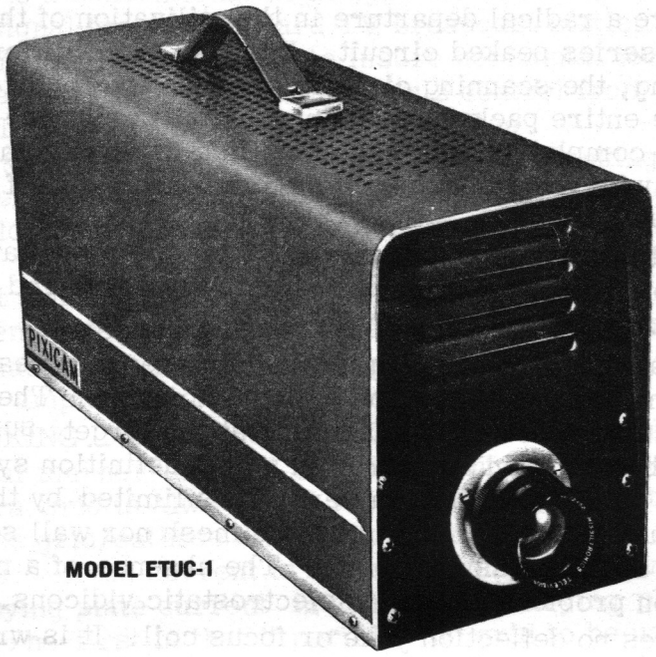
INSTRUCTION AND SERVICE MANUAL ON THE AL-DEE TV CAMERA SERIES 253
(Instructions only Stock #783 - $1.50)

SAVE TIME

ACCOMPLISH MORE

PIXICAM



MODEL ETUC-1

LOW-COST CLOSED-CIRCUIT TV CAMERA

* Provides a high-quality picture with 400 line resolution

LIST PRICE **$499.50**

Now, the Pixicam TV camera reduces the cost of closed-circuit TV to a point where almost every organization can afford the benefit of instantaneous visual communication. Pixicam transmits picture to any TV set, monitor or master TV cable system. It produces crisp, clear images of any object or scene, just as you would see it on a standard TV broadcast channel.

An exclusive development in pick-up tubes, the Pixicon, permits simplified circuit design. As a result, Pixicam is not only the most economical camera on the market, but also the most easily installed and serviced.

USE MANPOWER MORE EFFICIENTLY WITH PIXICAM'S EXTENDED VISION

By extending vision to remote locations, Pixicam enables you or your employees to be in several places at the same time. It avoids costly walking and waste motion. It brings hard-to-see subjects under close examination.

Pixicam has innumerable uses for conserving manpower through instantaneous visual communication.

APPLICATIONS INCLUDE:

- *control of pilferage*
- *safe observation of hazardous operations*
- *remote inspection of sketches, layouts and other graphic matter*
- *instruction and training*
- *observation of meters and gauges, loading platforms, entrance gates, storage areas*
- *enlargement of small subjects*

Among the many types of establishments utilizing closed circuit TV advantageously are: retail stores, advertising agencies, churches, schools, banks, hotels, motels, hospitals and other institutions, railroads, beauty salons, factories, wholesalers, warehouses, garages and many others.

A little thought will probably uncover applications in your own organization that would yield tangible benefits.

SPECIFICATIONS

OPERATION — light level compensation circuit
PRINTED CIRCUIT — 7 tubes
SIZE — 5¼ x 6¾ x 16".
WEIGHT — 11 lbs.
LENS — f 1.9, 7-element coated lens supplied. (Leica-type thread, lens interchangeable)
SENSITIVITY — similar to vidicon. (10 ft.-candles)
OUTPUTS — RF channel (2-6), 0.1 volt; Video, 1 volt.
SYNC. — industrial type, random interlace.
RESOLUTION — More than 400 lines video, 300 lines RF.
POWER REQUIRED — 110 V. 60 cycles AC. 40 watts

A Low Cost Electrostatic TV Camera System

Forward: A new type of TV camera utilizing an electrostatic camera tube of the vidicon type is described and the new and novel circuitry which has been employed presents problems which are unique even to those acquainted with conventional vidicon camera units.

Since the earliest days of commercial TV broadcasting, engineers have long desired a low cost TV camera for industrial and consumer use. Many attempts have been made in the past decade to produce such a unit, usually these cameras have been developed around the one inch type 6198 vidicon and its successors of like electromagnetic characteristics. The camera herein described is the first to depart from this general tube type and it is believed in the future there may be further departures in attempts to lower the complexity and cost of such units.

