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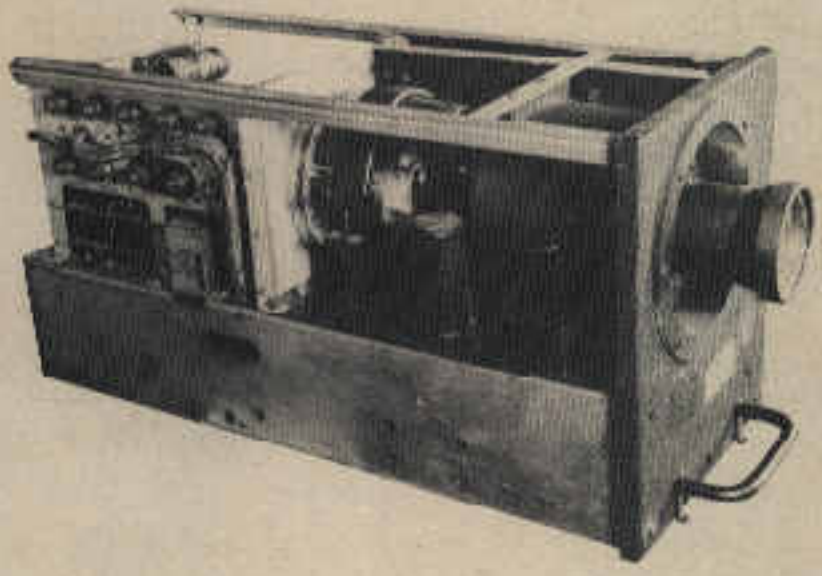

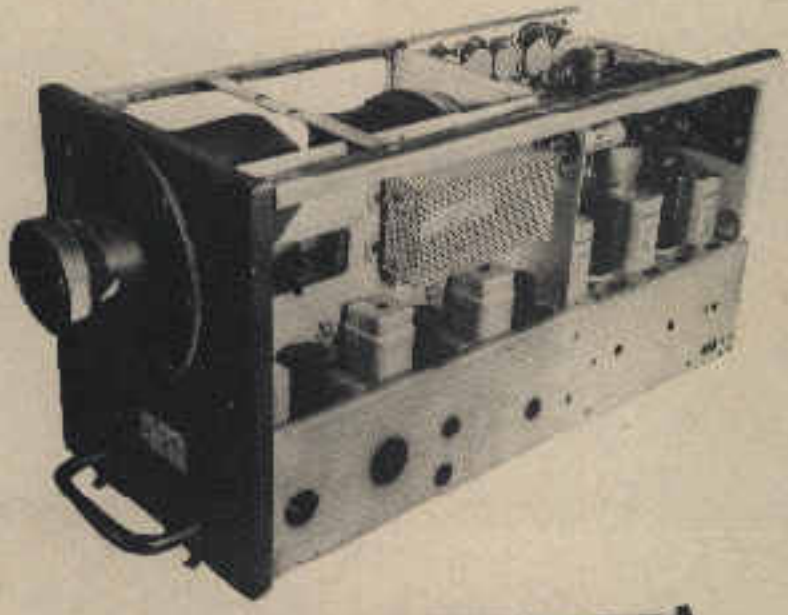

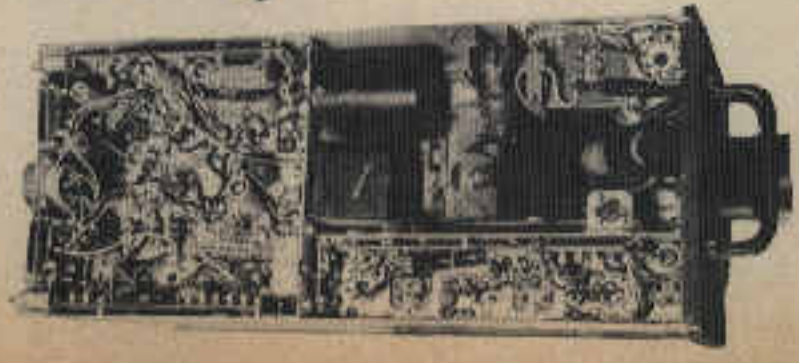

AIRCRAFT COMPONENTS AND ACCESSORIES • ELECTRONIC PARTS AND EQUIPMENT

Harjo Sales Co. CABLE ADDRESS: HARJO

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TELEVISION CAMERA CRV-59

CURRENT APPLICATIONS:

SCIENCE AND EDUCATION: For training and experimental work in the instruction of television technique in Universities and Electronic Engineering Schools.

