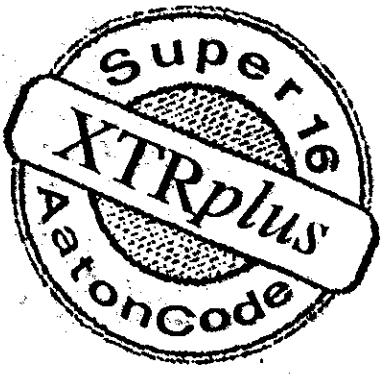
user's guide



AATON

The XTRplus User Guide
Peter Abel

Abel Cine Tech Inc.
66 Willow Avenue
Staten Island, NY 10305
(718)273-8108
(718)273-8137 fax

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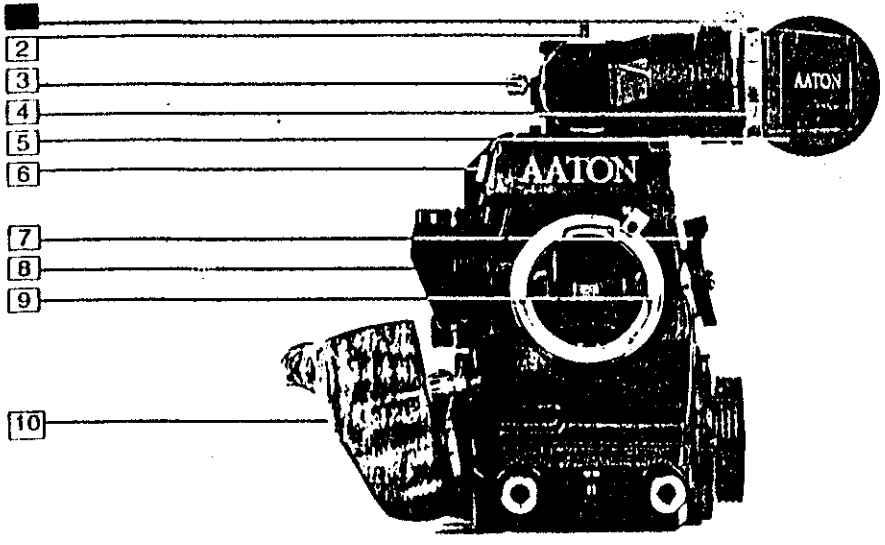
I

II

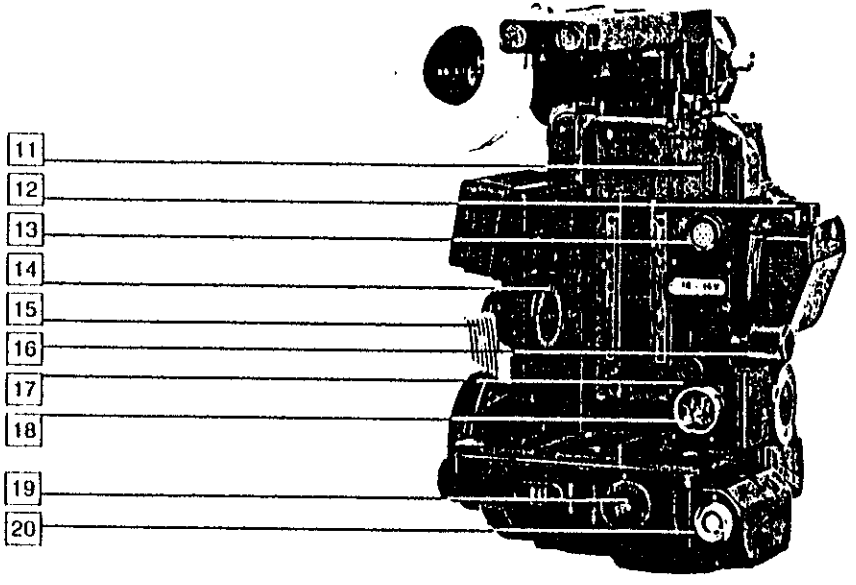
SYSTEM FEATURES AND CONTROLS

THE CAMERA BODY



Front

1 - Friction Adjusting Ring	adjusts the tension of the eyepiece swivel.
2 - Tape Measure Stud	holds tape measure at film plane.
3 - Lateral Lock Knob	locks the lateral position of the viewfinder.
4 - Eyepiece Lock Ring	fastens interchangeable standard and extension finders.
5 - Eyepiece Shutter	blocks light when operator's eye is away from the finder.
6 - Beamsplitter Access Cap	covers the port which accesses the beamsplitter adjustment screw.
7 - Body Run/Test Switch	provides camera run and half frame inching.
8 - CCD Cover	accesses the CCD head.
9 - Aaton Lens Port	standard mounting system for XTR*plus*.
10 - Wooden Handgrip	allows for comfortable handheld operation.



Rear

11 - Amph9	accessory input provides +/-, Hz, and camera run functions.
12 - Manual Iris Lever	controls CCD iris operation.
13 - Lemo14	connects CCD head to the CCD control unit.
14 - Magnetic Drive	provides magnetic magazine coupling.
15 - Mag Release Lever	releases the magazine for removal.
16 - Battery Lock Screw	fastens the on-board battery to the camera body.
17 - Camera Fuse	protects the body from excessive current and reverse polarity.
18 - XLR4	main power input for on-board battery or other 12V power source.
19 - Speed Dial	adjusts the crystal sync speeds of the body.
20 - Lemo6	accessory input provides +/- and camera run functions.

LCD Control Panel - Quick Reference

Desired Function	Body Configuration	What To Do
Show AatonCode	Time initialized, mag on or off camera	Default mode; automatically displayed when camera is not running
Count remaining footage	Mag on camera	Set on/off switch to Run or Test
Count in feet or meters	Mag on camera	Press all three buttons simultaneously
Reset footage - full load	Mag on camera	Press buttons 1 & 3 simultaneously
Reset footage - short end	Mag on camera	Press buttons 1 & 2 simultaneously
Show ASA knob setting	Mag off camera	Set on/off switch to Test position
Read battery voltage	Mag on or off camera	Press button 3
Read camera speed	Mag on or off camera	Set on/off switch to Run position, Press button 2
Show AatonCode software	Mag on or off camera	Set on/off switch to Test position, Press button 2

LED Indicators - Quick Reference

Status	Indicator	Where to Find
Camera Test	Blinking red diode, (long on, short off)	Left and right outside of body and in the viewfinder
Camera Run	Solid yellow diode only; Lightmeter flashes once per foot/meter	left and right outside of body; In the viewfinder
Low battery	Flashing red diode, (same duration on, off)	Left and right outside of body and in the viewfinder
Pre end-of-film (10 feet remaining and less)	Faster flashing lightmeter display, (2-3 times / second)	In the viewfinder, (if lightmeter is turned on)
End-of-film	Alternately flashing display	In the viewfinder, (with lightmeter on or off)

The Camera Body

The Pechan Prism

In order to provide a fully orientable upright image, the Aaton viewfinder incorporates a pechan prism assembly, which is actually comprised of two triangular prisms sandwiched together. On some viewfinders, depending on the construction of this prism, rotation of the eyepiece a full 360° will cause the image in the finder to shift slightly left/right.

After attaching an extension finder, if the image in the finder appears to have shifted slightly, rotate the finder 360° and choose the preferred centered image.

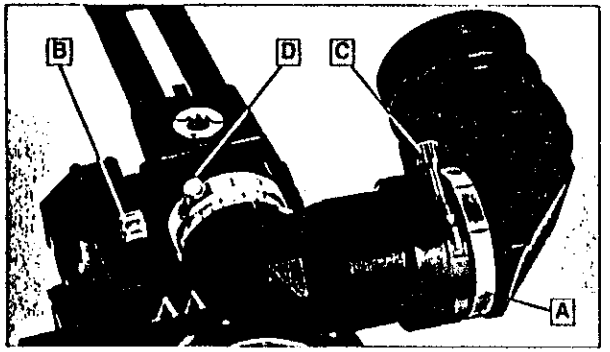
2.2 Attaching the Extension Finder

In order to use an extension finder on the XTR*plus*, the standard eyepiece must first be removed. To remove the eyepiece, locate the eyepiece lock ring, marked A in the photo below. Rotate counter-clockwise until the ring reaches its stop and gently pull off the eyepiece. To install the extension finder, locate the protruding guide pin on the seat of the viewfinder and align the pin with the hole in the flange of the finder. Mate the flange to the seat of the viewfinder and tighten the lock ring until it is set firmly in place. During this procedure, you will notice that the extension finder needs to face 180° away from the operator's eye to be installed onto the viewfinder. Because of its optical construction, this is completely normal. After installation, rotate the finder 180° to regular viewing position.

