RADIO & TELEVISION NEWS

APRIL
1949
35¢

PROJECTION TELEVISION *for* LARGE AUDIENCES

PAGE 52

PROJECTION TV FOR LARGE AUDIENCES

By

GERARD FRANCEOUR
Chief Eng. Television Assembly Co.

A commercially available kit that can be used as a basic unit for custom-built installations.

THE P-520 projection television receiver has a 520 sq. in. (20" x 26") projection screen, brighter than the average 16 mm. movies, which can be viewed comfortably from distances up to 120 feet.

The P-520 is supplied in kit form, with the critical assemblies prefabricated and checked at the factory. This enables the dealer to complete the assembly in his own shop with his own tools and instruments, and keep the entire profit on this stage of set manufacture.

The standard kit is supplied complete with mounting rack, metal sides, and the screen hood, but *without* the front panel. This enables the dealer to custom-tailor the installation by designing and supplying a special front panel, in any material or color or degree of ornamentation, to suit exactly the customer's decorating scheme.

The standard mounting rack provides room to spare for all the units of the television instrument. The dealer can install, in addition, an automatic record player, or a p.a. system, or both, mounting the additional units in the P-520 rack and utilizing its loudspeaker. This is another important source of additional revenue.

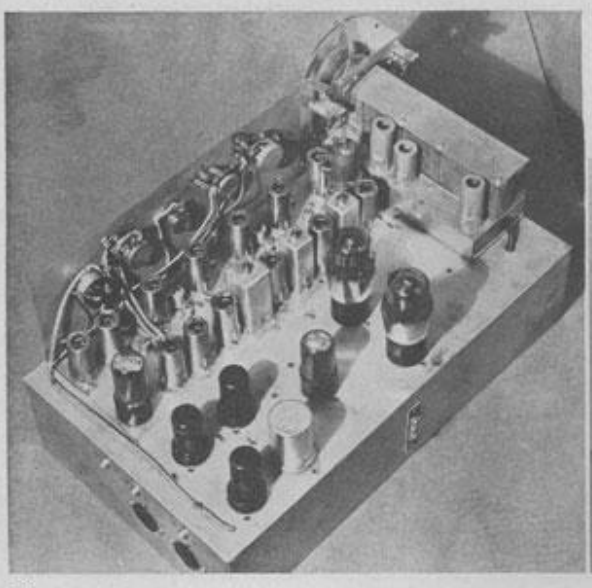
An exhaustive 80-page instruction and service manual, illustrated with photographs, diagrams and charts is supplied with each unit. The manual contains step-by-step instructions for the assembly and adjustment of the instrument, together with service notes on installation and troubleshooting. Complete electrical parts lists, hardware parts lists, and a composite schematic diagram of the instrument are also included.

To follow the technical description, refer to the block diagram (Fig. 1). The blocks are numbered consecutively, from 1 to 12, and we shall proceed in that order: from front end to the low-voltage power supply.

1. *Front End.* This consists of the *Du Mont "Inputuner"* employing a 6J6 as the r.f. amplifier, another 6J6 as the local oscillator, and a 6AK5 as the mixer. This standard unit is already familiar to the readers of RADIO & TELEVISION NEWS, and need not be described in detail, beyond stating that the r.f. amplifier has an input impedance of 73 ohms, and the coupling network to the mixer tube has a bandpass 6 mc. wide. The unit is pre-set at the factory, and no repairs or adjustments should be attempted in the field, but the entire unit returned for replacement, if needed.

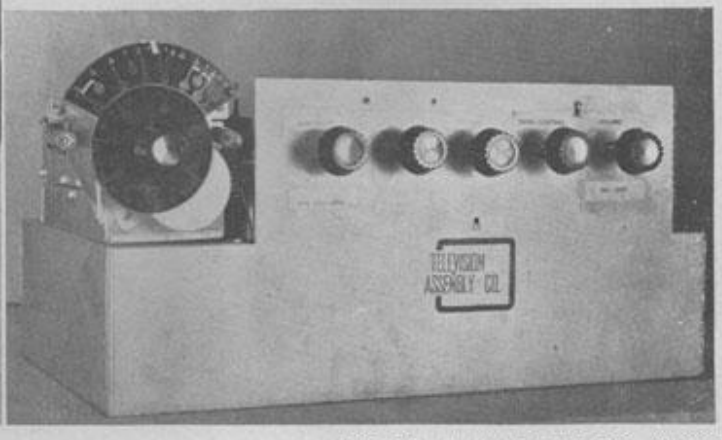
2. *Video Section.* The video i.f. section employs six 6J6 duo-triodes in a unique circuit arrangement. One section of each tube is cathode-coupled, while the other section operates as a grounded-grid amplifier. The signal is coupled from the first section to the second by means of a common cathode circuit, by grounding the grids of the second triode sections. The output of each grounded-grid amplifier is fed to the next stage through a bridged-T coupling network, providing a wide bandpass (4.25 mc.). Five and one-half of these stages are used in cascade. This circuit is shown in Fig. 2.