TELEVISION STUDIOS: This camera can be used very efficiently in a movie pick up chain. It has been very successfully used for titles, slides, and test patterns.

SCANNING: Vertical 40-60 FPS. Horizontal 13,000-15,000 CPS.

VIDEO AMPLIFIER: Uses 1845 Iconoscope. Six stage video amplifies and clipper.

SYNC GENERATOR: Horizontal sync pulses are generated from a Hartley master oscillator circuit which gives excellant stability to the multivibrator system. Vertical oscillator is synchronized by a submultiple of the horizontal master.

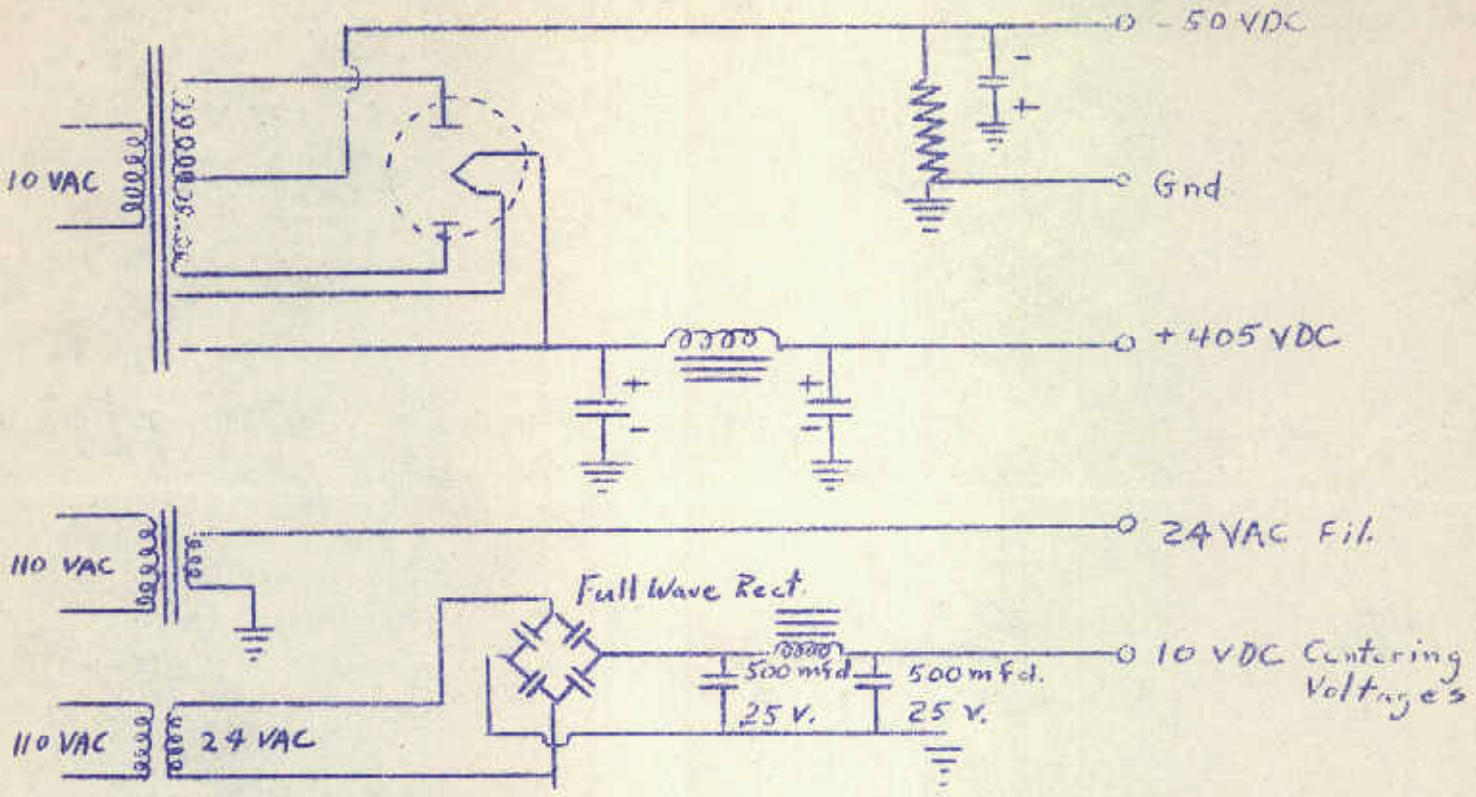
CONTROL SYSTEM: External controls are readily accessible and include a V & H centering, bias, focus, video gain; V & H sawtooth, V & H parabola, and vertical linearity. Internal controls also easily accessible and include video peaking, blanking, iconoscope filament adjustment, V & H speed, height and width.