2.3 Viewfinder Tension Adjustments

The large knurled knob at the base of the left/right lateral movement point (B) locks the lateral positioning.

The friction adjusting ring, located behind the eyepiece lock ring, can be used to adjust the tension of the eyepiece swivel, depending on the operator's preference and the viewfinder being used. When using the standard eyepiece, tension should be relatively light to allow for movement with a moderate amount of pressure. When using the standard extension finder, tension should be increased to hold the additional weight of this finder in place.



To adjust the tension of the swivel, loosen the steel knurled screw (C) located on the friction adjusting ring. Hold the eyepiece in place, rotate the adjusting ring slightly and retighten the screw; 1/8 of a turn, at first, will have an effect. To increase tension of the eyepiece swivel, rotate the adjusting ring clockwise; to decrease the tension, rotate the adjusting ring counter-clockwise.

2.4 Adjusting the Diopter

Before shooting, the diopter setting of the viewfinder should be adjusted to the operator's eye. To set the diopter, locate the diopter set ring (D) in front of the carrying handle at the top of the viewfinder, and loosen the small knurled knob. Look through the viewfinder, rotate the diopter set ring until the edge of the cross-hair is at its sharpest point and retighten the knob. It is recommended that, for easiest setting, this adjustment be performed with the port cover off and no lens on the camera.

Notice that the diopter set ring is engraved with numbers and dots - use this reference to quickly recall your particular setting when more than one person will be looking through the viewfinder.

The range of the diopter setting is + or - 3. If the range does not reach your particular diopter setting, the viewfinder optics can quickly be adjusted by a qualified technician and the diopter range reset to meet your needs.

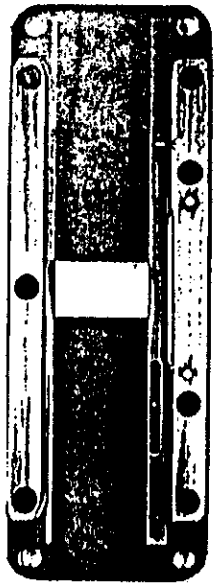
If a corrective lens is required, one can be fitted in the recessed area of the eyecup ring of both the standard eyepiece and the extension finder. This area of the eyecup ring can also be used to hold an anti-mist glass.

2.5 The Eyepiece Shutter

In order to avoid unwanted light seepage through the viewfinder, the eyepiece shutter must be closed any time the camera is running film and the operator's eye is away from the viewfinder.

To close the eyepiece shutter on the standard bellows eyepiece, grasp the rubber ring at the base of the eyecup and rotate 1/8 of a turn counterclockwise. On the extension finder and the old style

Film Gate and Pulldown Claw 4



4.1 Co-planar Movement

All Aaton cameras, including the XTR*plus*, incorporate a patented means of advancing the film called a co-planar claw movement. By utilizing this technique, Aaton is able to achieve an ultra-precise pulldown with a minimal number of moving parts. The co-planar concept is the key to the camera's low-noise operation.

The film gate also features a side pressure bar which is recessed into the claw-side rail at the point of image exposure to assure maximum lateral stability.

This unique, straight forward mechanism design results in horizontal and lateral film registration that is superior to all other 16mm camera movements with an accuracy of 1/2000 of the image dimensions.

4.2 The Hair-Free Gate

In most 16mm camera designs, there is a certain amount of film dust (also referred to as fluff or hair) that is generated as film rolls through the magazine and enters the camera gate. Because the gate and pulldown are the areas where the film must be held most rigidly, these are also the areas where most of the accumulating film dust tends to be deposited. The result could be a visible hair in the picture area and an unuseable shot.

Aaton has taken steps in the design of their magazines and gate assembly to ensure hair and dust-free images. The Aaton magazine features a twistless film path with little sprocket contact, which minimizes the amount of film dust that builds up before entry into the aperture area. Whatever dust does accumulate is filtered through the gate area quickly and efficiently. This is attributed to the design of the gate itself, which features recessed channels on the far edges of the film path and which does not require the use of a polished frame around the aperture opening to keep images in focus.

4.3 Cleaning the Gate

In order to avoid film dust buildup in the recessed channels of the gate, the gate should be inspected during magazine changes and cleaned every three to four mags if the shooting schedule permits. Refer to the Cleaning chapter for more detailed information.

Magazine 5

The Aaton Magazine holds 400 ft (122m) of standard 16mm or Super16 film. Shooting at 24 fps, a 400 ft roll will run for 10.5 minutes; shooting 30 fps, the same roll will run for approximately 9 minutes. The coaxial design of the magazine allows for complete self-contained threading, quick mag changes and a minimal amount of loading to be performed in the changing bag. Loading the magazine is a simple operation that, with practice can be performed in a little over a minute. Refer to the Magazine chapter of this manual for complete details on loading and caring for magazines.

5.1 Installing the Magazine

The instant mag design allows for instantaneous switching between mags on the set. To install the magazine on the camera, situate yourself towards the rear motor side of the camera body. If the aperture cover plate is on, remove it. Place your left hand around the front of the camera just underneath the lens area. Grasp the magazine firmly with your right hand below the midway point of its rear. While holding the camera body with your left hand, guide the magazine along the base of the camera into the aperture area. Make sure that the top edge of the throat of the magazine is parallel to the carrying handle of the camera as you guide the mag in place. Push firmly and evenly until you feel and hear the magazine snap into place.

Get into the habit of carrying a standard XLR4 powercable in your package in case an alternative power source is needed.

Regarding AC power supplies, it is recommended that the unit you use be at least 4 amps and 25 watts. Before connecting any non-standard source, always make sure that the pin configuration of the unit is correct. See the **Technical Specifications** chapter of this manual for details for proper wiring.

Motor 7

The tri-phase salarium motor design of the XTRplus provides low power consumption and improved stability at high speeds. The body is capable of speeds between 3 and 75 fps with a standard 12V battery.

7.1 Camera Speeds

The XTR*plus* provides dial-in crystal speeds of 6, 12, 20, 24, 25, 29.97, 30, 48, 50, 60, 75. With the use of a external speed control, any speed between 3 and 75 in .001 frame increments can be achieved.

The speed dial is located at the rear of the camera base towards the battery side. As a precaution, if the speed is adjusted while the camera is running, the change will not take place until the next camera start.

7.2 Using an External Speed Control

When using an external speed control, the camera's speed dial must be set to ext. If a speed control is connected and the speed dial is not set to ext, the camera will run at the speed indicated on the dial.

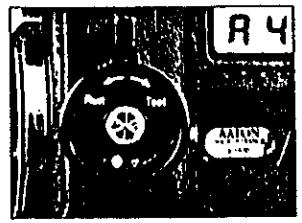
Keep in mind that, with certain manufacturer's speed controls, it may be possible to run the camera at speeds higher than the 75 fps factory limitation. Overcranking in such a way, however, will increase mechanism wear, increase noise and compromise image registration. Aaton urges to avoid such usage at all cost and will not be responsible for the resulting damage that may occur. This top speed cap of 75 fps has been designated by Aaton because it is the level at which the camera can run safely without any adverse effect on its mechanics.

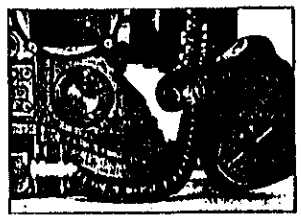
7.3 Electronic Inching

The inching function of the motor is accomplished electronically and can be accessed in a number of ways.

From the Body

The large run/test switch on the motor side of the body, not only runs the camera, but provides half frame inching for gate inspection, lightmeter functions and loop situating when installing a fresh mag.



