

# CUSTOM VIDEO Has Built-In BOOSTER

*Details covering an interesting  
new high-performance set which  
features adjustable sensitivity.*

By

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**T**HE trend in current television receiver design has been predominantly along the lines of streamlining in order to reduce the number of tubes in the receiver, a skimping and saving of component parts, reduction in chassis size and any other short cuts that would reduce manufacturing costs. As a result, the average purchaser of a television set is able to enjoy video programs at far less cost than a year or two back. However, there remains a very lush market for the aggressive television technician and dealer who gives equal attention to those who can afford and do demand something better than run-of-the-mill television. One answer to this demand can be found in a television chassis incorporating many features not found in conventional sets and designed especially for the discriminating customer.

By using finest quality components and by utilizing time-tested and proven circuits, in addition to many other special features, this set is ideally suited to custom installation and for use in fringe areas, due to its extreme sensitivity.

As a matter of fact the sensitivity of the set compares favorably with most television receivers that use separate high gain boosters, but instead of requiring two separate units the sensitivity is already incorporated within the circuitry of this new tuner.

Excellent reception is had even up to 125 miles from television transmitters. The circuit incorporates a remarkable

new automatic gain control that operates instantaneously and eliminates all noticeable flutter caused by airplanes moving as fast as 300 miles per hour. It also is capable of eliminating disturbances, such as those resulting from wind-blown outdoor antenna systems and transmission lines, or from persons moving near indoor antennas.

Reference to the diagram discloses the extent to which the design has gone. Perfect interlacing and exceptionally sharp images (extremely important for the excellent picture obtainable on large kinescopes) is obtainable under all conditions of noise by an automatic phase control of both the vertical and horizontal synchronization. Vertical retrace lines are automatically removed by a special erase circuit, which operates even in the absence of a video signal.

The original design employed four 6AG5 video i.f. amplifier tubes. The new circuit employs the specially designed 6CB6 tube. This results in even better performance than was possible with the 6AG5's.

The exceptional ability to provide perfect interlacing is perhaps the most salient feature of this circuit. It means that pictures can be seen with clarity from any usable distance. It is not necessary to employ the old formula which requires the viewer to sit at a certain distance from the picture tube face. Perfect interlacing is the answer to flexible viewing distances.

A total of 25 usable tubes, plus 4 rectifiers are utilized in this circuit. A 6AG5 r.f. amplifier, 6J6 r.f. oscillator and mixer, four 6AG5 video i.f. amplifiers, 6AL5 video detector and d.c. restorer, 6AU6 video amplifier,

6AR5 amplifier, three 6AU6 sound i.f. amplifiers and limiters, 6AL5 FM discriminators, 12AU7 audio output, 6AU6 keyed a.g.c., 12AU7 sync clipper and separator, 6AL5 vertical sync discriminator, 12AU7 vertical control and blocking oscillator, 6AQ5 vertical output, 6AL5 horizontal sync discriminator, 6AH6 horizontal automatic phase control, 6AR5 horizontal oscillator, 12AU7 horizontal discharge and vertical phase inverter, 6BG6G horizontal output, 1B3GT high voltage rectifier, 6W4GT horizontal damper, and in addition, three selenium rectifiers and the picture tube. Any of the conventional 16" tubes may be used, 16AP4 through 16GP4.

A cathode follower audio output of 500 ohms impedance permits connection to any remote system. This consolidation with existing audio equipment eliminates wasted expense of minimum performance systems, currently included in many TV sets. (See editorial, January 1950 RADIO & TELEVISION NEWS.) Separate sound i.f. incorporates a double limiter and Foster-Seely discriminator for outstanding audio fidelity.

