New Two-Volt Tubes

THE R.C.A. Radiotron Company has recently announced the production of three new tubes, all designed to operate at the same filament potential, 2 volts. A general purpose tube, a power output tube, and a screen grid tube form the new series. The general-purpose tube, known as the UX-230, and the screen grid tube, the UX-232, correspond approximately (in characteristics other than filament voltage and current) to the Type '01-A and Type '22 respectively. The power output tube has no approximate counterpart in the present smaller sizes of audio output tubes, but to some extent averages the characteristics of the present Type '12-A and '71-A.

THE UX-230

The new general-purpose tube is similar to the Type '99 in external appearance, but the elements are those of the Type '01-A reduced to an appropriate size to fit the envelope. The small standard base and pin connections are used. The tentative ratings and average characteristics of this tube are listed below. The corresponding characteristics of the Type '01-A are also given for comparison.

	UX-230	*UX-201-A*
Filament voltage	2.0	5.0
Filament current, amperes	0.06	0.25
Plate voltage (maximum)	90	90–135
Grid voltage (C-bias)	−4.5	−4.5 to 9.0
Plate current, milliamperes	2.0	2.5
Plate resistance, ohms	12500	11000
Amplification factor	8.8	8.0
Mutual conductance, micromhos	700	725

The approximate direct inter-electrode capacitances of the UX-230 are as follows:

Grid to plate	6 μμfd.
Grid to filament	3.5 μμfd.
Plate to filament	2 μμfd.

The tube is suited to all uses to which a Type '01-A may be put, either as a radio-frequency amplifier, detector, or intermediate audio amplifier.

THE UX-231

The UX-231 is designed "for use in the last audio stage only," and is capable of delivering a moderate amount of undistorted power output to the loud-speaker. In appearance it is exactly the same as the UX-230, the only noticeable difference in the construction being in the spacing of the grid wires. Tentative ratings and average characteristics of this tube are as follows:

Filament voltage	2.0 volts
Filament current	0.150 amperes
Plate voltage, maximum and recommended	135 volts
Grid voltage (C-bias)	−22.5 volts
Plate current	8 milliamperes
Plate resistance	4000 ohms
Amplification factor	3.5
Mutual conductance	875 micromhos
Undistorted power output	170 milliwatts

The approximate direct inter-electrode capacitances are the same as those given above for the UX-230.

When operated at the recommended plate voltage the grid bias should never be lower than the values specified above, since a lower bias will

THE UX-230

cause an increase in plate current which may adversely affect the performance of the tube. When used correctly the output may be fed directly into a loud-speaker of suitable impedance without the use of an output transformer, since the plate current is comparatively low.

THE UX-232

The new screen-grid tube has about the same external appearance as the Type '22, but the construction of the elements is somewhat different, the control grid and inner screen grid being oval instead of cylindrical, and the filament is in the form of an inverted "V." The arrangement of the elements is shown in an illustration.

The average characteristics of the tube are listed below, together with the corresponding figures for the Type '22.

	UX-232	*UX-222*
Filament voltage	2.0	3.3
Filament current, amperes	0.06	0.132
Plate voltage, maximum	135	135
Grid voltage (C-bias)	−3.0	−1.5
Screen voltage, maximum	67.5	67.5
Plate current, milliamperes	1.5	1.5
Screen current	Not over 1/8 of plate current.	
Plate resistance, ohms	800,000	850,000
Amplification factor	440	300
Mutual conductance, micromhos	550	350

The effective grid-plate capacitance of the UX-232 is 0.02 μμfd., maximum.

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ment adopted in the consideration of questions of policy brought forward by letters to some of the directors from some of their constituents. The members of the Board agreed to undertake the operation of a radio net of their own on the air, the Directors' Chain, and they elected Professor Woodruff as chairman thereof.

The foregoing account is at best an outline of the definite actions taken by the Board. It cannot begin to record the discussions which took place on the many angles not only of these questions but of about every other problem that could be thought of. In addition to their formal meeting the directors inspected the properties of the League, the offices and the headquarters station W1MK, and found time to better their acquaintance with the headquarters personnel and its work.

Somebody recently wished out loud that when Warner wrote up these Board proceedings for *QST* he would cut out the moralizing, give a bald recountal of the facts, and refrain from "interpreting." We've done our best, but we can't refrain from concluding that it was a good meeting and that it shows that we have a strong and workable system of self-government in our League.

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It will be noted that the mutual conductance of the new tube is about 50% greater than that of its predecessor, with a slight decrease in plate resistance. Greater amplification can therefore be expected from the UX-232 when substituted for the Type '22 without any changes in circuit constants other than those necessitated by the lower filament voltage and a slight increase in the grid bias. When used in present receivers operating from a 6-volt battery, both these changes can be made simultaneously by the insertion of a 50-ohm resistor in the negative leg of the filament, the grid return being made to the battery side of the resistor.

Screen-grid voltage should be obtained from a tap on the "B" battery rather than from a dropping resistor connected between the plate and screen grid. Variations in screen current of individual tubes make this necessary. As with all screen-grid tubes, the screen-grid should be bypassed to ground by a comparatively large condenser.

The new tubes have been designed to be non-microphonic, and therefore should find wide application in automobile receivers and other portable sets. The low filament current and voltage make dry-cell operation entirely practical, although care should be taken to maintain the actual voltage on the filaments at not more than two volts. It is therefore recommended that a filament voltmeter be employed, particularly when dry cells are used.