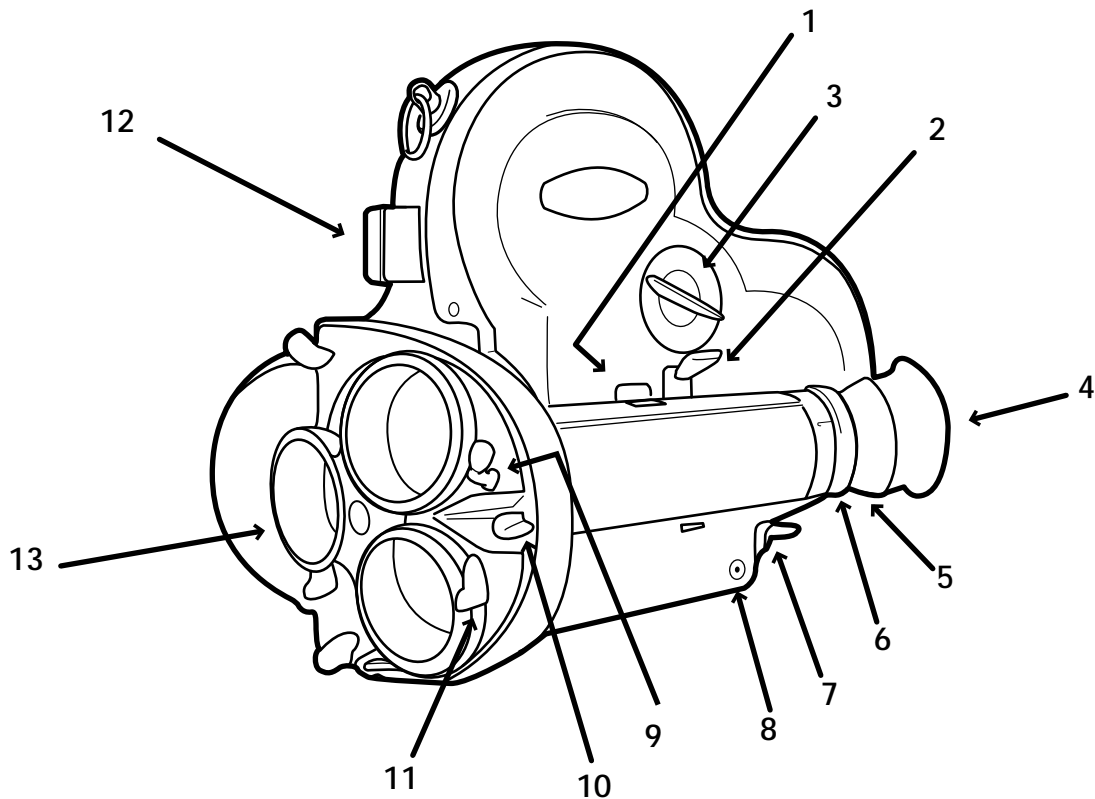


# ARRIFLEX ARRI - 16S



LEFT SIDE VIEW  
(DOOR SIDE)

- |                            |                           |
|----------------------------|---------------------------|
| 1 - LOCK RELEASE (OFF)     | 8 - DOOR GUIDE PIN        |
| 2 - ON-OFF SWITCH          | 9 - LENS RELEASE          |
| 3 - DOOR LOCK              | 10 - TURRET WING          |
| 4 - EYECUP                 | 11 - FOCUS WING (ON LENS) |
| 5 - DIOPTER RING           | 12 - MATTE BOX SHOE       |
| 6 - EYEPiece COUPLING RING | 13 - LENSES (3)           |
| 7 - CABLE LATCH            |                           |

A TECHNICAL MANUAL  
COMPILED & WRITTEN BY  
RENATO TONELLI

# ARRIFLEX ARRI – 16S

## ARRIFLEX-S ARRI-S

A versatile, compact, lightweight, well-designed camera for general use. Extremely well-suited for hand holding. As sturdy and reliable as the FILMO A good camera on which to learn the basics of cinematography. The camera every student wants to use.