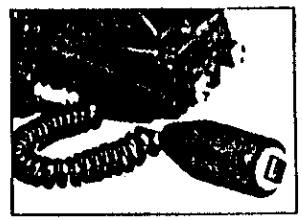


From the Handgrip

The wooden handgrip switch, by way of the Lemo2 connector, provides camera run and full frame inching for single frame operation and loop situating.

From a Remote Cable

The Lemo2 connector, as well as the Lemo6 and Amph9 accessory connectors, provide the capability of using a remote on/off with either a half-frame or full-frame inching function.



9.4 Testing and Adjusting the Meter

If you are operating the lightmeter for test purposes, don't forget to have film in the gate before taking a reading.

The following is the procedure for checking and adjusting the sensitivity reading of the lightmeter:

1 - Evenly light a standard 18% grey card.

2 - With a loaded magazine and lens on the camera, frame the chart so that it completely fills the Super16 frame.

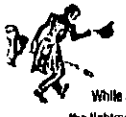
3 - With a properly calibrated handheld lightmeter, take a reading of the grey surface and set the T stop of the lens accordingly.

4 - Switch the camera to run or test position and check the position of the darkened diode. If the center green diode is darkened, the camera's lightmeter is set correctly. If the darkened diode is to the left or right, it is possible to adjust its reading.

5 - To access the lightmeter potentiometer, remove the complete viewfinder by means of the four screws which mount it to the front housing. Locate the hole between the two viewfinder screwholes on the top motor side of the front housing. The white potentiometer will be visible within this hole.

6 - With a small screwdriver, adjust the potentiometer slightly; 1/8 of a turn will have an effect. Rotating clockwise will correct an overexposure and move the darkened diode to the left; rotating counterclockwise will correct an underexposure.

7 - In order to check your adjustment, replace the viewfinder, tighten the four screws and repeat the procedure from step 4. When the reading through the camera matches your handheld meter, the adjustment is complete.



Adjustment Tips

While adjusting the sensitivity of the lightmeter, you may wish to use your direct view of the display through the body's top cavity for reference. If so, there are a few points to remember:

- Because the image is inverted without the viewfinder in place, your adjustments will move in the opposite direction than seen through the finder.
- Since the cavity is open, light will enter through this opening, making any reading inaccurate by 1/3 to 2/3 of a stop. Therefore, only use the direct view of the display to reference the number of diodes adjusted. Always check your final adjustment with the viewfinder in place.

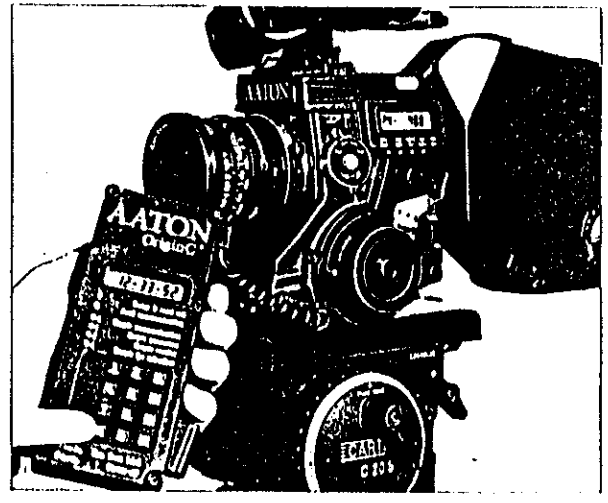
9.5 Turning the Lightmeter Off

If the lightmeter is not being used, it may be turned off. The on/off toggle switch is located on the operators side to the left of the motor. Keep in mind, the red diode indicator and end-of-film warnings will function whether the display is on or off.

AatonCode 10

As a standard feature, the XTR*plus* is equipped with the capability of recording AatonCode in-camera time. Timecode information is exposed onto the film by means of seven micro-diodes, which are relayed, by means of fiber optics, into the gate above the claw to the right of the aperture opening. These micro-diodes flash rapidly to form the code as the film rolls through the gate between exposures.

Because the Aaton timecode system is completely self-contained in the camera body, any XTR-compatible magazine (DX style) can be used on cameras recording AatonCode.



LED Indicators 12

The XTRplus utilizes LED indicators in three locations to convey information: in the viewfinder and on both left and right outsides of the camera body.

12.1 Camera Test Indicator

A blinking red diode (long on, short off) is activated in all three locations when the camera is in test position. On the outside of the body, this will be accompanied by a solid yellow diode.

12.2 Camera Run Indicator

A solid yellow diode on the sides of the camera, with the absence of a red diode indicates that the camera is running and receiving an acceptable voltage (10-14V).

12.3 Low Battery Indicator

If the yellow diode is accompanied by an evenly flashing red diode (same duration on and off), this indicates that the camera is receiving a voltage of 10V or below and that sync will soon be lost (within 5 minutes of camera run time) The flashing red diode alone will also be activated in the viewfinder.

When the input voltage reaches a level too low to run the camera at crystal speed, the body will automatically shut off.

12.4 End-of Film Warning Sequence

The lightmeter display features pre-end-of-film and end-of-film warnings for the operator.

Under normal operation, the lightmeter display will flash once for every foot or meter that is counted down. When the footage counter on the LCD display counts down to 10 feet remaining, the display will flash more rapidly, at a frequency of about 2-3 times per second. Keep in mind, the pre-end-of-film warning will only operate if the lightmeter display is turned on.

When the counter reaches zero, the left and right sides of the display will alternately flash, indicating the end of a roll. The end-of-film warning will function whether the lightmeter display is on or off.

Insuring an Accurate End-of-Film Warning

The lightmeter display uses the countdown of the LCD display's remaining footage to activate the pre-end-of-film and end-of-film warnings. For these warnings to be accurate and useful, it is essential that the digital footage counter be properly set when a full roll, as well as a short end, is loaded.

Connectors 13

The XTRplus uses six main connectors for power and accessory input. Following is a detailed list of the location and main functions of each.

13.1 XLR4 - Power In

The XLR4 connector, located on the bottom of the PBX panel, is the main power input. It is designed to accept a standard on-board battery or an XLR4 powercable to another power source such as a battery belt, block or AC power supply.

13.2 Amph9 - Accessory Input

The Amph9 connector, located at the top of the PBX panel, is one of two main accessory connections on the XTR*plus* and provides +/-, Hz, and camera on/off. It is designed to accept a crystal speed control as its main input but will power any accessory (such as power zoom) and provide remote on/off control as well.

In the instances where the video assist VR42 or VR46 is used, the CCD control unit is plugged directly into Amph9 and a duplicate Amph9 connector is provided on the side of the control unit near the CCD on/off switch.

13.3 Lemo14 - CCD Assist

The Lemo14 connector, located directly underneath the Amph9 connector on the PBX panel, mates the CCD head assembly to the CCD control unit. When the CCD control unit is fastened to the body, it connects to the Lemo14 and the Amph9 (described above).

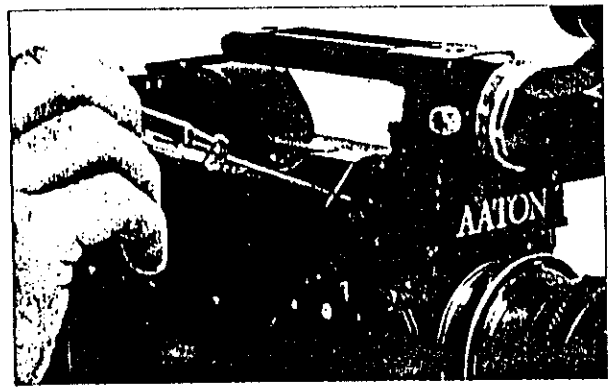
Keep in mind that this connector can only be used for CCD assist; if the CCD head is not installed in a particular XTR*plus* body, the Lemo14 will not be present and a black plug or blank plate will seal the connector port.

13.4 Lemo6 - Accessory Input

The Lemo6 connector, located on the battery side at the rear of the base, is the second of two main accessory connections on the

14.3 Positioning the Beamsplitter

The beamsplitter adjustment screw is located underneath a small, capped port on the battery side of the camera. To access the beamsplitter, unscrew and remove this silver cap. A 1.3mm allen head adjustment screw will be visible through the opening. With an allen wrench, gently rotate the adjustment screw approximately 30 turns in the desired direction to position or retract the beamsplitter.



