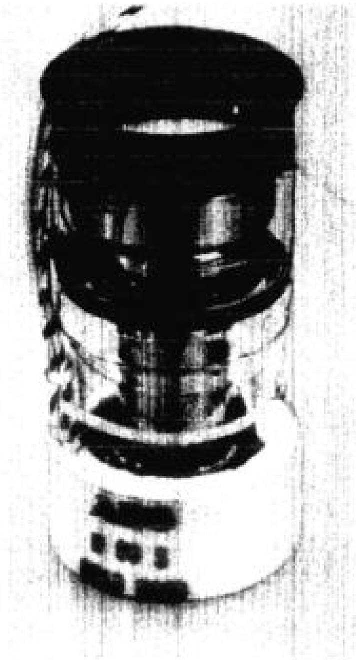
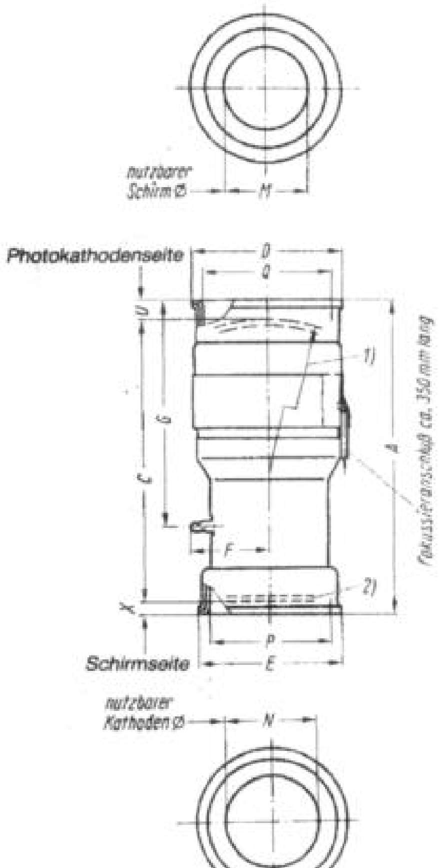
Infrarot-Bildwandlerröhre AEG B 80 S



Anwendung: Umwandlung von Infrarot-Strahlung in sichtbares Licht. Triode mit elektrostatischer Fokusierung ohne eingebauten Spannungswandler. Nutzbarer Kathodendurchmesser 26mm. Nutzbarer Leuchtschirmdurchmesser 23mm.

Röhrensystem--Triode
Fokusierung--elektrostatische Fokusierung
Photokathode---halbtransparent
Maximum der spektralen Empfindlichkeit ca. 800 nm
langwellige Grenze der spektralen Empf. ca 1200nm



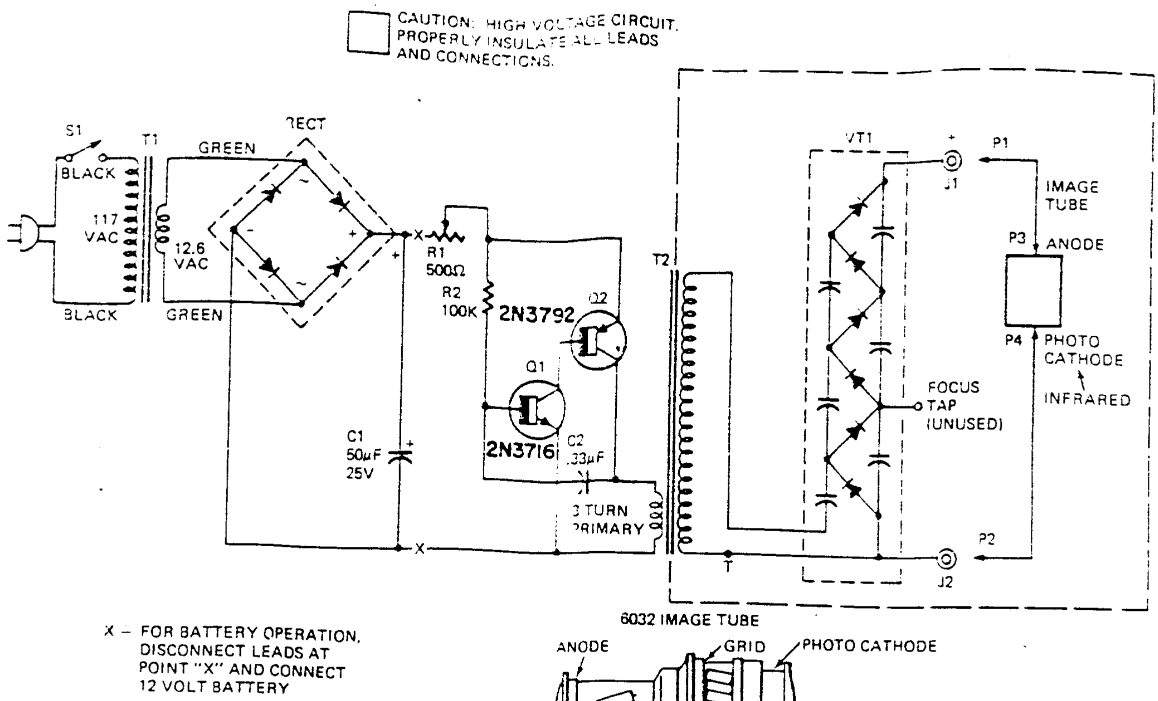
	max.	min.	
A	88,8	87,2	mm
C	80,8	79,2	mm
D	41,9	–	mm
E	40,1	–	mm
F	21,8	–	mm
G	64,0	59,0	mm
M	–	23,0	mm
N	–	26,0	mm
P	34,15	33,85	mm
Q	36,25	35,95	mm
U	5,5	4,75	mm
X	3,5	2,75	mm