**Movement:** Cam-driven, single pull-down claw and single registration pin. Claw engages film one sprocket hole below film gate from front (emulsion) side. Registration enters film from rear (base) side. Registration pin moves film into final position and holds it rock steady during exposure. Perfect registration forward or reverse. Specially designed aperture prevents film “breathing,” providing optimum sharpness. The pressure plate is hinged to allow access directly to the aperture and to the film guides.

**Shutter:** 180 ° mirror reflex shutter rotates at 45 ° angle between lens and film plane. Requires no exposure adjustment. Exposure at 24 fps = 1/48 sec. In closed position it reflects image to finder. In open position it passes image to film.

**Lenses & Focusing:** Reflex, through-the-lens focusing and viewing. Bright image. Focusing of lenses is achieved by grasping “wings” or “butterflies” – which turn focusing ring on lens. Eyepiece has a diopter adjustment; also has provision for prescription lens. To adjust diopter to your eye, rotate narrow scalloped ring on eyepiece clockwise. Rotate large scalloped ring nearest the eyecup until groundglass is sharp or use focus test chart as outlined in *Working Procedures and Responsibilities for the Assistant Camera Operator* section elsewhere in this booklet.

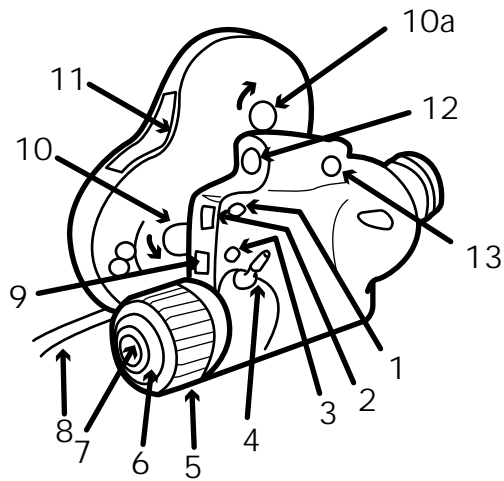
When focus is set, turn the narrow ring counter clockwise to lock diopter in place. As with any reflex system, the f-stop on the lens should be set at its widest opening before focusing. Groundglass shows full aperture and TV safe area. If you are looking through the viewfinder and you cannot see any image, rotate inching knob until mirror-surfaced part of the shutter is back in viewing position. Do not take eye away from viewfinder while filming or light will pass through the viewfinding system to the gate and fog the film.

Some ARRI-S models are equipped with an automatic eyepiece closure device; as you press your eye against it, it opens; as you pull away, it closes. To lock autoclosure device open, pull eyecup from finder and rotate inner knurled lock-nut clockwise. Replace eyecup.

Lenses are mounted on a 24 ° divergent three-lens turret. Lenses are: 16mm, 25mm, and 50mm. Accepts a wide variety of Arri-mount lenses available at rental houses. Lens is placed in filming position by rotating the turret: grasp grip opposite filming lens. Turn until desired lens is in place nearest the contour grip at the right side. Turret “clicks” into place. Lens turret grips are coded so lens in position can be identified by camera operator from rear of camera. Wide angle lens – one dot; normal lens – two dots; telephoto lens – three dots. Lenses should be mounted opposite the data mark to which they correspond.

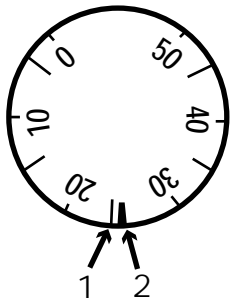
To mount lens on turret: Make sure mirror-surfaced shutter is out of the way. To check this, look through viewfinder and rotate inching knob. When you can no longer see an image, mirror is out of the way. Rotate lens until channel in the mount aligns with the infinity mark on the lens. Grasp lens by the footage ring. Squeeze locking levers at each side of the lens port on the turret and insert lens into the port with the follow – focus “butterflies” up. Slide the channel at the rear of the mount over the guide key inside the lens port. Release the locking levers. Gently check to make sure lens is attached.