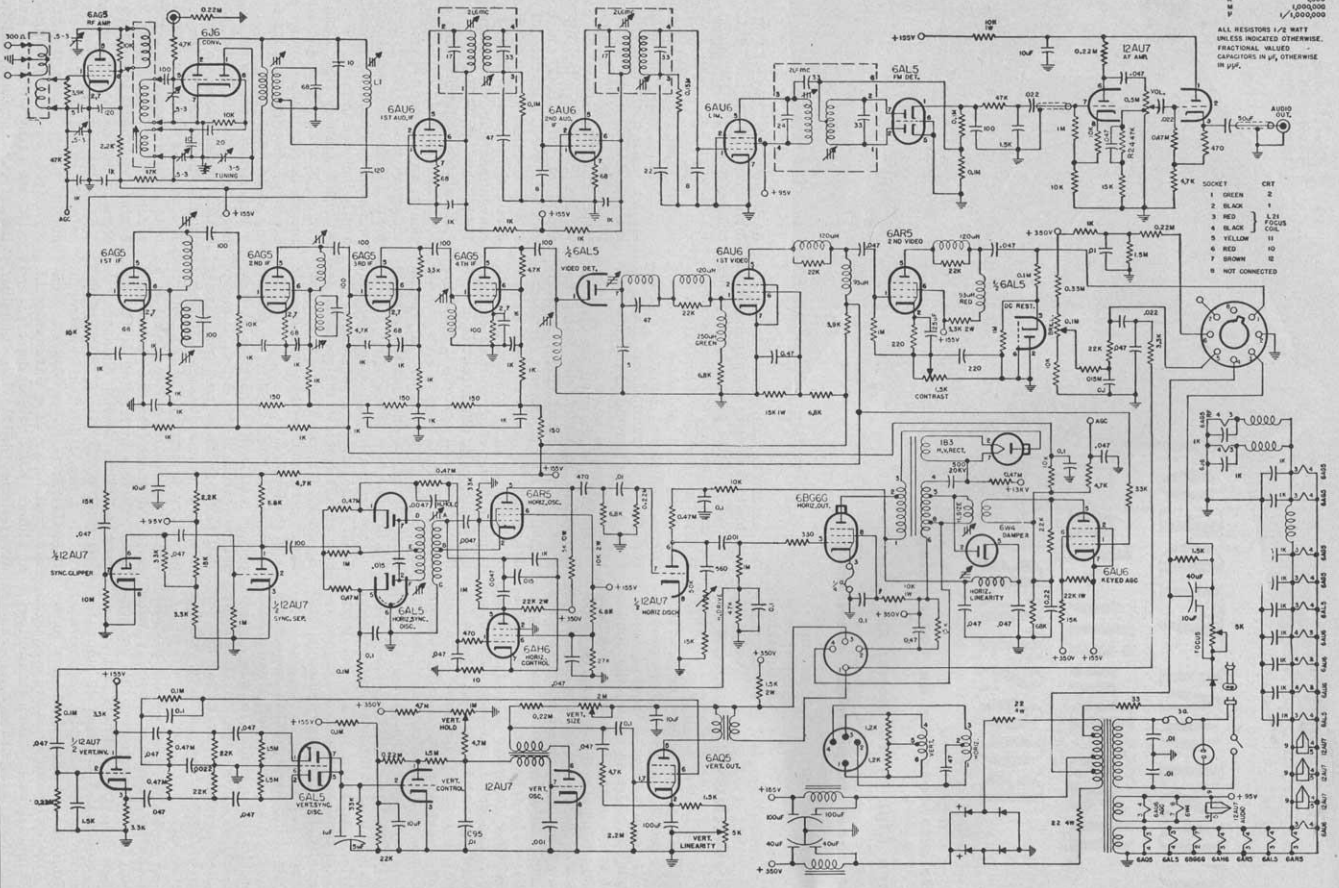
Experience has shown a definite need for separate audio systems in custom installations. In fact they are usually preferred by the customer. The selected output of 500 ohms permits accurate impedance matching to practically any high fidelity amplifier, having an input impedance of 500 ohms or more.

Of particular interest, as will be noted by examining the photos, is the unique turret tuner design. Small cartridges, each containing essential coils, are easily slipped in and out of the turret. The tuner coil cartridges

Over-all view of Radio  
Craftsmen's RC-100 TV  
custom receiver unit.



Schematic diagram of Radio Craftmen's Model RC-100 sixteen-inch television chassis.



NOTATION MULTIPLIER  
 K 1,000  
 M 1,000,000  
 W 1/100,000  
 ALL RESISTORS IN OHMS UNLESS INDICATED OTHERWISE.  
 FRACTIONAL VALUED CAPACITORS IN  $\mu\mu$ , OTHERWISE IN  $\mu\text{F}$ .

AIRCO 602V  
 SOCKET CRT  
 1 GREEN 2  
 2 BLACK 1  
 3 RED 1.21 7500  
 4 BLACK 7500 COL  
 5 YELLOW 10  
 6 RED 10  
 7 BROWN 12  
 8 NOT CONNECTED

furnished for 12 channels can be interchanged in any desired sequence for easier front panel selection, as well as being readily replaceable with u.h.f. cartridges when these channels are made available for television.

The set is capable of being tuned to receive all FM frequencies between 88 and 108 mc. by simply tuning the slugs which are a part of each cartridge. Full FM coverage is therefore possible and the technician should query his customer as to his interest in this feature.

Controls on the receiver are simplified and include only those which are essential to normal operation. They are: Off-On-Sound Volume, Contrast, Fine Tuning, 12 Channel Selector. Secondary controls are mounted conveniently for easy adjustment on the front apron of the chassis. They include horizontal hold, vertical hold, vertical linearity, focus, brilliance and vertical size.

