

Constructing the DON LEE Video Receiver

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The original circuit of this tele-receiver was presented in 1931. It has been brought up to date, and is one of the most used and popular for builders.



One of the many tele-receivers built from information furnished by the famous W6XAO.

HEREWITH is presented the television receiver diagram which Mr. Lubcke of the Don Lee-Mutual Broadcasting Corp. had found could give the best reception performance for his television transmitter. He would rather call this his "experimenters receiver" and wants it definitely understood that this diagram may have to be adjusted to the reception of your local television station. Therefore, he suggests that you check with your local station on this setup.

The receiver shown has sufficient gain for reception within forty miles of the transmitter W6XAO in a line-of-sight, unobstructed location with the recommended antenna assembly 25 or more feet above all surrounding obstacles. When these conditions cannot be met, one or more stage of intermediate frequency amplification must be added to increase the gain, and preserve the wide band pass which is required.

The "high" leads in the grid and plate circuits should be made as short as possible to make the stray capacitance to ground as low as possible.

Oscillator coil L-12 is placed over (surrounding) the grounded end of coil L-11.

The i.f. transformers and associated condensers should be put in a tight fitting shield with holes and slotted condenser shafts so arranged that lining up can be done with shields in place while looking at an image. The i.f. is 8000 kc. and the oscillator operates 8000 kc. above the incoming carrier frequency.

Remember that the cathode end of the 905 cathode-ray tube is about 1700 volts below ground. NEVER make any adjustments of this circuit with the power turned on.

If deflection sensitivity is less, amplifiers must be added to the sweep

circuit outputs, or the cathode ray tube operated at reduced anode voltage, for 9" C.R. tubes.

Deflecting plates of the C.R. tube, as viewed from the front of the cabinet: (1) right rear, (2) lower front, (3) upper front, (4) left rear.

The C.R. tube should have a magnetic shield. Stovepipe is satisfactory, which may be black enameled or cadmium plated to improve appearances.

Front panel controls are: tuning (C-1 and C-15 ganged), volume control (R-7), low sweep (R-18), high sweep (R-18) and C.R. intensity (R-11) (optional). The other five controls are seldom adjusted and may be placed on the rear of the chassis. R-9 and R-11 should have short lengths of bakelite rod between the resistor and the control knob because of high voltage.

The receiver proper and the sweep circuit-high voltage apparatus may be mounted on one large or two small chassis. The high voltage transformer (TR-1) and rectifier (VT-8) should be placed as far away as possible from all other tubes, including the C.R. tube. This receiver has been constructed and tested on the Don Lee W6XAO images.

A suitable sound receiver for the reception of the aural portion of the Don Lee Television programs may be had by constructing and applying the attachment outlined below, to an ordinary broadcast or all-wave radio receiver.

It is important to distinguish between the aural or sound portion and the visual or sight portions of a television program. An attachment to exhibit the sight portion of modern television programs cannot be constructed or applied to any existing radio receivers.

The aural attachment is known as a superheterodyne converter. It con-

sists essentially of an ultra high frequency first detector and companion ultra high frequency superheterodyne oscillator. The usual radio frequency circuits in the radio receiver are utilized as the intermediate frequency amplifier. The second detector, audio amplifier, loud speaker, and power supply are utilized as usual.

Since the visual and aural transmissions of a television station are correspondingly adjacent in the ultra high frequency spectrum the two tubes—VT1, VT7, and the associated equipment given in the diagram are suitable with but small modifications. The circuit diagram itself is exactly the same from the antenna to the coil condenser combination C3-L3. In other words, Vacuum tubes VT1, VT7, Coils L1, L2, L11, L12, Condensers C1, C2, C13, C14, C15, C16, Resistors R1, R6, R35, R36, R37, R38, R39, comprise the superheterodyne adapter unit. The difference lies in the placement of a broadcast size radio frequency choke from the plate of tube VT1 to R38 instead of the condenser coil combination C3-L3.

Also, from the plate of VT1 terminal of a .0005 mfd. mica condenser is connected and the other terminal thereof is connected to the antenna binding post of the broadcast receiver. The usual antenna is removed from this binding post. The ground connection to the radio receiver may or may not be used as is the usual practice in the particular installation. However, a connection must be made from the metal chassis of the converter unit to the metal chassis of the radio. A wire is also installed from the high voltage terminal of the power supply of the radio to the junction of Resistors 38 & 39. This supplies the plate current for the converter unit. Similarly the heaters of tubes VT1 and VT7 should be connected to the heater transformer

gess No. 44 1½ volt A battery and two Burgess No. Z3ON 45 volt B batteries on the chassis. These batteries will give about 30 days life at a rate of an hour or two a day usage, are cheap and easily replaced when needed from the stock of almost any radio dealer. For permanent station use larger external batteries would be preferable, while a small a.c.-d.c. "B" pack will probably be available to fit in place of the B batteries for permanent station use. Thus one set serves two purposes—and serves each one well—as both portable and permanent communication receiver.