# ARRIFLEX ARRI - 16S



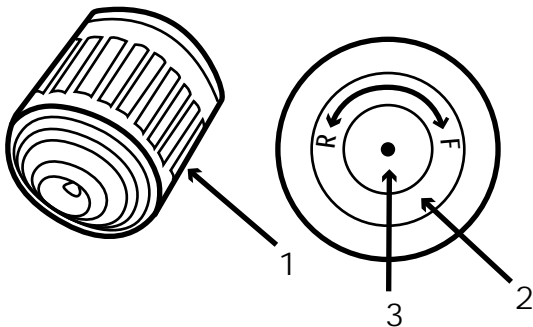
## RIGHT SIDE VIEW

- 1 - FOOTAGE RESET KNOB
- 2 - FOOTAGE COUNTER
- 3 - FRAME RESET KNOB
- 4 - MOTOR LOCKING LEVER
- 5 - MOTOR (VARIABLE SPEED SHOWN)
- 6 - FWD/REV KNOB
- 7 - INCHING KNOB
- 8 - POWER CORD
- 9 - FRAME COUNTER
- 10 - 10A - FILM TIGHTENING KNOBS
- 11 - CAVITY COVER
- 12 - TACHOMETER
- 13 - FILM PLANE MARK

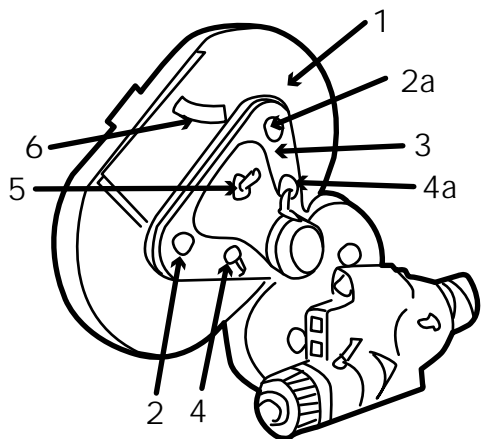


## TACHOMETER

- 1 - RED LINE (24 FPS)
- 2 - 25 FPS



- 1 - MOTOR
- 2 - MOTOR KNOB FOR FORWARD (F) OR REVERSE (R)
- 3 - INCHING KNOB



## ARRI - 16S WITH 400 ft./122m MAGAZINE

- 1 - MAGAZINE
- 2 - 2A - FILM TIGHTENING KNOBS
- 3 - TORQUE MOTOR
- 4 - 4A - TORQUE MOTOR LOCKING LEVERS
- 5 - TORQUE MOTOR FW/REV
- 6 - MAGAZINE FOOTAGE COUNTER

# ARRIFLEX ARRI – 16S

To remove lens: Rotate follow-focus “butterflies” up. Grasp by footage ring. Squeeze locking levers and gently pull lens away. When using less than three lenses, always plug the empty port(s) to avoid a light leak to the aperture.

**Motors:** Motors are interchangeable. Inching knob is at the back of the motor(s). Governor-controlled, constant speed motor does not run in reverse. Variable speed motor can run in either forward or reverse. Change direction (forward/reverse) by rotating large knurled knob at back of motor. Rotate clockwise for forward (FWD) and counter-clockwise for reverse (REV). To adjust variable speed motor, rotate entire ribbed motor shell clockwise for fast, counterclockwise for slow. The motor-speed scribe marks are for reference only. Correct fps speed is obtained by observing the tachometer and rotating the ribbed motor shell for the desired speed.

Speed is continuously variable from 2 fps to 48 fps. To shoot at speeds faster than 24 fps, motor must be “brought up to speed.” Start running at 24 fps and rotate slowly until desired speed is verified by looking at the tachometer. Make sure to calculate correct exposure for the speed you have chosen.