The Al-Dee camera represents the first successful attempt by any manufacturer to package a complete unit of the relatively high technical characteristics and low cost in one unit. Numerous design firsts have been incorporated which will become apparent as the design features are explained. The camera itself utilizes a 2 inch electrostatic vidicon of unique design and a 2 inch F 1.9 lens which is interchangeable with any Leica/Cannon screw mount lens or accessories. The use of a standard 35 mm Leica/Cannon lens mount marks a departure in this respect as such lenses are readily available of excellent quality at a relatively low cost in a wide variety of focal lengths and F stops eliminating the need for specialized high cost 16 mm lenses, as well as providing almost unlimited versatility as regard to the availability of accessories and attachments.

Most cameras have, in the past, followed a general trend in utilizing video amplifier circuits of the RCA TV eye type and again we have here a radical departure in the utilization of the new Sylvania 10 pin dual tetrode 6C9 tube in a series peaked circuit. Because of the different circuit requirements for electrostatic scanning, the scanning circuits are also totally different from other cameras of this class. The entire package containing 7 tubes plus the 2 inch camera tube weighs only 11 pounds and is completely self-contained in a case with an overall length of 17", a height of 6 3/4" by 5" wide and consumes the minimum amount of 40 watts from a standard 115 volt 60 cycle AC power source.

In designing and producing camera systems, the first consideration was given to price; and secondly to performance. The end result, however, is a camera that actually compared in performance to its competitors so that little or nothing was sacrificied.

Figure 1 was the actual 2 inch electrostatic camera tube showing the Indium pressure seal on the face and a split deflection plate system which gives a common deflection center. The electron optics are such that a .0015 inch defining aperture is magnified at the target surface in a 1/1 ratio. The actual resolution of the tube has been measured in a high definition system as 650 lines at the center and 350 lines at the corner. In this camera, it is limited by the video band pass to 400 lines. The tube is again unique in that it uses no mesh nor wall screen and that the bulb is made of G-12 glass with a LIME glass face plate. The absence of a mesh practically eliminates beam flutter, a common problem with most electrostatic vidicons.

Being electrostatic, the tube of course requires no deflection yoke or focus coil. It is wrapped in a high Mu 80 shield and clamped into place with motor block clamps, a high production item in the fastener industry, readily available and of low cost.

The lens as previously mentioned, has a standard Leica thread and the particular lenses supplied as original equipment, when specified, with the camera were especially designed for these units and are of 7 element, anastigmatic, coated, color corrected construction.

The lens mounting flange may of course be changed to accommodate other lenses such as those used by the Practica and Pentax or others as desired by the user.

As presently constructed, the video amplifier circuit is very stable, operating the tubes well below their maximum rating and gives a.15 volt composite video output.

The type 6C9 tubes used in the video amplifiers are series compensated tetrodes, contrary to expectations, there is no perceptible front end noise. The first stage has no plate circuit peaking since it was found the overall gain was quite high and peaking tended to cause a regenerated white noise.

Because of the relatively high output capacity of the electrostatic pickup tube, the correction required is approximately 3 times that of a conventional 6198 type vidicon. Under these conditions the LR Peaker would have caused a loss of gain compared to the RC Peaker used. Aperture correction is provided by the RC combination in the cathode of the 4th stage. Biasing is provided by various means with the first 3 stages operating with about 2.0 volts of bias while the 4th stage operates at about 4.0 volts. The average stage gain is about 12 times.

A plate follower output stage is used for coax line driving, DC restoration and sync mixing. The plate of the tube is at ground potential so that no video coupling condensor is required for the 75 ohm coax output. Sync pulses are mixed in the plate load resistor and the grid/cathode combination serves as a DC restorer, clamping on the blanking signal from the camera tube.

The small trimmer condensor located in the plate circuit of the first video amplifier labeled C15 and located just to the rear of this tube, may be adjusted for video response with minimum capacity usually giving the widest band pass and the lowest gain.

VERTICAL CIRCUIT ... Numerous 60 cycle line drive systems were tried and eventually abandoned in favor of the more expensive blocking oscillator type which gives superior blanking and sync signals being less responsive to power line fluctuations. The output of

the vertical blocking oscillator is directly coupled to a phase inverter which drives the deflection plates. (The Stancor A-8124 transformer was found to give superior results in this particular circuit configuration.) The vertical centering control (R14) is on the top, side mounted adjustment nearest the front of the camera while the vertical height (R52) is the top adjustment nearest the back of the camera or counting from the front would be #5 control.

HORIZONTAL... Horizontal deflection is provided by ringing coil (L7) mounted on the top rear center of the large printed circuit board used in a stabilized multivibrator type of circuit feeding a direct coupled phase inverter which feeds the horizontal deflection plates. It is usually unnecessary to readjust the horizontal frequency at any time but should such an adjustment become necessary a suggested method would be to lightly couple the TV camera output to a conventional home type TV receiver which has been previously locked to a fringe area signal from a standard TV broadcast station. Readjustment of the slug in the ringing coil L7 may then be made to insure horizontal lock. The horizontal centering control (R-17) for the camera tube is the number 2 control from the camera face while the horizontal width control (R59) is #4 from the camera face.