PHYSICAL DESCRIPTION: Entire camera is self-contained complete with modulator, sync generator. Camera dimensions: 12 1/4" x 10 1/2" x 25". Weight: 49 pounds. Mfd by RADIO CORPORATION OF AMERICA to Army-Navy specs.

LIGHT REQUIREMENTS: Camera will operate efficiently with an approximate light source of five to ten foot candles, on the mosaic. With proper back lighting on the iconoscope, this can be reduced approximately fifty percent.

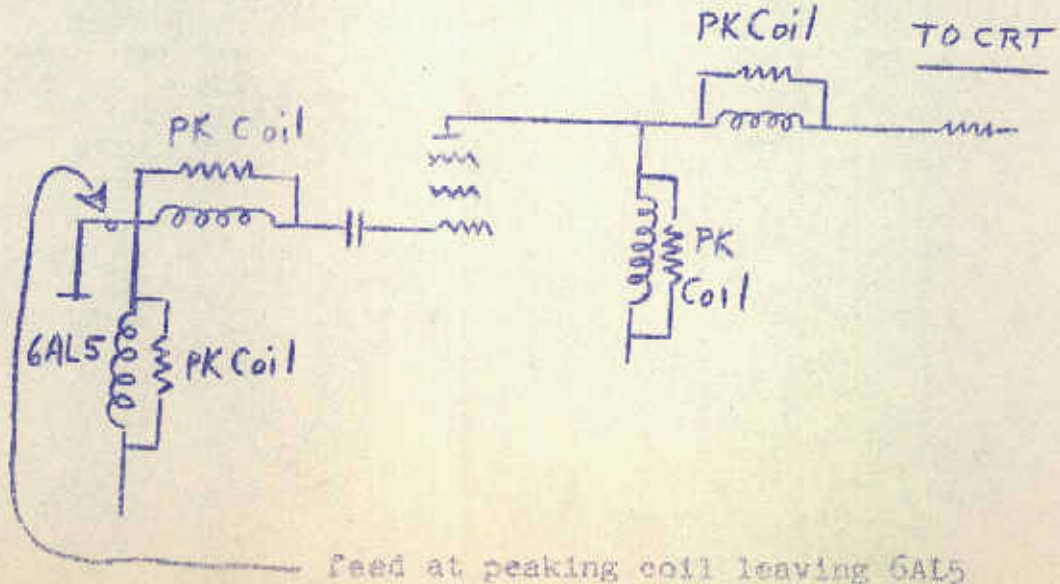
POWER REQUIREMENTS: 24 volts AC or DC for filaments. 405 volts DC at 150 ma. 55 volts negative bias.

SUGGESTED POWER SUPPLY TO USE WITH TELEVISION CAMERA CRV-59



To connect Camera to any Receiver connect video output cable from Camera to Video Det. (6AL5) and peaking coil of video Amp. (6AV6)

Signal is composite of sync and picture from camera. To drive seperately use both cables from camera (Sync and Video).



