



Top left—main videophone camera and its monitor—camera at left of picture. Lower left—a view under the deck of the camera and looking inside the monitor (smaller apparatus). Top and bottom views at right show videophone camera, with cover removed; iconoscope tube shield is shown in place.

The R. & T. Videophone



Ricardo Muniz, E.E.,*
and S. Morton Decker**

● DESCRIBED in this and next month's article you have "in the flesh" one of the simplest and cheapest Television camera units yet designed for the home constructor, the experimenter, the teacher and the amateur. It makes use of the new RCA Radiotron 1847 amateur Iconoscope.

The authors show how to make this unit into a two-way television-telephone, carrying the picture and voice both ways. How many men have dreamed of doing this! This was made possible, of course, by the "ham" ike—the unit was designed to make use, as economically as possible, of this tube. The use of the RCA 902 cathode ray tube to view the picture is dictated by economy, as the same power-supply is then used for both ikes and also both picture tubes. The use of a 906 or larger C-R tube would necessitate a separate power-supply for them and the addition of sweep amplifiers to the present

This extremely flexible unit can be used as:
Two-Way Television Telephone
One-Way Television Telephone
Modulator Unit in Amateur Radio Television
Television Service Engineer's Video Signal Generator
Television Camera for Demonstrations
Classroom Demonstration Unit

sweep oscillators in order to cover the larger area.

The design is such that either camera can be used with either "monitor." When the nearer monitor is plugged into its camera it is possible to make camera adjustments. When the camera is fully adjusted the nearer monitor is plugged out and the distant one plugged in. The operator is thus assured that he is sending out a good picture.

Two designs are described. In one the use

of the device as a two-way television telephone is uppermost in mind; in this one the second camera has no built-in power-supply at all. The one camera supplies all sweeps, video amplifiers, etc., for both cameras and both monitors. In the second design its use as a one-way unit OR as a MODULATOR FOR HAM TELEVISION is considered more important. The power-supply used in this design is smaller and somewhat cheaper; it is called upon to supply only one camera and one monitor. For utmost flexibility it is desirable to make both units like the latter. In this case the constructor will be able to use either camera completely independent of the other. For maximum economy, however, where two-way television telephone service is desired, the first unit is the one to build.

The tentative amateur television standard was adopted. This is 120 lines per picture, 30 pictures per second. This was done with the use of the unit as a modulator for amateur television, later, in mind. The 120 lines

*Radio Instructor B'Drn. Technical H. S.; Engineer WNYE and Faculty Adv. Television Club.
**Student, B.T.H.S.; President Television Club.

per picture is about the resolution limit possible with the ham ike.

The camera unit containing the power-supply for the complete television telephone system, also contains the video amplifiers which must follow its ike, a blanking and synchronizing impulse tube and the sweep (saw-tooth) oscillators. The other camera in this set-up contains the ike and its videos. The controls provided on the first camera are: Horizontal Sweep Frequency (number of lines per second); Vertical Sweep Frequency (number of frames per second); Focus and Beam Current of the ike; Gain of the Video Amplifier (picture contrast); and blanking level control.

On the monitors, which contain only the cathode-ray viewing tube and its bleeder (besides the plug), are mounted the focus and brilliance controls of the picture-viewing tube, and a jack for a pair of phones (when apparatus is used as a one-way televisionphone). On the camera is mounted a pair of jacks, one for mike and one for phones (phone jack used for two-way videophone operation). The other camera contains an ike and its video amplifiers, a filament transformer, focus and beam current controls for the ike, and a video gain control.