Tachometer shows speed only in FWD (forward) position. To film in any given fps in reverse, first run camera in FWD position. Verify speed on tachometer. Stop. Turn large knurled knob on back of motor to REV (reverse) position. Turn camera on to film in reverse. Footage and frame counters are on right-hand side of camera and must be manually reset.

To mount either motor, rotate motor lock lever counterclockwise. Match cylinder locating pin with keyway (approximately at 7 o'clock position). Insert motor into motor cavity until fully engaged. Rotate locking lever clockwise. To remove motor, loosen locking lever counterclockwise and pull motor straight out.

On/off switch is on door/cover of camera. Push lever down until it locks into place to turn camera on. Depress lock release forward of the lever to turn camera off.

These motors are powered by an 8 volt battery. Other motors for animation/time lapse or for sync may be rented at rental houses. Caution: when camera is running, do not obstruct inching knob rotation. Make sure that nothing comes in contact with it.

**Battery:** Powered by an 8 volt battery pack or belt; will run approximately 1200 ft./366m of film. Recharge for 14 hours (not more). No battery check. Power cable: the male end of the cable (two pins) is inserted into the battery. Pin marked + (positive) is inserted in red socket of battery. Plug other end into rear of camera base (left of motor). A latch above the socket (not all models) engages a rubber catch on the female plug and holds it in place and at the proper polarity. Positive (+) is the left pin, closest to door.

**Magazines:** Camera takes internal 100 ft./30m daylight loading spool. External 400 ft./122m ARRI-S magazine mounts on top of camera and requires a detachable torque motor, which is capable of running in forward and reverse.

# ARRIFLEX ARRI – 16S

**Filters:** Camera accepts a matte box (not available) with filter holder. A 49mm filter may be placed in front of the lens and taped securely all around.

S

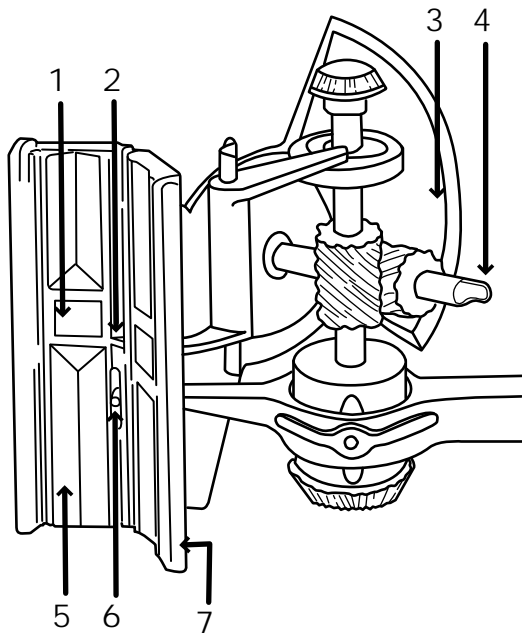
**Other Feature:** Handgrip contour filming and follow-focusing without the need for a body brace. Built-in buckle-trip switch (not all models) turns camera off in case of film jam, or a short lower film loop. To reset, depress pivot-pin button on the sprocket-guide roller assembly. When assembly opens, the buckle-trip is automatically reset. If it fails to reset, push plunger in door below eyepiece. This will override it and it will no longer function. To cut out override, place forefinger on narrow base of the toggle lever and push the base toward rear of camera. (It pays to thread camera carefully and correctly the first time, every time.)

When using a pistol grip accessory fitted with a plunger, the trigger acts as an on/off camera switch, bypassing the on/off switch on the camera door. Insert pistol grip into the 3/8-16 mounting hole in the camera base.

**Loading/Threading:** See diagram. Supply feeds clockwise and take-up is clockwise, emulsion in. Remove camera cover. Place supply spool on supply side of the camera and unreel approximately 18 inches/45cm of leader film from spool (the first 6 ft./1.8m of the film itself will serve as threading and as a light-proof protective leader).