Feed at peaking coil leaving 6AL5 sync and DC restorer.

CONVERSION OF THE PH-522/AXT-2 TELEVISION CAMERA

POWER SUPPLY CONVERSION UNIT. The following information concerning the power supply requirements should be followed as closely as possible in order to insure optimum performance of the camera. The filament requirements for the camera are either 28vac at 5 amps or 28 vdc at 5 amps. It is not advisable to try converting the filaments to 12 volt operation due to the number of tubes involved and the difficulty of reaching some of the connections in the camera. The advantage of using the dc filament voltage is twofold. One of the advantages is that the camera shutter operates from 28 vdc. The second advantage is that the vertical centering voltage for the 1846 comes from the dc filament supply. The difficulty with using dc is that it must be very well filtered to prevent hum appearing on the transmitted picture and of course the difficulty of obtaining the dc power supply and its expense. The system used here was to supply 28vac for the filaments and remove the resistor supplying the vertical centering voltage from the filaments and connecting tie to the plug on the rear. This of course necessitated supplying 12vdc at 200 ma for the vertical centering voltage. It is of utmost importance that the 12vdc supply be well filtered. We used here 2000 mfds of filter and a 32 ohm resistor for voltage dropping and filter. This arrangement worked very satisfactorily, using a selenium rectifier to obtain the dc voltage from a low voltage, low current filament transformer.

The plate voltage required for the camera is 400vdc at 150 ma. Adequate filtering of this supply was obtained by using choke input filter. The chokes and condensers were rated as follows: 9 to 15 henries swinging followed by 6 mfd of filter and a 10 henries smoothing choke and 4 mfd of filter. The voltage is very critical for proper operation of the camera and UNDER LOAD should fall between 395 to 410 volts. The load to the power supply is not varying so it is possible to get the voltage within these limits under load. If it is desired to operate the associated transmitter along with the TV camera the current ratings for this section of the power supply should be doubled; that is 300ma. This will provide the low voltage dc for the transmitter and the B-plus for the camera from one power supply.

The final requirements for the power supply is that it also contains a negative 50 volts dc bias supply. The current drain on this supply is nearly nothing and a small bias supply was built supplying regulated 105 volts dc. This was connected to the camera with a small receiving type potentiometer in series with the negative lead. This potentiometer was adjusted until 50 volts bias was obtained when hooked to the camera.

The power supply must contain a method of controlling the B-plus voltage separate from the filament supply. The filaments should be warmed up for a few minutes before applying high voltage in order to increase stability and prevent tube and circuit damage.

CAMERA CONVERSION. In discussing the camera we will start from the front and work towards the rear. On the front of the camera is an orange filter unit which is placed in front of the lens by a solenoid which may be operated either electrically or mechanically. The purpose of this filter is to provide clearer pictures of clouds and is unnecessary in ground operation. This filter may be removed and replaced by an opague sheet of paper cut to the same size. This is very desirable in those not supplying 28 vdc to the camera as this voltage actuates the shutter mechanism when power is applied. The reason for this opague paper is to keep focused light from falling on the 1846 picture pickup tube when high voltage is not applied to the camera. WARNING: FOCUSED LIGHT MUST NOT BE ALLOWED TO STRIKE THE PICTURE PICKUP TUBE WHEN THE HIGH VOLTAGE IS NOT APPLIED AS THIS WILL CAUSE THE PHOTO SENSITIVE ELEMENT OF THE TUBE TO BURN OUT. The unit formerly holding the filter may now be manually moved up and down and locked to remove, or supply light to the lens system. The heating grids on the lens should also be removed as their only purpose is to prevent the lens from fogging at high altitudes due to moisture condensation. Lens adjustment is made by