The sensitivity of the video channel (measured on channel 6) is 25 microvolts or less for 1 volt at the detector. The noise figure is minus 12 db.

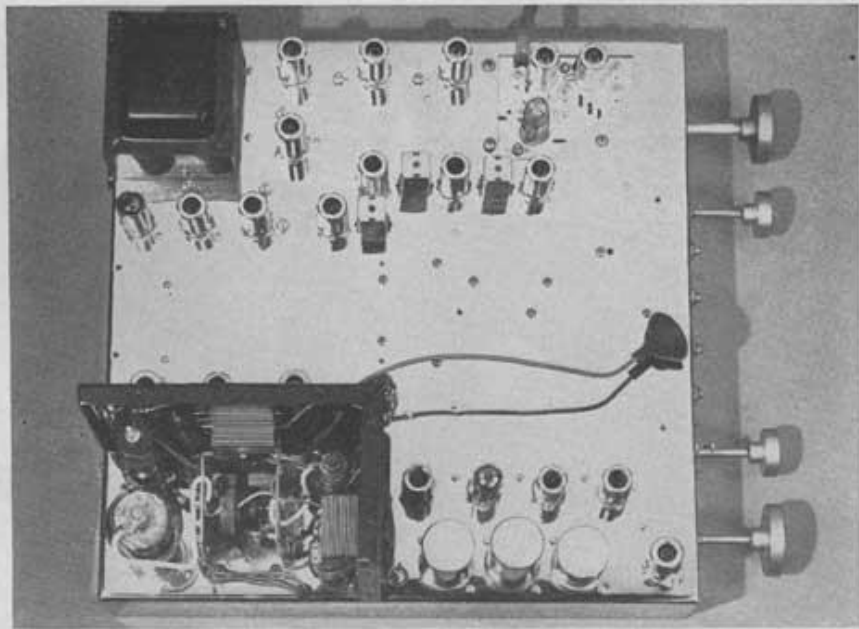
A new development, which adds a 16 db. video boost by shifting the position of the control knob, equals or betters the performance of external boosters. It does not in any way disturb audio reception.

The input circuit employs a 300 ohm balanced primary. Separately matched transformers for each channel are provided. This provides maximum transfer of voltage from the antenna system. The video i.f. is 26.1 mc. while the audio is 21.6 mc. The bandwidth of the video is 4 mc. and the audio 250 kc. Three volts of audio output are available at 500 ohms covering the range of 20-20,000 cycles per second, at less than 1% distortion. Power supplies provide 150 volts at 180 ma., 350 volts at 140 ma. and 13 kilovolts and 500 volts horizontal kickback.

As mentioned previously, the circuit is capable of extreme sensitivity and therefore ideally suited for fringe locations. This is made possible by five separate r.f. coils, including the individually matched 300 ohm input transformers for each of the 12 channels. Tracing the circuit shows that this is followed by six amplifying stages, to provide full four megacycle bandwidth, with negligible phase distortion. Phase controlled synchronization systems, unaffected by noise, control both the horizontal and vertical sweeps. Since the receiver is completely under the control of the instantaneous automatic gain control, itself immune to noise, further improvement is obtained in the synchronization because these circuits are always working at maximum efficiency.

The circuit, with simple additions, will handle the new 19" tubes.

One of the most unique features of the assembly is a remote tube mounting. The picture tube mount has been especially designed to make the picture tube assembly removable from



Top view of the RC-100 television chassis with the cathode-ray tube removed.

the receiver chassis for remote mounting. This is a particular advantage in custom installation. Five mounting screws hold the mount to the chassis. All connections to the picture tube are provided with plugs, so that extension cables can be made of the desired length and inserted in the appropriate sockets. Particular care should be taken with the high voltage extension. Use high tension wire capable of withstanding up to 15 kilovolts. The limiting factor in determining how far the tube can be removed from the chassis is the shunting capacity offered by the picture tube grid (green) lead. This lead should be run isolated from the cables and chassis and in general

6 to 8 feet will be found to be the maximum length permissible before high-frequency smearing results.

To achieve the very low heat dissipation necessary for mounting in confined areas, (wall installations, for example) a new selenium rectifier bridge circuit was developed. It permits the unusually low power consumption of 175 watts.

Many articles devoted to custom installation of television, radio, and audio have been published. The introduction of this new *Radio Craftsmen* RC-100 television receiver is certainly a step forward in the search for perfect television reception for a discriminating clientele.

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Under-chassis view of receiver. Either a 16 or 19 inch kinescope may be used.

