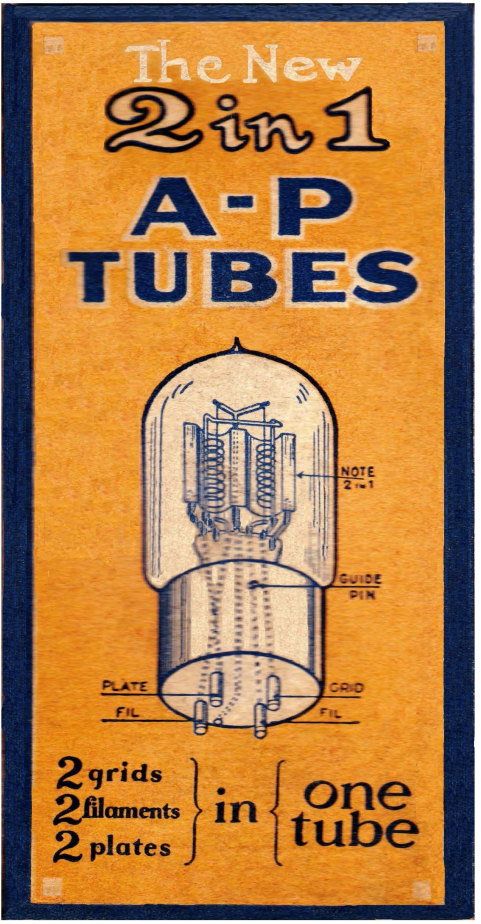
The New Two In One A-P Radio Tubes



A-P Radio Laboratories

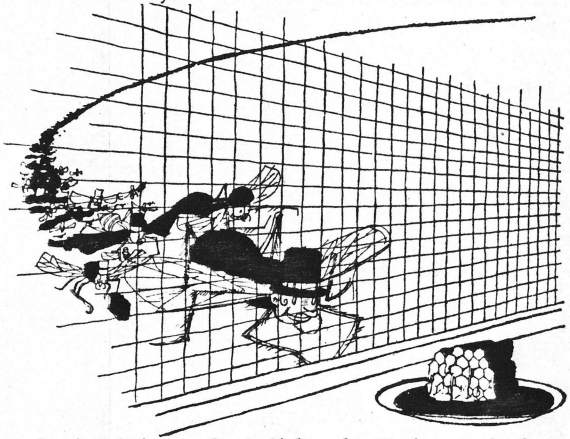
650 Mission Street San Francisco, California, USA.

THE new A-P "Two-In-One" Radio Tube is the only fundamental improvement in Radio Vacuum tubes since they were first made. It differs radically from other tubes by overcoming the inherent weaknesses of other tubes and at the same time emphasizing their strong points.

HOW RADIO TUBES ARE MADE:

The most important factor in any vacuum is the filament. When heated to a certain degree this filament gives off negative centers of energy called electrons. These electrons are attracted by a metal surface within the tube called the plate, just as flies are attracted to a plate of honey. This attraction is caused by a positive electrical potential eminating from the "B" battery.

The third element and the one which has made present day radio possible is the Grid. This consists of a number of wires closely spaced around the filament and placed between the filament and plate. When so placed this grid becomes the controlling factor of the electrons, passing from filament to plate. When your radio is working this grid controls the filament electrons and at certain instances keeps them from reaching the plate, just as a screen at the window keeps the flies from the honey.



In A-P "Two-in-One" Tubes the Grid controls the electrons, just as the screen controls the flies after the honey.

By its amount of grid surface or control can be determined the probable efficiency of your tubes. In the new A-P "Two-In-One Tubes you have **two** grids—**two** filaments—**two** plates, all in one tube, operating to give you greater clarity, greater efficiency, greater distance, yet consuming only ¼ ampere of filament current.