After 30 or so turns, the adjusting screw will reach its stop and resistance will be felt. At this point, stop and rotate the adjusting screw one turn in the opposite direction to complete the adjustment. By backing the beamsplitter off its stop, fine centering of the CCD target is maintained and the beamsplitter itself is less susceptive to residual shocks caused by a drop or sudden jolt.

Positioning the Beamsplitter for video use - the adjusting screw should be rotated **counter-clockwise** to move the glass in place.

Retracting the Beamsplitter for non-video use - the adjusting screw should be rotated **clockwise** to move the glass out of viewing area.

No Image? Check the Beamsplitter First.

A battery is connected, the CCDs power is on, the lens cap is off, but still no image on the video assist monitor...? Before doing anything drastic, double check that the beamsplitter is in place. It is the one simple step which is most often overlooked.

14.4 The Beamsplitter Axis Adjustment

The beamsplitter axis adjustment is used to recenter the CCD assist image when switching between 16 and Super16 formats. If the CCD image on your monitor appears off to one side, the angle of the beamsplitter must be adjusted.

The beamsplitter axis adjustment is located to the above/right of the aperture and consists of an allen screw within a slot. A red dot to the upper left of the slot indicates the position of the screw for Super16.

Loosen the allen screw one turn; while looking at the monitor move the screw within the slot in the appropriate direction until the image of the screen is centered. Afterwards, if the image is not sharp, follow the directions under **14.7 Installing the CCD Head** to adjust focus.

14.5 The Manual Iris

The VR42 and VR46 CCD assists feature an automatic gain. In certain situations, however, further light control may be desired (such as high contrast or strong back-light circumstances). In these instances, it is recommended to employ the manual iris feature of the XTR*plus*, which is located on the CCD head cover on the battery side of the camera.

Under normal operation, this mechanical iris should be wide open; check that the iris indicator on the CCD cover is pointing to the large circle, indicating an open iris. The VR42 utilizes a black lever as an iris indicator; the VR46 incorporates a silver dial with a black dot. When further light control is necessary, look at a video monitor and move the iris indicator towards the small circle to the desired degree.

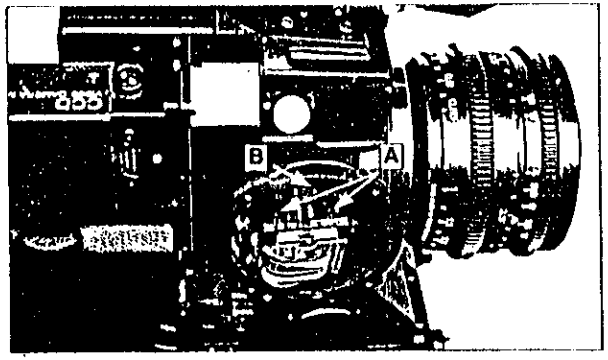
14.6 Battery Life with CCD Assist

The VR42 assist draws 180-200ma when powered. This translates into approximately 8 to 9 hours of operation (without the XTR*plus* running) from one 12V 1.8 ah on-board battery.

Although battery life will vary greatly depending on the amount of film run and the number of accessories powered from one

case, the beamplitter may be retracted. Remove the beamsplitter access cap on the battery side of the camera and position the beamsplitter by rotating the adjustment screw approximately 30 turns counter-clockwise until it reaches its stop. Back off the stop one turn clockwise.

8 - Locate two allen head screws on the CCD head (A) identified by a red dot. Loosen the screws 1/2 a turn. While looking at the monitor, gently move the CCD head until the viewing screen image is in focus. Notice that this adjustment also affects image rotation. When sharp and even focus is achieved and the image is square to the monitor, tighten the two screws.



9 - If the CCD image is centered in the monitor, your adjustment is complete. However, if the image is off to one side, the beamsplitter axis adjustment needs to be reset. Follow the directions under **14.4 The Beamsplitter Axis Adjustment** to recenter the image. Afterwards, loosen the two screws on the CCD head and refocus the optics.

10 - Locate the iris rod on the CCD head (B) and move it by hand to an upright position. Replace the CCD cover on the body; take care to locate the iris control fork and position it around the iris lever. Tighten the four screws to secure the cover in place. Operate the manual iris lever and check that the CCD iris itself is functioning by looking at the monitor. If the brightness of the image does not change, the iris rod may not be engaged in the control fork. If this is the case, remove the CCD cover and repeat the procedure.

Correcting a Dark or Grainy CCD Image

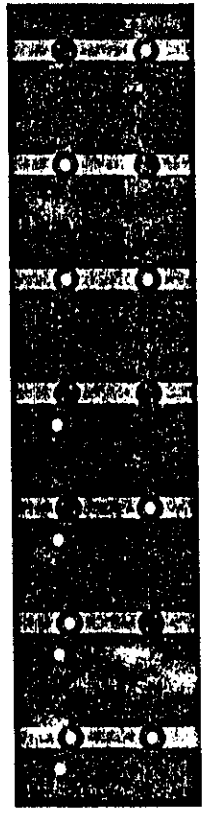
If your CCD image appears darker or grainier than expected, it may be that the travel range of the iris lever is such that it does not open the manual iris completely. If the unit is set properly, the iris lever and fork, when moved right, should be able to move the internal iris rod to the left until it rests against the left wall of the cutout. If this is not the case, the relay lens, which houses the iris, must be rotated clockwise in relation to the CCD head.

To do this, first remove the control unit and PBX cover plate. Next, loosen the allen screw described in step 4, rotate the entire CCD head and relay assembly slightly clockwise and resecure. Follow steps 5 through 10 to readjust the focus and rotation of the image.

Mag Identification System 4

4.1 Mag ID

Each DX magazine bears its own identification (ID) determined by the combination of magnets in receivers located above the drive wheel on the throat of the mag. This identification is used by the camera to recall the remaining footage of a mag removed from the body unfinished. The XTR*plus* can differentiate three magazines (A,B,C) via electronic sensors located within the LCD display and recall the memorized footage for each. By comparison, the more sophisticated display of the XTR*prod* can identify seven magazines (A through G)



The chart to the right represents the seven IDs which can be read by the XTR*plus* and XTR*prod* cameras, with the corresponding magnet in receiver combination for each.

ID of Mags on XTRplus vs XTRprod

As mentioned, the XTRprod can distinguish seven magazines because its sensors can read all three receivers. The XTRplus, however, can only distinguish three magazines, as its sensors will only detect the two upper receivers. Be aware of this fact when renting additional magazines. For example a mag which is read as a G on an XTRprod will be read as a C on your XTRplus camera; the lower receiver will not be detected. Conversely, always leave the lower receivers of your A, B, C mags empty (even though your camera will not detect this position) so that they remain A, B, C mags if used on an XTRprod.

4.2 Changing the ID of a Magazine

The Mag ID of a particular magazine can be easily changed by the user. Determine the magnetic receiver(s) that need to be changed according to the chart above. Locate the small silver spanner tool located on the coaxial roller in the feed side of the mag. Using this tool, loosen and remove these receiver(s). A spare receiver is located at the base of the coaxial roller. Install the appropriate receivers as necessary. Remember to change the letter decal on the outside of the feed side door to match the new ID. For spare decals, contact your Aaton representative.

Loading 5

The straightforward design of the DX magazine allows for quick, easy loading and an absolute minimum amount of threading in the dark. The film does not need to be cut in preparation for loading.

Care for your Changing Bag

A clean and light-tight changing bag is the only thing separating your precious footage from a veritable washout. Before using your changing bag each day, turn it inside out and shake it clean of dirt and debris. It is also a good practice to periodically inspect its edges for holes and tears. Hold it up to a strong light to check for any pin hole leaks.

5.1 Feed Side - In the Changing Bag

- Place the film can and the magazine, feed side up, in the changing bag and zip closed.

- Disable the mechanical footage counter, located on the feed door, by rotating counter clockwise until it locks in its recessed position.

