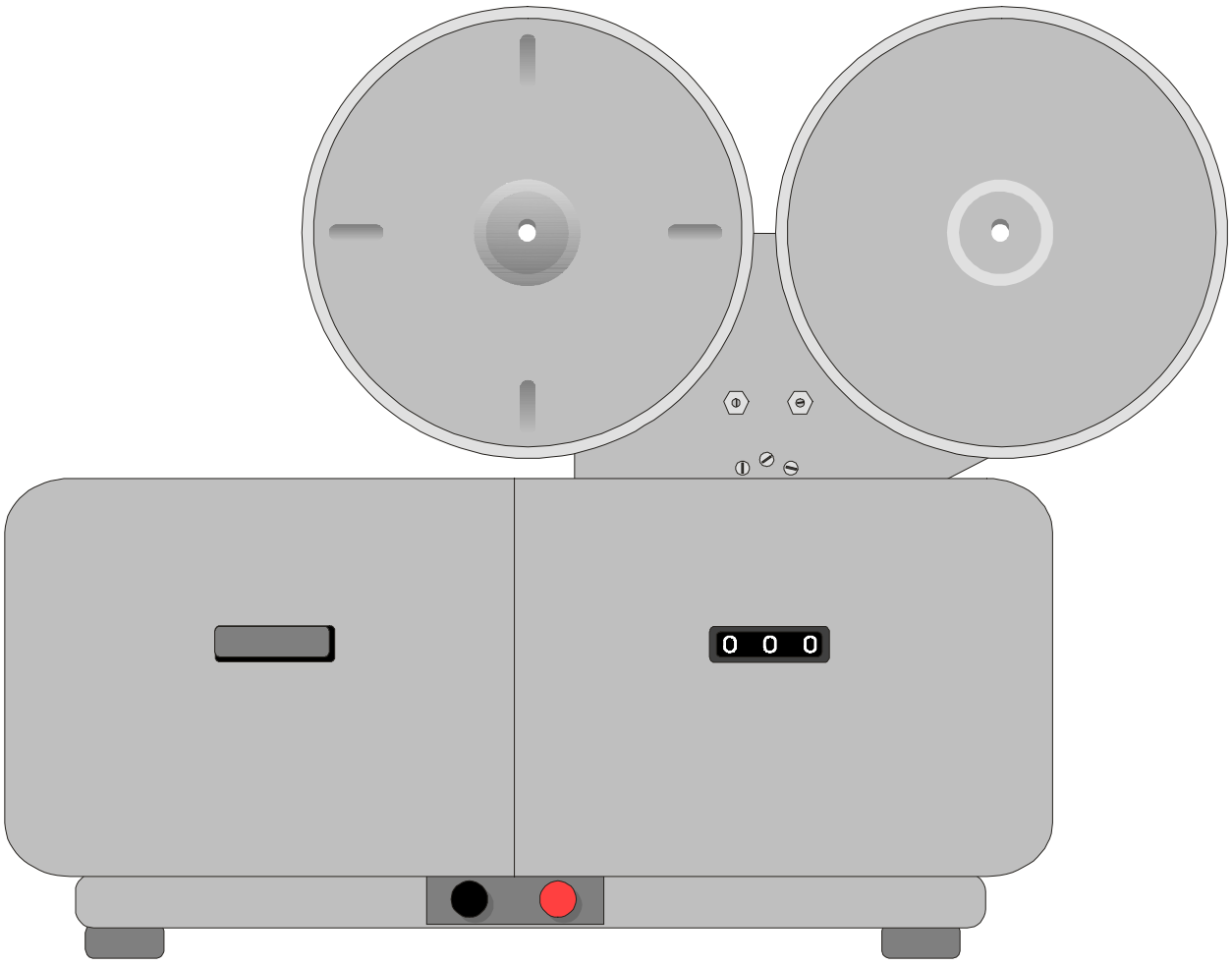
RA-1231

OPTICAL SOUND TRACK RECORDER



Revised September 5, 2001

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OPERATING AND MAINTENANCE INSTRUCTIONS FOR RA-1231 TYPE FILM OPTICAL RECORDER

1.0 USE

The RA-1231 type optical film recorder is designed to record variable area sound tracks on either 35mm or 16mm film. It is equipped with a modulator unit which accommodates either a 1405N mono or a 1563N stereo Light Valve. The 1405N light valve will record a dual bilateral, variable area 76 mils (0.076 inch) standard mono track (60 mil track in the case of 16mm). The 1563N stereo light valve will record a standard Dolby Stereo track.

2.0 GENERAL DATA

Dimensions:	23" long x 13" wide x 11" tall (59 x 33 x 28cm) (not including magazine).
Weight:	Approximately 102 lbs (46kg) (not including magazine, but including motor). Magazine weighs approximately 9 lbs (4kg) empty.

3.0 INSTALLATION

Install Flywheel;
The recorder is shipped with the flywheel packed separately to avoid damage in shipment. To install, first remove the motor from the recorder. The electrical connections to the motor may be left in place. Move the motor aside so the flywheel can be slid onto the recording drum shaft. Slide the flywheel onto the shaft with the holding screw facing outward towards you. Tighten the screw. Replace the motor and drive belt. Make sure that the motor shaft is aligned parallel to the gear shaft it drives. The rubber drive belt should be drawn snug but not stretched. Check to be sure that the belt runs true on the drive gears.

Dash Pot Fluid;
The recorder is shipped without the dash pot fluid due to possible spillage in shipment. To re-fill, remove the 2 screws from the filter unit mounting plate (see figure 7 number 29) and remove the filter unit. You may now re-fill the filter unit with "dash pot fluid" (Dow Corning 200, 100 cs viscosity, A Dimethylpolysiloxane) which you will find enclosed in a small bottle marked "Dash Pot Fluid".