SYNC & BLANKING... Various sync and blanking arrangements were devised and tried but the one finally incorporated into the camera proved to be the most satisfactory even though it would require the use of an additional tube section which most low cost cameras try to avoid. Positive pulses are taken from the horizontal and vertical oscillators and applied to RC net works to the grid of the blanking pentode. This tube is biased so that it is cut off between pulses and the pulse peaks saturate the tube below the knee of the pentode curve. The blanking and sync pulses are therefore squared, of uniform height and of more than adequate amplitude to blank the camera tube.

BLANKING...It will be noticed that the electrostatic camera tube is blanked in a somewhat unusual manner and that the beam control is also quite different from the usual practice. The camera grid is always at 0 volts with respect to the cathode, especially during blanking, so that the grid/cathode diode effect can be used to provide D.C. restoration to the blanking pulses. Beam current is varied by varying the voltage on G2 (base pin 4) this is an analogous to varying plate current in a triode by varying plate voltage. There are two reasons for this: The first is that it permits the grid to be used as a D.C. restorer. The second is that by lowering the voltage on G2 to the lowest possible limit, the effects of the secondary emission from the defining aperture are reduced. When G2 is high, A "ion" spot sometimes appears at the center of the picture. This could be eliminated by using a wall screen or mesh in the tube but this would greatly increase the tube cost.

OUTPUTS... Two standard RCA audio type jacks are provided on the rear of the camera for supplying the camera output to use with associated equipment. The video output as originally stated is a plate follower for feeding 75 ohm coax cable giving approximately one volt with a composite signal containing all blanking and sync information providing resolution of approximately 400 lines. This output also feeds an internal RF modulator circuit which takes the applied composite video signal and modulates it to a standard U.S. TV channel tuneable by the user from channel 2 to 6. This has second harmonic output and may be received acceptably on U.S. Channels 7 - 13. However, a band pass filter will be needed if the RF is to be mixed into a master antenna system. The output of the RF oscillator is also for 75 ohm coax and it is suggested that a (balum) transformer be used when feeding conventional 300 ohms circuits.

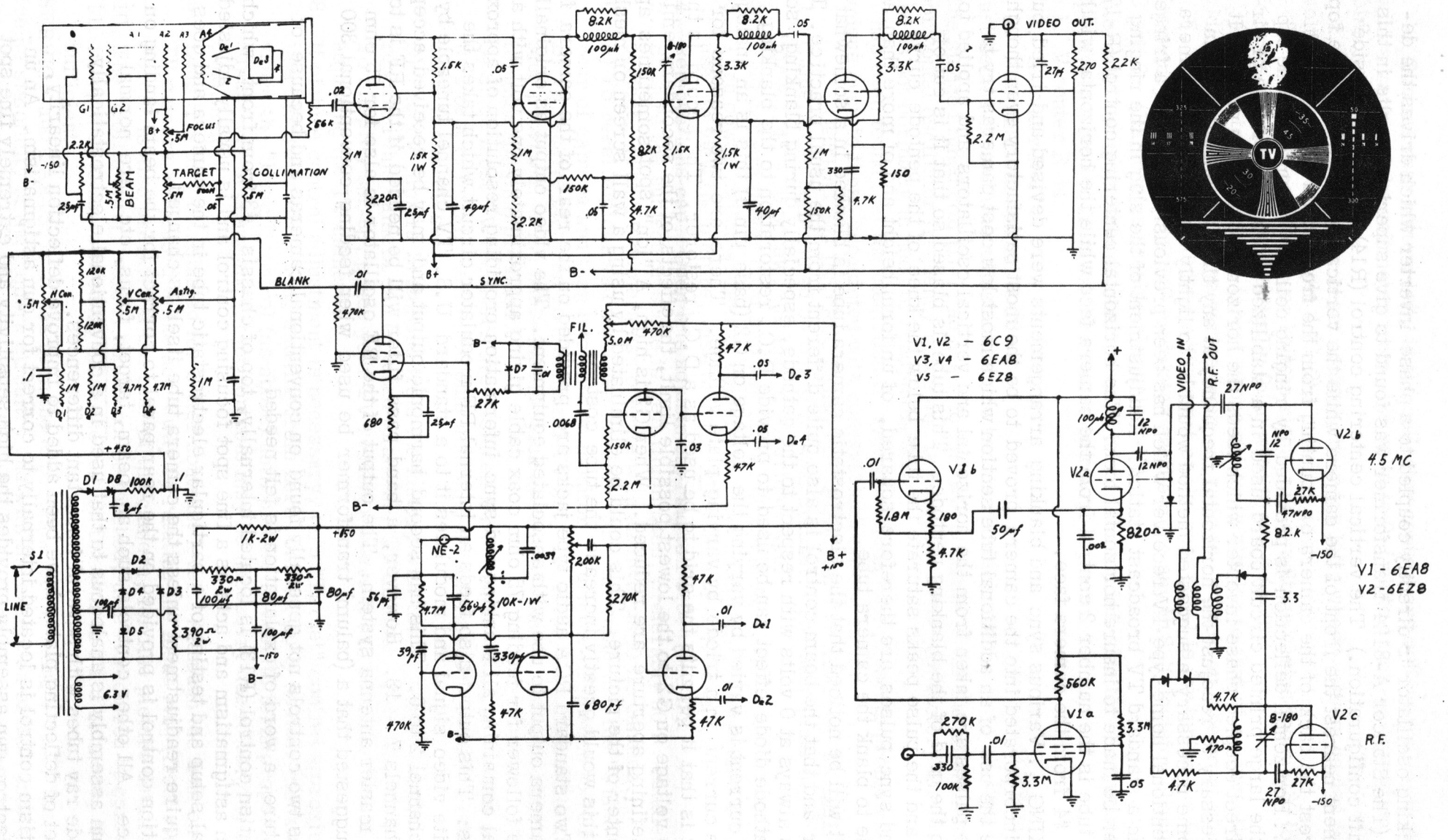
The camera has two controls not generally found on conventional cameras and because of their special nature, a word of explanation is felt needed.