Der Brechungsindex des Glases der Kathoden- und Schirmscheibe ist 1,5.

The refractive index of the glass of the cathode- and screen window is 1.5.

Anodenspannung + 16 KV, maximum + 17 KV, Fokusspannung + 3 KV, Maximum + 4KV ,
Dunkelstrom <0,02 uA,Vergrößerung typ. 0,72
Betrieb: Falschpolung der Betriebsspannung kann auch bei nur kurzzeitigem Betrieb zur Beschädigung bzw. Zerstörung der Photokathode führen. Zu hohe Lichtbelastung der Photoempfindlichkeit kann zum vorzeitigen Abfall der Photoempfindlichkeit und zu Einbrennflecken führen.

Die Röhre soll nur mit einem Infrarotfilter vor der Photokathode betrieben werden.



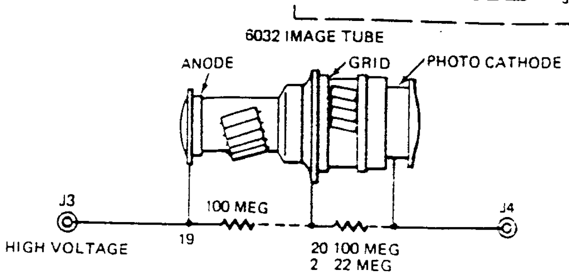


FIG. 1—THE POWER SUPPLY, ac or battery powered dc-to-dc converter develops the high voltage needed by the image converter tube. Parts are cheap and readily available.

for the hazards associated with very high voltages. While the actual assembly goes quite fast, use great care to properly wire and insulate *all* high voltage terminals and connections.

Begin assembly by preparing the power supply housing. The prototype circuit was installed in an LMB Blue Hinged cabinet (B-H 643) measuring 3 × 4 × 6 in., and a drilling pattern for this cabinet is shown in Fig. 2. If any component substitutions are made check the location of their mounting holes before drilling the cabinet.

When the cabinet is drilled, install R1, S1, T1, and the power cord. Use a rubber grommet to protect the power cord where it enters the cabinet. Tie a knot in the cord several inches from the exposed end to secure it in place. Insulate the connection between the power cord and T1's primary with electrical tape.

Install the two high-voltage output jacks in the housing next. The red (positive) jack should be installed in the hole nearest the edge of the cabinet.

Prepare T2 for installation by removing and discarding its 2 turn [illegible] winding. Use a length of No. [illegible] insulated hookup wire to wind a [illegible] 3-turn winding in place of the original winding. The new winding, used as the primary, can be wound anywhere along the flyback's core so long as it is wound tightly around the core itself and not around the fiberboard supporting material. The prototype T2 primary was wound at the base of T2 in a manner which permitted the two leads to be readily accessible.