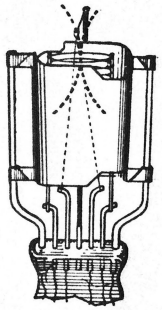


Fig. 1

In so-called standard tubes the plate and grid construction is oval and there is a pronounced loss of energy between the legs or lengths of the filament, due to difference in potential. (See Fig. 1).

In A-P "Two-In-One" Tubes the grids and plates form two complete and separate circles, giving them greater mutual conductance and greater amplification. The plates, which completely surround the two filament lengths conserve the energy that ordinarily is lost in other make tubes. (See Fig. 2).

The new A-P "Two-In-One" Tube is fully protected by the United States patent office, both as to construction and principles. Each tube is carefully tested, with instruments and actually on the air. All tubes are matched and balanced before packing. Certain factory marks on the carton indicate the particular characteristics of each tube.

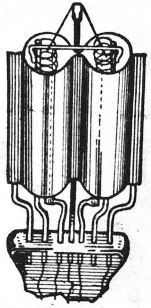


Fig. 2

When using several tubes in a set it is always best to use those of like character for best results. After many, many months of exhaustive tests our laboratory has determined definitely what A-P Tubes work best together in each of the better known radio sets.

Would you try to move a load of hay to market with a horse, a goat and your pet dog, or would you hitch up animals of like power and characteristics? (See Fig. 3).

Do not expect to get full efficiency by using different kinds of tubes of varying size and capacity. Use new A-P "Two-In-One" Tubes of like characteristics to best amplify what is in the air. Follow this plan and we can guarantee you'll get greater distance—greater clarity—more general efficiency and use less plate current on higher voltage. Complete operating data as to

which A-P tubes work best in certain standard sets is given elsewhere.

To make it easier to understand. You want to hear clearly and distinctly what's in the air. You want volume. You want tone. You want minimum distortion.

For your radio set substitute (mentally) a fisherman, trying to catch the tiny fish (far distant stations) with a net intended only for whales. How many fish get away? How many get by and through the net grid?

But, suppose the fisherman used a net of finer mesh —a tube with double the grid surface of so-called standard tubes! (See Fig. 4).

The new A-P "Two-In-One" Tubes are the "fine mesh net" of radio. Having double the grid and double the plate surface they naturally control more electrons than tubes with only half the grid and plate surface.

There also is a big advantage in the construction of the "Y" shape filament support wire which is connected to the shell of the base of the A-P tube. This may be operated as a center tap from the two filaments. By means of this center tap you can connect the filament of your new A-P tubes in series or in parallel and operate them on either three or six volts. Should one filament burn out or break, do not throw away the tube. You can easily restore it to useful life by operating the remaining filament over this center tap as a return lead. It also may be used in place of a potentiometer. Or, in a circuit where an alternating current supplants the storage battery you may connect a lead from the center tap of a suitable transformer to the center tap of the tube, which is connected to the center tap of the base. This will give equal voltage to both filaments at all times and materially reduce the A-C hum.

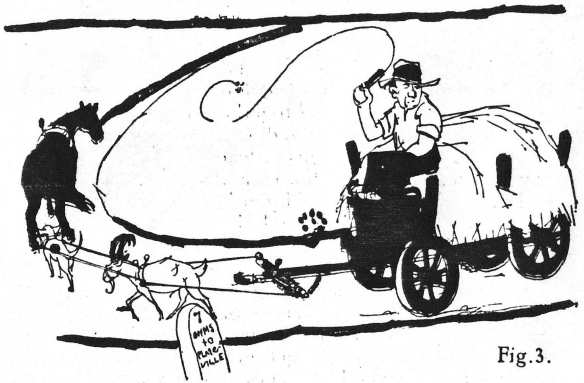


Fig.3.

Hitch-up Radio Tubes that will pull together.

Because it takes advantage of all the energy without waste, the new A-P "Two-In-One" tube can and does handle more power without distortion. It's amplifying power, as compared with the power of other tubes is that of the elephant compared to the power of a horse. The elephant can perform many times the work of a horse with no greater expenditure of energy. Again—the so-called standard tube will give good service with a 90 or 100 volt "B" Battery. The A-P "Two-In-One" tube will handle up to 400 volts "B" Battery without distortion. This means less effort to bring in distant stations—greater clarity—easier tuning—greater efficiency of your set.