(1) Astigmatisn control (R13) is located internally, top of chassis, #3 from front, which corrects for gun astigmatism and acts as a fine spot focusing control and is usually adjusted during the initial setup and testing of a particular electrostatic tube in the camera and does not normally require readjustment unless the camera tube itself is changed.

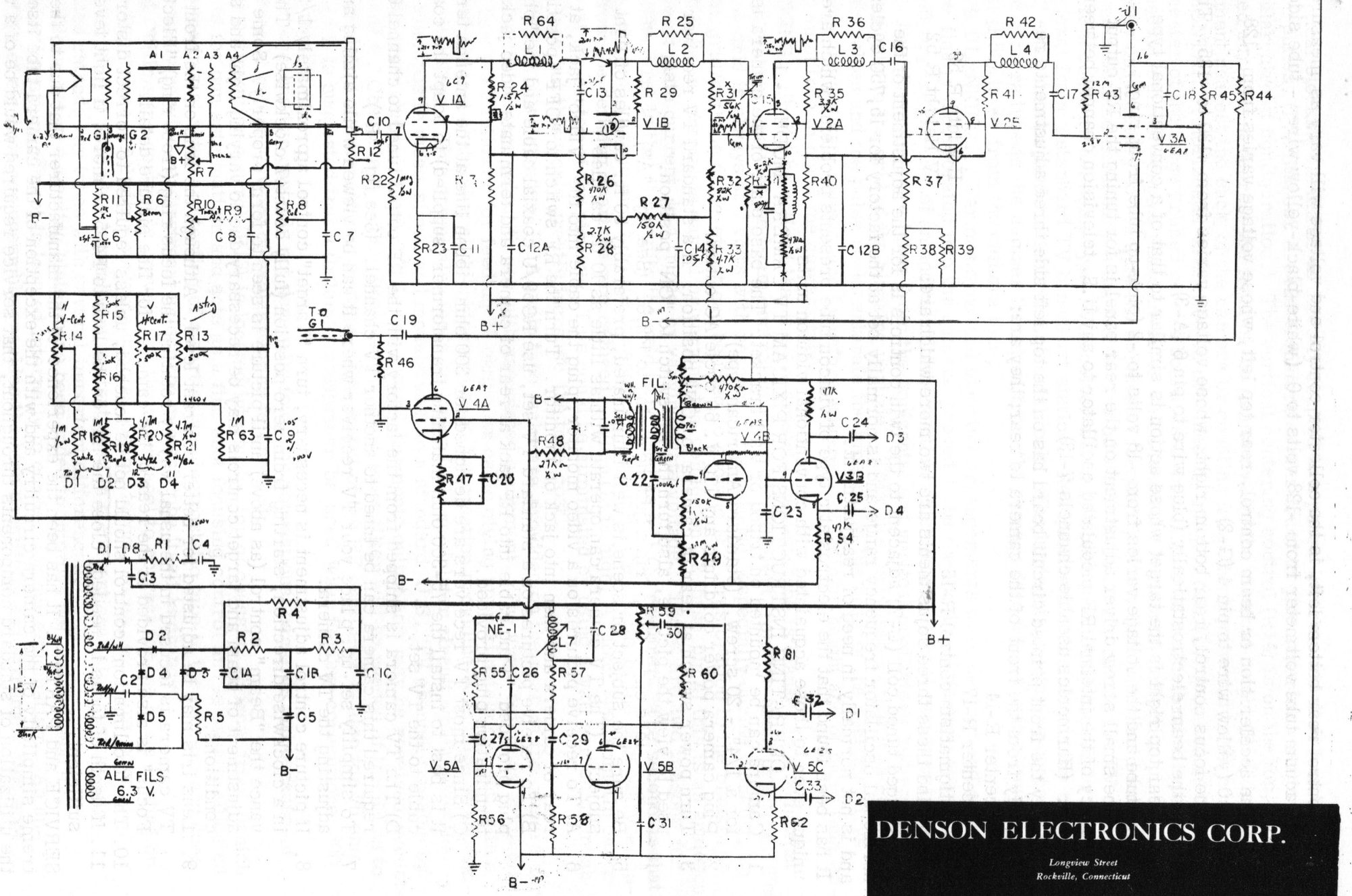
(2) Collimation control is provided on the rear panel to correct for the beam landing on the target surface. All other controls such as beam, target, focus, etc. are normal.