Connections to the Recorder;
Connect the motor drive cable. Connect the three cables from the Nuoptix SORS Electronics which consist of the following;

1) The Record Lamp Cable (4 pin male cable connector)
2) The Optical Preamplifier Cable (5 pin female cable connector)
3) The Light Valve Output Cable (5 pin male cable connector)

Three Phase Motor Connection;
The three phase sync motor connections are on the large four pin circular connector located on the rear connector plate. Pins 'A', 'B' and 'C' are the 230VAC three phase power inputs. Pin 'D' is earth ground. Connect power as indicated. Remove film magazine from the camera. Press the motor start switch. The main shaft knob located on the right side of the camera should be rotating clockwise. If it is not rotating clockwise then, disconnect the power and reverse the connections to pins 'A' and 'B'. The shaft should now rotate clockwise.

Setup Procedure for Recording;
A recording of slack ribbons (ribbons at rest) should be done to check for proper track placement (see next section for details). A lamp balance test should be made (see next section for details). Finally a cross-modulation test should be made to determine the required negative density for a given laboratory (see the Stereo Optical Recording System or SORS manual for details).

4.0 MAINTENANCE

Condenser Lens Adjustment (refer to figure 1 below);
This adjustment is performed at the factory during initial setup and is not required in the field.

Remove light valve. Loosen lens clamping Allen screw (arrow D in figure 1) and slide condenser lens to the left (towards lamp) approximately 1/8 inch. Replace light valve or insert lamp target in light valve position. With the lamp on, gently slide the condenser lens in mount while watching the meter(s) until you are in center of peak reading (similar to lamp adjustments). Those with the "lamp target tools", adjust until filament is focused within the target area. If you overshoot the peak reading, remove the light valve or lamp target and gently move the condenser lens to the left to approximately beyond the peak reading. Reinsert the light valve or lamp target and move lens to right to peak reading. Re-tighten the lens clamping screw and clean lens with lens cleanlint paper to remove any fingerprints.

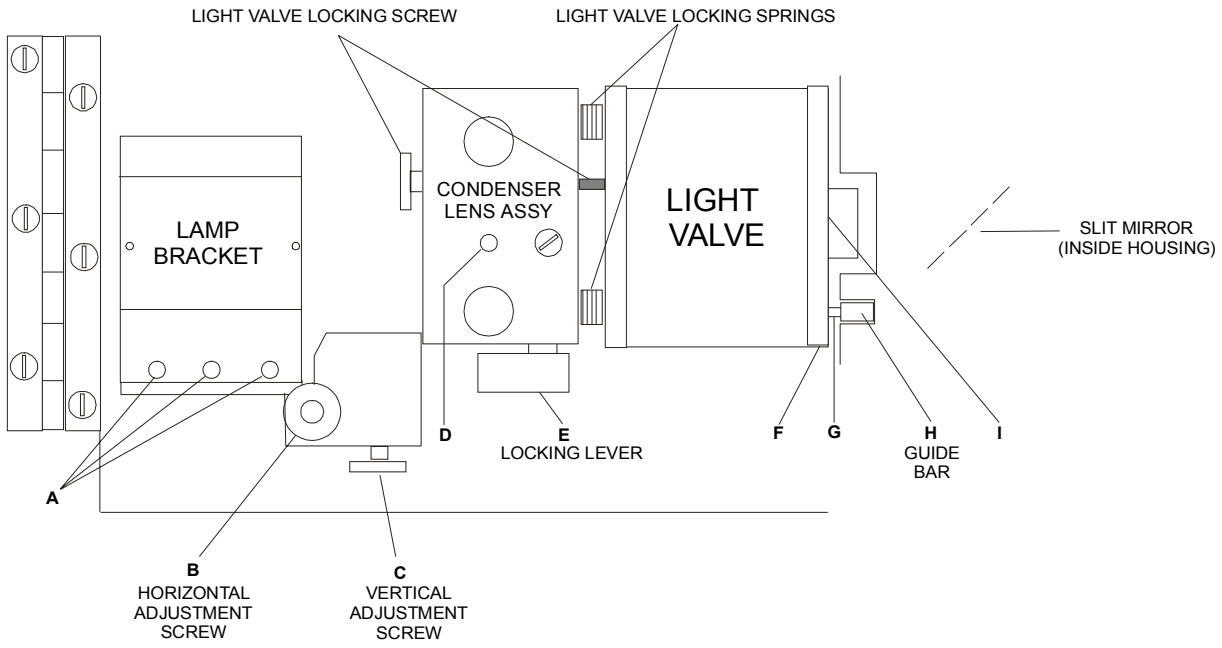


FIGURE 1

4.0 MAINTENANCE (continued)

Record Lamp Installation and Adjustment:

installation (refer to figure 1);

To install the record lamp, first remove the three bottom screws on the bracket (arrow A in figure 1). Now the lamp may be installed easily. Try not to touch the glass surface of the lamp but if you do, clean the lamp with a glass cleaning solution. Replace bracket and the two mounting screws.

coarse adjustment (refer to figure 1);

Required when just changing the Quartz Halogen Lamp.

For those who do not have the "Lamp Target Tool" to adjust the lamp, turn the "MODE" switch on the Nuoptix Stereo Optical Recording System (SORS) to "SETUP" and adjust the "SETUP" pot(s) on the SORS to read approximately 15.0. Now rotate the vertical adjustment ring (arrow C in figure 1) and observe the meter readings on both meters. You should adjust for the center part of the peak reading on both meters (they will peak and stay there for part of a turn before dropping on either side of the peak portion). If one is going down while the other is going up, or If the meter readings are vastly different, try turning in the opposite direction. Basically, the lamp should be roughly vertically centered in the condenser lens. Adjust the horizontal adjustment screw (arrow B in figure 1) for the same result as above.

