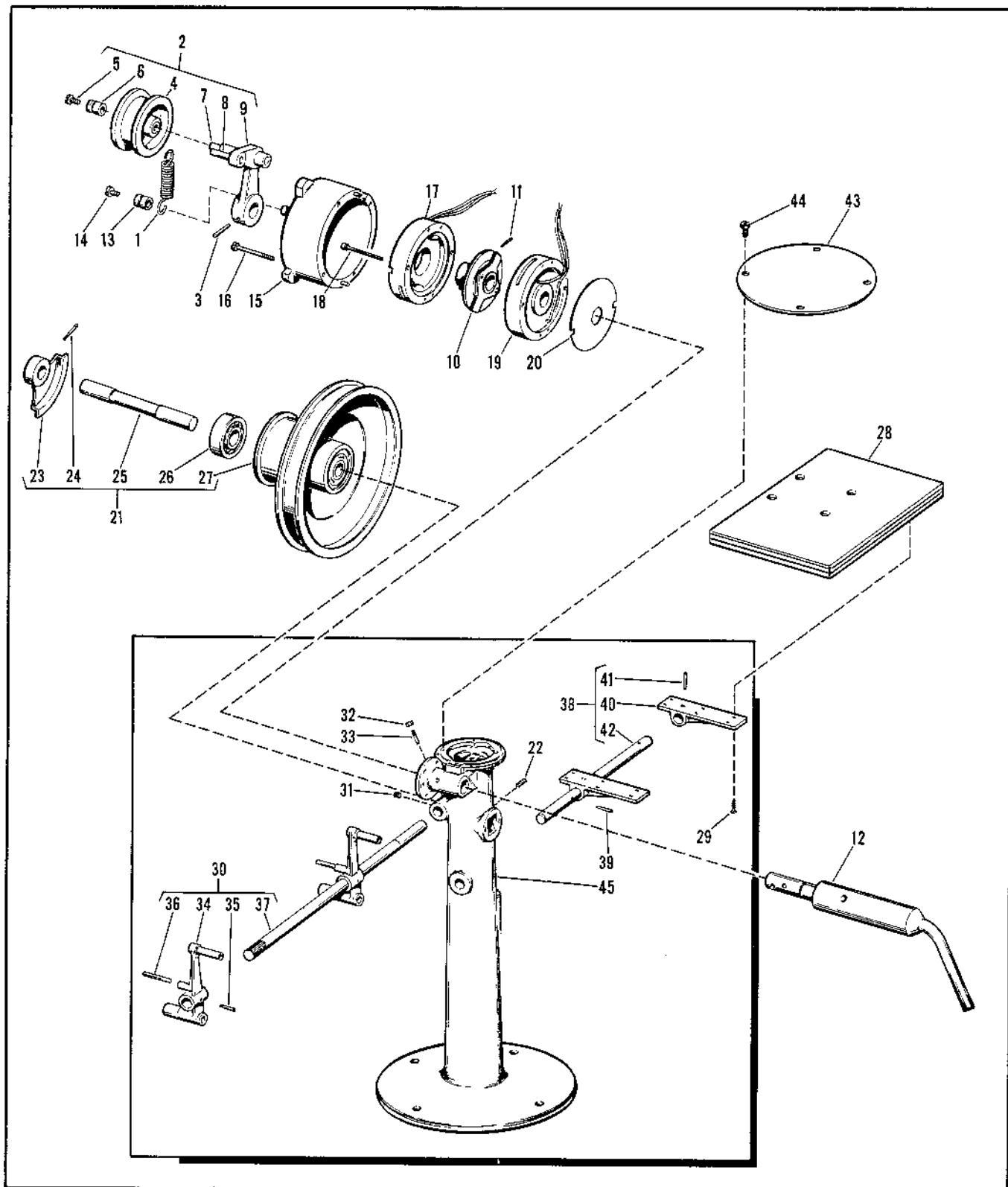


Figure 28. Pedestal Assembly - Sheet 2 of 2 Sheets

Fig. and Index No.	Part No.	Part Name	Qty. Req'd.	
			D	J
29-1	10365	SPRING, compression	1	1
-2	10366	SETSCREW	1	1
-3	10364	PLUNGER	1	1
-4	10362	CAP, adjustment	1	1
-5	2394	PLUG, pressure	3	3
-6	2395	SPRING, compression	3	3
-7	2398	DISC, driving	3	3
-8	2396	DISC, friction	5	5
-9	2397	DISC, driving.	3	3
-10	22105	SPLINE, take-up drive shaft	1	1
-11	12271	SETSCREW, Bristol	2	2
-12	22104	SHAFT, take-up drive	1	1
-13	10361	PULLEY, take-up drive	1	1