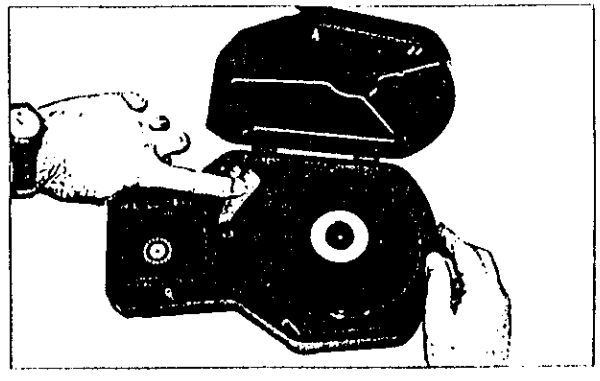
- Unfasten the feed door lock by turning downward and open the feed door.

- Remove the film from its can and bag.

- On the feed core holder, squeeze the core lock mechanism on either side with thumb and forefinger to release core lock.

- Place the film on the feed spindle with its wind clockwise and press the center of the core lock to lock the core in place.

- Thread 4" of film around the outside of the lower guide roller and through large coaxial roller emulsion out. Make sure that the length of film feeds completely through to the take-up side.



5.4 Removing the Magazine

To remove the magazine, situate yourself as before, towards the rear motor side of the camera. Grasp the magazine anywhere which is comfortable at its rear. Place your hand above the motor of the camera and push the mag release lever towards the front of the body with your thumb. Pull the magazine straight off the camera with your right hand.

IV The Aaton System

Handgrip 2

The XTRplus body includes a wooden handgrip, short 15mm rods, rod coupler and Lemo2 cable as standard. The handgrip, which is designed to be used for comfortable hand held operation, can also be used to provide on/off control on the battery side of the camera while on the tripod.

2.1 Mounting the Handgrip

Screw in one 15mm short rod into each of the two recepticles on the front housing of the camera below the lens port. Slide the coupler over the two rods to the desired location and fasten its center wing nut to secure the rods in position. Attach the handgrip to the coupler by mating the star plate on the coupler to that on the handgrip, adjusting to the desired position and fastening the T screw of the handgrip. Connect the Lemo2 cable between the handgrip and camera body to add on/off capability to the handgrip. The Lemo2 connector is located on the battery side of the camera at the front of the accessory box.

2.2 Handgrip On/Off Functions

Both camera run and test functions are available from the handgrip. While hand-holding the camera, pressing the rocker switch to the right provides camera run, pressing the switch to the left provides test. Unlike the body switch, the camera test position of the handgrip is a momentary switch. Pressing and holding the switch opens the shutter and advances the mechanism 1/2 frame. Pressing and immediately releasing this switch advances the mechanism one full frame at a 1/4 sec exposure time. This function allows the use of the handgrip as a simple intervalometer.

2.3 Handgrip Adjustments

The handgrip rotation should be adjusted for maximum handheld operating comfort. Loosen the T screw and rotate the handgrip at the star plate until a more comfortable position is found.

If a more extreme repositioning is required, whether it be for reasons of comfort or clearance in certain studio rig configurations, this can be achieved with coupler extenders, spacers and intermediate arms which utilize the star plate system for adjustment. Ask your agent for a configuration that meets your needs.

Tripod Use 3

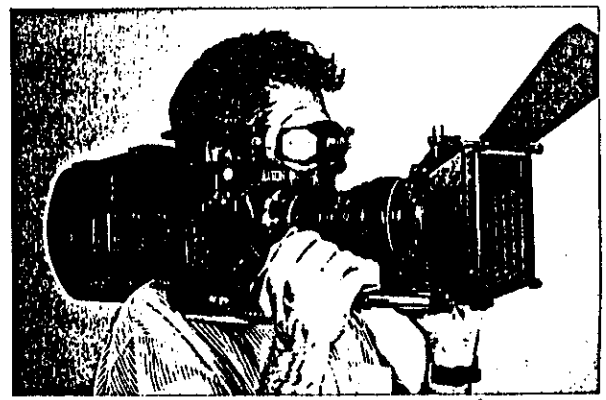
In order to use the XTR*plus* on a standard tripod, the tripod's quick release plate must be fastened to the underside of the camera body with its standard 3/8-16 screw. Make sure to use only a quick release plate screw provided by the manufacturer; non-standard screws longer than 8mm (1/3") can fracture the base casting and damage the camera's electronics.

Shoulder Operation 4

One of the most attractive features of the Aaton system has always been its comfort and ease of use in handheld situations.

The XTR line does not require the use of shoulder braces or additional padding for handheld operation. The contour of the camera and magazine is designed to fit snugly around the operator's shoulder. The wooden handgrip is attached to the front rod coupler at a slight angle to bring the operator's elbow into his side and increase stability.

The system can be completely built off the 15mm front rods without the use of a bridgeplate to allow for quick changing from shoulder to tripod operating modes.



powercable so that the on-board battery could be kept in a pocket close to the warmth of your body.

When filming outdoors, use a standard or heated barney to protect the camera body from direct contact with the wind and cold. To avoid condensation inside the mechanism, electronics and lens elements, do not take the equipment indoors or expose it to sudden temperature changes. If and when the equipment must be moved inside, do so by first placing it in a sealed container and letting it thaw for a few hours before opening.

Always keep your raw stock and loaded magazines below freezing temperatures at all times during a cold weather shoot.

The XTR*plus*, as an option, can have its base equipped with a built-in electronic heating element, which is designed to automatically turn on when needed and maintain the claw mechanism at a temperature of 15° F. Contact your Aaton representative for further information.

7.2 Warm Weather

To keep the temperature of the camera body down, avoid having the camera exposed to direct sunlight for long periods of time by using a barney, all-weather cover, or some form of shading, like an umbrella.

Most importantly, keep raw stock and magazines in a dry cooler or in the coolest location available.

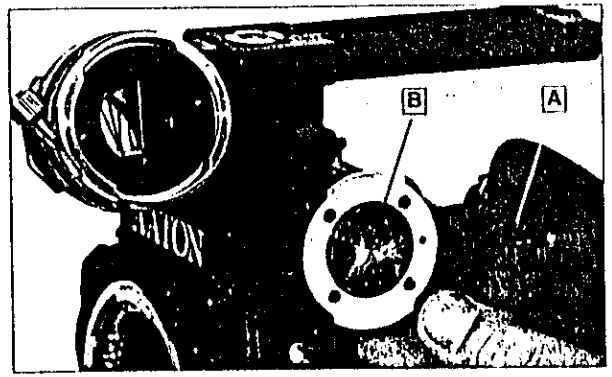
7.3 Humid Conditions

Moist and humid climates are very often the cause for the erratic behavior of any electronic equipment. In order to keep the camera performing normally, care should be taken in such conditions.

A threaded port on the battery side of the XTR*plus* front housing can be fitted with a silica gel caplet, which will protect the most sensitive area of the camera's electronics. Also, transport the camera and other electronic devices in cases containing silica gel pouches and store with the cases closed in the driest location available any time the equipment is not being used.

3.2 Eyepiece

Clean the eye lens (A), which is the outermost element closest to your eye, by first blowing the surface with canned air, then cleaning with lens fluid and a Q-tip. Remove the eyepiece and clean the field lens (B), which is located on the inside of the eyepiece, in the same fashion.



3.3 Viewfinder

With the eyepiece off, look into the remaining viewfinder and clean the exposed element of the pechan prism using canned air or an air syringe. If dirt particles are still present, remove the viewfinder assembly from the camera by removing the four allen screws that hold the base of the viewfinder to the front housing. Clean the exposed element of the viewfinder.

WARNING

When preparing to clean the top surface of the viewing screen, **never, ever** stick anything down into the top cavity of the body without first being absolutely certain that the beamsplitter is recessed. If you do not feel confident cleaning the screen in this fashion, an alternate means of cleaning is described on the following page.

3.4 Viewing Screen / Interior Surface

The last surface to be cleaned also happens to be located in a most delicate area. With the viewfinder off, look into the top cavity of the camera body and visually locate the top interior surface of the viewing screen.