TEST THEM IN YOUR RADIO SET.

The only fair way to test the efficiency of A-P "Two-In-One" tubes is in your own radio set. Do not try to determine their efficiency with antiquated instruments made especially to test some other make of tubes.

When using the new A-P "Two-In-One" tubes in any sensitive set, reduce the rheostat setting to the lowest possible point: **otherwise there is danger of oversensitizing the set,** which will cause undesirable noises and distortion. This merely emphasizes the fact that the new A-P tubes are super-sensitive and that balanced tubes of like characteristics should be used. People have asked what we mean by "sensitivity" in a radio tube?

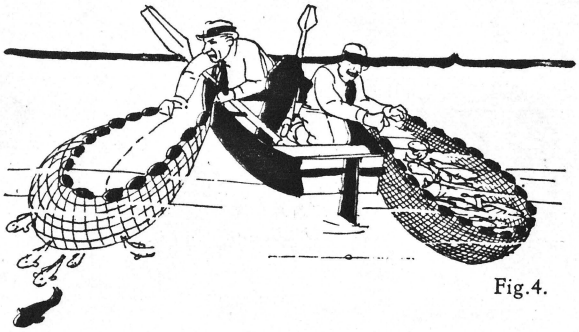
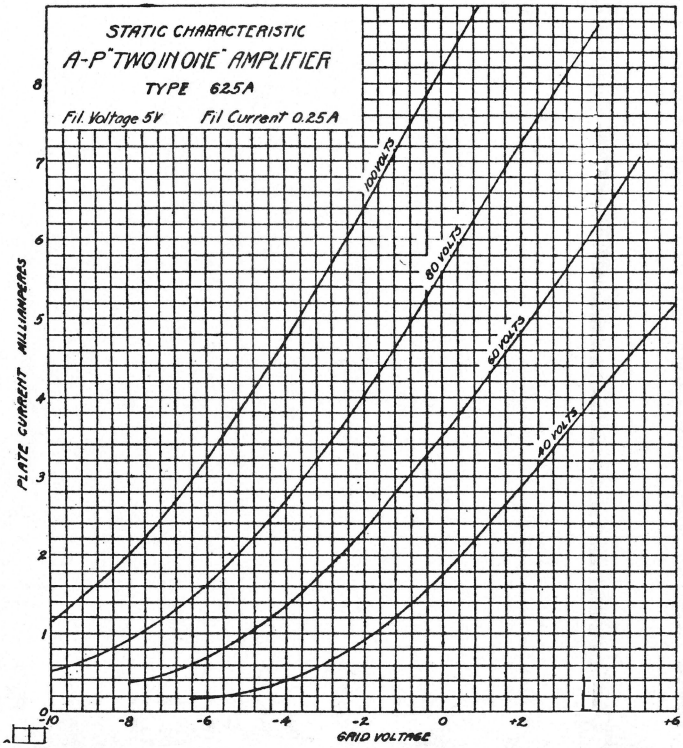


Fig.4.

The fine mesh net (grid) of A-P "Two-in-One" Tubes catches all the fish.

Fig. 5.



Charts shown on this page indicate graphically just how the new A-P "Two-in-One" Tubes perform. Test the new A-P "Two-in-One" Tubes in YOUR set. Watch your detector tube voltage and your tuning.

Characteristic curves of the new A-P "Two-in-One" 625-amplifying tube, showing performance on various "B" Battery voltages and how much "B" Battery current is consumed.