The electron gun assembly is analogous to that used in a conventional electrostatically deflected cathode ray tubes with several important differences.

An additional set of deflecting plates have been added to improve deflection linearity, and an astigmatism control is located internally to correct for gun astigmatism. An unusual type of electron gun assembly provides the high sensitivity and extremely fine spot required for high definition at low accelerated voltages. On the rear of the camera are located 4 controls which are the only ones which it is normally required be adjusted during normal field use.



INTERCARRIR MODULATOR UNIT


A1 A2 A3 A4
G1 G2
B+
R7
B-
R11
R6
R10
R9
R8
C6
C8
C7
C10
R12
R22
R64
L1
R24
V1A
6C9
C13
R25
L2
R29
V1B
R26
R27
R23
C11
C12A
R28
C14
R31
L3
C16
R35
V2A
R36
R32
R33
R40
C12B
R37
R38
R39
R41
L4
R42
C17
R43
C18
R45
R44
V3A
6EA8
V2B
TO G1
C19
R46
V4A
6EA8
R48
R47
C20
C22
R49
V4B
6EA8
C24
D3
V3B
C25
D4
R54
C23
R15
R14
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R13
R16
R18
R19
R20
R21
R63
C9
D1
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D3
D4
D1 D8
R1
C4
C3
R4
R2
R3
D2
D4
D3
C1A
C1B
C1C
C2
D5
R5
C5
115 V
ALL FILS
6.3 V.
NE-1
L7
C28
R59
R55
C26
R57
R60
R61
C32
D1
V5A
6EA8
C27
C29
V5B
V5C
6AB5
C33
D2
R56
R58
C31
R62
FIL.
B+
DENSON ELECTRONICS CORP.
Longview Street
Rockville, Connecticut

1. Control rear bottom left, is the collector control and voltage will vary as measured with a vacuum tube voltmeter from -128 volts to 0 (white-black-yellow wire - tube side pin).

2. The acceleration or beam control, rear top left, whose voltage varies from -128 volts to 0 (yellow wire to pin 4 (G-2).

3. The focus control, rear bottom right, whose voltage varies from +130 to -135. This focuses the beam electrostatically (blue wire to pin 6 (A-3).

4. Rear top right is the target whose action is similar to that of a conventional type vidicon tube and the voltage varies from -18 volts to -2 (pick-up tube front ring).

5. The small screw driver adjustment on the rear panel is for tuning the RF output frequency of the internal RF modulated oscillator to any U.S. television channel between 2 and 6. (Harmonics useable channels 7-13)

Internally the front printed circuit board has on the top left side three adjustments respectively from the front of the camera to rear; they are:

1. V center R-14
2. H center R-17
3. Astigmatism control R-13

H Width R 59
V Height R 52

Just behind these three adjustments are two more which are:

The slugged tuned coil (L-7) adjacent to the twin controls is for the adjustment of the horizontal oscillator frequency range and is normally set at the factory for 15,750 cycles and is not normally in need of readjustment.

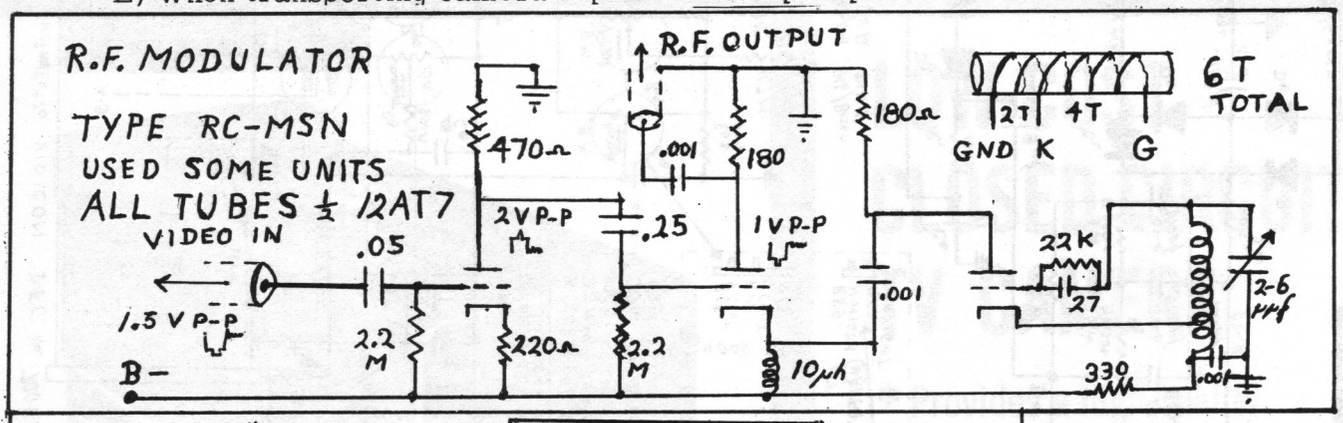
It has been found that the electrostatic type of vidicon tube presents problems which are unique even to those acquainted with conventional vidicon units.