If you shoot with the CCD assist, you will also notice that the retractable beamsplitter will most likely be in place between your eye and the viewing screen. If this is the case, remove the beamsplitter access cap on the battery side of the camera and retract the beamsplitter by rotating the adjustment screw approximately

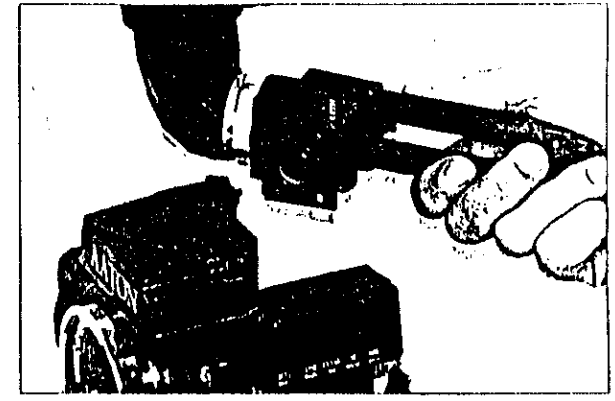
30 turns clockwise. Double-check that the beamsplitter is fully retracted, giving you access to the top surface of the screen. With lens cleaner applied to a 6 inch wooden Q-tip, reach in and gently clean this surface, making certain to angle the shaft of the Q-tip as far from the edge of the beamsplitter as possible.

Finding the Dirt...

There is a simple means of locating much of the dirt within your viewing system:

Look through the viewfinder with no lens on the camera and adjust the diopter ring. If the dust particles remain in focus, they are most likely located on either side of the eyepiece. If the dust comes in and out of focus as the ring is moved, the dust is probably located on either surface of the viewing screen. Furthermore, if the dust appears to be on the same focus plane as the cross hairs of the viewing screen, it is most likely on the bottom surface of the screen and easily accessible.

The beamsplitter is an extremely thin and fragile glass; any contact whatsoever will most likely break it. Therefore, if this viewing screen surface does not appear dirty or if you do not have the right tools, **do not clean the surface in this fashion.**

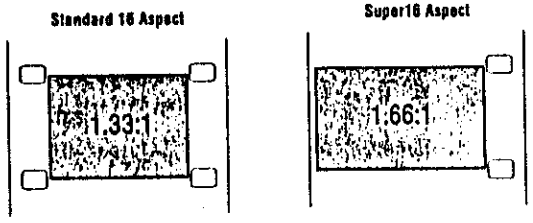


There is an alternative means of cleaning this surface which is a bit time-consuming, yet much safer and very effective. By removing the CCD cover and head, as detailed in section 14.7 **Installing the CCD Head**, there is direct access to the top of the screen from the side. Because the beamsplitter sits well above the top surface of the screen, there is no danger whatsoever of contacting it.

Super16 1

1.1 The Format

Super16 is a means of utilizing the cost effectiveness of 16mm film for wide-screen applications. The 1.66 aspect of Super16 uses 20% more of the film surface by extending the picture into an area otherwise reserved for soundtrack or a second set of perforations. This increase in usable area results in significant improvements in image quality obtainable from 16mm film when used for any wide-screen application.



1.2 When to Shoot Super16

Generally speaking, Super16 can be a good choice of origination in the following instances:

- Any low-budget, theatrical production shot in 16mm for blow-up to 35mm.
- Any documentary or film that has the potential for future use in HDTV or some other widescreen aspect.
- Any 16mm production that has a long shelf life or would like to extend the shelf life of their film by making it wide-screen ready.
- Any 16mm commercial, music video or such that will be shown in the letterbox format.

General Concerns 2

2.1 Protecting the Negative

Specific precautions should be taken with any piece of equipment that handles the Super16 negative. The additional usable area of the film must be free from contact with transportation surfaces in all instances, whether it be in the camera, at the lab or on the telecine. The Aaton XTR camera series, since its debut in 1984, has been built for safe and trouble-free Super16 operation.

On the other hand, equipment that has not been designed with Super16 in mind may cause rub, scratch or pressure marks within the area once occupied by a second set of perfs. In order to be sure that a certain device is compatible with Super16, it is always best to check with the manufacturer or the facility responsible for the equipment.

2.2 Maintaining High Quality

When Super16 is to be used for 35 blow-up, for future HDTV purposes, or for any other medium of greater resolution than today's standard television, it is of utmost importance to use the appropriate equipment and develop practices that will ensure the high quality of your images. Slight imperfections, which very often pass undetected on an NTSC or PAL screen, are greatly magnified when viewed in a more demanding format.

The XTR*plus*, with a registration tolerance of 1/2000 of the image dimension both laterally and horizontally, delivers the most stable and exact imaging of any 16mm camera available.

Your Super16 images, however, will only be as sharp as the lenses you use to capture those images. It is not enough to choose a lens that merely covers the wider aspect of Super16; just as important are the attributes of a lens such as sharpness, contrast and zoom curve, which affect overall image quality. See the list of recommended lenses for Super16 use, which follows.

The critical adjustment of camera and lens and their relationship to one another insures that the lens is achieving its optimum focus point at precisely the same distance as to where the film plane lies. With the stringent requirements of Super16, it is recommended that camera flange focal distance (FFD) and lens back focus be checked and precisely upheld by a qualified service facility.

3.4 Exposure

When shooting Super16 for blow-up, avoid underexposure and push-processing whenever possible. In fact, slight overexposure of the negative will produce a blow-up with less grain and increase color saturation and detail in shadowed areas. For best results, it is recommended to overexpose the negative anywhere from 1/3 to one stop, depending on the stock and the desired look.

When shooting Super16 for video transfer, slight overexposure is recommended for the same reasons, but care must be taken. Overexposed negatives on a telecine require a higher gain, which increases video noise. The benefits of an overexposed negative, however, outweigh the additional noise introduced if the overexposure is kept within one stop or less.

3.5 Camera Moves

If a Super16 film is to be viewed on a large screen, any camera movement becomes intensified. Therefore, it is best to keep camera moves subtle and handheld activity more controlled than when shooting in 35mm.

Super16 Field Conversions 4

All XTR cameras, including the XTRplus are capable of both 16mm and Super16 operation. These cameras are designed to be field convertible; switchable between formats by the user in a few simple steps. The following section offers detailed instructions on this procedure.

• For easier identification, the Super16 position of all adjustments will be marked with red dots, standard 16 position will be unmarked.

• All references to alignment in these instructions are made looking at the port of the camera from its front, unless otherwise noted.

4.1 Before You Begin

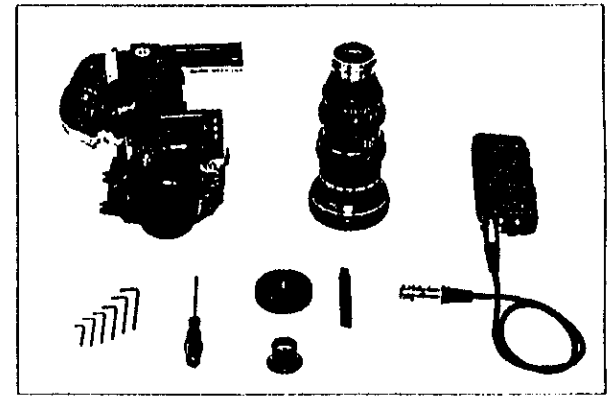
Before attempting a field conversion, make sure you have the following tools on hand:

1 - small slotted screwdriver
1 - loupe - approximately 5x magnification.
1 - standard metric Allen L-wrench set - sizes delivered with camera
1 - orange stick
1 - Port Alignment Tool * - *part #09-100-62 for Aaton Port, #09-100-61 for PL Port*

** There is an alternate means of aligning the port which does not require the use of the Port Alignment Tool. See Step 3 for a description of both methods.*

You'll also need the following equipment:

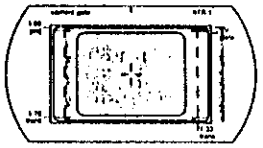
1 - Battery, preferably with XLR4 powercable
1 - Zoom lens

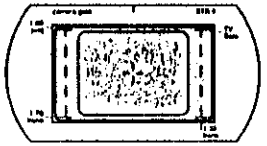


The conversion should be performed on a clean workbench or table by an individual who is somewhat mechanically inclined. The entire procedure should take about 45 minutes.

- When both the viewing screen and aperture opening can be distinguished, check that the viewing screen image is properly aligned to the aperture opening (indicated below in grey).