The output from the fifth video i.f. stage is fed to one triode section of the sixth 6J6, which functions as the detector-driver stage. The second triode section of this tube has its grid and plate connected, and this triode section functions as a diode detector. The signal from the detector-driver stage is coupled to the detector stage by a common-cathode circuit. The output from the plate circuit of the detector stage is then fed to the video amplifier section, with peaking circuits incorporated in the outputs of the detector and the video amplifier stages. Two stages of video amplification are employed, utilizing a 6AG5 and a 6V6 tube. The output from the



Top view of r.f. chassis. All critical assemblies are prefabricated and, when possible, aligned at the factory.

Panel view of the r.f.-i.f. chassis. The front end is a Du Mont "Inputuner" employing a 6J6 as an r.f. amplifier, with another 6J6 as local oscillator, and a 6AK5 as mixer.



Final installation of any television receiver is an important factor for best performance. Availability to antenna lead-in and proper viewing position must be considered.

mixer tube is directly coupled to a converter transformer, the primary of which is tuned to 26.4 mc. (the intermediate frequency of the video section), and the secondary tuned to 21.9 mc. (the intermediate frequency of the audio section).

Only two traps are used: 27.9 mc. and 21.9 mc. These traps are pretuned at the factory but may require an adjustment to meet local reception needs.

3. *Automatic Gain Control.* The system consists of a 6AT6 tube which serves as an a.g.c. noise clipper and a d.c. amplifier. A portion of the output signal from the cathode of the detector-driver tube is fed to the a.g.c. detector section of a 6AL5 tube, and the voltage across a resistor in the cathode circuit of this section is then fed to the diode of the 6AT6; this section of the 6AT6 thus functions as a noise limiter. The output from the 6AT6 diode section is now fed through an integrated network, and the signal applied to the grid of the triode section of the 6AT6, where the signal is amplified and inverted. A portion of this amplified a.g.c. signal now is fed to the control grid of the mixer tube, while the other portion of the signal is fed to the first four video i.f. stages. A feature of this circuit is that overloading of the i.f. amplifiers on strong signals is prevented, yet maximum r.f. gain is obtained on weak signals in the mixer stage.

4. *D.C. Restorer.* The d.c. component of the video signal is here fed through a 1N34 crystal to the sync amplification and separation circuits.

5. *Sync Amplifier and Separator.* The signal is first fed to the control grid of a 6SK7 tube which serves as the first sync amplifier where the sync signal-to-noise ratio is improved. The output of this tube is then fed to the control grid of a 6SH7, which serves as the second sync amplifier. The values of the operating potentials of the 6SH7 are such that the video and blanking pulses are removed and only the sync pulses pass through. Next, a 6J5 triode serving as the third sync amplifier inverts the signal to the required polarity and removes amplitude variations between the sync pulses. The vertical and horizontal sync pulses are separated in an integrating network, and the two groups of sync signals are coupled to the corresponding vertical and horizontal sweep circuits.

6. *Vertical Deflection.* A 6J5 triode and its associated circuit form a blocking oscillator and discharge network, producing a saw-tooth waveform of the correct polarity and frequency in the vertical deflection coils to which the signal is fed through a 6K6 power output tube. The impedance match between the 6K6 and the vertical deflection coils is provided through an output transformer.

7. *Horizontal Deflection.* In the horizontal deflection circuit, one triode section of a 6SN7 tube serves as the horizontal blocking oscillator, while the second section of this tube with its associated circuit forms the horizontal discharge network. The output from the second triode section of the 6SN7 is fed through two 6BG6 power tubes connected in parallel, to raise the signal level to the value required for the operation of the high-voltage power supply as well as of the horizontal deflection coils.

8. *Kinescope and Optical System.* A five-inch magnetic-deflection, electrostatic-focusing 5TP4 projection kinescope tube is employed, projecting the image through an F/1.9 *Bausch & Lomb* focusing projection lens, the image being reflected by the silver top-coated mirror onto the 20" x 26" projection screen.