[illegible] high-voltage output lead. It will [illegible] its free end about an inch from where it enters the secondary winding and carefully remove its insulation. Temporarily install T2 in its position without mounting hardware.

Voltage tripler VT1 can be any high-voltage unit of the type used in late model color television sets. Many manufacturers use the Varo MH-383 and attach their own type number. For example, the Zenith 212-130 is an exact replacement for the MH-383. The only requirement is that the unit be capable of at least 10 kV input and delivering at least 25 kV. Triplers are available from television parts suppliers for about $12. The price may seem high for a handful of high-voltage rectifiers and capacitors, but the individual components would cost far more if purchased separately. And, of course, the pre-packaged tripier is properly and safely insulated with a thick layer of sealant.

If you use the MH-383 style tripler and the cabinet specified in the parts list, it will be necessary to remove one of the two plastic mounting brackets with a saw for a proper fit. Clip off the white focus lead about an inch from the tripler's case since it will not be needed. Finally, install the tripier in the housing with 4-40 hardware.

When the tripler is installed, trim the red high-voltage input lead to an appropriate length and solder it directly to the flyback's high voltage output terminal (the one connected directly to the secondary winding). The black common lead should also be cut to an appropriate length and soldered to the black banana jack. The remainder of the black lead should be soldered to terminal "T" on the flyback. For a slightly higher output voltage you can connect the flyback's width coil winding (terminals [illegible] and [illegible]) in series with the remainder of the secondary as was done in the prototype, but this is not necessary for most image tubes.

Finally, the tripler's high-voltage output lead is cut to an appropriate length and soldered to the red banana jack. At this point carefully inspect all high-voltage wiring and connections for possible errors or shorts. In a high-voltage circuit, a "short" can occur [illegible]

PARTS LIST

C1—50 µF, 25 V electrolytic
C2—33 µF, 25 V
J1-J4—insulated banana jacks
P1-P4—Insulated banana plugs
Q1—2N3716 or other general-purpose npn power transistor
Q2—2N3792 or other general-purpose pnp power transistor
RECT1—50 volt full-wave rectifier (Radio Shack 276-1146 or equal)
R1—500-ohm potentiometer
R2—100,000 ohms, 1/2 W
S1—Spdt toggle switch
T1—Power transformer: primary 117 Vac secondary 12.6 Vac center tapped
T2—Television flyback transformer (Stancor A-8279 or equal, see text)*
VT1—High voltage tripler (Varo MH-383 or equal, see text)*
Image Tube—6032, 6929 or other IR image tube (see text)*
Misc.—Cabinet (3" x 4" x 6" B-H 643 available from LMB, 729 Ceres Avenue, Los Angeles, Cal 90021 for $3.50 or equal), high-voltage cable, high-voltage silicone sealant, perforated board, mounting hardware, marking labels, Plexiglas cylinder for image tube, etc. (see text for details)

*Flyback transformers available from electronics and TV parts dealers.
Image tubes are available from Edmund Scientific Co., 300 Edscorp Bldg., Barrington, NJ 08007.

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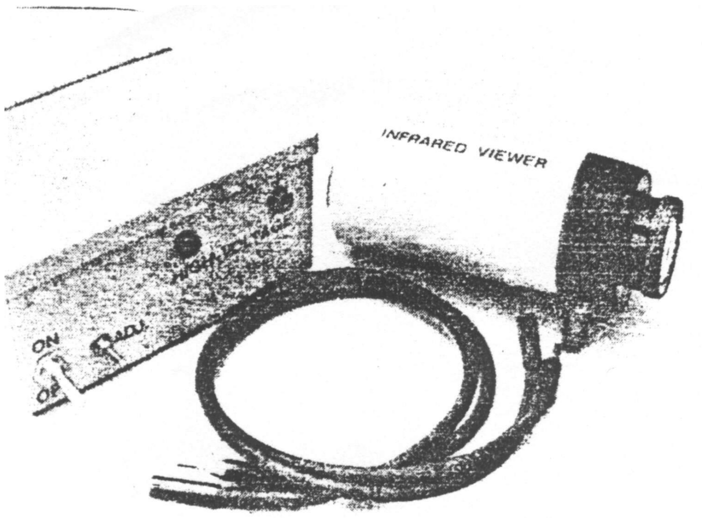
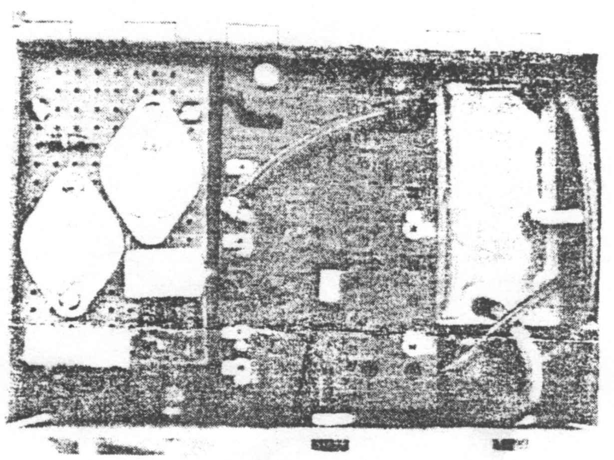