For those who have the "Lamp Target Tool", simply adjust the vertical adjustment ring until lamp is centered in the target area and then make final balance tests with the horizontal adjustment screw as described below under "Fine Adjustment".

fine adjustment;

With the light valve disconnected ("slack ribbons") record a short test and develop the negative. Read the density of the two tracks with a densitometer. See the SORS manual for additional information. Use the "SETUP" pot(s) on the SORS to read the same as the densities have just read from the sound track negative (the "picture side" reading is the "LEFT" channel). Re-adjust the horizontal adjustment screw until the readings match. Record a new test, re-read the densities, and repeat as necessary until they are balanced. This should get you very close. You must use the densitometer to make the final determination. The left and right track densities should be within 3 points. The SORS meter(s) should be only be used as a guide.

4.0 MAINTENANCE (continued)

Monitor Target Adjustments (refer to figure 2);
The monitor target mirror may require adjustment after replacing the light valve. To adjust the target mirror, remove the two screws on top of the monitor mirror assembly and remove the cover plate. Loosen the clamp screw (arrow A in figure 2) on the monitor target mirror assembly and rotate the mirror to center the track image on the stereo photocell. This can be done using a dental type mirror. When proper alignment is finished, center the mask plate by loosening the two mounting screws and sliding the plate in the proper direction. Re-tighten the screws. Replace the monitor mirror assembly top cover.

The four mirrors to the left and right are adjusted at the factory and should not require adjustment. If adjustment is necessary, the mirrors may be slid on their adjustment track (left to right movement) or shimmed to move the image around. To shim a mirror assembly, loosen it's holding screw and carefully remove the mirror assembly. Place a shim on the required side of appropriate mirror and reassemble. This is a trial and error procedure. Focus on the visual monitor can be adjusted via the monitor target focus ring.

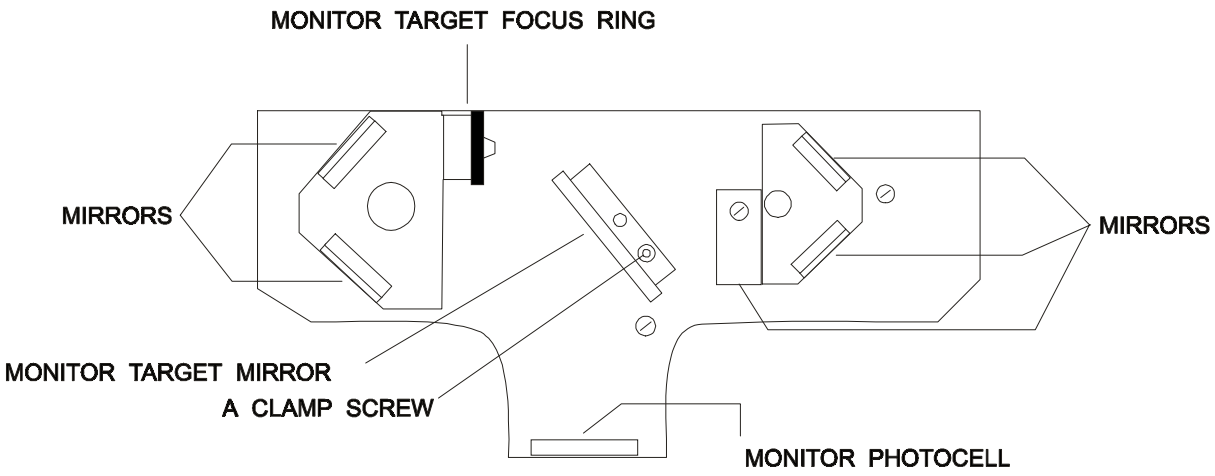


FIGURE 2

4.0 MAINTENANCE (continued)

Light Valve Installation (refer to figure 1);
Slide the valve in with its guide pins in the slot on the front side of the valve. Carefully, but firmly, push the light valve in until it seats completely and then turn the light valve locking lever (see arrow E in figure 1) to lock and secure the valve in place. If the condenser lens assembly is so equipped, turn the light valve locking screw clockwise until screw face rests against the light valve.
To remove the light valve, turn light valve locking screw counterclockwise until the screw face is retracted into the condenser lens assembly. Push the light valve firmly from front side (see arrow I in figure 1) and grasp it firmly with both hands. Carefully remove the light valve. Remember the valve is a big magnet when you are choosing a place to put it down.

Track Placement (refer to figure 1);

Mechanical adjustment (read this section completely before beginning);
Make a recording with the light valve disconnected ("slack ribbons"). Allow the camera to get up to speed before closing the film compartment door. Develop the test. Place the developed test in a toolmakers microscope and measure from the edge of the film to the centerline of the tracks. The distance should be 0.243" for 35mm (0.058" for 16mm) ±0.001". See diagram in the SORS electronics manual.
To mechanically adjust the track placement:
Remove the light valve. Loosen the two clamping screws that hold the light valve guide bar (arrow D in figure 1). On the rear side of the modulator plate is a guide bar position adjustment screw. A ¼ revolution turn moves the light bar about 1 mil (0.001"). Make the appropriate adjustment. Gently press the guide bar against the positioning screw and re-tighten the guide bar clamping screws. Re-install the light valve then record and develop a new test. Measure the track placement. Repeat adjustment as necessary.

Note: The modulator plate assembly should never be removed. If, for some reason it has been removed, please contact us for instructions.

Electronic Adjustment;
Once the above mechanical adjustment is complete, refer to the SORS electronics manual for electronic track placement.