9. *Sound Section.* The FM sound section is comprised of the sound i.f. section, the limiter-discriminator section, and the audio section.

The 21.9 mc. sound i.f. signal is taken from the secondary of the converter transformer in the front end, and directly coupled to the control grid of the first sound i.f. amplifier, a 6BA6. The sound i.f. signal is then fed to the second i.f. amplification stage (another

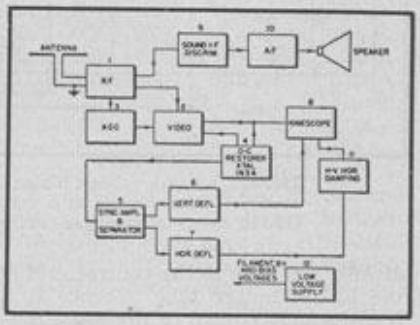
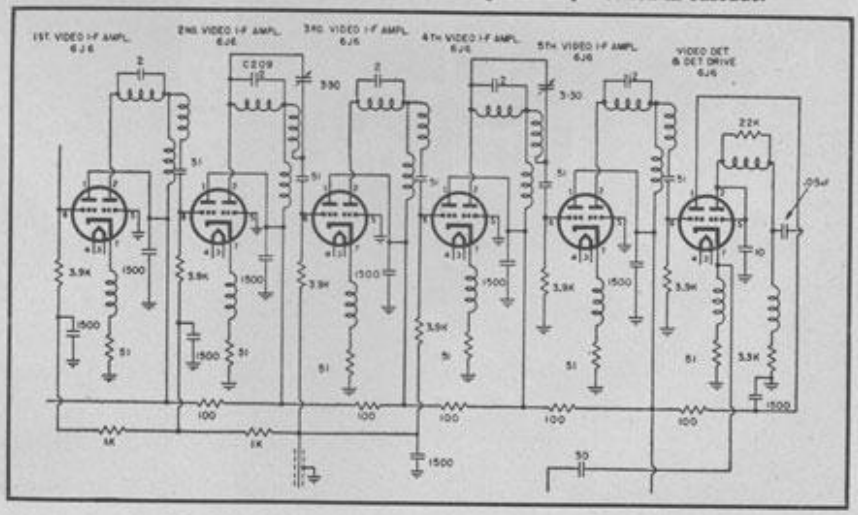
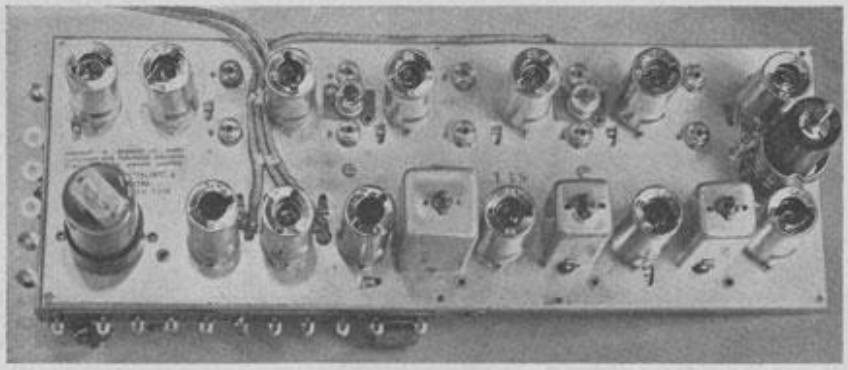


Fig. 1. Block diagram of Model P-520 TV projection unit manufactured by Television Assembly Company. Blocks are numbered to show sequence of operation.

Fig. 2. The video i.f. section of the Model P-520 receiver employs six 6J6 duo-triodes to provide five and one-half stages of amplification in cascade.





Top view of i.f. chassis. This 14-tube i.f. picture and sound strip is shipped pre-wired and pre-tested. Automatic gain control is included.