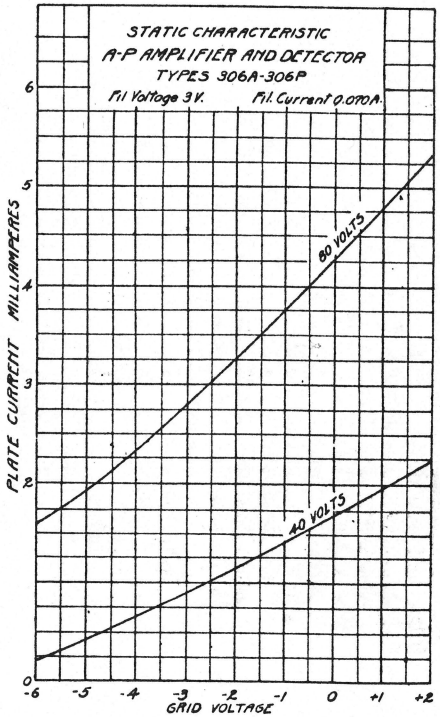


Fig. 6

The difference in sensitivity between the new A-P "Two-In-One" tube and other tubes may be compared to the natural ability of wild animals to "pick-up" a scent many times more quickly than a domesticated dog. (See Fig.8).

For best amplification a negative grid bias of "C" battery should be used when the plate voltage exceeds 45 volts. The grid return should be connected to the negative end of the filament or if the rheostat is connected in the negative "A" battery lead, the grid return should be connected direct to the negative side of the "A" battery.

The following grid bias voltages should be used:

Plate Voltage	Negative Grid Bias (C Battery)
45 volts	0
60 volts	1 to 2
75 volts	2 to 3
90 volts	3 to 4½
105 volts	4 to 6
120 volts	6 to 8

Unless the signal intensity is very high the adjustment of the negative grid bias is not so important, but if the signal intensity is very high an improper grid bias will be shown by distortion, causing an unnatural sound in music and speech.

Most important—**these tubes are amplifiers** and should not be used as detector tubes in any set. When so used this tube will **over-sensitize the set and make it microphonic.**

We recommend the new A-P 625-D tube for this purpose. No. 625-D is a gas contained tube and is very critical on A & B battery adjustments; and great care should be used in the selection of your Detector tube. If your set is not adaptable for fine adjustment on your detector tube use any other good, less sensitive detector tube in this position, in conjunction with the new A-P "Two-In-One" amplifiers. In hooking your detector tube to your "B" battery, be sure to adjust your detector voltage to get best reception and to prevent distortion.

Type 306-P tube (Peanut type) has a small base and is recommended where compactness is desired. Type 306-A has a standard base and a little larger bulb which eliminates the troublesome adapter and has the same operating characteristics as Type 306-P. Both can be operated on three ordinary dry cells, connected in series, i. e., the outside terminal of one battery connected to the center terminal of the next.

A rheostat of 30 ohms should be used when only one tube is used in circuit and a 10 ohm rheostat,

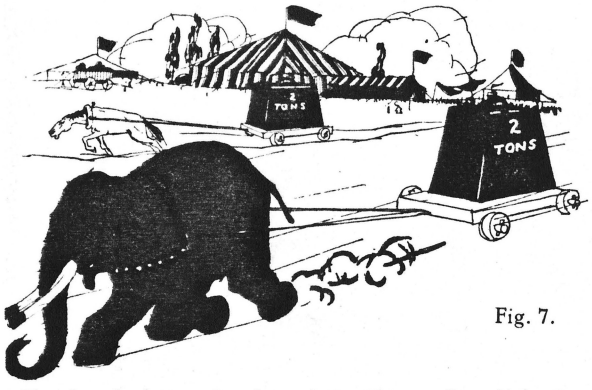


Fig. 7.

To the elephant of radio—A-P "Two-in-One Tubes" a load is moved with ease that would strain the horse.

Fig. 8.