For 16 centering, the left edge of the 16 full frame dotted line should meet the left edge of the aperture opening. ⟶





For S16 centering, the entire Super16 full frame should be centered to the entire aperture opening. ⟵

The tolerance for this alignment is approximately the thickness of a line of the screen. If the viewing screen does not seem to be aligned properly, loosen the viewing screen adjustment screw and try moving the screen again.

Step 3 - Shifting the Viewfinder

The viewing optics of the camera need to be set to the new optical center of the shifted viewing screen.

- Remove the viewfinder assembly from the camera by removing the four allen screws and spacer that hold the base of the viewfinder to the front housing. Take note of the side on which the spacer has been removed. The spacer is used to fill the gap that is created when shifting the viewfinder between formats. Replace the viewfinder assembly accordingly:

Standard 16	Super16
shift viewfinder to the Left	shift viewfinder to the Right
install spacer on Right	install spacer on Left

- Secure the viewfinder by installing the spacer on the appropriate side and installing the four screws loosely. After all four screws are in place, tighten each screw until it is snug.

Shifting the Aaton Lens Port of Older Cameras

The lens ports of older Aaton cameras (namely the LTR and XTR series) will have only one set of holes and will not be marked in red. In this case, the flange guides of the lens port ring will have to be rotated to a 7/8 o'clock position for proper Super16 alignment.

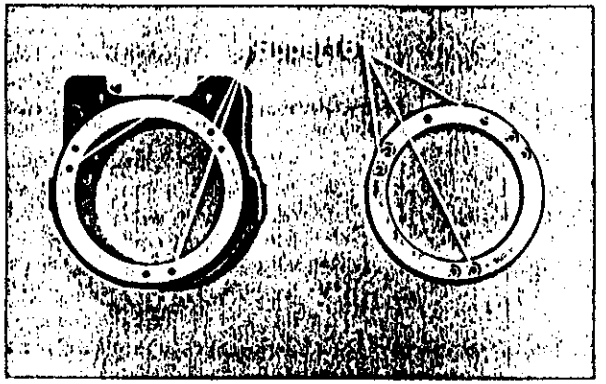
Step 4 - Shifting the Lens Port

The lens port needs to be reset to the new optical center of the shifted viewing screen and viewfinder.

- If the port cap is on, remove it. Remove the lens stop knob by loosening the single slotted or allen screw which secures it to the lens lock ring.

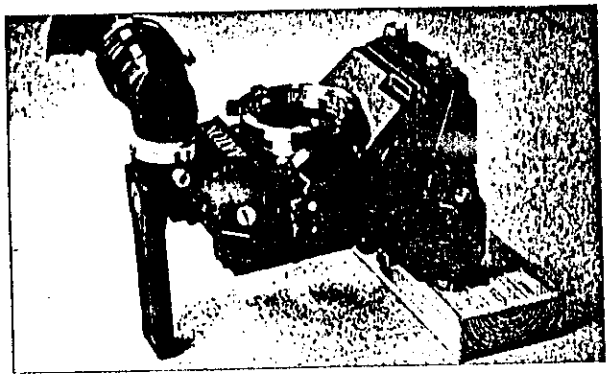
- Remove the lens lock ring by unscrewing it off the lens port ring. Take a look at the lens port ring. Notice that there are three allen head screws which lock the lens port ring to the lens holder, each with an unoccupied hole alongside it. Also note that one of each pair of holes will be marked with a red dot indicating Super16 positioning.

- Remove the three allen screws and carefully lift off the lens port ring and its accompanying shims and place on a clean surface with the shim side face up. Take note of the screw holes from which the three screws have been removed. Also note an unoccupied hole alongside each.



- Shift the lens port by refastening the lens port ring utilizing the second set of screw holes in both the lens port ring and the lens holder.

- Select the zoom lens that will be used most frequently with the camera; preferably the lens in your kit with the longest zoom ratio. Mount the lens on the camera and tighten the lens lock ring until the cutouts in the ring give full access to the three allen screws.



- Look through the viewfinder and set the zoom of the lens to its full telephoto position (the longest focal length). Focus the lens on the target and reposition the camera body so that the center of the viewing screen cross-hair exactly matches the center of the target.

- Set the zoom to complete wide-angle position and notice that the center of the target with relation to the viewing screen cross-hair will track off in one direction. Without moving the camera steady, reposition the lens and lens port ring until the target is centered. Using an allen L wrench, carefully tighten the three screws enough to secure the lens port ring.

A Simple and Useful Rule

Always remember one simple rule and you should be able to complete the fine-centering of your Lens Port in a few attempts:

- lens at **telephoto** - reposition the **body**
- lens at **wide** - reposition the **lens.**

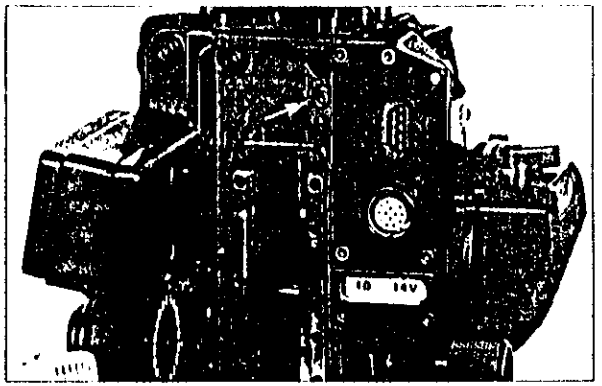
- Set the zoom lens to telephoto position and check that the cross-es remain centered. If this is not the case, reposition the body, loosen the screws slightly and repeat the above procedure. You will find that, with each adjustment, you will come closer to the correct lens centering.

When the cross on the target matches and holds its center through the entire zoom range, firmly secure the three screws. The target cross should remain within the inside edges of the viewing screen cross-hair to be considered in tolerance through the range.

Step 6 - Realigning the CCD Assist Target

The CCD assist needs to be repositioned and refocused to be properly aligned to the new optical center.

- Fasten the CCD assist to the camera body by means of three allen screws. Attach a monitor and BNC cable and power the camera and assist. If the monitor has an underscan mode, select it. Because all other elements of the body have already been converted, the CCD image should be soft and off to one side.



- Locate the beamsplitter axis adjustment, which is to the above / right of the aperture and consists of an allen screw within a slot. Notice a red dot to the upper left of the slot indicating the position of the screw for Super16. Loosen the allen screw 1 turn; while looking at the monitor move the screw within the slot in the approprate direction until the image of the screen is centered.

Standard 16
move allen screw Down

Super16
move allen screw Up

- The resulting CCD image, after this adjustment, should now be centered but slightly out of focus. Follow the next few steps to refocus the CCD head.

Concept 1

AatonCode, Aaton's proprietary in-camera timecode system, is recorded in the XTR*plus* on the edge of the film between the perforations in both matrix and man-readable form. As recorded in the camera, AatonCode contains a six digit production ID, a SMPTE-compatible real time address (full date and time), a camera equipment ID and the running speed of the body.

Timecode is exposed onto the film by means of seven micro-diodes, which flash rapidly to form the code as the film rolls through the gate. The intensity of the diodes is adjusted to the film's sensitivity by means of the camera's ASA knob.

The XTR*plus* can accept timecode information in both ASCII and SMPTE form, and work with all standard timecode devices. Because the same time address is running in both the camera and the sound recorder, a slate is no longer needed for syncing purposes; synchronization becomes fully automatic during the film/tape transfer or later post-production stage.

An Aaton device called **KeyIlnk**, which consists of CCD reader heads and a PC, and which is owned by the telecine house, is designed to read Keycode and Aatoncode off the film during transfer and correlate this to the continuous video timecode and all other colorist entries for storage on its hard drive. Keylink can also ingest scene/take information and script notes from the set recorded by means of Aaton's **Script Supervisor** software.

The facility can then supply all correlated information in VITC (vertical interval timecode) and/or burn-in windows on the transferred tape, and also on floppy disk for direct use with non-linear editing systems, audio workstations and logging programs.

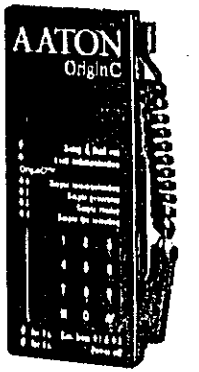
The Internal Clock 2

The XTR*plus* contains an internal clock designed to be initialized from an outside source and keep accurate time (within a half a frame) for 8 hours. The side display of the camera will flash after seven and a half hours of running time to warn that a half hour remains before re-initialization is necessary.