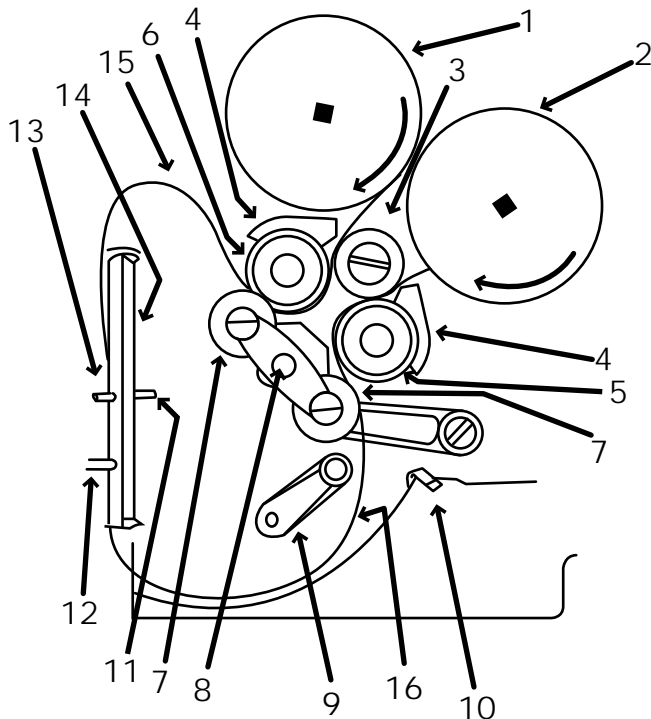
Depress pressure plate catch and swing the hinged pressure plate open. Depress pivot-pin button on sprocket-guide roller assembly (located below and to the left of the sprockets) and move the spring-loaded rollers away from the sprockets. Rotate inching knob (back of motor) clockwise until the registration pin is out, towards back of camera.

# ARRIFLEX ARRI - 16S



## ARRI-16S MOVEMENT

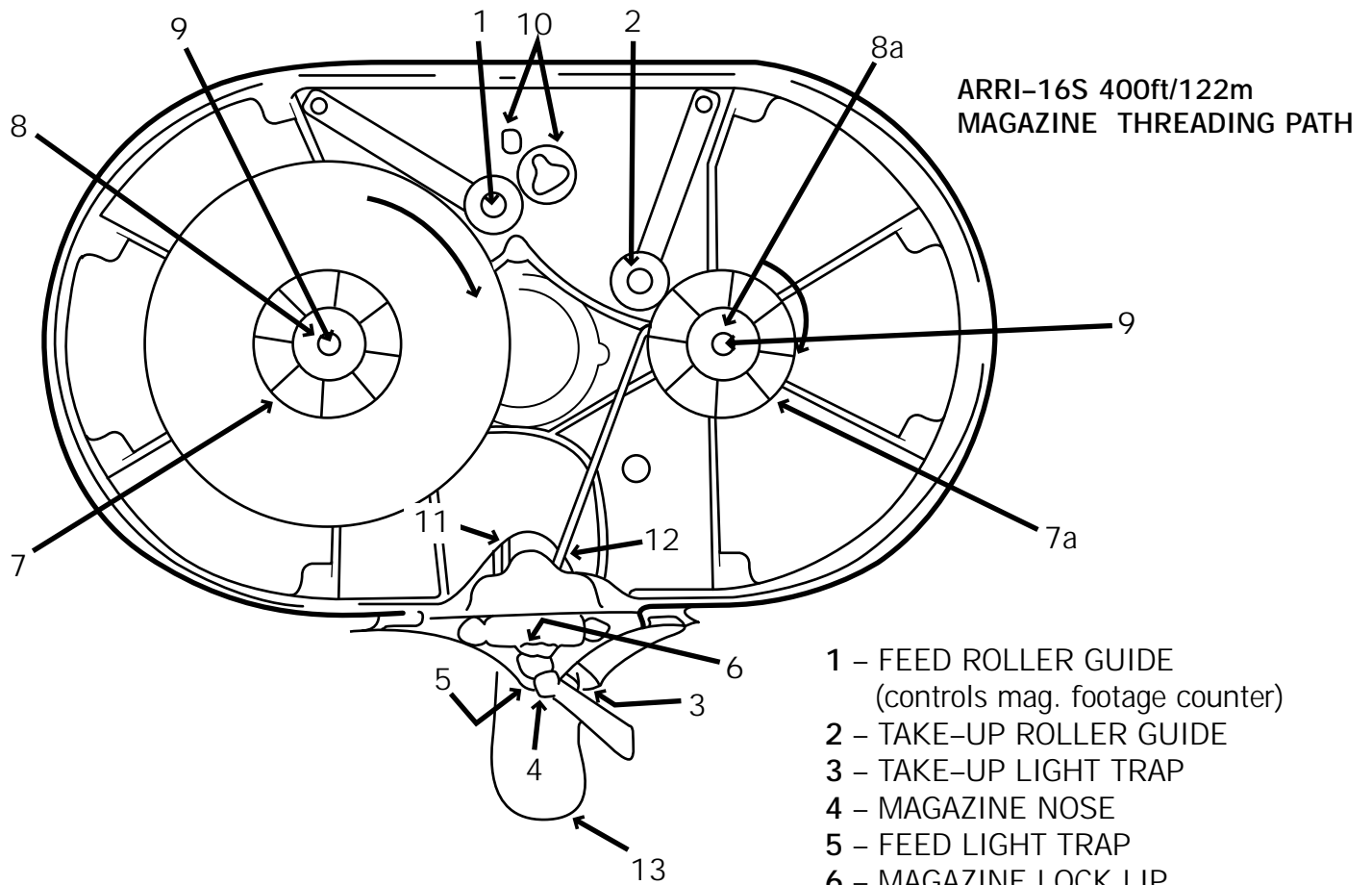
- 1 - APERTURE
- 2 - REGISTRATION PIN
- 3 - MIRRORED SHUTTER
- 4 - SHAFT TO INCHING KNOB
- 5 - APERTURE PLATE
- 6 - PULL-DOWN CLAW
- 7 - PRESSURE PLATE