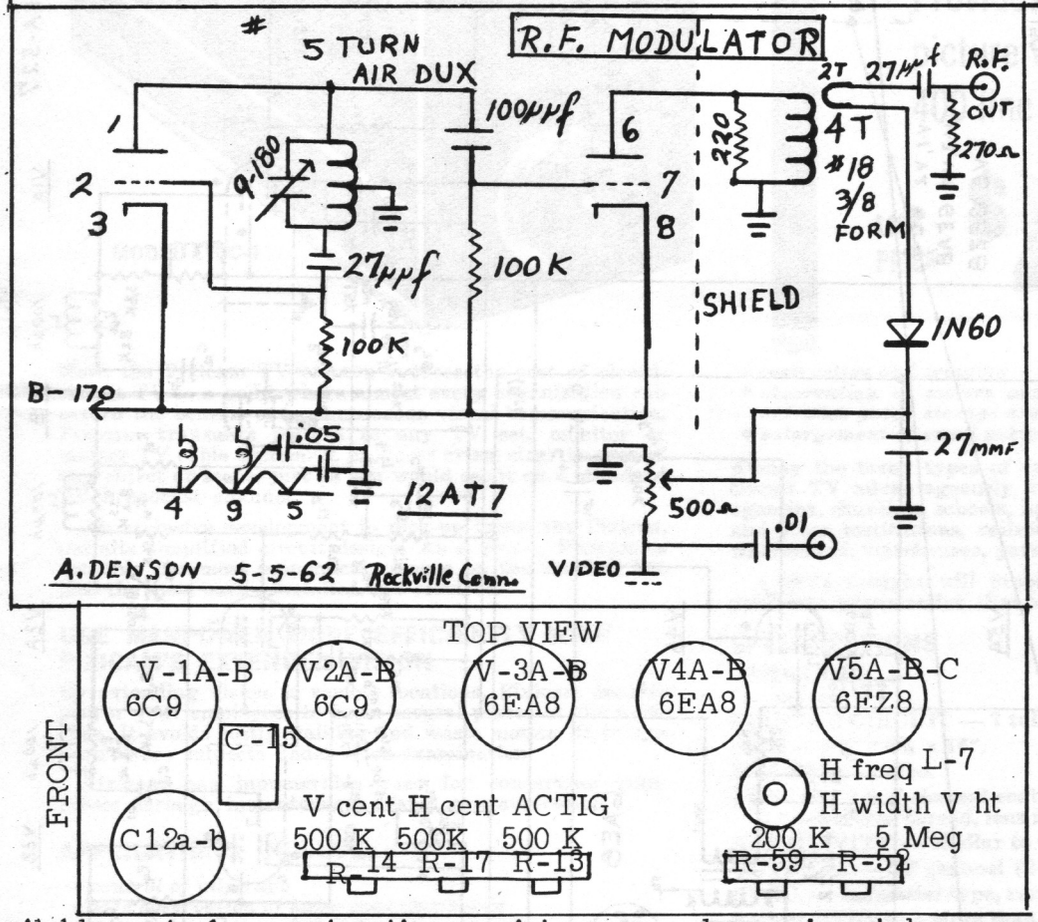
OPERATING INSTRUCTIONS FOR PIXICAM TV CAMERA MODEL - 1

1. Camera can be mounted on tripod or wall bracket. The base plate of the camera is tapped for a 1/4" - 20 screw. (Standard American type)
2. Plug camera power cord into any 110 V. 60 cycle AC outlet.
3. Turn power switch at rear of camera to "ON" position. If a standard TV receiver is to be used to view the picture, also turn the RF switch to "ON" position.
4. Remove lens cap. Open iris adjustment ring to F2.8. (See fig. "A")
5. Be sure the subject or scene is well illuminated, preferably 50 ft. candles of light to the subject. (The TV camera can operate with as little as 10 ft. candles.)
6. A) To receive pictures on a video monitor, plug the cable into the "Video" jack, at the rear of camera and then into jack on monitor. Turn the RF switch to "OFF" position.
   B) To receive pictures on a standard TV set, use RG59/U coaxial cable and the "phono" plug provided. Plug cable into RF jack at rear of camera and terminate video jack with termination plug provided.
   C) Since most TV receivers are designed for 300 ohm ribbon line at the antenna terminals, it is best to install the 75-300 ohm matching transformer (supplied) to adapt the coaxial cable to the TV set.
   D) The TV camera is shipped from the factory with the RF output tuned to channel 6. If required this camera can be tuned to another TV channel. (See fig. "B")
7. To simplify set-up, place your TV receiver where it can be viewed while aiming and adjusting the TV camera.
8. If picture control adjustment is necessary, turn "Target" control approximately 1/2 turn in a clockwise direction, starting from zero position (fully counter clockwise). Then advance the "Beam" control (as above) until picture is seen to form properly. Some further adjustment of beam and target controls may be necessary due to varying light and shading conditions.