loosening the two wing nuts, one on each side of the camera. Upon opening the second door on the right side of the camera 8 screwdriver adjustments will be found. These perform the following functions: FOCUS controls electrically the focus of the received image in the camera. The LINEARITY controls the vertical linearity of the transmitted picture. The VERTICAL SAW TOOTH, HORIZ SAW TOOTH, VERT PARABALA and HORZ PARA control the transmitted picture shading horizontal and vertical. The VIDEO GAIN potentiometer controls the strength of the transmitted picture. The BIAS ADJ controls the bias voltage to the picture pickup tube. These last two control settings can independently control whether a picture is transmitted or not. To get to the three screw driver adjustments on the rear, the case must be removed. Their function is as follows: HEIGHT controls the height of the transmitted picture. The VERTICAL and HORIZ SPEED controls the frequency of the sync circuits of the camera. The monitor plug on the rear merely supplies both sync and video signal to a monitor receiver. This plug is paralleled directly with the coax connectors marked video and sync. The power input plug has the following voltages connected to these lettered pins: Pin A, ground. Pin B, plus 28 volts filaments. Pin C, minus 50 volts bias. Pin D, plus 405 volts dc. Pin E, 28 vdc to shutter relay if used. Pin F, ground.

If a separate 12vdc centering voltage is supplied the following internal modification is required. Remove the end of resistor R200 (18 ohms) from pin number two on X105 (616). To this resistor supply 12 vdc for centering, at 200 ma. Next it is necessary to rewire the horizontal and vertical speed controls so that the sync frequency may be brought in range of present day standard TV sync frequencies, enabling the camera to "lock in" with your TV receiver. On the horizontal speed control potentiometer to the center connection will be found resistor R-170 (47,000 ohms). This value must be cut in half; that is reduced to approx 23500 ohms either by paralleling and equal value resistor with it or replacing it with a 23500 ohm resistor. The value of this resistor is critical and it is recommended an equal value resistor be paralleled with it. On the vertical speed control potentiometer to the center connection will be found resistor R-163 (1.2 meg ohms). This value must be cut in half as before and should be reduced to 600,000 ohms. Its value is also critical. Before operation of the camera the tubes should all be checked except of course the 1846 unless a checker is available for it. It was found at this station after many hours of work on the camera and a still very poor picture that three tubes were slightly weak. Not bad - just a little weak on a standard tube checker. Upon replacing them the picture changed from terrible to excellent. It made just that much difference. My advice is check them all first before you sweat hours trying for a decent picture.

Filament and bias voltage may now be applied. It is immaterial whether bias voltage is applied with filament voltage or plate voltage. Operation of the bias light (standard bayonet base bulb located on the partition separating the rear of the camera from the front) should be checked along with filaments. This light increases the sensitivity of the camera and should be replaced if burned out or broken before operation of the camera is attempted. Filament voltage for the 1846 is supplied to the tube when the high voltage is applied. It is obtained from the master oscillator through a step down transformer. It takes the picture pickup tube (1846) about 30 second after high voltage is applied to "warm up". The filament voltage to the 1846 can be adjusted and should be checked. This is done by connecting an AC voltmeter to pin 3 and 4 of T-104 located underneath the camera, on the left side looking from the rear of the camera and next to the neck of the 1846. The voltage as read on a copper oxide rectifier type ac voltmeter should be adjusted to read 6 volts ac. If a termo coupling type ac voltmeter is used this voltage should be adjusted to read 6.3 volts ac. WARNING: APPROXIMATELY 2000 VOLTS DC APPEARS ON PINS THREE AND FOUR ALONG WITH SIX VOLTS AC. METER LEADS SHOULD BE WELL INSULATED AND NOT TOUCHED DURING ADJUSTMENT. The adjustment control for the filament voltage is a potentiometer (R-172) located in the underneath center of the 1846 compartment. It is readily apparent.