## INTERNAL LOADING THREADING PATH

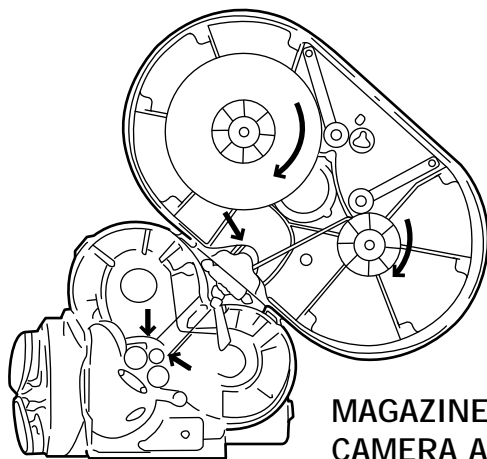
- 1 - SUPPLY-SIDE SPOOL
- 2 - TAKE-UP SPOOL
- 3 - CENTRAL GUIDE ROLLER
- 4 - FILM GUIDES
- 5 - SPROCKET DRIVE (TAKE-UP)
- 6 - SPROCKET DRIVE (FEED/SUPPLY)
- 7 - GUIDE ROLLERS
- 8 - PIVOT PIN (PUSH)
- 9 - BUCKLE TRIP
- 10 - INTERNAL ON/OFF SWITCH (PUSH)
- 11 - PRESSURE PLATE CATCH
- 12 - PULL-DOWN CLAW
- 13 - REGISTRATION PIN
- 14 - PRESSURE PLATE
- 15 - UPPER FILM LOOP
- 16 - LOWER FILM LOOP