9. Lens iris may be adjusted for better contrast level. Although the lens on the front of the TV camera is focused in the usual way by rotating the focus ring (front ring) "Electrical Focus" is also provided at the rear of the camera, for fine picture detail.
10. The "Collimation" control should not be touched, unless required to correct distortion.
11. If depth of focus is needed, close the iris on the lens to F4.5 or more, if light level is sufficient.

SERVICE and PARTS... It has been the experience of the manufacturer that due to the extreme simplicity of the camera circuitry and with the exception of the camera tube itself and the utilization of standard components throughout, that service required would be of a very nominal nature accomplished by any competent technician. Should the purchaser desire any particular, specific part for replacement or other purpose, a quotation as to price and delivery from stock will be cheerfully made upon request.

Notes: A) The Pixicam is designed to feed Video and RF receivers as required.
B) If sound is to be added to the picture (for a complete channel) connect the "Video" output of the Pixicam camera (with RF switch off) to the "Video" input of our A-V Transmitter (Model TT-1). Then feed microphone, tape player or other audio source to proper audio input on the A-V Transmitter.
C) Caution, never point camera at extremely bright lights or objects, like sun or lamps.
D) Never point camera down at more than 40° angle, if there is any physical vibration or shock present.
E) When transporting camera replace lens cap to protect tube and lens.





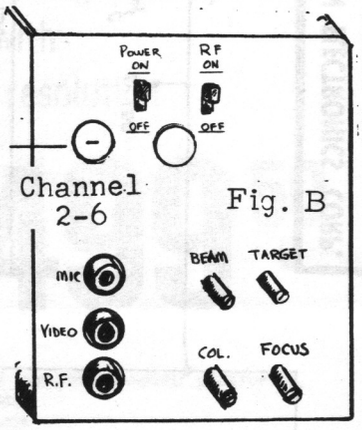


Fig. B

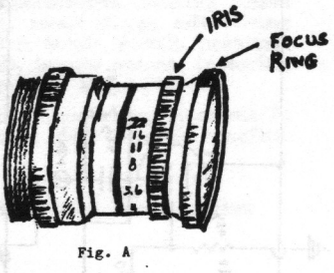
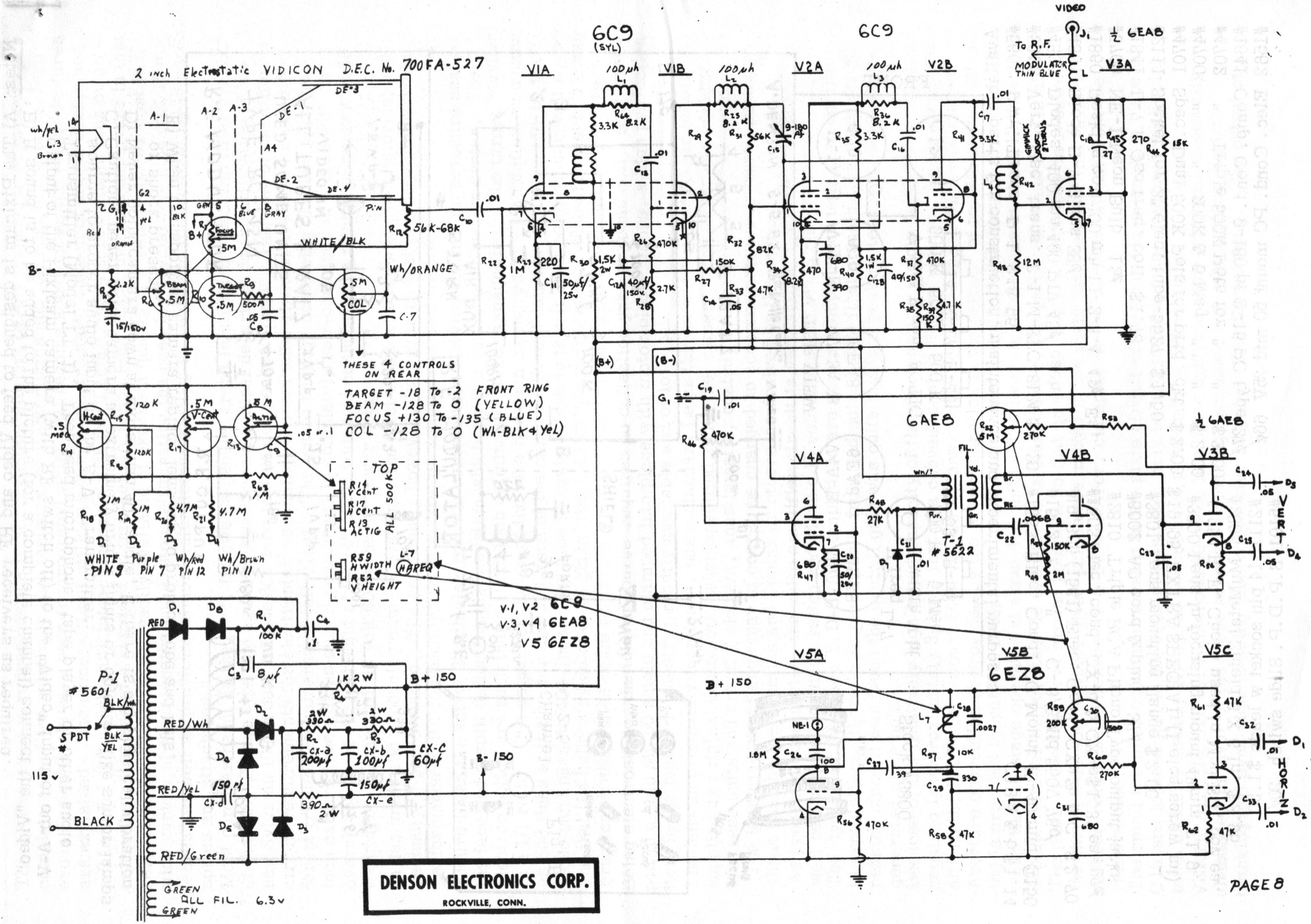