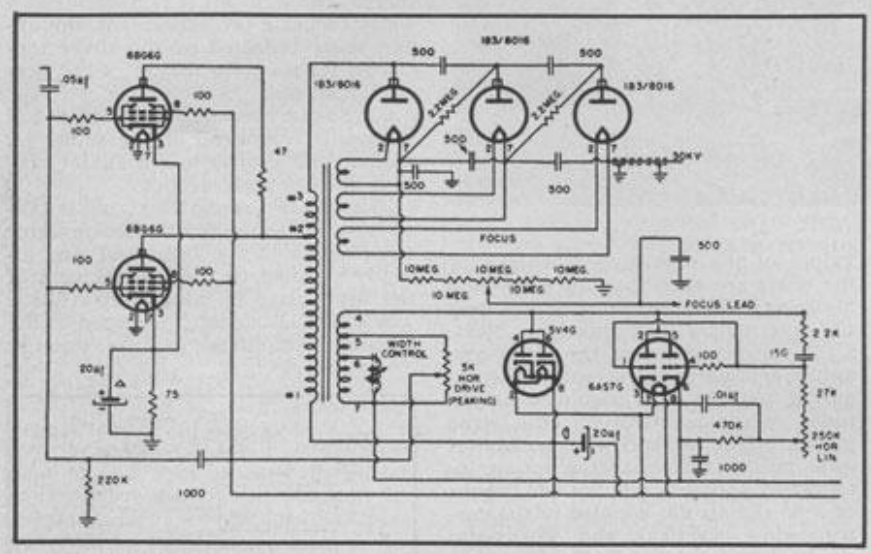


Fig. 3. The high voltage tripler flyback power supply unit. The three rectifiers are arranged in a voltage-tripler circuit. A high frequency (15,750 c.p.s.) is employed, necessitating only a small filter capacity.

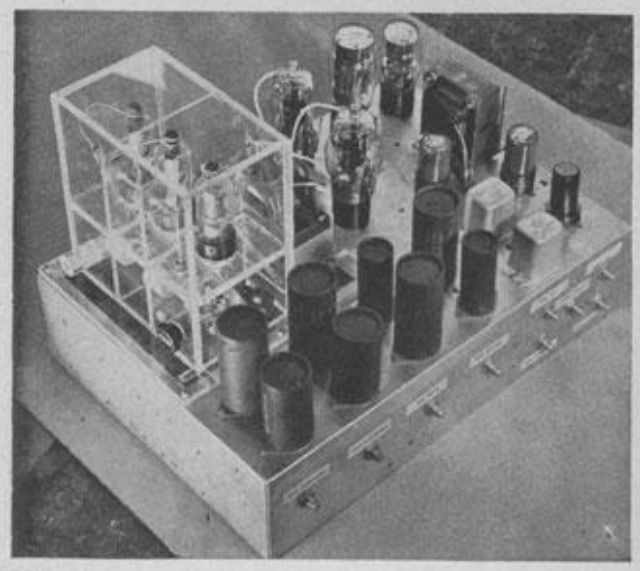
6BA6), and then to the control grid of the 6AU6 limiter tube, whence it is transformer-coupled to the 6AL5 duo-diode serving as the discriminator. The audio component in the output of the discriminator tube is then applied across the volume control.

10. *Audio Section.* The audio output from the volume control is fed to the first triode section of a 6SN7, where it is amplified. The second section of this tube functions as a phase inverter and provides the required signal for the grids of two 6F6 power amplifier tubes working in push-pull. The power stage output is coupled to the loudspeaker through an output transformer.

11. *High-Voltage Power Supply.* The high-voltage power supply unit is shown in Fig. 3. The power supply is obtained from the energy stored in the inductances of the deflection coils during each horizontal sweep. A collapsing field in the deflection coils is produced when the incoming signal cuts off the plate currents of the two 6BG6 tubes, causing a positive pulse to appear in the step-up transformer. These stepped up pulses are then applied to the plates of three 1B3/8016 rectifiers, and at the same time a negative pulse is applied to the rectifier filaments. The three rectifiers are arranged in a voltage-tripler circuit, producing about 27-30 kv., direct current. The horizontal sweep frequency, 15,750 c.p.s., is employed.

12. *Low-Voltage Power Supply.* Two separate low-voltage supply sources, each of 6.3 volts, are provided: one for the heaters of the r.f., video, sync amplifier, and sound sections, the other for the tube heaters of the deflection circuits and the 6AS7 damping tube. The transformer in the first section, in conjunction with a 5U4 rectifier, also supplies "B-plus" and bias voltages for its associated circuits, as well as the negative potentials for the deflection circuits. The transformer in the second section, in conjunction with two 5U4 rectifiers connected in a single full-wave rectification system, furnishes "B-plus" potentials for the deflection circuits. The operation of these two power supplies is controlled by the "FM-Television" switch, with the a.c. power supplied to both transformers when in the "Television" position, and only to the first transformer when in "FM" position. —30—

Top view of deflection chassis. High-voltage power supply producing nearly 30,000 volts is shown within plastic housing.



The kinescope and projection unit. A 5TP4 kinescope tube projects image through an F/1.9 lens onto a 20" x 26" screen.