4.0 MAINTENANCE (continued)

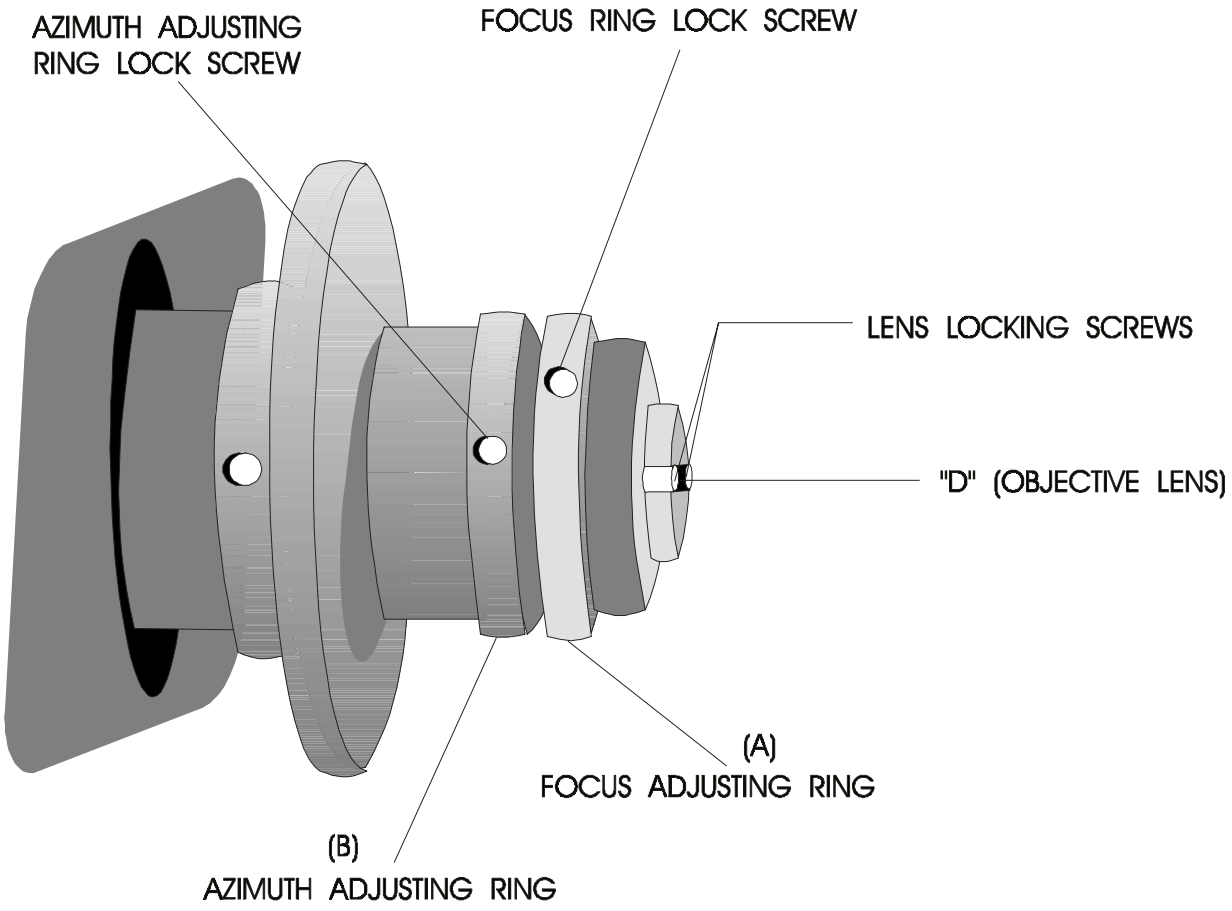


FIGURE 3

4.0 MAINTENANCE (continued)

Focus Adjustment (refer to figure 3);
The focus has been factory adjusted and should not require any further adjustments. If, for some reason adjustment is required, please use the following procedure:

Begin by adjusting the focus ring until the front of the "D" lens is 0.015" from the sound drum. Place a thin strip of tape with 5 marks every 1/8" on the focus ring (see arrow A in figure 3) and 5 marks every 1/32" on the azimuth ring (see arrow B in figure 3). Place a mark on the azimuth ring aligned with the center mark on the focus ring and loosen the focus ring clamping screws. Using the mark on the azimuth ring as a locating guide, rotate the focus ring until the most counterclockwise mark is aligned on the guide mark. Start the recorder and record 15 feet of an 8 kHz signal. Now punch the film and rotate the focus ring clockwise to the next mark. Continue for all the marks. Develop each test and mark them according to the sequence in which they were made. Using a microscope, determine which test was best focused. When rotating the ring to the appropriate mark, it is best to rotate counterclockwise to the first mark and re-rotate clockwise to the desired position. Re-tighten the clamping screws and make a final test to verify the focus.

Azimuth Adjustment (refer to figure 3);
The azimuth has been factory adjusted and should not require any further adjustments. If, for some reason adjustment is required, please use the following procedure:

The focus should be adjusted before adjusting the azimuth, as changing the focus will effect the azimuth. Place a mark on the focus ring aligned with the center mark on the azimuth ring (see beginning of focus adjustment section for details). The procedure is the same as for the focus test above. The azimuth can be done with individual adjustments and development tests if desired. To check the azimuth, align the film on a toolmakers microscope so that the edge of the film is very accurately aligned horizontally. Move the microscope stage vertically to verify that all the signal peaks are aligned. After the clamping screw(s) is tightened a final test should be made to verify the alignment.