COMPLETE IR VIEWER (left) and a 6032 image tube (above) with voltage divider added. Power supply connections are high-voltage cable.

Bildwandlerröhre



INTERNAL VIEW of image tube power supply. Oscillator is at left, T2 at center and voltage tripler at right. Never open supply housing when operating and never operate supply without a load.

Infrared technology has made rapid strides in surveillance, security, ecological surveys and other fields. This simple experimental viewer has many applications.

by FORREST M. MIMS

INFRARED EMITTING LASERS AND LED'S ARE of great value in light beam communicators, intrusion alarms, and ranging systems. All these applications, however, would be easier to achieve if the invisible beam from the infrared source could be seen during alignment.

Phosphor viewing screens are available for as little as $25, but they suffer from low resolution and limited viewing time before requiring "recharging" from an ultraviolet source. The next least expensive solution is an infrared image converter tube, but even war surplus tubes with an integral power supply cost $300 or more.

An ideal solution to the problem is to assemble the infrared image converter described here. This device is centered around a variable-output high-voltage power supply capable of operating practically any new or surplus image tube and this permits an entire image conversion system to be put together for a tenth the cost of the least expensive commercial units.

How it works

Image converter tubes contain a light-sensitive photocathode which emits electrons when struck by light. Various cathode coatings are available for ultraviolet, visible, or infrared light. An anode surrounding a phosphor coated viewing screen is connected to a positive high voltage and attracts electrons emitted by the photocathode. As the electrons strike the phosphor screen, they excite individual phosphor atoms to higher than normal energy levels. When the atoms resume equilibrium, they emit a yellowish-green light.

Some image tubes require electrostatic focusing and include a central grid for the purpose. The 6032 is an example of an electrostatic focused tube. More recent tubes, such as the 6929, include prefocused internal grids and are easier to operate. Self focused tubes such as the 6929 will operate from about 12 kilovolts, while the 6032 requires a hefty 20 kV.

Too much voltage can damage or destroy an image tube, so a power supply designed to operate a variety of tubes must have a variable voltage control. The very high voltage required for the tube can be generated by several techniques. Since the image tube may be required to operate from batteries in such field applications as aligning an infrared communicator or intrusion alarm, the system should be capable of low voltage operation. In-house operation of the tube, however, is best accomplished by means of 117 Vac. For this reason a compromise circuit permitting both modes of operation at the least possible expense was chosen.

The circuit diagram for the power supply is shown in Fig. 1. In operation, transformer T1 and the rectifier bridge convert the 117 Vac delivered by the household line to 11 volts of pulsating dc. Filter capacitor C1 smoothes this voltage and passes it on to a regenerative amplifier composed of Q1 and Q2.

The regenative action of Q1 and Q2 causes an oscillation with pulses of dc at near the power supply voltage being delivered to the primary of high-voltage flyback transformer T2. R1 varies the voltage output of the oscillator and serves as a variable high voltage control. The dc pulses from the oscillator are converted to ac by the inductor action of T2's primary. T2's inductance causes the dc pulses switched by Q2 to have an undershoot nearly as great in amplitude as the pulse itself.

T2 has a very high turns ratio so a small voltage at its primary is stepped up to a high voltage at its secondary. The high-voltage output of T2, which ranges up to about 14 kV depending on R1's setting, is smoothed and increased by a factor of three by voltage tripler VT1. The output of the tripler is connected to the image tube.

Putting it together

Construction of the high-voltage power supply would be straightforw