# ARRIFLEX ARRI - 16S



ARRI-16S 400ft/122m  
MAGAZINE THREADING PATH

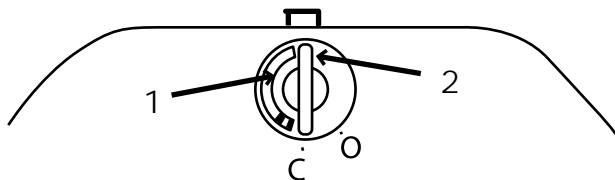
- 1 - FEED ROLLER GUIDE  
(controls mag. footage counter)
- 2 - TAKE-UP ROLLER GUIDE
- 3 - TAKE-UP LIGHT TRAP
- 4 - MAGAZINE NOSE
- 5 - FEED LIGHT TRAP
- 6 - MAGAZINE LOCK LIP
- 7 - FEED CORE
- 7A - TAKE-UP CORE  
(use 2 inch/56mm cores only)
- 8-8A - CORE ADAPTERS
- 9 - CORE ADAPTERS SHAFT  
RELEASES -PUSH-
- 10 - ROLLERS GUIDES LOCK-UP  
CATCHES
- 11 - FEED SLOT W/FELT ROLLERS
- 12 - TAKE-UP SLOT W/FELT ROLLERS
- 13 - FILM LOOP (thread into camera)



MAGAZINE MOUNTED ON  
CAMERA AND THREADED

## MAGAZINE LID OPEN/CLOSE

- 1 - SAFETY SPRING (PRESS AND HOLD  
DOWN TO TURN LOCK BAR TO OPEN LID)
- 2 - LOCK BAR (ROTATE COUNTER-CLOCK-  
WISE TO OPEN)



# ARRIFLEX ARRI – 16S

Insert film to left of central roller, then between upper sprocket–guide roller and sprocket. Engage perforations on sprocket; swing upper sprocket–guide roller toward sprocket to hold film in place. Conform upper film loop to scribe line in camera. Insert film into the gate and engage a perforation on the pull–down claw. Turn inching knob until the registration pin engages a perforation. Close pressure plate.

Rotate inching knob clockwise to make sure pull–down claw and registration pin are engaging the perforations. Conform lower loop to scribe line in camera. Insert film between lower sprocket–guide roller assembly gently toward sprockets. Make certain that both sprocket–drives are engaged with the film by turning inching knob clockwise.

Insert film end in the take–up spool hub slot (never use tape) and place the take–up spool on the take–up side of the camera. Make sure that the spool is not bent or damaged in any way. Take up slack. Depress internal on/off switch momentarily a few times to verify proper loop and proper take–up.

Correct any errors discovered by this test. Replace the camera cover. Tape all around to ensure against light leaks. Cover lens with your hand and run camera approximately 5 ft./1.5m while checking tachometer and making any speed (fps) adjustments on the motor. Reset footage counter to zero. The camera is now ready for filming— are you?

## **400 ft./122M External Magazine:** (See diagram)

Remove lid by depressing safety spring in lid recess. Rotate lock bar counterclockwise from “C” to “O” and lift. Swing footage–counter (supply) roller–guide arm up and lock into catch near top of magazine. Swing take–up roller–guide arm up and lock into catch below the counter arm.

In total darkness, remove film from can and bag. Pull film off roll clockwise. Insert film end through feed side and past the light–trap rollers. To facilitate penetration, fold 4 inches/10 cm of the film end lengthwise. Place roll on core adapter. Film feeds clockwise. Press down gently but firmly until roll is in place— should not be wobbly.

Insert film through take–up side light–trap rollers and into magazine interior. Place core on take–up side of magazine with film slot facing right on core adapter. Press down gently but firmly. Insert film end into core slot (fold film for a tight fit). Never use tape to attach film to core. Wind take–up core clockwise, emulsion in, a few times. Lower take–up roller–guide arm and supply (footage counter) roller–guide arm, making certain that film rides between the flanges of the roller–guides of both arms.

Replace lid. By holding the magazine lid at an angle, insert the lid lugs (at bottom) into mating slots in the magazine. Lower lid to a secure fit. Rotate the lid lock bar clockwise from “O” to “C” until safety spring snaps up. Pull on lid to make sure it is properly locked.