4.0 MAINTENANCE (continued)

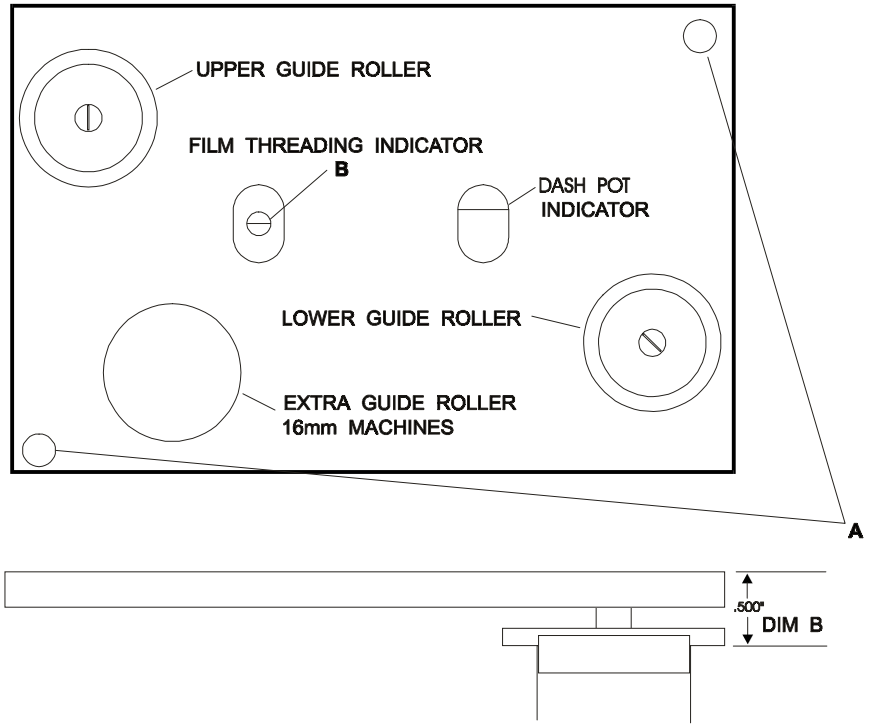


FIGURE 4

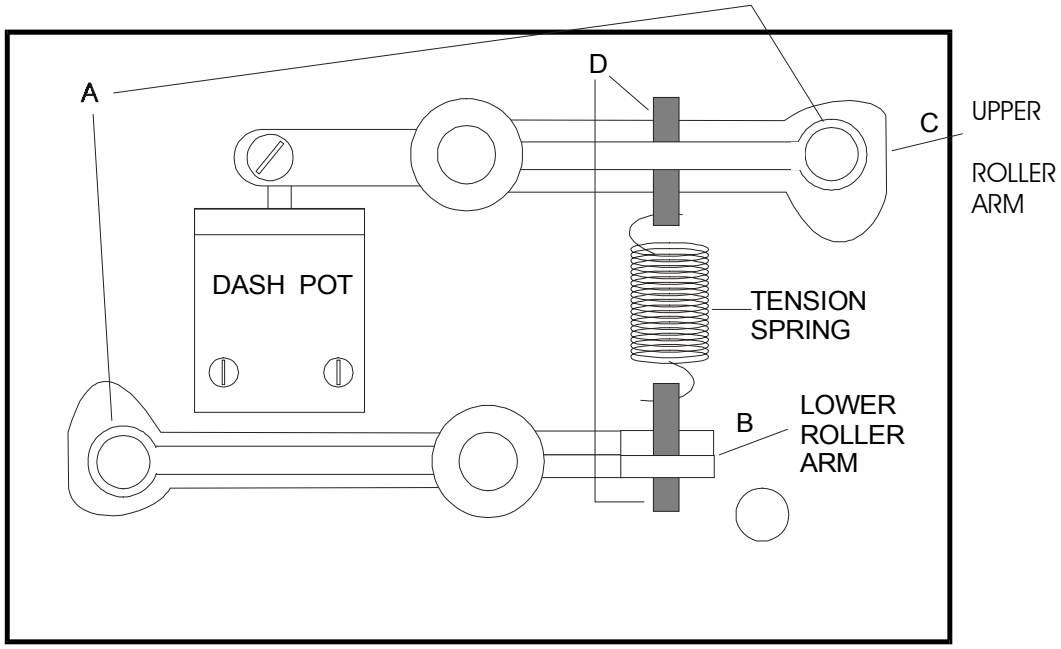


FIGURE 5

4.0 MAINTENANCE (continued)

Guide Roller Adjustment (refer to figure 4 and 5);
Remove the two mounting screws from the roller plate (see arrow A in figure 4) and remove the plate. Using calipers, measure the distance from the guide edge of the rollers to the back edge of the mounting plate. This should be 0.500" for 35mm (0.685" for 16mm) ±0.002" (see DIM B in figure 4). To adjust a rollers position, loosen the set screw holding its shaft (see arrow A in figure 5) and slide the shaft in or out and re-tighten the set screw.

Spring Tension Adjustment (refer to figure 4 and 5);
Remove the roller plate as in the guide roller adjustment procedure and clamp the plate in a vise taking care that the vise does not interfere with the lower roller arm (see arrow B in figure 5). Block the upper roller arm (see arrow C in figure 5) in the mid-position of its travel and attach a gram gauge to the lower roller and pull upward until the film threading indicator is in the center position (see arrow B in figure 4). The black index line on the moving element should bisect the hole in the indicator. Using the two screws on each end of the spring (see arrow D in figure 4), adjust the tension until the gram gauge reads 375 grams for 35mm (200 grams for 16mm) when the indicator is in the correct position.