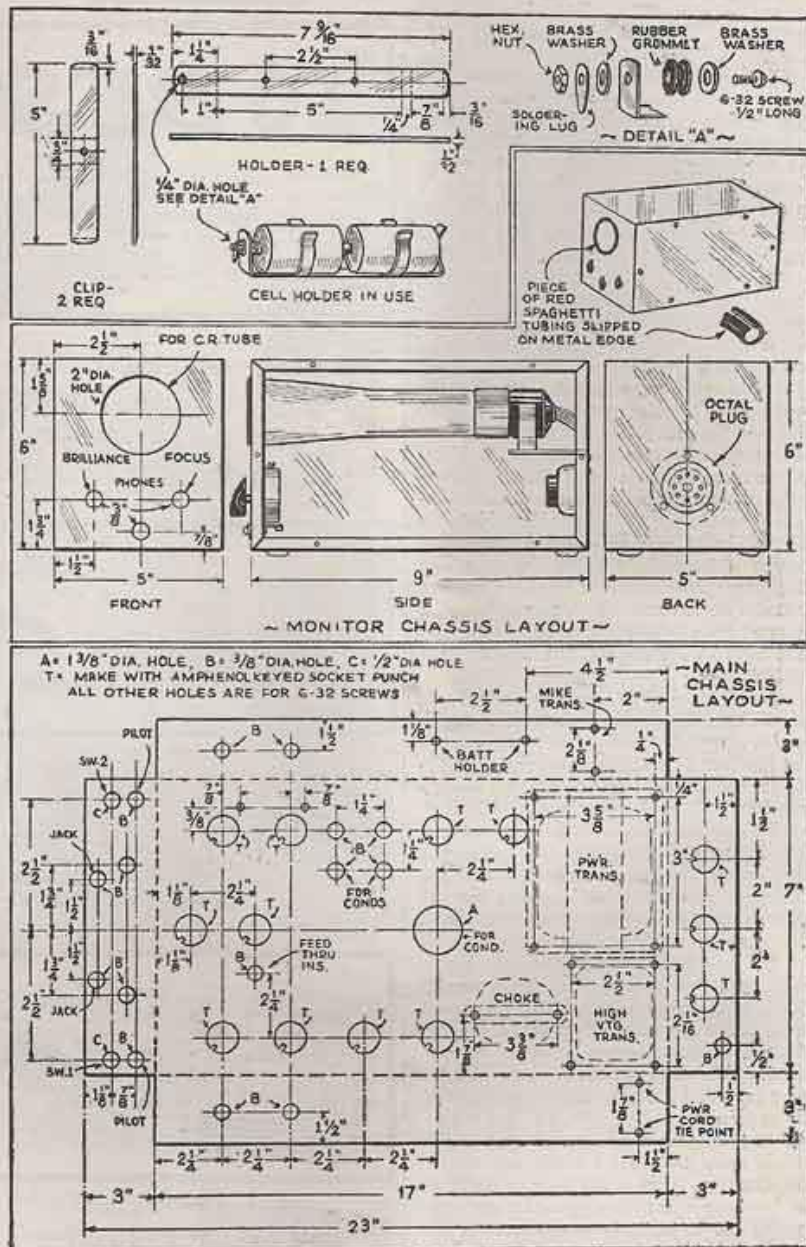
When use of each unit independently is foremost in the mind of the constructor—or if it is intended to build only one camera and monitor (for either one-way televideo-phone OR as modulator for ham xmr) the units will each contain the following. In the camera: power-supply for camera and one monitor complete—this includes a high voltage supply for the ike and the C-R tube and a low voltage one for the video amplifiers and the sweep oscillators. The camera will also contain the bleeder for the ike, the video amplifiers, the sweep oscillators, the blanking and synchronizing tube, the six controls mentioned above and the ike. The monitor will contain a bleeder, plug, jack, and the two controls for the viewing tube. The camera of course has the mike jack and the plug for the cable going to the monitor.

The photographs which accompany this article show the BIG camera and one of the monitors. This is the camera designed for two-way videophone operation and containing the larger power-supply. Note the relatively small size of the unit, also the bare simplicity of the monitor unit. In this two-way unit the other camera will be very empty; the other monitor just like the one shown.

We are accompanying this write-up with full chassis drilling layout and with all mechanical construction details. The sketches will enable the ambitious constructor to get started without any delay. By the time the next article appears he can be ready to mount parts and wire the unit he has elected to construct.

In the meantime final tests and improvements are being made on the videophone units at the laboratories of the Television Club at the Brooklyn Technical High School to assure the constructor that he is going to have a completely "de-bugged" outfit which will work well—first crack!

At the present moment we are employing five video amplifier stages—four using 6AC7 tubes and one a 6AG7. We are endeavoring to improve the gain, without im-



Drawings above show detail of cell holder; monitor chassis layout (center) and lower view—main chassis layout.

pairing the response of the videos, in an effort to do with three stages in place of five. Five are a little fussy to keep stable and without tendency to oscillate. However, should they prove absolutely necessary, following our plans will assure good results.

We have endeavored to build the camera unit upon the smallest possible chassis, so that it may not be clumsy and so that it can later be mounted upon a regular heavy wooden camera tripod for out of doors use. The experimenter may therefore employ a larger chassis. In this case it is suggested that the space between the power-supply and the rest of the unit be increased and that additional separation be provided between the sweep oscillators and the videos. This enlargement will require less careful routing of wiring in the unit. With care in rout-

ing of leads, it is not necessary to make the unit any larger than we have. Naturally the experimenter will so route his wires as to: avoid regenerative feedback in the videos; hum pick-up by wiring of the low-level stages, etc. The specific precautions will be listed in the next article. By the way, a suggested change which would make the camera lighter would be to build its power-supply as a separate unit, and to put a cable between the camera and the power-supply. The authors felt, however, that better a heavy camera in one unit, than to have to "portage" two units!

The drilling dimensions given correspond to the parts used by the authors. These parts will be listed completely in the coming article, so the constructor will be able to get exactly the same parts to fit his drilling.