Fig. A

Stock #3800

Available parts for construction, maintenance and experimental purposes:

#5601 Pwr. Trans. P-1 $18.95
#5622 Vert. Osc. trans. T-1 M-STC-8124 $4.20
#4800 Diodes 400 ma 400 PIV 45¢ each
#4801 Diode D-7 Glass 38¢
#1860 Peaking coil 100 mh L1-2-3-4 42¢ Ea.
#5700 NE-1 Neon Bulb 12¢
#1841 L-7 H Osc freq. coil $1.78
#2111 Socket for 2" elec. tube-5527 $1.50
#4701 Spec. Dual 500K Pots for prtd. ckt. $2.00
#4700 " " 200K & 5 Meg " " $2.00
#4702 " Triple 500K Pots for " " $3.00
#1641 Comp. Cond. 9-180 pf C-15 PC type 27¢
#1562 Elec. Cond. PC mount 50 mfd 25V 66¢
C12 a & b $1.14
#1563 Elec. Cond. PC Mount 40-40 mfd. @150
#1502 " " C-3/8Mfd 550V 78¢
#19,805 (1561) Elec. Cond. CXa2b & C $2.70
#1503 Elec. cond. CX-d & CX-e $1.32 ea. 27¢
#2810 Triple RCA Phono Type output jacks
#6002 AC cord & plug 37¢
#3801 Lens mounting flange $2.00
$19.95 EXTRA SPECIAL (Leica screw mt)
#3800 Lens in focusing mount 48mm F1.9
#1754 R.F. Choke used in Mod Fil. 56¢ ea.
#2805 MuMetal Shield 6 X 6 in. $3.95
#2111 14 pin socket w leads $1.50
#5101 S.P.D.P. Slide switch 20¢


2 inch Electrostatic VIDICON D.E.C. No. 700FA-527
6C9 (SYL)
6C9
VIDEO
J1
½ 6EA8
To R.F. MODULATOR THIN BLUE
V1A
V1B
V2A
V2B
V3A
100μh L1
100μh L2
100μh L3
THESE 4 CONTROLS ON REAR
TARGET -18 To -2 FRONT RING
BEAM -128 To 0 (YELLOW)
FOCUS +130 To -135 (BLUE)
COL -128 To 0 (Wh-BLK & YEL)
TOP
R14 V CENT
R17 H CENT
R13 ACTIG
ALL 500K
R59 H WIDTH
R52 V HEIGHT
L-7 H FREQ
WHITE PIN 9
Purple PIN 7
Wh/Red PIN 12
Wh/Brown PIN 11
V1, V2 6C9
V3, V4 6EA8
V5 6EZ8
6AE8
½ 6AE8
V4A
V4B
V3B
T-1 #5622
V5A
V5B 6EZ8
V5C
P-1 #5601
S PDT
115 v
BLACK
RED
RED/Wh
RED/YEL
RED/Green
GREEN
GREEN
ALL FIL. 6.3v
B+ 150
B- 150
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