Take-up Tension (refer to figure 6);
The multiple disc clutch of the drive unit should be adjusted to give a tension at the take-up spindle of the magazine of 850 grams on a 3 inch radius for 35mm (150 grams on a 3 inch radius for 16mm). To adjust the tension, loosen the locking set screw (see arrow A in figure 6) and, while holding the shaft, rotate the housing. Rotating the housing clockwise increases the tension. After adjustment, tighten the locking set screw, taking care that it seats on a solid surface and not in one of the cut away sections of the take-up pulley assembly.

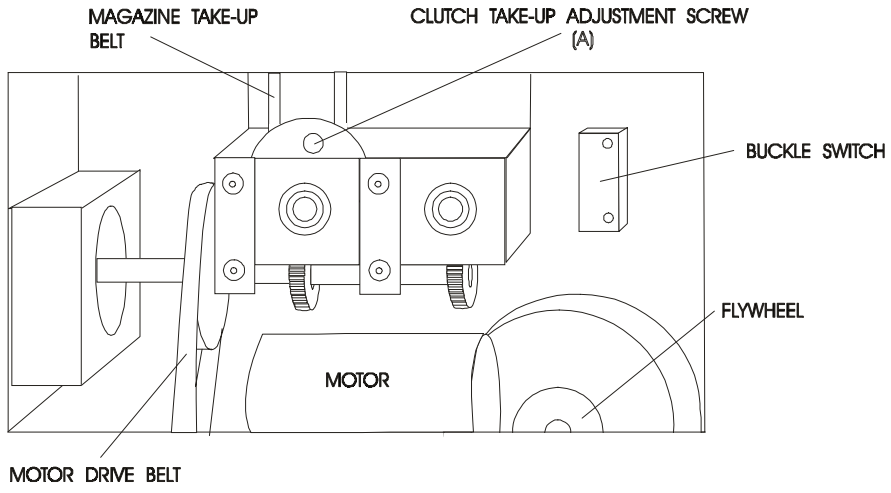


FIGURE 6

4.0 MAINTENANCE (continued)

Lubrication;
The film pad roller shafts and the footage counter shafts and gears should be given an occasional drop of light machine oil and all excess wiped off.

All driving gears should be lubricated with "Sta-put" oil #370 or equivalent. Make sure all parts of the gear surfaces are properly lubricated. All excess oil should be wiped off.

The dash pot in the damper filter unit should be kept filled to the level of the indicator line. Use Dow Corning 200, 100 cs viscosity, A Dimethylpolysiloxane.

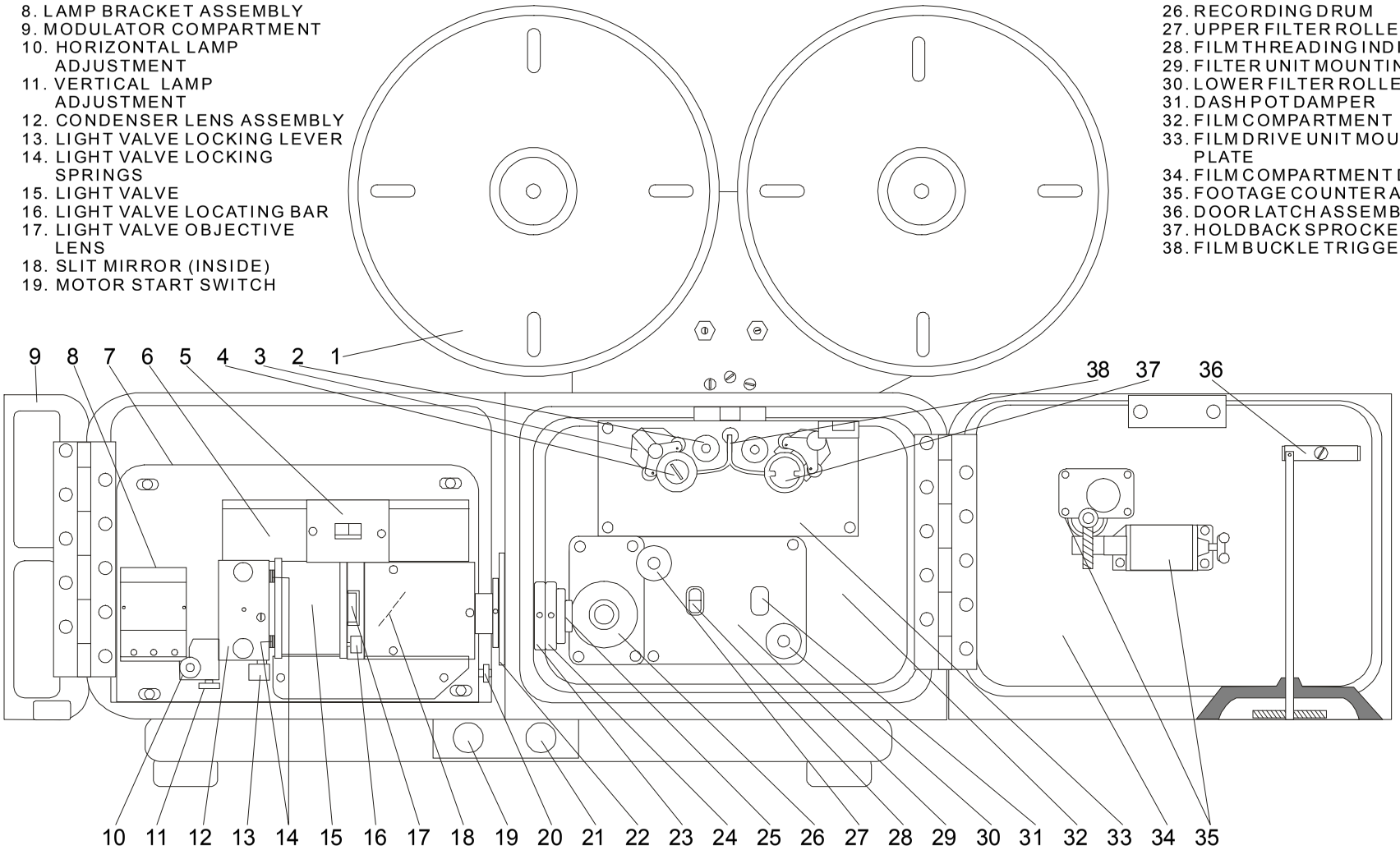
Optical Elements;
All optical elements should be kept clean and free of dust, fingerprints, oil, etc. If only dust is present you can use one of the commercially available pressurized dust blowers to remove from lens surface. If dirt, oil, etc. you will have to use a dry swab of sterile cotton with a small amount of denatured alcohol (or equivalent) and carefully wipe the surface immediately wiping off the excess with a dry swab.