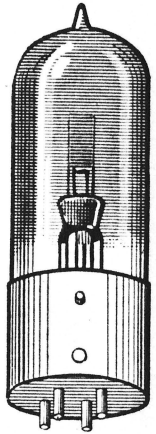
The old 'houn' dog is like a turtle, on the scent compared to an honest-to-goodness lion. So are A-P "Two-in-One" Tubes.

when three or more tubes are connected to the same rheostat. When used with three new dry cells the rheostat should be operated with the maximum resistance in the circuit. When operating with all the resistance cut out, the life of the tube will be materially shortened. Move the rheostat up accordingly as the dry cells become weak from constant use. Normal operation of the tube should be at three volts at the terminals of the tube. The normal operation of plate voltage should be from 45 to 90 volts. Greater voltages may be used, but they will materially shorten the life of the tube.

The negative grid bias required for the best operation of Type 306-A and 306-P tube is:

Plate Voltage	Negative Grid Bias
45 volts	1 to 2
60 volts	3 to 4
75 volts	4½
90 volts	6 or more
100 volts or more	

As a detector, Type 306 tube should have a grid return to the positive end of the filament. A grid leak of from 2 to 10 meghoms should be used for the higher voltages and weaker signals.



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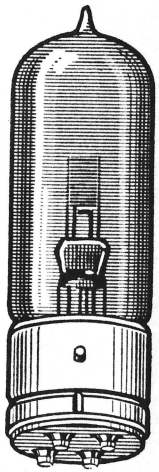

No. 306-P

Could anything be fairer than this?

After you have put them in set, if you believe that your A-P "Two-In-One" Tubes are defective, return them to your dealer. He will replace them without quibble or cost.

RADIO NEWS
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February 18, 1925

A-P Radio Laboratories
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San Francisco, California

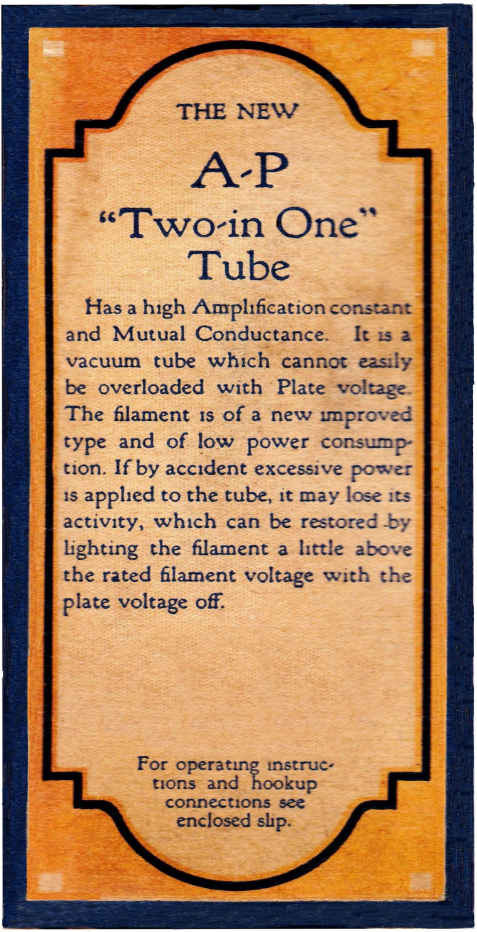
Gentlemen

We are pleased to inform you that the 2 in 1 A-P Tubes that you recently submitted for tests have met with our approval and a Certificate of Merit will be issued within a few days

The nine tubes submitted were very uniform as to their electrical characteristics and were accurate in rating The 2 in 1 feature is very good and should meet with favor among radio experimenters Although we have made no detailed electrical tests or life tests of these tubes, we find them fully up to standard as to efficiency and operation. We note that when used in a tuned radio frequency set, the circuit does not have as great a tendency to oscillate as when other tubes are used, indicating that the electrostatic capacity between grid and plate is less, which of course is a very good feature. In other words, we believe this tube ideal for tuned radio frequency amplifiers A short write-up describing it will appear in a coming issue of RADIO NEWS.

If you have any other radio instruments that you care to have tested, we shall be pleased to extend the further services of the LABORATORIES to you.

Very truly yours,
RADIO NEWS LABORATORIES



Patents Pending
A California Product