Circuit-wise, the receiver closely resembles the "Silver-Super" reviewed last month, and from which it takes its origin. It has a number of new points of interest, however, in the lineup of the six tubes. First is a 1A7G regenerative, with its normal oscillator grid used for separate oscillator injection, since the 1A7G when functioning as both detector and oscillator will not operate satisfactorily down to 5 meters. Only one set of coils, as for one wave-band, are diagrammed for detector and oscillator, but actually there are twelve coils, a pair to each of the six wave-bands. The antenna circuit trimmer condenser C2, is shown connected from antenna to grid. This is a neat little trick that enables it to trim the grid circuit at the same time it adds a bit of capacity coupling between primary and secondary—so desirable to equalize r.f. gain over

each band. Regeneration is had in a somewhat new manner which both renders it stable and free of antenna reaction when used with high-impedance antenna primaries, but which prevents any marked reaction on circuit frequency. An r.f. choke of quite special design, tho very ordinary appearance (no, just any 10 mh. r.f. choke won't do the job) is included in the plate circuit between B+ and the first i.f. transformer primary. The r.f. voltage developed across this choke is fed back to the grid circuit (actually across the impedance of C3 in the grid return) thru C1. The direct current grid return is thru R1, the impedance of which is much greater than that of C3.

The balance of the circuit is quite conventional, even tho it employs the new 1G4G driver and 1G6G (1.4 volt version of the 2 volt type 19) twin-triode, push-pull Class B tubes to get what is plenty of loud-speaker volume.

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Don Lee Receiver
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receiver is increased to a maximum value, and the tuning dial set to some position near the high frequency end of the broadcast range at a point where a broadcast station is not received. Nearby powerful broadcast stations are sometimes received by stray pickup in a receiver and this must be avoided otherwise the program of such station and the television aural program will be heard simultaneously.

Condensers C1 and C15 may be brought to two separate dials on the front of the converter unit, or if ganged, should be coupled by an adjustable coupling. This may be of any simple type. To tune in the aural program attempt to do so during a regularly scheduled program and adjust condensers C1 and C15 opposite to each other until the program is received. The inductance of the coils may also require adjustment. This is accomplished by squeezing the turns closer together to increase inductance, or pulling them apart to decrease inductance. There must be a slight mismatch between the tuning of the first detector resonant circuit and the oscillator resonant circuit so that the intermediate frequency may be produced according to the usual theory of the operation of the superheterodyne receiver. In this instance the intermediate frequency provided by the circuits of the broadcast receiver as a whole is in the neighborhood of 1400 kc. Final adjustment of the tuning dial of the broadcast receiver will give a vernier tuning adjustment.

If you desire to utilize the new electro magnetic deflection Kinescopes type RCA 1800 or 1801 they may be adapted to the diagram.

The scanning sources shown as "low frequency sweep" and "high frequency sweep" on the diagram are adapted for electrostatic deflection of the RCA

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In placing the superheterodyne visual frequency receiver in operation it is constructed according to diagram it is likewise important that Condensers C1 and C15 be staggered to give an intermediate frequency of approximately 8000 kc. To accomplish this the two condenser rotors must be misaligned mechanically about 1/4" on the periphery thereof. Neglect in making this adjustment has sometimes caused needless trouble in putting the visual receiver into operation.

Record Player

(Continued from page 37)

entertainment is the provision of a microphone jack as shown. When a single-button carbon microphone is plugged into this jack the voice of anyone speaking into the microphone is heard through the radio. Thus announcements can be made in-between recorded selections, recorded music may be made to serve as an accompaniment for the voice, or the listeners may be "kidded" no end if the record player and microphone are located in another room out of their sight.

As shown in the circuit, a 6A8G pentagrid converter tube is employed in a somewhat unorthodox manner in that grid No. 4 and the plate serve as the r.f. oscillator elements rather than the more usual No. 1 and No. 2 grids. Grid No. 2 is not used at all. By impressing the audio output voltage of the pickup on grid No. 1 the electron stream is modulated and this in turn modulates the oscillator output. In this way effective modulation of the carrier is obtained with the minimum of equipment and complications.

The oscillator coil, which may be an ordinary broadcast oscillator coil, and tuning condenser (one of the trimmer type) resonate the circuit in the broadcast band. Normally this circuit is tuned to the vicinity of 1200 kc. (250 meters) but should there be a powerful local broadcast station on this frequency the oscillator may be adjusted by means of a screwdriver to any nearby channel that is clear. The presence of a distant station on the same channel will not cause interference as the output of the record player, if located within a few feet of the receiver, will be sufficiently great to blanket the distant station.

CONSTRUCTION

It matters but little as to just which method of building the unit is used as long as short leads may be used between parts. A metal chassis would be very suitable provided that no direct wiring is made to this base. Remember that one side of the line is

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