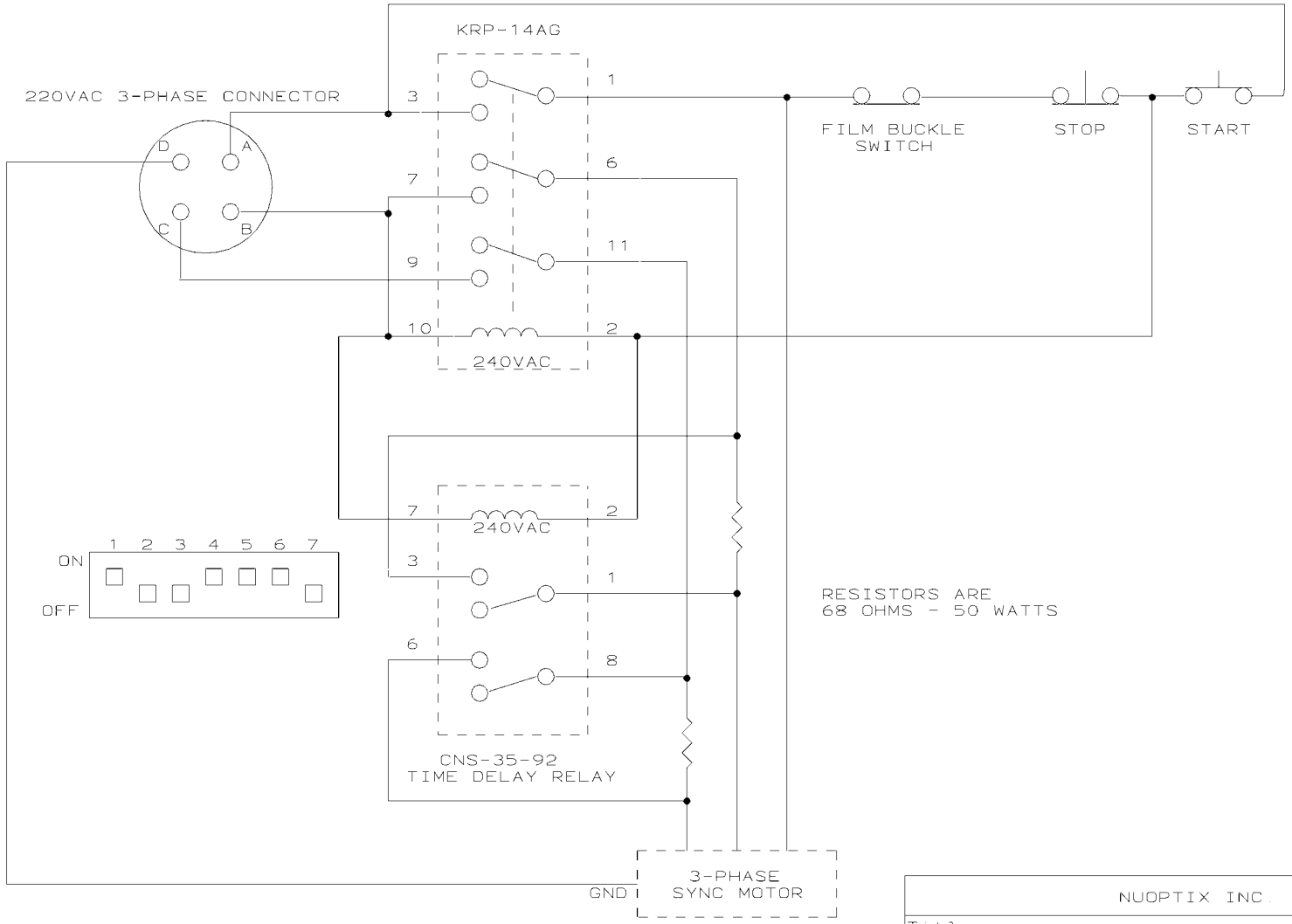
Note: To remove the recording drum to clean and/or inspect the "D" lens, loosen the clamping screw part way and carefully, but firmly, pull the drum off. After cleaning and/or inspecting, replace drum and re-tighten clamping screw.

Take-up Belt Installation;
If the old belt is still on the machine and you wish to replace it, cut the old belt (if it's not broken) and attach the Polycord belting to one end securely and pull the Polycord belting through until you have both ends above the machine routed correctly. If the old belt is not on and you have to thread the belt through by hand, you may have to move the drive motor out of the way. This can be done without removing the wires but disconnect the motor AC cable. Once the Polycord belting is properly threaded, cut the Polycord belting to the proper length for the magazine used. Using a match or other source of flame, melt both ends of the polycord belting slightly and push them together immediately. Hold them until the polycord belting has cooled thoroughly and trim the excess off with small wire cutters or a razor blade. This makes a very strong bond which lasts several years and may be re-bonded.