In order for the internal clock to operate, the XTR*plus* must be powered before initialization. The camera is also equipped with an instantly charged supercapacitor buffer that is designed to keep time between battery changes. Keep in mind that a battery which is too low to run the camera has enough energy to drive the internal clock for hours. Get into the habit of leaving an exhausted battery on-board the camera until you have a fresh battery close by. The supercapacitor allows a full minute for battery replacement before timecode is lost.

OriginC*plus* 3

For the most efficient and foolproof means of working with AatonCode, it is highly recommended that an Aaton device called Origin*Cplus* is used. Origin*Cplus* can be quickly programmed with a Production ID, full date and time of day, then input into timecode devices in either ASCII or SMPTE form. Origin*Cplus* is TCXO controlled and will run for 150 hours with its internal 9V lithium cell; it is designed to be left on during the shoot day and used as a comparator to monitor timecode drift between devices.



Origin*Cplus* can also be used as a SMPTE generator to supply accurate timecode for slates and inserters, or to record timecode on one audio channel of a non-timecode audio recorder.

Initializing AatonCode in the Camera 4

There are two ways in which AatonCode can be initialized in the XTRplus camera. The preferred method is by means of the OriginCplus, which inputs timecode in ASCII form. It is also

- Follow the same procedure for each camera or sound recorder on the set running AatonCode.

5.2 Maintaining AatonCode without OriginC*plus*

If the Origin*Cplus* has not been used and timecode has been set in the XTR*plus* directly from the TC audio recorder, there is no way to monitor timecode drift between the two devices. In this case, it is recommended to simply re-jam the camera every two to three hours. Follow the procedure detailed in section 4.2 **Using an External SMPTE Device**

Make sure that the camera on/off is switched to test position to tell the camera to accept the newly fed code.

The Camera Assistant's Duties 6

Although timecode-related practices on the set are very straightforward and uncomplicated, there are a few duties which should be handled by the camera assistant as part of his/her routine.

6.1 Checking the Diodes

In order to inspect and clean the gate between magazine rolls, the camera must be set to test position. Not only will test position rotate the shutter 180°, but the seven timecode LEDs in the gate will illuminate in sequence. Occasionally check that all diodes are operational and are evenly illuminated. As part of the normal gate cleaning procedure, clean this area with a Q-tip and lens cleaning fluid to assure that no dust particles cover the LED array.

The seven diodes will illuminate in test position whether or not timecode is running in the camera.

6.2 Setting the ASA

As an instant reminder, test position, with magazine off the camera, will also display the current setting of the ASA knob. Make sure that the ISO rating of the loaded film matches what is set on the ASA knob. The ASA knob is located to the right of the motor on the motor side.

6.3 Checking for Running Time

The yellow LED located to the right of the motor, will flash once per second on the second when timecode is running in the camera. Get into the habit of looking for this flash as an additional peace of mind check. If more than one camera is counting time on the set, check that all flashes occur simultaneously.

Recommended Film / Audio Selections 7

The following are recommendations for the audio timecode resolving rates to use with specific film speeds under normal operation. For less common situations, (such as filming with sync sound and a separate audio playback, filming live monitors, or resolving with audio from video recorders), consult your Aaton representative or your transfer facility for advice.

Desired Film Speed	Audio Selection
24 fps	Smpte 30 non-drop
25 fps	Smpte 25
30 fps	Smpte 30 non drop

List of Specifications

Weight	6Kg / 13lbs with 400 ft load and 12V on-board battery.
Power	10-14V, 600mA with film at 25°C / 77°F.
Temperature range	-20°C / +4°F to +40°C / +104°F. (-40°C w/ optional electronic heater)
Noise level	20 dB -1 / +2.
Image stability	Co-planar claw and lateral pressure. Vertical and lateral steadiness to 1/2000 of image dimensions.
Speeds	From 3 to 75 fps with independent external speed control. 6, 12, 20, 24, 25, 29.97, 30, 48, 50, 60, 75fps preset sync speeds with 12V.
Formats	16 / Super16 operation. Field-convertible - quick centering of lens axis, viewing system and CCD target between formats.
Viewing screen	Universal fiber optic containing 1.37, 1.78 (16/9), 1.85 aspect ratios.
Viewfinder	Interchangeable finders. Magnif / Ang of view: bellows short eyepiece - 9.5 X / 39° extension eyepiece (20cm) - 9.9 X / 41° hyperlong eyepiece (40cm) - 9.94 X / 42°
Lens port	Interchangeable hard fronts: Aaton universal as standard. ArriPL and Panavision on option.
Shutter	Reflex mirror - fixed 180°.
Lightmeter	Photo-measurement of reflected quantity of light. 1/3 of a stop increments, 4 stop range.

Accessory inputs	Amph9 (video sync), Lemo6 (power zoom), Lemo14 (CCD assist), Lemo5 (SMPTE and ASCII- RS232 time input) and Lemo2 (camera on/off).
Time recording	AatonCode; in-camera, at-the-gate matrix recording of man-readable figures and machine readable data. TCXO control for 1/2 frame accuracy over 8 hours internal clock. SMPTE and ASCII-RS232 in.
Video assist	Black & white - low power (170mA) high sensitivity, integrated CCD assist with manual iris. PAL or NTSC formats. Color - high sensitivity, flicker-free (frame-store in NTSC), integrated CCD assist with timecode windows, video-generated adjustable frame and Vitc insertion. PAL or NTSC formats.
Magazine	400 ft, coaxial instant DX magazine, quick-loading, magnetic drive, no timecode-related parts.
LCD display	ASA selection monitoring, battery voltage monitoring, remaining footage, short end reset, mag ID, timecode readout.
LED indicators	Display camera run, camera test position and low battery.
End-of-film warning	Pre-end and end-of-film warnings via the lightmeter display visible through the viewfinder.

Australia

LEMAC FILM

277 Highett Street
Victoria 3121 RICHMOND
Contact: John Bowring

Tel : 61 3429 8588
Fax: 61 3428 3336

Belgium

COLOR BY DEJONGHE

Diskmuidekai 4
B 8500 KORTRUE
Contact: Dirk Dejonghe

Tel : 32 56 350 710
Fax: 32 56 350 780

Brazil

HAGA DE

Rua Sergipe 475 cj. 612
Cep 01243-001 SAO PAULO
Contact: Hugo Kowenski

Tel : 55 11 258 5752
Fax: 55 11 258 5752

Canada

OLE CANADA

3981 Boul St. Laurent
Mezzanine 2
H2W 1Y5 Montreal Quebec
Contact: Danys Bruyere

Tel : 1 (514) 844-8555
Fax: 1 (514) 844-3777

Germany

DEDO WEIGERT FILM

Karl-Weinmair Strasse 10
8000 MUNCHEN 40
Contact: Dedo & Jennifer Weigert

Tel : 49 89 35616 01
Fax: 49 89 35660 86

Great Britain

ICE FILM EQUIPMENT

The Robert Elliot Center
1 Old Nichol Street
Shoreditch LONDON E2 7HR
Contact: Peter Bryant

Tel : 44 71 739 4800
Fax: 44 71 729 2554

Greece

CHASSAPIS

Olymbou St 55
152 34 HALANDRI
Contact: Stravos Chassapis

Tel : 30 1 6821 237
Fax: 30 1 6846 584

Holland

HOLLAND EQUIPMENT

HJE Wenckebachweg 49
1090 AK AMSTERDAM
Contact: Nico Van Den Boogard

Tel : 31 206 943 575
Fax: 31 206 685 381

Hong Kong

SALON FILM

Unit "C", 1/F Freder Ctr
68 Sung Wong Toi Road
KOWLOON
Contact: Patrick Lamm

Tel : 852 764 3123
Fax: 852 764 3149

India

CINTRONICS

S-2 Khira Industrial Estate Rd.
Santacruz
400 054 WEST BOMBAY
Contact: Pramod Mital

Tel : 91 22 6145 509
Fax: 91 22 4920 756