CONNECTING THE CAMERA TO THE TV SET AND ADJUSTMENT. A fifty-two ohm coaxial cable, receiving type, any practical length, is used to connect the VIDEO coax fitting on the rear of the camera to the TV set. The length of power supply leads for the camera is not critical, and they may all be run in one cable. The center of the coax should be connected directly to the grid of the first VIDEO amplifier stage in the receiver by a clip lead. The two units should be grounded together through the shield of the coaxial cable. Due to the fact that at this station the grid of the first video amplifier in the TV set had 250 volts plus dc on it, an attempt was made to couple the camera to the TV set through a condenser ranging from 40mfd to .001 mfd. No picture would pass through the condenser. Although this direct coupling between the camera and the TV set put a plus 250 volts on the cathode of the last video amplifier in the camera, with respect to ground, no adverse effects were noted on the camera's signal, or on the reproduced picture. The video output of the camera is 1.5 volts whereas the voltage appearing on the grid of the video amplifier in the TV set is 2 to 3 volts of video but a very satisfactory picture was obtained on the TV set. These connections to the TV set should be made only temporarily as the connection of the camera blurs considerable the normal received picture on the TV set. Connected to the grid of the first video amplifier in the TV set will usually be found a small peaker coil. This looks like an RF choke. On the set at this station the best picture was obtained from the camera by hooking the center conductor of the coax through this peaker coil to the grid. Experimentation will show which is best on your particular set. If a 17 inch or higher size screen is used on your particular set the line structure of the picture from the camera will be noticeable as the output signal of the camera is not interlaced as is the standard TV picture. Thus decreasing by one half the apparent number of lines seen on the screen. Your receiver should now be tuned to an unused channel where there is no overlap from an adjacent channel, or your antenna disconnected from the set. Apply filament voltage and allow three minutes for warm-up. Then apply high voltage. You should now see a raster appear on the screen although it will be badly torn and a jumble of black lines and bars. With the case removed from the camera, adjust the vertical and horizontal speed controls along with your vertical and horizontal controls on your TV set attempting to get a somewhat more stabilized raster. Noted on the TV set at this station, it was found that the contrast control should be set at Minimum (furthest counter clockwise) for a picture to appear. If contrast on THIS RECEIVER was advanced all the way clockwise no picture was apparent. Also adjust the master oscillator slug located next to T104 mentioned earlier in filament voltage adjustment of the 1846. This coil and slug are located on the left side of the 1846 compartment viewed from the rear and underneath the chassis. It should be readily obvious. By adjustment of this slug along with adjustment of vertical and horizontal speed controls of your camera and TV set you should be able to obtain a fairly steady raster. It is not necessary to uncover the lens and allow light to fall on the 1846 for the foregoing adjustment. After a fairly steady raster has been obtained on the TV set a 13.6 mmf condenser should be connected between pins A and D of J-102 (monitor output jack on rear of camera). This value of condenser is quite critical as this connection is made to feed a small amount of the sync output of the camera into the set to stabilize the picture raster. If too much capacity is used it will reduce the picture contrast and if too little, the picture raster will not remain steady. This condenser is added to relieve the necessity of connecting the sync voltage output of the camera into the receiver from the coax fitting on the rear marked sync. Of course when using the camera on the associated transmitter this should be removed (condenser). The raster of the picture is the appearance of the "frame" of the picture on the screen. This is what you see when a TV station is not transmitting a picture but is "on the air". After a stabile raster has been obtained the opaque covering of the lens should be removed and light allowed to strike the 1846. The camera should be tried out using a scene illuminated by bright sun light. A 200 watt bulb