Tape magazine all around to ensure against light leaks. **Note: After each shot, take–up slack by turning knurled wheels film tightening knobs in the direction of the arrows. For internal loads turn knurled wheels on right hand side of camera body. When using the external magazine, turn the knurled wheels on torque motor.**



# ARRIFLEX ARRI – 16S

Place torque motor on right side of magazine and lock into place by turning the motor attachment knobs away from each other. Rotate FWD/REV switch on torque motor counterclockwise to FWD (forward). Rotate knurled knob on camera motor clockwise to FWD.

Remove cavity cover from top of camera. Lift up lock-lip on nose of magazine. Pull loop of film from supply side and insert it into camera cavity. Seat rear male dovetail that is on the magazine nose into the rear female dovetail of camera housing, then lower front male dovetail into camera housing. Press lock-lip down until magazine locks into camera housing. Hand tighten only.

To remove magazine, make sure that camera is unthreaded first; remove lock-lip spring; lift lock-lip up; raise magazine; replace cavity cover on camera. Proceed to thread camera as outlined at beginning of "Loading/Threading" section.

**Unloading:** Avoid direct sunlight. Take the exposed film out and place it in its container. Note: if you exposed to the last available foot of film, unload in total darkness to avoid spoiling your last shot(s). Magazine must be unloaded in total darkness. Before taking magazine off of the camera, make sure there is no film threaded inside camera. After taking film out of the gate, close pressure plate.

**Tripod Mounting:** Has both 1/4–20 and 3/8–16 mounting holes. 3/8–16 mounting hole has an on/off switch. See "Other Features" heading, above.

**Recommended Tripod:** Bogen 3146.

# ARRIFLEX ARRI – 16S

## CAMERA TROUBLESHOOTING

### **Camera Door Will Not Close**

On/off switch on door is set to “on”

Door opening mechanism is in closed position

### **Camera will not run, runs only slowly or intermittently**

Guide rollers not closed (reset)

Battery does not produce full voltage on load (poor connections between individual cells).

Battery fused or circuit breaker open

Battery not fully charged (insufficient time, charger current inadequate, mains voltage wrong)

Battery not delivering full power due to cold

Battery to camera cable has internal fault (flex to check)

Battery self discharged due to excessive heat during storage

Camera buckle and trip switches not set

Camera not switched on (more than one switch)

Camera seized up or very stiff (Try inching by hand)

Poor electric contact somewhere (use test meter to test voltage at motor)

### **Film cannot be threaded through camera gate**

Camera not inched until registration pin is withdrawn

### **Film does not take up or jams**

Bent spool

Film end has become detached from take-up core or spool

Film in either side of mag became loose during transportation

Incorrect loop sizes, faulty film threading

Mag not seated on camera correctly

Mag with electric take-up motor has faulty electric connection

Reversible mag direction not set correctly

Motor not fitted or set incorrectly

### **Film fogged**

Camera door or mag lid not completely closed or taped

Eyepiece not covered or eye not close enough to eyepiece

Faulty filmstock (extremely unlikely)

Faulty handling, processing or printing at laboratory

Film loaded in less than absolutely dark conditions

### **Film loses loop**

Damaged sprocket

Film incorrectly threaded

Film not over sprocket teeth correctly

Loops incorrect size

Sprocket guides not engaged

# ARRIFLEX ARRI – 16S

## **Film scratched**

- Abrasive or scratched gate and pressure plates
- Careless handling at laboratory
- Careless rewinding
- Dirt in the mag or camera wherever the film may touch
- Faulty camera loading
- Faulty filmstock (extremely unlikely)
- Loops too large or too small
- Pressure plate rollers jammed

## **Image unsteadiness**

- Bad print
- Bent camera pull-down claw caused by starting camera at too high a speed
- Camera running faster than designed to do so by manufacturer
- Emulsion build up in gate or chip of film stuck in film path
- Loop size incorrect, faulty camera or mag threading
- Unsteady projector

## **No image**

- Film not threaded through gate
- Lens iris (f/stop ring) completely closed