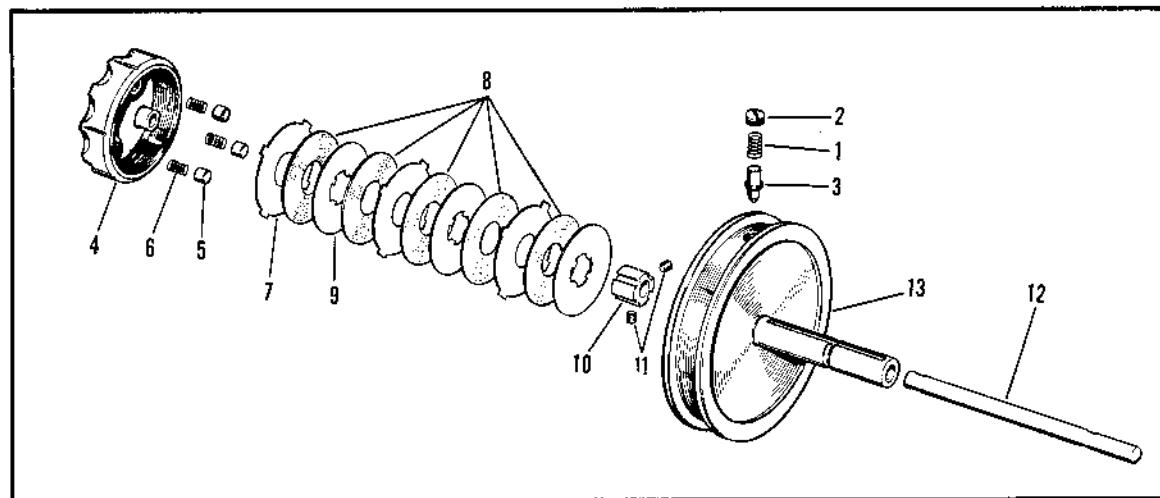
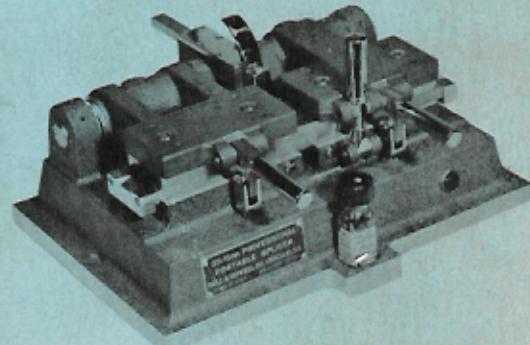
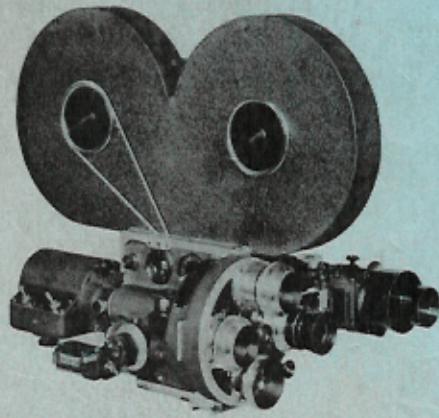
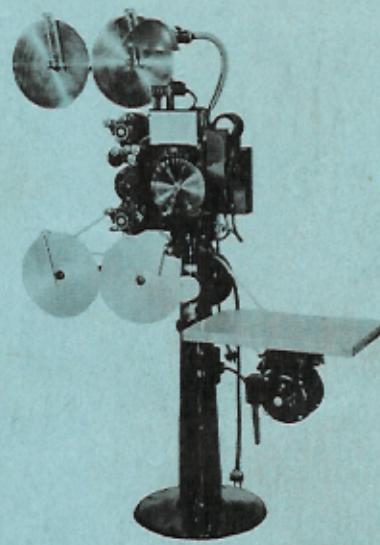
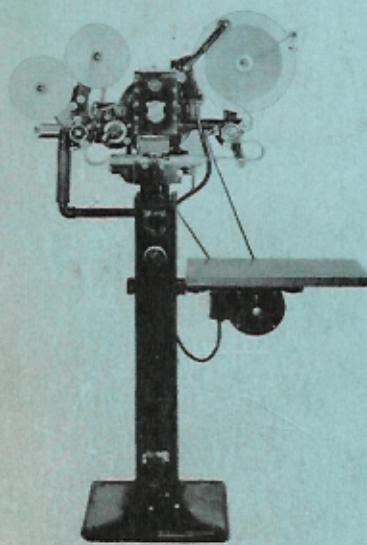
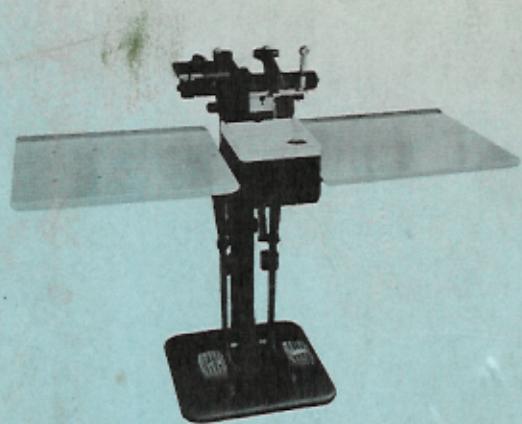
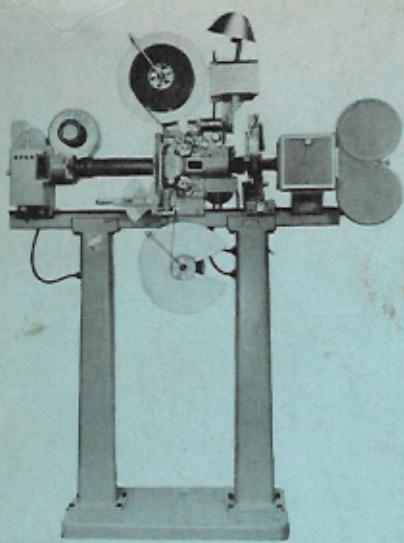


Figure 29. Clutch and Shaft Assembly

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