will give enough illumination to be seen fairly well on the TV screen but for preliminary adjustments, sunlight subjects should be used. Do not be discouraged if when you remove the opaque covering of the camera no picture appears. It probably will not. Remember the lens will only focus objects from six feet to infinity. By looking through a hole on the shielding around the 1846 the sensitive part of the screen of the 1846 can be viewed. The image of the scene should be focused on this plate by visual inspection and then the lens locked in place by the wing nuts. Now follows the sweat and strain part of the operation. Two controls can completely prevent any picture from getting through the camera. One can be eliminated by adjusting the video gain control full clockwise. The other control is the bias control. Two other controls may also prevent your getting a picture and these are the vertical and horizontal CENTERING. Adjust the Bias control about three quarters of the way open then adjust the vertical centering control and see if you can get two round or oval donut appearing dots on the screen. These dots will be fairly large. If these fail to appear try adjusting both vertical and horizontal centering controls and also the bias control along with the contrast control on your TV set. Remember on some TV sets the contrast needs to be near minimum or opposite to where you usually set it for standard TV reception. Once you have obtained the dots you know your 1846 is operating. These dots are the rivets that hold the cessium (photo sensitive plate) in the 1846. Much juggleing of the above controls may be necessary to get this far. Possibly the bias adjustment is the most critical although they are all very critical until you have first obtained a picture. Once you have the donut shaped dots and there is a good amount of sunlight illuminating the scene focused on the 1846 try getting something of this scene onto the TV receiver screen. Then adjust the focus control on the camera until the picture is focused the best on the TV receiver. Then try adjusting the contrast control on your TV and the camera bias control to see if you can get more picture into the TV set. It is possible the video gain control will need to be backed off some to obtain the best picture but due to the low voltage output of the camera this is doubtful. Adjustment of the HORIZ S.W., VERT S.W., HORIZ PARA, AND VERT PARA controls the shading of the picture. In other words if say one half of the picture was very light and the rest fairly dark this can be corrected both vertically and horizontally, by these controls. After a good picture is on the camera, a slight adjustment of the TV receiver focus control may be necessary. Each control reacts on every other one to some degree and it takes quite a bit of adjustment and readjustment to get the best possible picture. The proper adjustment of the bias control can "make or break" the picture. This is one of the most important adjustments. After the foregoing has been accomplished an object six or so feet away in sunlight should be focused in. This should be a round object, here I used a standard phonograph record. This should be held or set so that its degree of roundness can be observed on the screen. Then by adjusting the HEIGHT control on the rear of the camera and the LINEARITY control on the camera, the object can be made to appear as nearly round as possible. Now the picture edges of any focused scene should be checked by visual inspection on the 1846 sensitive plate and the width slug adjusted to make the edges of the scene as seen on the TV screen correspond exactly to the scene edges on the edge of the sensitive area of the 1846. This slug is located in the main tube compartment of the camera as viewed from the top. It is near the 6x5 rectifiers. This increases or decreases the width of the picture and of course improves the horizontal linearity. The final operation before you start adjusting and readjusting the controls for just that little bit better quality picture is to again measure the voltage to the 1846 filament as described before. It will probably be found to have decreased so bringing it back to 6 vac will increase the sensitivity of the camera. Now, inside scenes may be tried and you will probably never be quite satisfied until you squeeze the last drop of gain from the camera. You will find quite a bit of light is necessary for a good picture and probably two 250 watt photoflood lamps will be needed to give you adequate lighting for inside work.

SUMMARY. Don't be discouraged if at first you don't get any picture or a poor one. Approximately 24 hours of continuous work was needed to get all the adjustments just so at this location. Of course it was cut and dry here. I sincerely hope that this helps you in getting your camera working. I have tried to mention all the pitfalls I encountered. The picture put out by this camera is about 75% as good as with commercial equipment and, without interlacing, this is not bad. Remember, don't let focused light fall on the 1846 without plate voltage applied to the camera. These tubes are out of production and cost a mint when made. Maybe they will become surplus one of these days. For example, there are a million things I haven't mentioned on this camera. I have mentioned nothing of the technical side. The book on the camera and transmitter is the size of the Washington, D. C. telephone directory with a wealth of information on this and that problem, etc. Good luck with your camera.

73

SCOTTY FISHER
AF4TST

ADDENDA. On the rear of the lens it will be found that there is a shutter assembly. If the ac is used for the filaments of the camera this shutter must be removed or fastened open to allow light to pass into the camera. At this station the lens leads controlling the opening and closing of the shutter were pulled up and tied so that the lens was opened and yet if ever desired, it could later be hooked up for 24 vdc operation.

You will notice tubes on the left and right deck of the 1846 compartment. Some of these are special non-microphonic 6AC7's. It was necessary for these tubes to be non-microphonic due to airplane vibration in which the cameras were mounted. Any good 6AC7 may be used as a replacement because no vibration of the camera will be experienced in operation.