FIGURE 7: INSTRUCTION ASSEMBLY

1. FILM MAGAZINE
2. IDLER ROLLER
3. PAD ROLLER ASSEMBLY
4. PULL DOWN SPROCKET
5. VISUAL MONITOR SCREEN
6. VISUAL MONITOR ASSEMBLY
7. MODULATOR MOUNTING PLATE
8. LAMP BRACKET ASSEMBLY
9. MODULATOR COMPARTMENT
10. HORIZONTAL LAMP ADJUSTMENT
11. VERTICAL LAMP ADJUSTMENT
12. CONDENSER LENS ASSEMBLY
13. LIGHT VALVE LOCKING LEVER
14. LIGHT VALVE LOCKING SPRINGS
15. LIGHT VALVE
16. LIGHT VALVE LOCATING BAR
17. LIGHT VALVE OBJECTIVE LENS
18. SLIT MIRROR (INSIDE)
19. MOTOR START SWITCH
20. MODULATOR STOP SCREW
21. MOTOR STOP SWITCH
22. LENS BARREL LIGHT SHIELD
23. AZIMUTH ADJUSTING RING
24. FOCUS ADJUSTING RING
25. OBJECTIVE CYLINDER ("D") LENS MOUNT
26. RECORDING DRUM
27. UPPER FILTER ROLLER
28. FILM THREADING INDICATOR
29. FILTER UNIT MOUNTING PLATE
30. LOWER FILTER ROLLER
31. DASH POT DAMPER
32. FILM COMPARTMENT
33. FILM DRIVE UNIT MOUNTING PLATE
34. FILM COMPARTMENT DOOR
35. FOOTAGE COUNTER ASSEMBLY
36. DOOR LATCH ASSEMBLY
37. HOLDBACK SPROCKET
38. FILM BUCKLE TRIGGER





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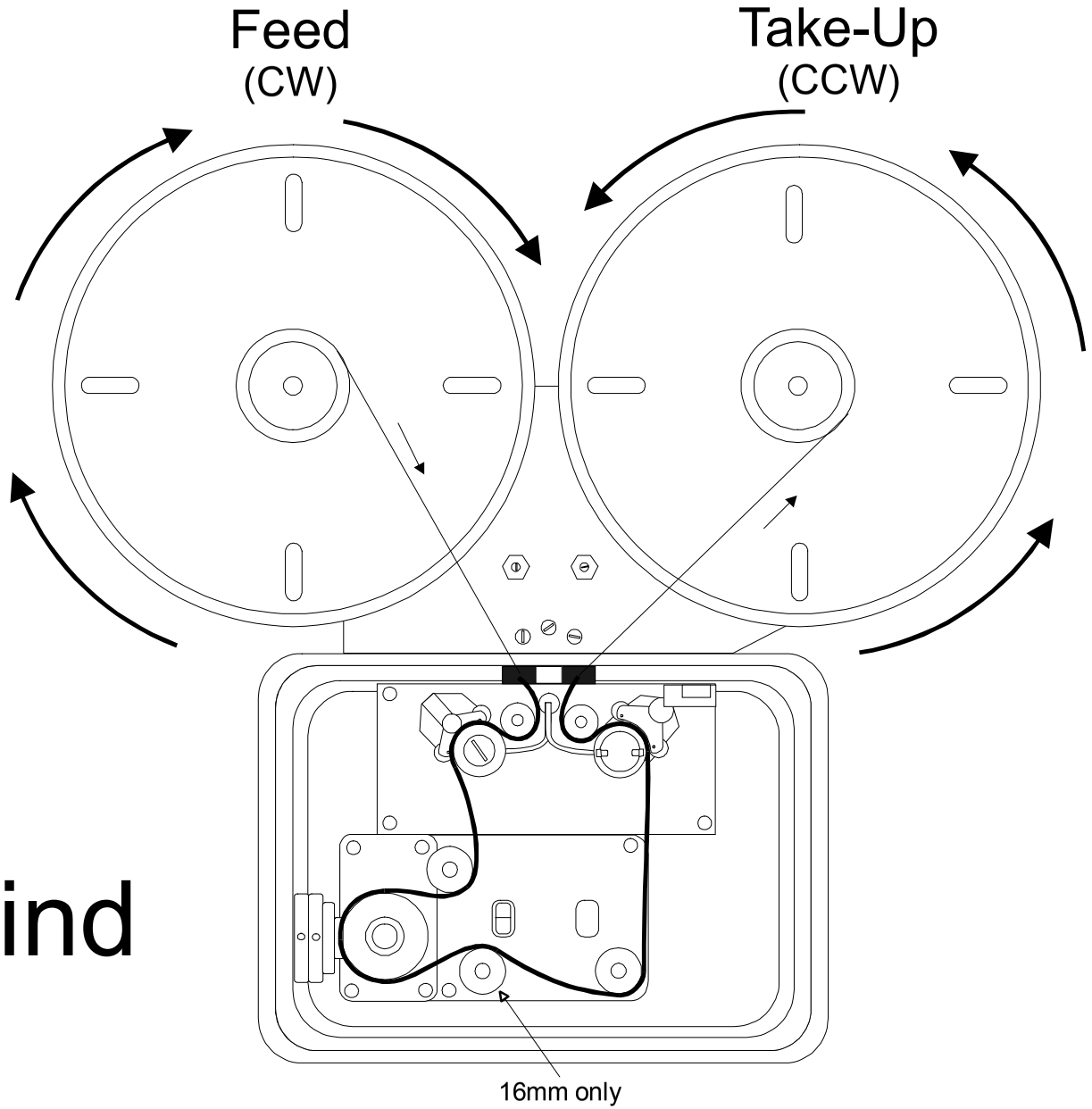
35mm and 16mm A-wind



16mm B-wind